FUTURE FOR OTB :
HOW WILL YOU USE OTB IN THE NEXT FEW YEARS ?

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OTB User Days – @Artilect TOULOUSE

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Back in the past : where does OTB come from ?

Image processing library : covers all needs in Remote Sensing

Funded and developed by CNES : State of the art algorithms / in the frame of the development of Pleiades satellites.

Open-Source : Apache V2.0

Maximum reach : for all kind of users, SIG, scientists… laptop to clusters computers

Software distribution : built upon major libraries

Success stories : a nice 15 years old story…

- Used at CNES, ESA (European Space Agency), mission exploitation platforms, remote sensing labs
- More than twenty training sessions around the world ☺
- OTB helped to improve the open-source codec for JP2 OpenJpeg
- Lots of algorithms from PhD, internships, etc. have been developed in OTB

- Big data capable
- Streaming / pipeline

- Applications : write it once, use everywhere
- => ~ 100 applications, tens of Remote Modules

- User community

Every day irritating tasks

Lots of libraries updates (> 15 main dependencies)

Continuous Integration (lots of different builds)

Installation/packaging issues

Dynamic user community… but lots of issues/bugs and not enough time to correct them !

What's prevent us to do more…

Lots of target platforms (Linux, Windows, Mac)
+ Conda, Docker
+ Linux distributions : (Debian, OSGeo Live, etc.)

Intrinsic code complexity (architecture, C++)

Many ways to use : command-line, GUI, Python, Monteverdi, QGIS

Remote-Module obsolescence…

(too ?) many applications

In the last years

Some processing chains are not based on OTB any more...

→ We need to understand **why users/developers use other softwares**

Brainstorming with the first OTB developers

- **Compatibility with Python environments**
- **Execution pipeline (streaming, etc.)**

→ **OTB became too big / too heavy / too complex to maintain**

User surveys (OTB user forum)

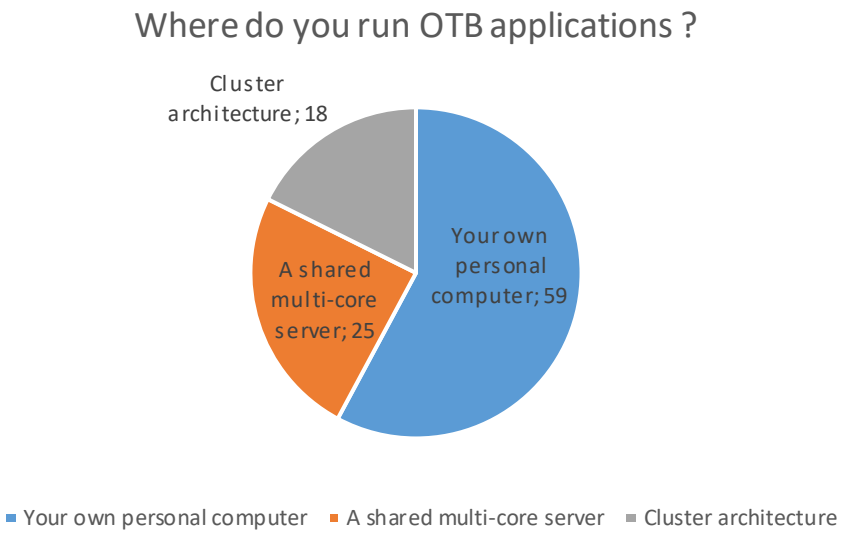
→ Try to clarify what is mainly used (OS, interfaces, applications, use case)

