



## Collaborative validation of visual data through the Pl@ntNet identification system

Samuel Dufour-Kowalski, Jeremy Salinier, Aurelien Peronnet, Jennifer Carré,  
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# Collaborative validation of visual data through the Pl@ntNet identification system

S. Dufour-Kowalski, J. Salinier, A. Peronnet, J. Carré,  
J.-P. Milcent, H. Goëau, A. Joly, N. Boujemaa,  
P. Bonnet, J. Barbe, J.-F. Molino, D. Barthélémy



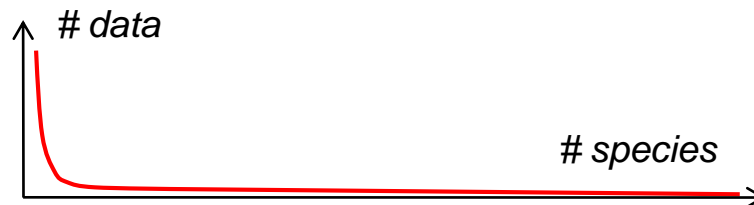
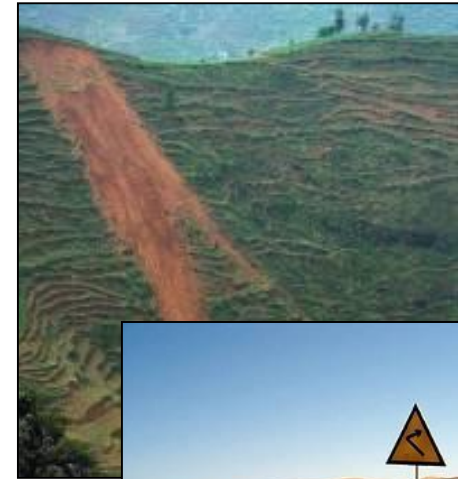
# Context & challenges

Accurate knowledge of **plants** (distribution and ecology) is essential for **sustainable agriculture** and **biodiversity conservation**

But accessing basic information about plants is still challenging

**Botanical data** is:

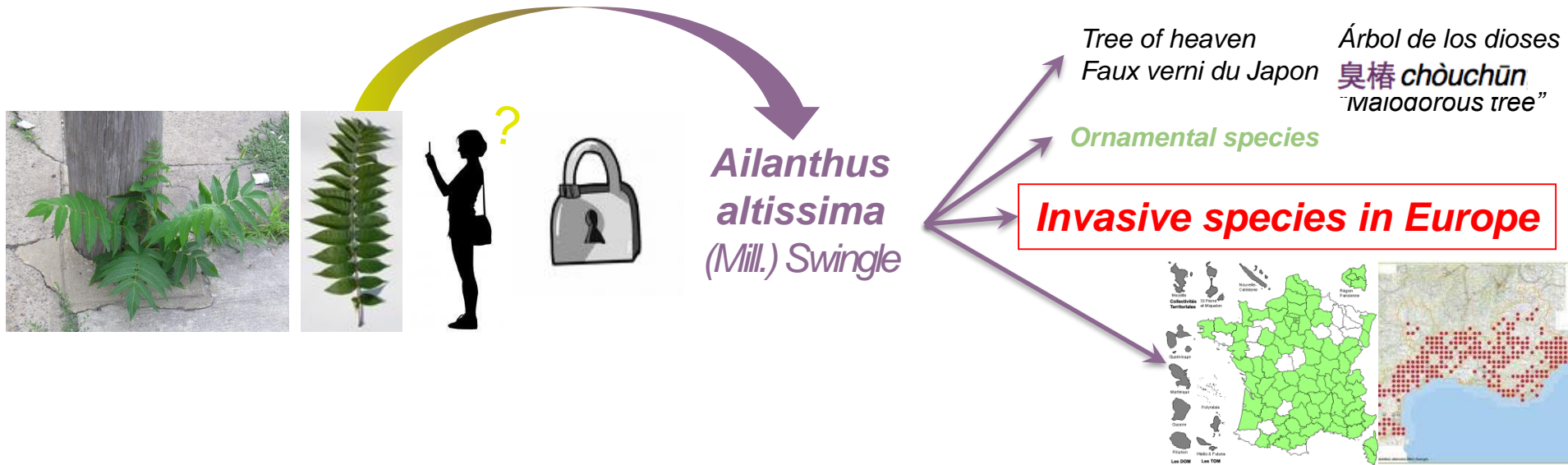
- ❖ *decentralized and heterogeneous*
- ❖ *complex* (un-structured tags, empirical measurements,...)
- ❖ *sparse and incomplete*
  - *huge & unknown number of species*
  - *"long tail distribution" (1 record per species !)*



