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Robust and Reliable WPS for climate simulations – nothing clever, just test, test, test!

Ag Stephens (STFC CEDA) – 02/12/2019

IS-ENES3 ESGF Virtual Workshop on Compute and Analytics

Centre for Environmental Data Analysis
SCIENCE AND TECHNOLOGY FACILITIES COUNCIL
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Experience of WPS – the operations

1. It is easy to put up a processing web service that works with *some* data.

2. Scientists are cautious about using processing services. Why?
   - Transparency
   - Robustness
   - Trust

3. Complex operations are hard to validate.

Experience of WPS – the community

1. Unlike other parts of ESGF (e.g. Data/Index nodes), we have entertained divergent solutions. What is the impact?

2. There is a finite resource for development and maintenance (globally). It would be great if we could converge on a single solution.

Experience of WPS – the code

1. Each codebase starts off looking very tidy.

2. The data (e.g. CMIP5) is *dirty*: in spite of CMOR, it is actually heterogeneous.

3. The codebase tends towards complexity:
   - If model == XYZ: fix the time axis
   - If variable == ABC: fix the units
   - Etc, etc…

Proposed solution

1. Python codebase, build on PyWPS, Birdhouse, Xarray and any existing libraries/tools.

2. Begin with basic operations:
   - Subsetting, Averaging and (some) regridding.

3. Focus on *robustness*, not *functionality*.

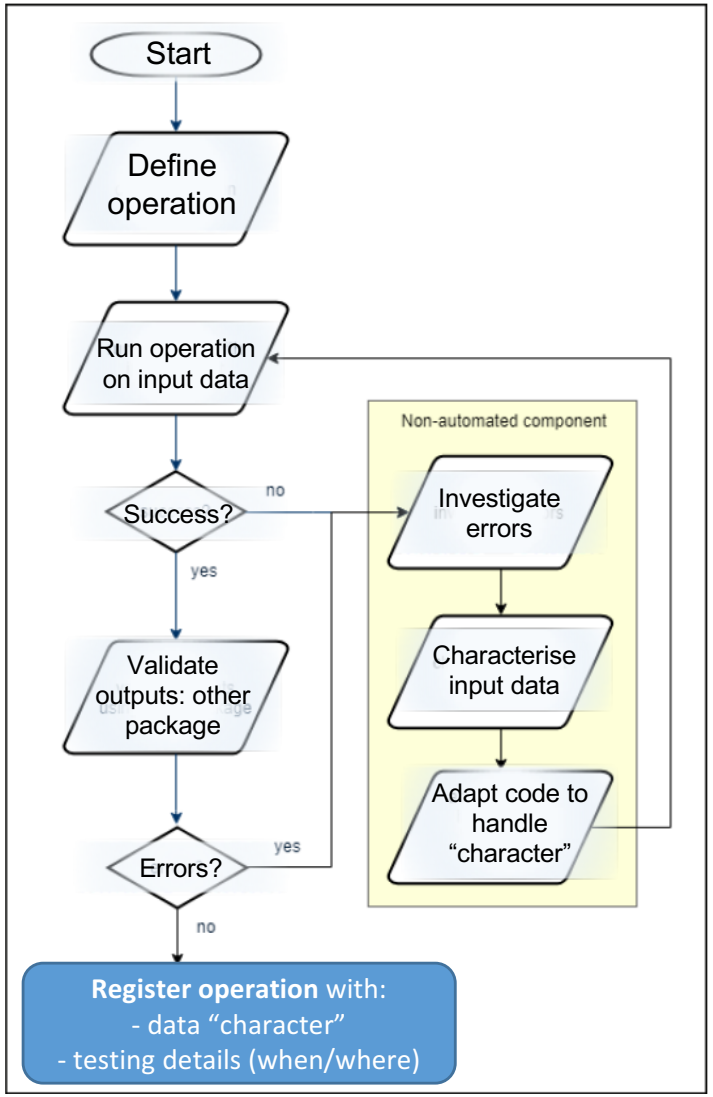
Focus on robustness, how?