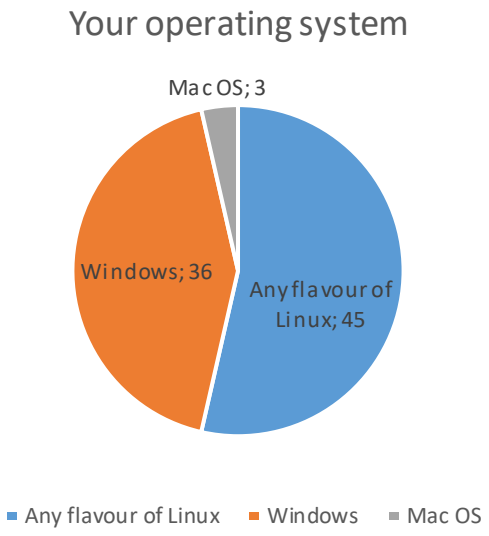
Software audit

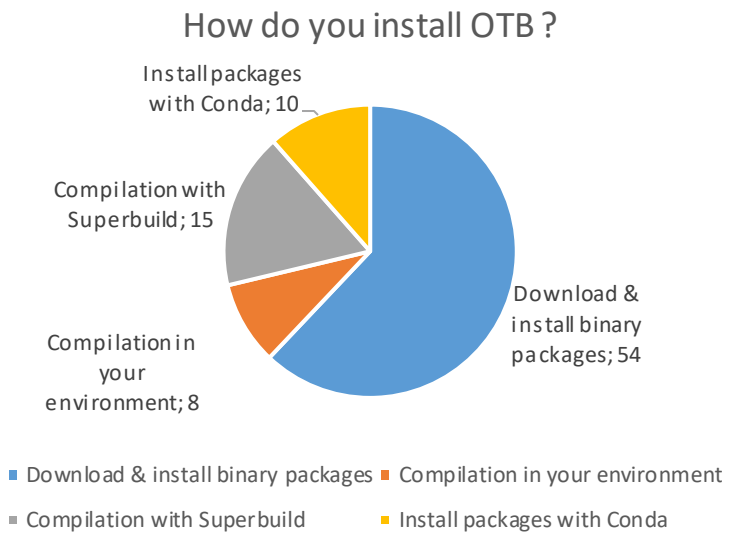
→ Challenge OTB, understand its weaknesses, imagine the future


Too Tall
Too Tall
Tall
Tall
Perfect
Perfect
Too Short
Too Short

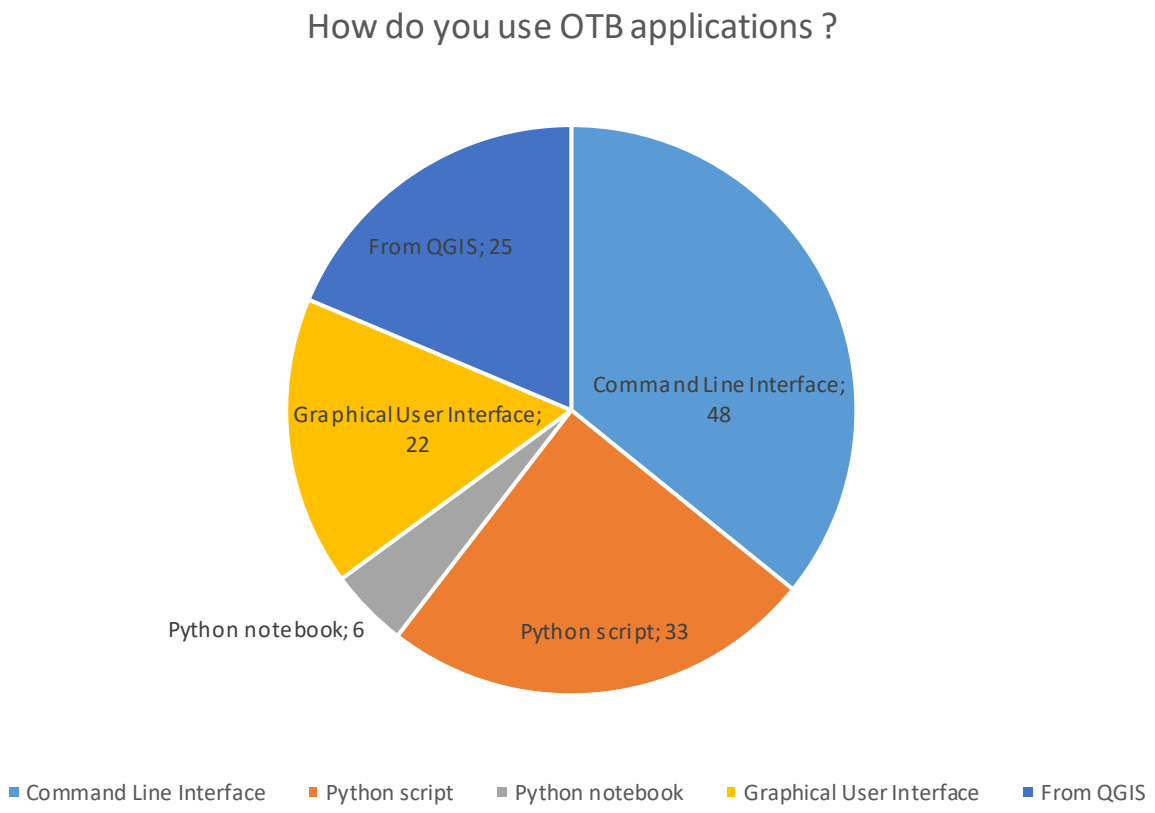
User survey (66 answers) : main tendencies