# Towards bridging the taxonomic gap

Identifying and naming plants is a very difficult task

Plant names are the KEY to access and to enrich botanical information on plants



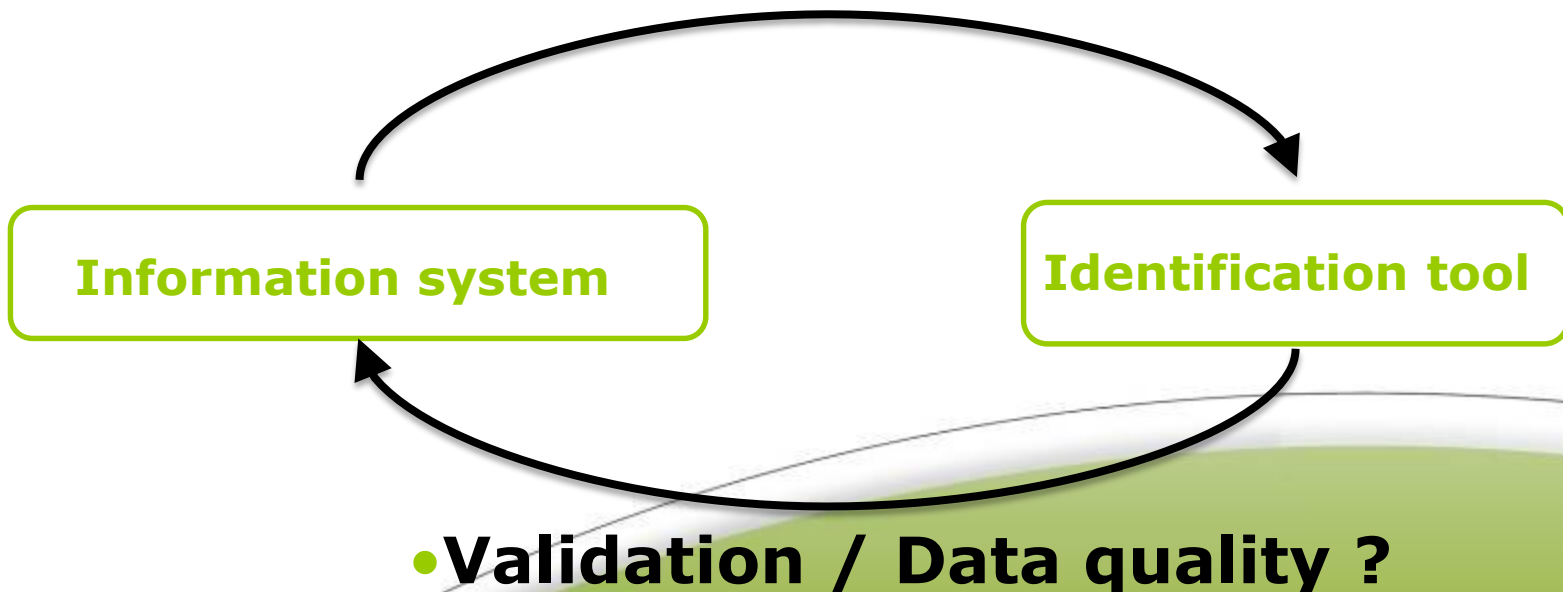
# Towards bridging the taxonomic gap

## Possible solutions

- ❖ **Collaborative Information Systems**  
Sharing and speeding up integration of raw data
- ❖ **Large audience Identification Tools**  
Multimedia image retrieval techniques ...

But ...