For each project/activity (e.g. CMIP5, CORDEX):

- Test *all* operations against a large, representative sample of the available data.
- Validate the outputs in a comprehensive way.
- Most importantly, “characterise” the data sets in a public register.

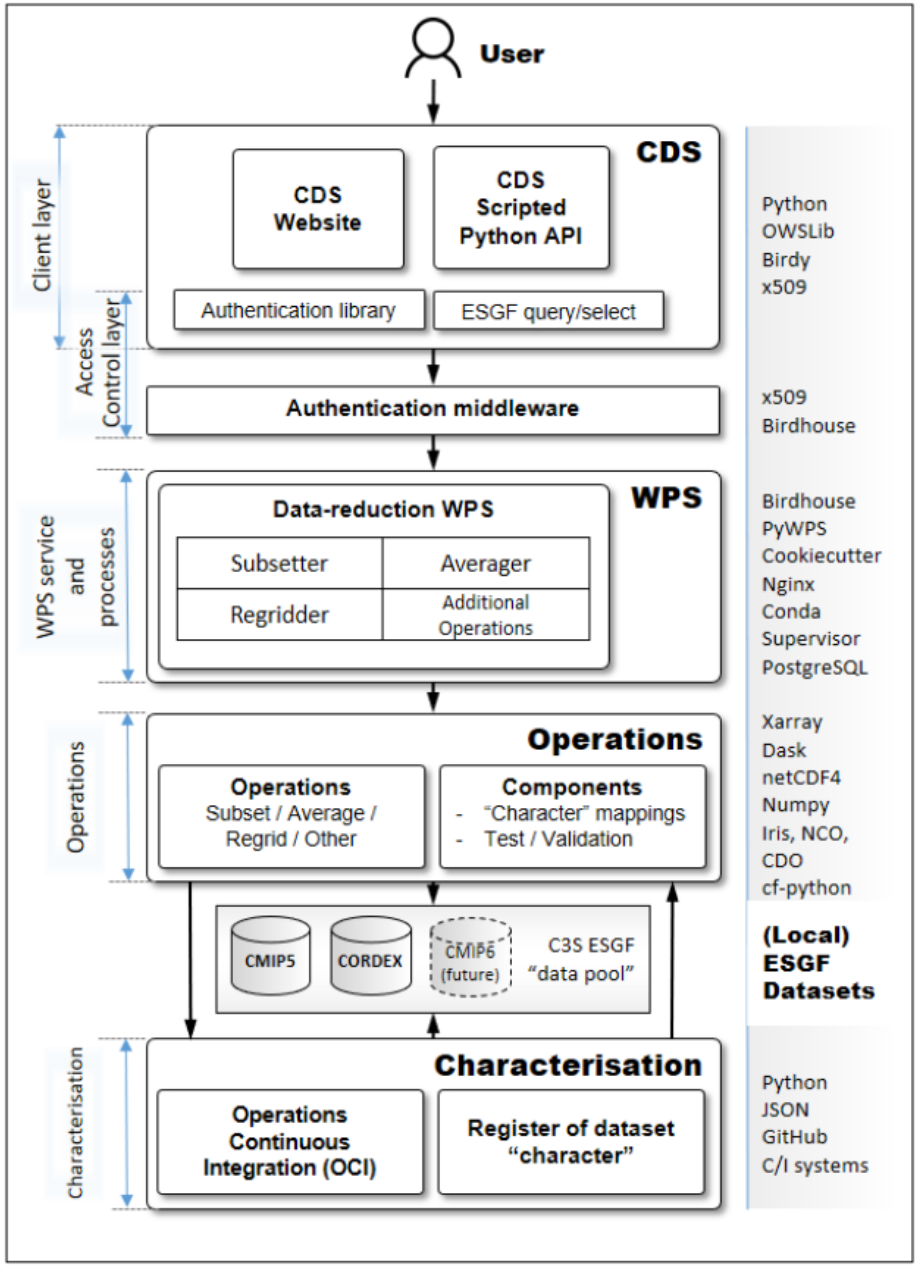
Characterise the data?