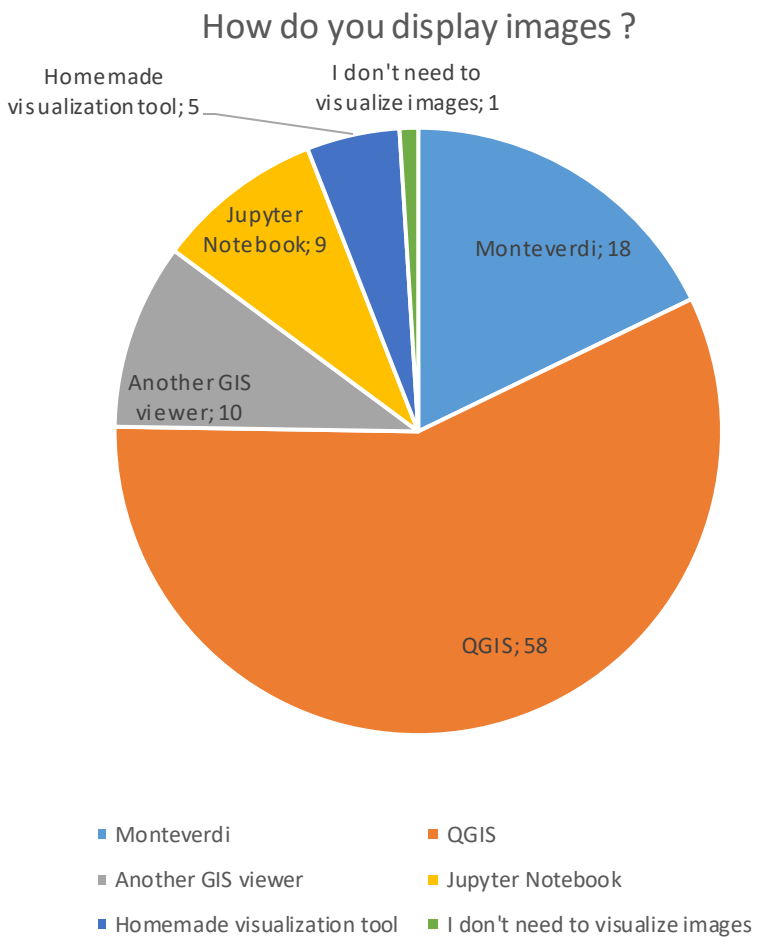




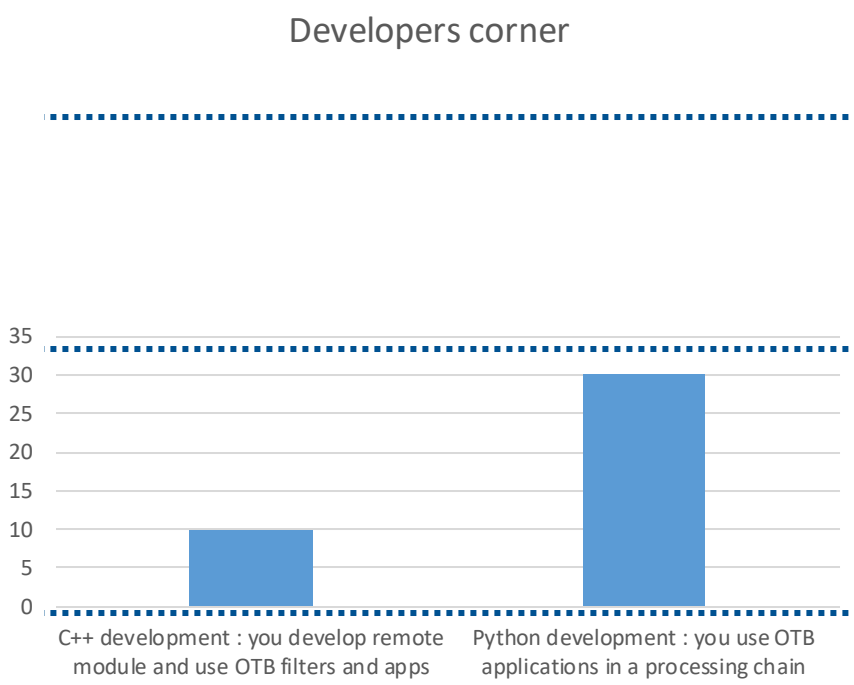


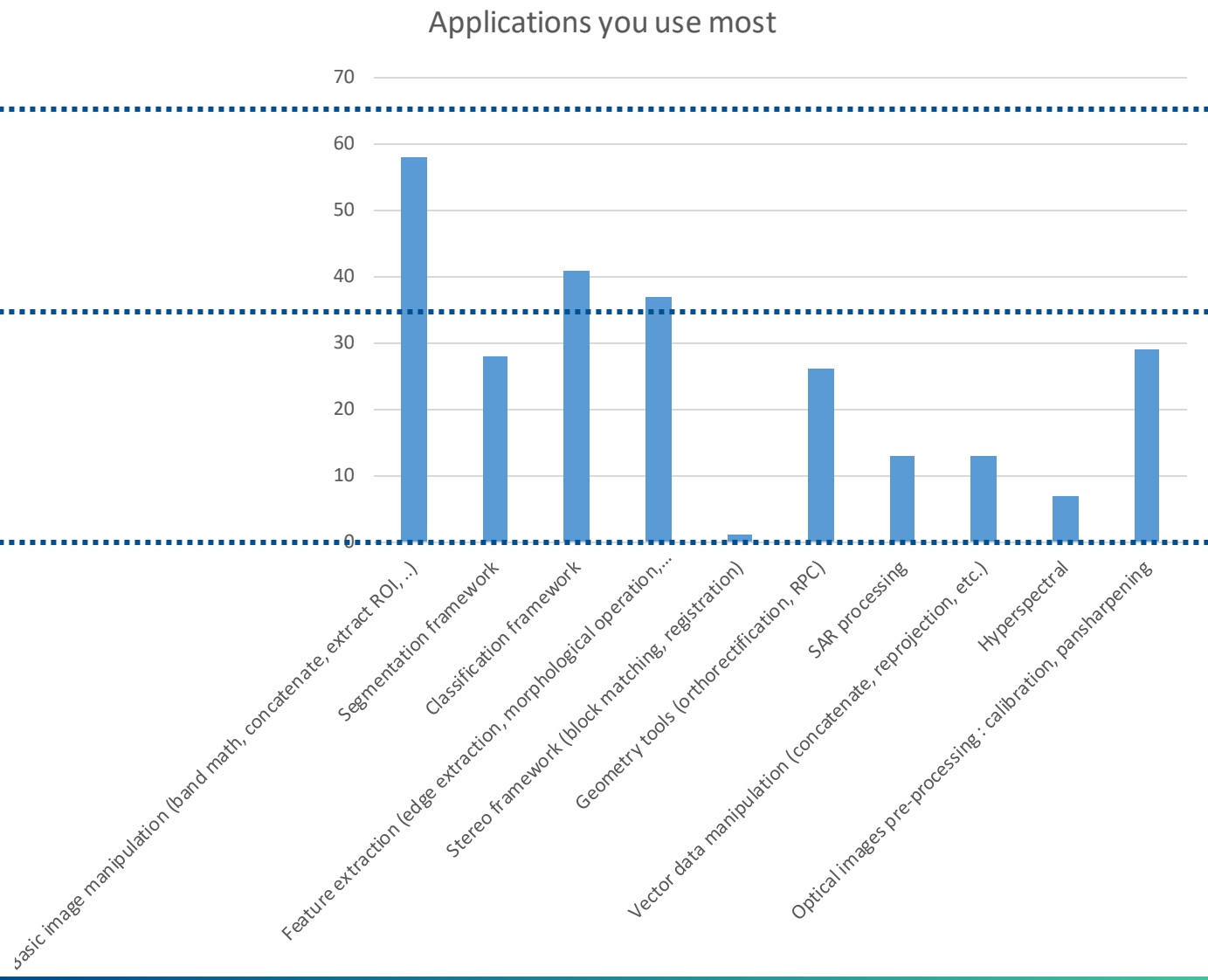
User survey


How do you use OTB applications ?
From QGIS; 25
Command Line Interface; 48
Graphical User Interface; 22
Python notebook; 6
Python script; 33
Command Line Interface
Python script
Python notebook
Graphical User Interface
From QGIS