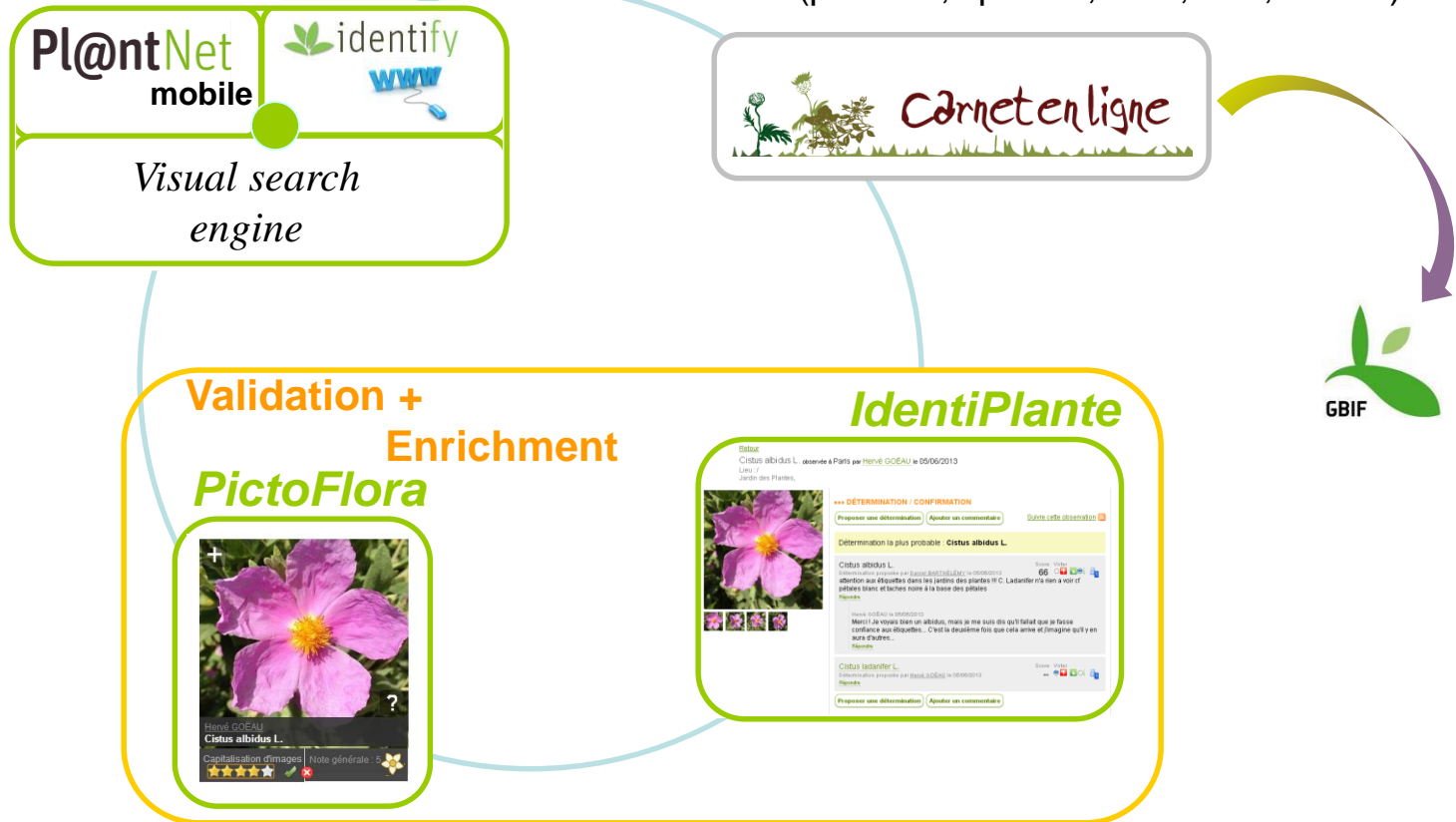
**Few, small, biased datasets**



# Pl@ntNet Workflow

- Image sharing and retrieval app for plant identification
- Shared observations (Creative Commons)

- o Botanical obs. management system (pictures, species, date, GIS, author)



- o **Collaborative images annotation system**

- Tags (flowers, leaves, etc.)
- Quality evaluation

- Joly & al., 2013. Ecological informatics.

- o Collaborative Identification

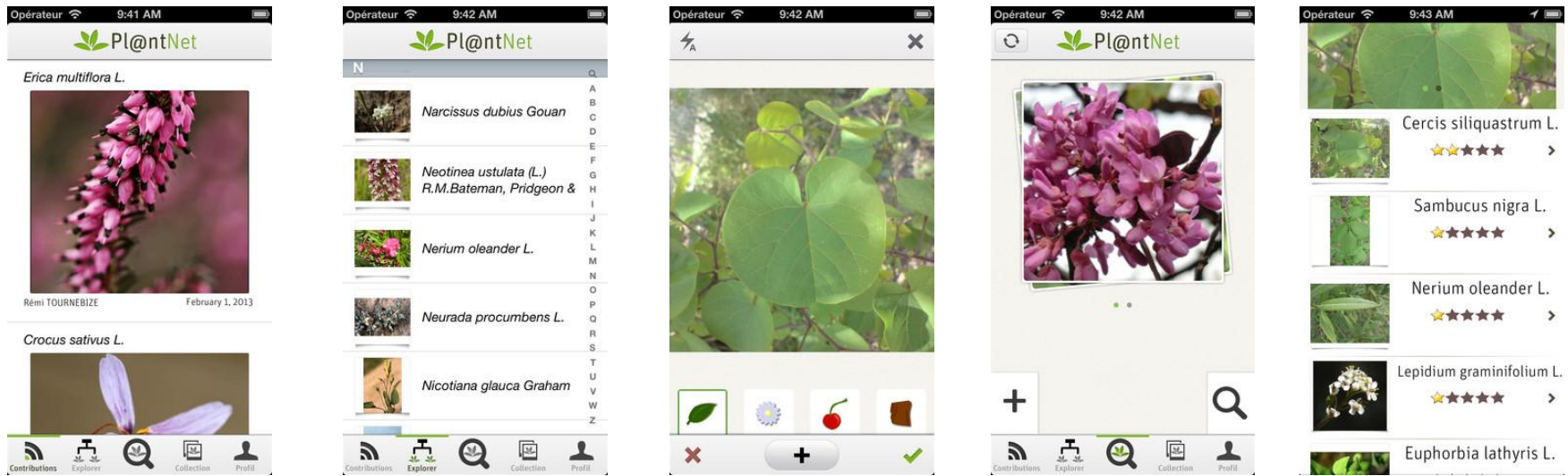
- Identification suggestion
- Identification vote
- Forum



# Pl@ntNet mobile app

iPhone

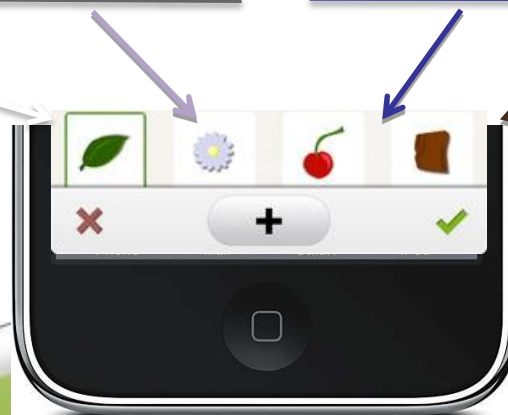
• Goëau & al., 2013. ACMM.



Public version

70 000 images

3 700 species



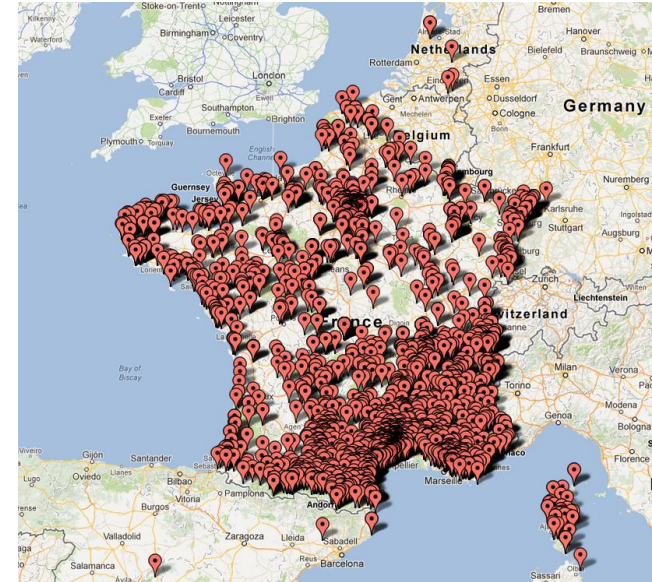
BETA

105 000 images

5 000 species

# Dataset based on social network of botanists

- ❖ 21 500 members
  - From amateur to expert botanists
- ❖ Hundreds of contributors with different skills
  - with their own scanners, cameras & Smartphone
- ❖ Thousands of individual botanical records
  - at different growing stage,
  - different periods of the year,
  - under different light conditions (raining, sunny, ...)