How do you display images ?
Homemade visualization tool; 5
I don't need to visualize images; 1
Jupyter Notebook; 9
Monteverdi; 18
Another GIS viewer; 10
QGIS; 58
Monteverdi
QGIS
Another GIS viewer
Jupyter Notebook
Homemade visualization tool
I don't need to visualize images

User survey


Developers corner
35
30
25
20
15
10
5
0
C++ development : you develop remote module and use OTB filters and apps
Python development : you use OTB applications in a processing chain


Applications you use most
70
60
50
40
30
20
10
0
Basic image manipulation (band math, concatenate, extract ROI,..)
Segmentation framework
Classification framework
Feature extraction (edge extraction, morphological operation,...
Stereo framework (block matching, registration)
Geometry tools (orthorectification, RPC)
SAR processing
Vector data manipulation (concatenate, reprojection, etc.)
Hyperspectral
Optical images pre-processing : calibration, pansharpening

Use cases (1/3)

Sparse images
Some basic treatments / use of the classification / segmentation framework

Laptop
Few satellite images

- ☑ Fonctions de base / frameworks segmentation & classification
- ☑ Binary packages installation
- ☑ QGIS

Use case (2/3)

« I develop / maintain a processing chain based on OTB »

Server
Heavy images processing

☑ Lots of base functions … plus some specific functions in OTB

☒ Software updates

Use cases (3/3)

« I want to use OTB in an existing Python processing chain »

Big server, cloud computing, etc.