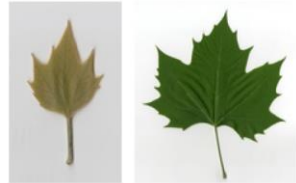


**A huge visual  
diversity to canalise**



# Pl@ntViews dataset

## Leaf diversity



Spring 2012 Summer 2010



Autumn 2011 Winter 2011

Leaf at different  
growing stage of  
*Platanus x  
hispanica* Mill ex.  
Münchh.  
(London plane)



Shooting  
conditions and  
used devices,  
*Acer  
platanoides* L.  
(Norway  
mapple)



Lobe number  
and deep of  
leaf lobes on  
*Ficus carica* L.  
(Common fig)

# Users =



# localities  
# seasons  
# environments  
# climate  
# ecosystems  
# devices



Leaflets  
number  
variability on  
*Fraxinus  
angustifolia*  
Vahl  
(Narrow-  
leafed Ash)

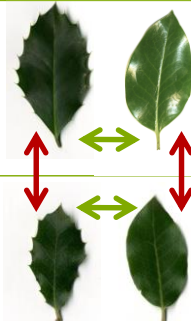


Autumnal  
variability of  
the lamina  
color on  
*Cotinus  
coggygria*  
Scop.  
(Eurasian  
smoketree)



Growing stage:  
two compound  
leaves from  
the same tree  
! *Gleditsia  
triacanthos* L.  
(Honey Locust)

*Ilex aquifolium* L.  
(European holly)



*Quercus ilex* L.  
(Holm oak)

Intra-species  
diversity  
versus  
visual similarities  
between species

# Pl@ntViews dataset

## *Flower diversity*



### COLOR



Brown

White

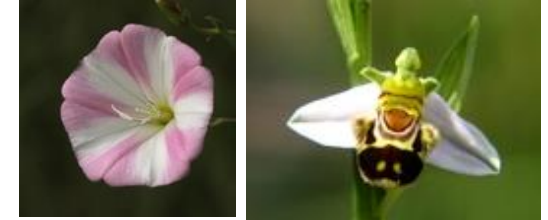
Green

Rose

Blue

Yellow

### Symmetry



Radial

Bilateral

### Structure



4

5

6

>>6

Number of petals

### Orientation



Face

Profil

### Size



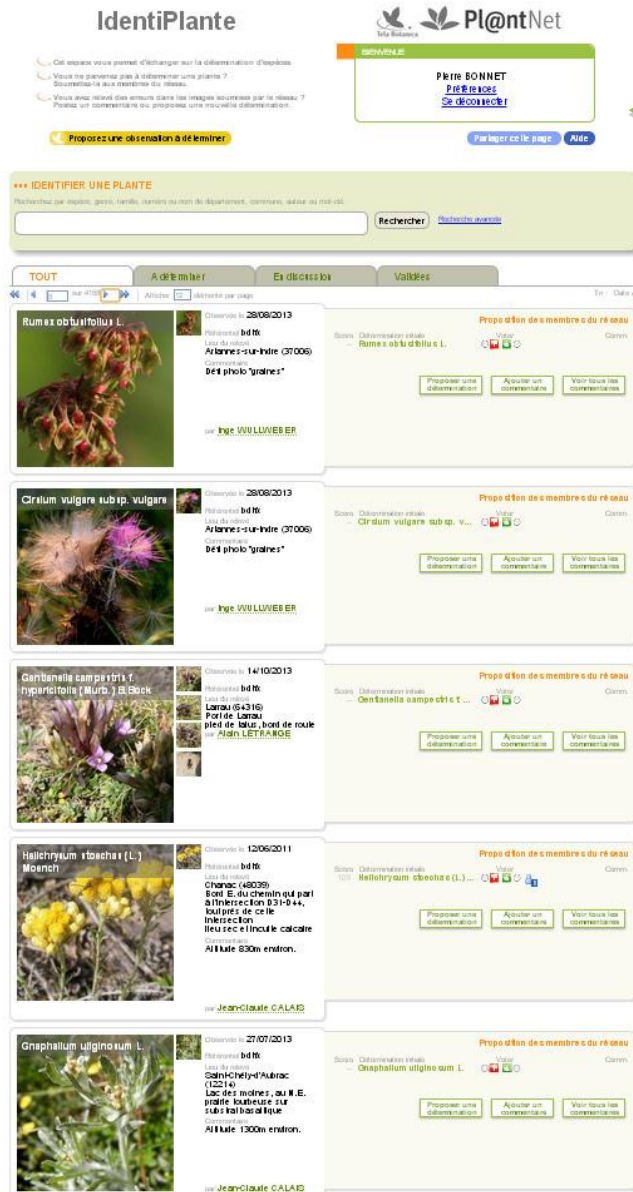
small

middle

big

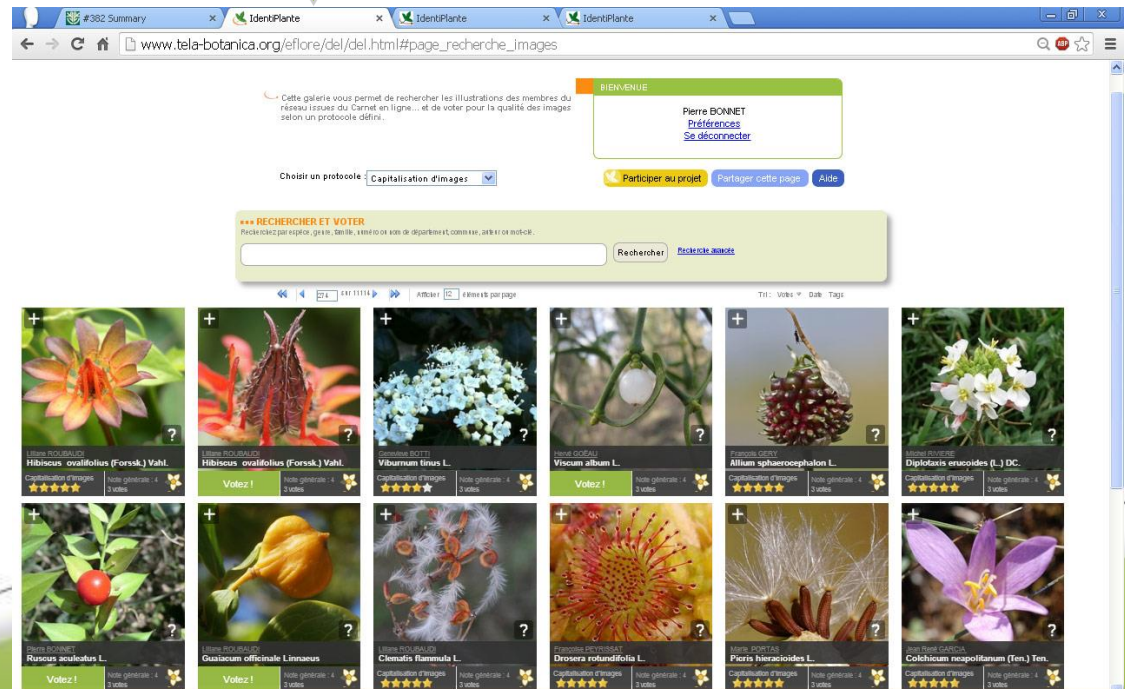


# A collaborative website for data validation and annotation



**IdentiPlante**  
Botanical records validation

**PictoFlora**  
Picture validation and annotation



# IdentiPlante, for Identification validation



**Web application**

Individual URL  
Users can search Botanical  
record

can be logged  
but not necessary

User can see  
any botanical record,  
from any contributors

**Botanical record** = Image(s) + Taxa name + Place + Date + Contributor name

National  
taxonomic  
indexes

National  
localities  
indexes

# IdentiPlante, for Identification validation

Retour

sureau référentiel bdtfx observée à Sailly-Flibeaucourt (80692) par Françoise CARLE le 17/07/2013