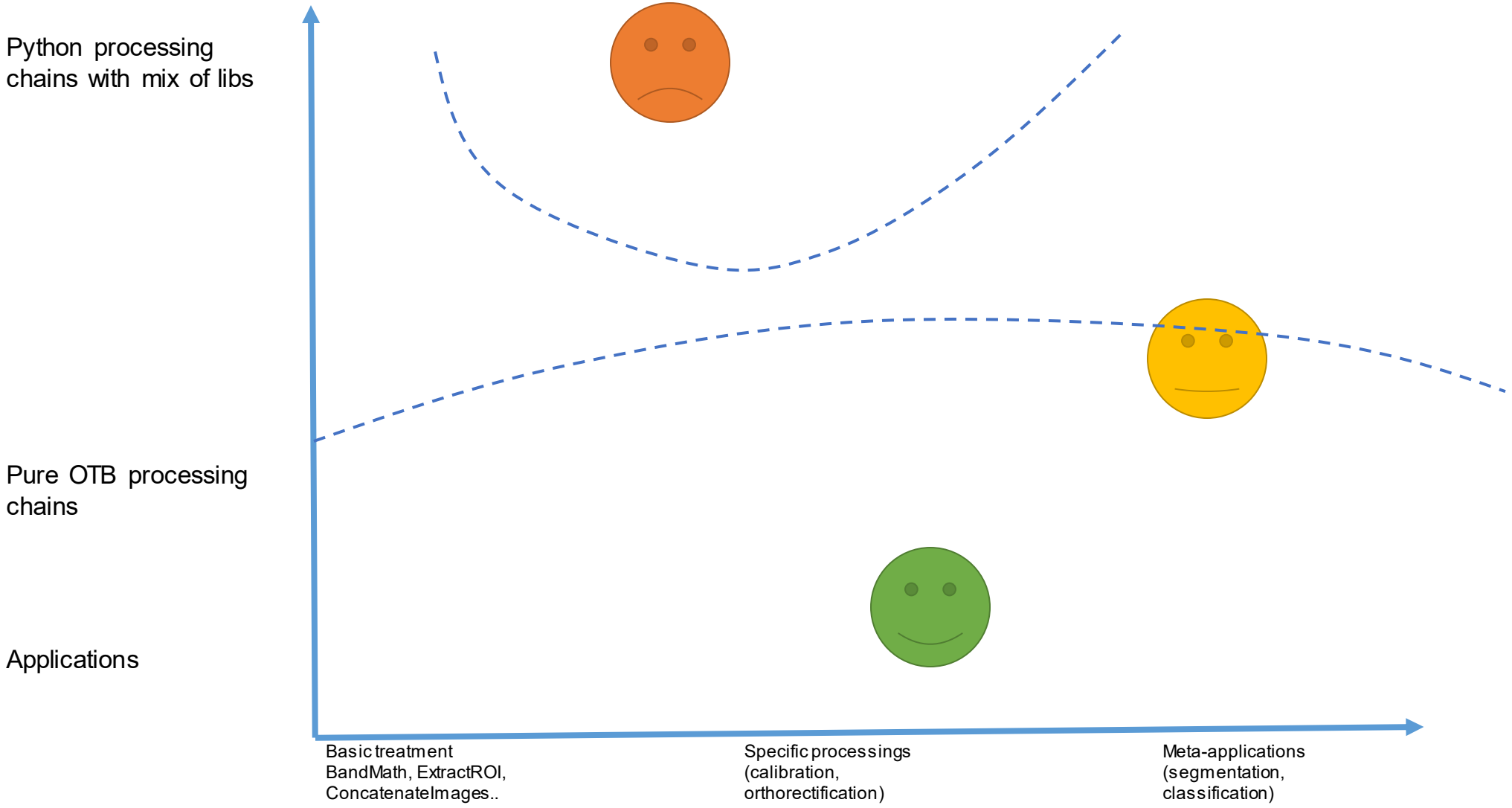
Big data

☑ Only a few specific functions

☒ Hard to install in a Python environment

☒ Hard to use with other Python libs (rasterio, xarray, etc.)

User satisfation / use cases



A few conclusions from the survey

No need to maintain as many platforms (Linux / Windows … very few mac users)

Binary packages / conda packages ... Few compilations from scratch

QGIS gain many users : QGIS interfaces can replace OTB gui

Drop Monteverdi

Python : favourite environment for developers

Applications : core OTB to identify (some low level applications, specific preprocessing applications, SAR applications)

Software audit : new ways to make data science

Jupyter notebooks / Jupyter hub virtual envs

Pip install

Lots of Python libs : gdal, numpy, sk-learn, scipy, (geo)pandas, etc.

New ways to deal with execution pipeline (dask..)

(….)

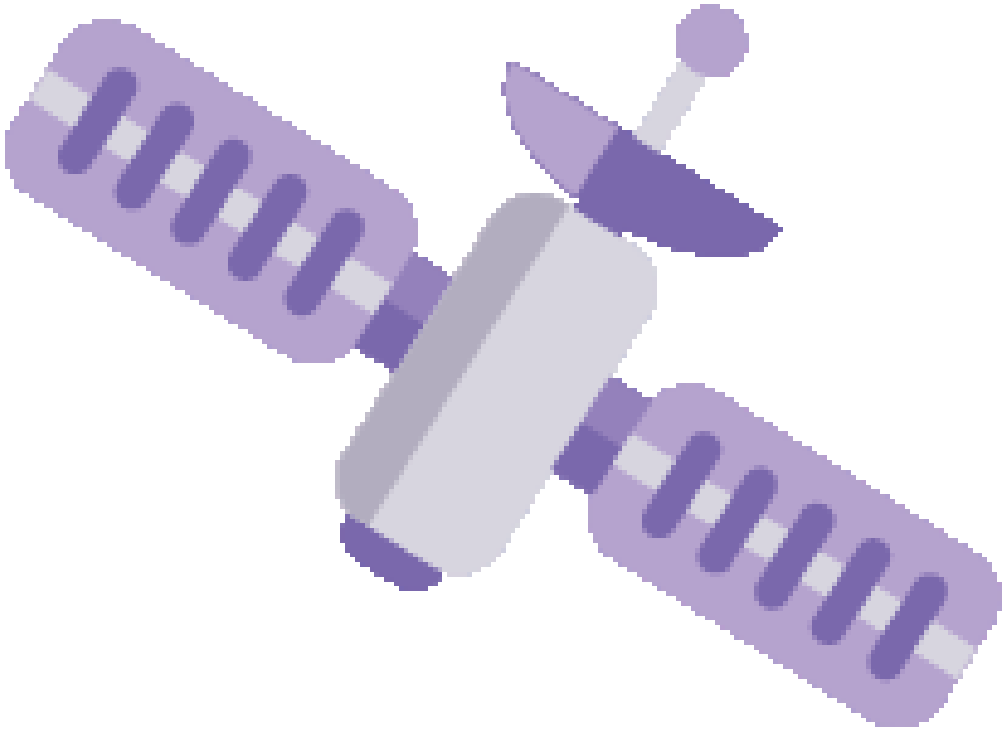
But a lot of tasks to tackle (satellite images reading, preprocessings, metadata, image registration / re-sampling, geometry/projection….)