Lieu : / A16,

**Sorbus aucuparia L.** proposé par Bernard ANDRIEU le 07/05/2014

Votes Pour 71%		Votes Contre 29%	
David MERCIER	13/10/2013	Florent BECK	13/10/2013
Danièle DOMEYNE	14/10/2013	Charlotte POLLET	14/10/2013
Benot BOCK	14/10/2013		
jean-claude echartour	14/10/2013		
Et 1 votes anonymes			

1 Ces votes permettent de confirmer ou non une détermination proposée par un membre du réseau. Vous pouvez changer à tout moment votre vote à l'aide de ou .

Une pondération s'opère pour le calcul des votes : vote en tant que membre identifié (3 points) / non identifié (1 point).

**Sorbus domestica L.**  
Détermination proposée par Florent BECK le 13/10/2013  
On ne voit pas bien distinctement, cependant il me semble que la dentation des folioles ne descend pas jusqu'à leur base (ce qui devrait être le cas pour Sorbus aucuparia) mais s'arrête vers le tiers inférieur pour se terminer par une marge lisse, ce qui conduit à Sorbus domestica.

Charlotte POLLET le 14/10/2013  
Sorbus domestica n'a pas des fruits rouges mais plutôt jaunâtres/rosés et plus ovales. Pour moi il s'agit de sorbus aucuparia.

Proposer une détermination Ajouter un commentaire

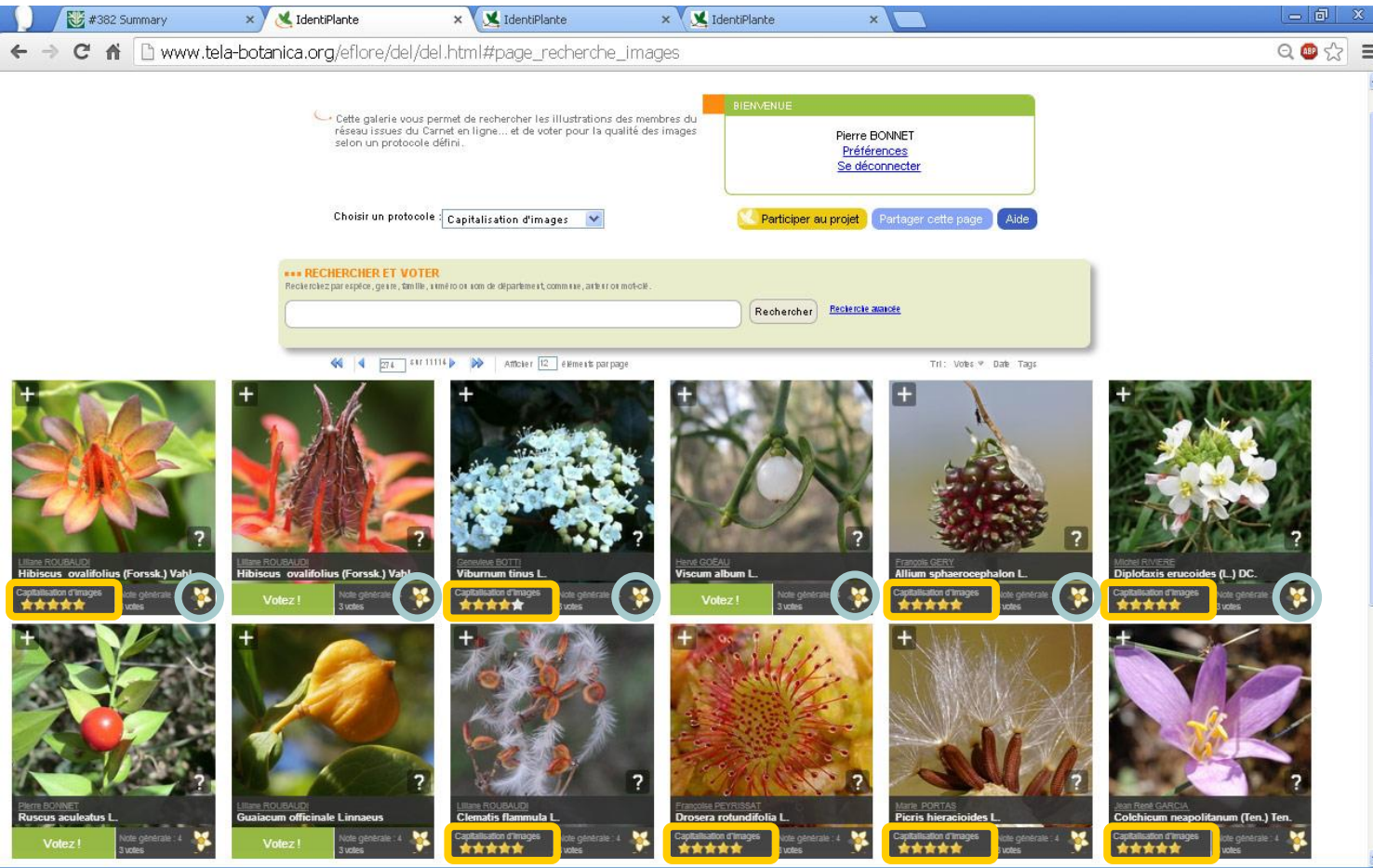
Community members  
Vote for any  
suggestion

Define the most  
probable species  
**Several suggestions**  
**Initial identification**  
by members of  
the social network  
**Suggestions**  
very anonymous  
Can be commented

... and then discussed



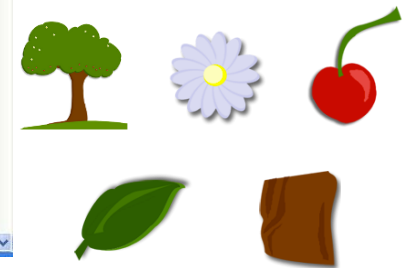
# PictoFlora, for Tags and image quality evaluation



User can see its  
**own votes**

Each picture can  
be tagged

According to  
Visual concepts  
of PI@ntNet  
Identification  
app



# Results

IdentiPlante

PictoFlora



The most probable species name :

- according to collaborative votes
- among the national species index

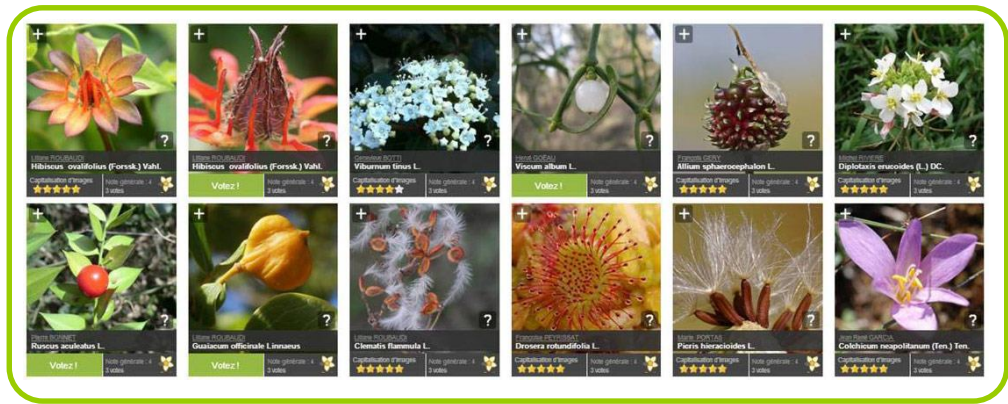
Pictures :

- With one tag only
- A mean of more than 3 stars

We don't use records with determination  
At the family or genus level

PI@ntView dataset

1100 users  
10500 votes  
7000 propositions  
900 Comments



850 users  
63 000 tags  
137 000 votes

70 000 images / 3 700 species

# Future directions

- ❖ Invest in user profile  
(for a specific region, or group of taxa)
- ❖ Use all the data according to their quality
- ❖ Use some automatic algorithm to tag data
- ❖ Use of meta data in the identification and the validation process (localisation and/or date).
- ❖ Apply this workflow on other botanical (or non botanical) datasets

# WWW.plantnet-project.org

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# Thank You !!!