Le “Why” de l’OTB

Nous v ous proposons...

“Être la référence dans le traitement avancé d’images satellites”

Le NumPy de l’image sat ellite



There is a better way

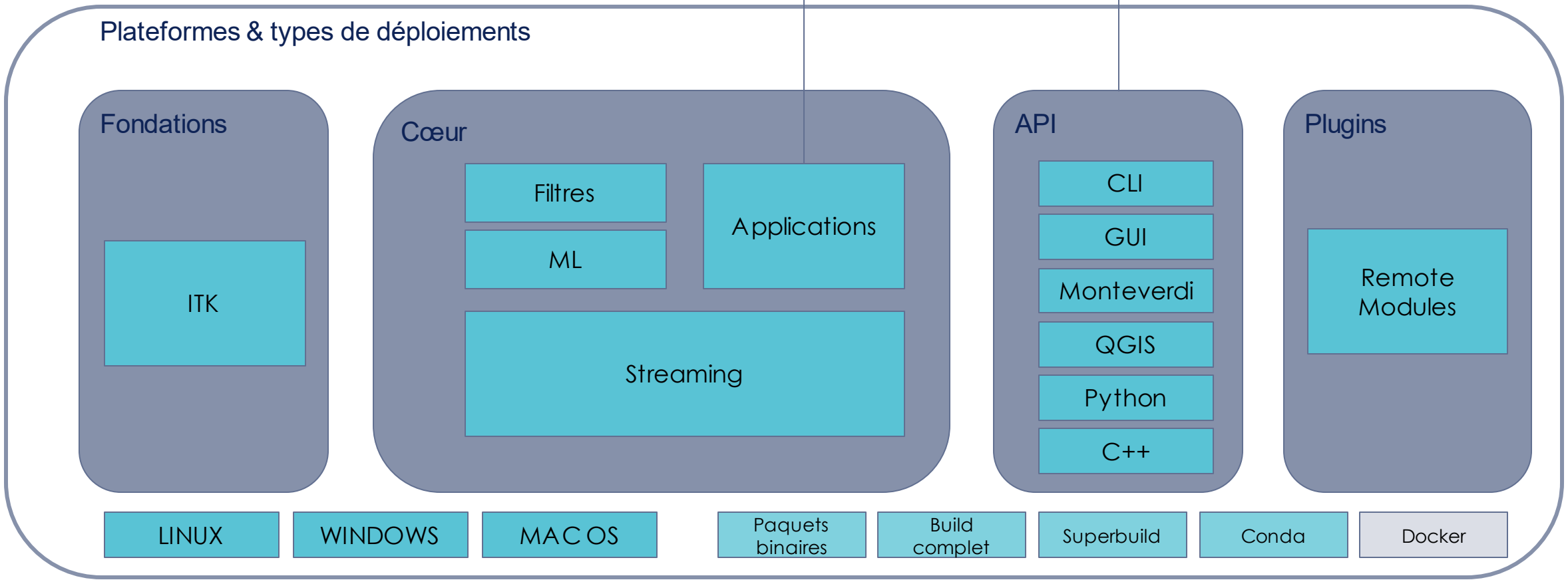
Schéma de l'OTB actuel

Thématiques couvertes

- Pré-traitements imagerie optique (ortho, calibration)
- Filtres d'extraction de features
- Machine learning (classification pixellique, OBIA)
- Segmentation
- Traitements SAR
- Processing hyperspectral
- Détection de changements

Profils utilisateurs

- Utilisateur Python / scientifique
  - Traitement batch
  - Laptop > Serveur
  - Python
- Étude occasionnelle
  - Traitement 1 à quelques images
  - Laptop
  - QGIS
- Chaîne de traitement télédétection
  - Traitement images massif
  - Serveur > Cluster
  - C++ / Python



Go toward an OTB « LTS »

OTB LTS :

- **Lightest**
- **« Pip installable » → what kind of installation process ?**
- **Concentrate on a few OS**
- **Less interfaces, but more pythonic**

- **OTB « core » :**
  - Preprocessing (calibration, orthorectification, re-sampling, etc.)
  - Main basic apps
  - SAR processing : specific to OTB / several processing chains
  - Segmentation / Machine learning / … → remote modules ?
- **Drop Monteverdi, QT GUI (replace by QGIS plugin)**