- Record the variations in “character” in a public register.
- Code for each character is agnostic/reusable.
- Keeps the code clean.
- Register can be shared across the community (scientists and developers).

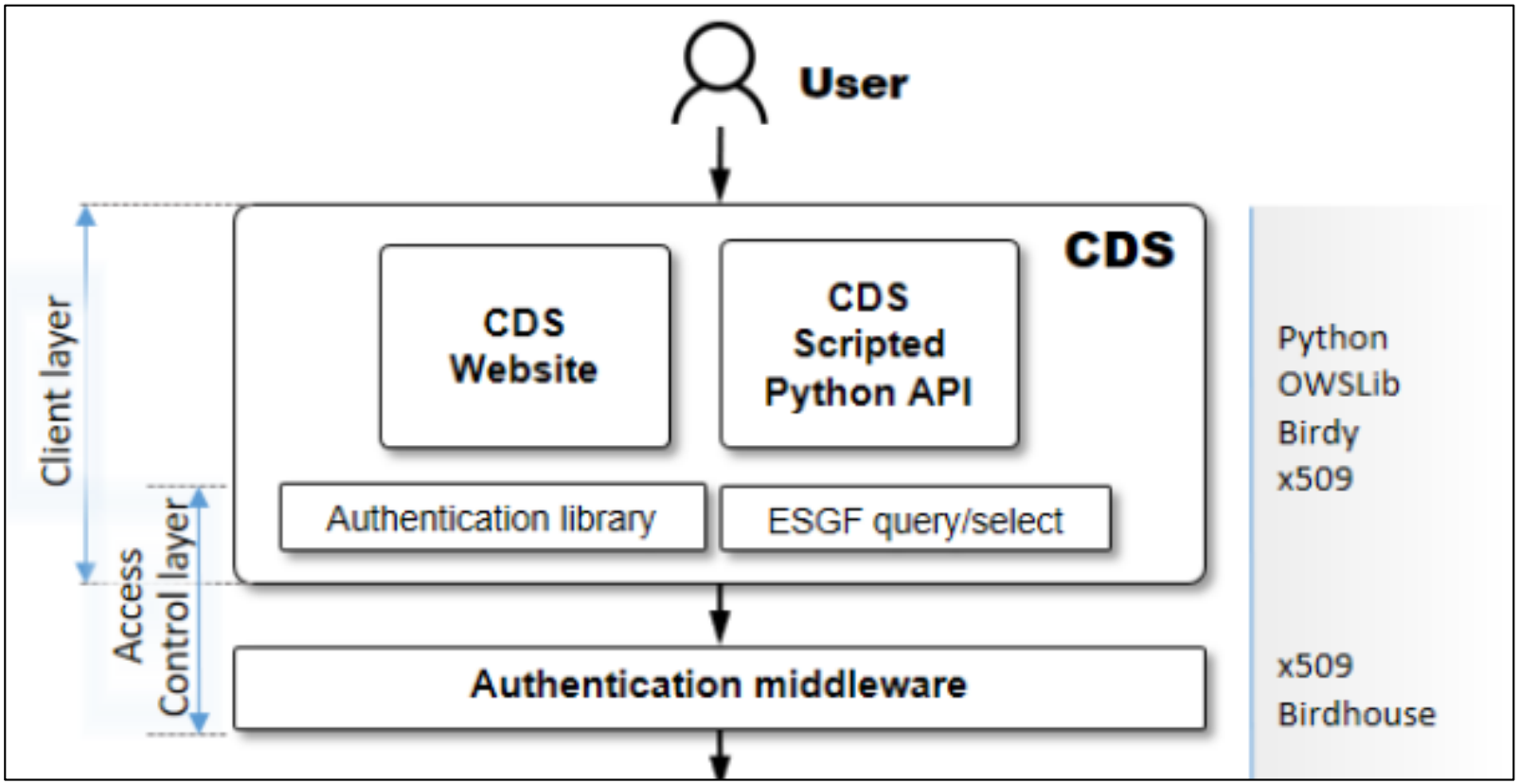


C3S Proposal

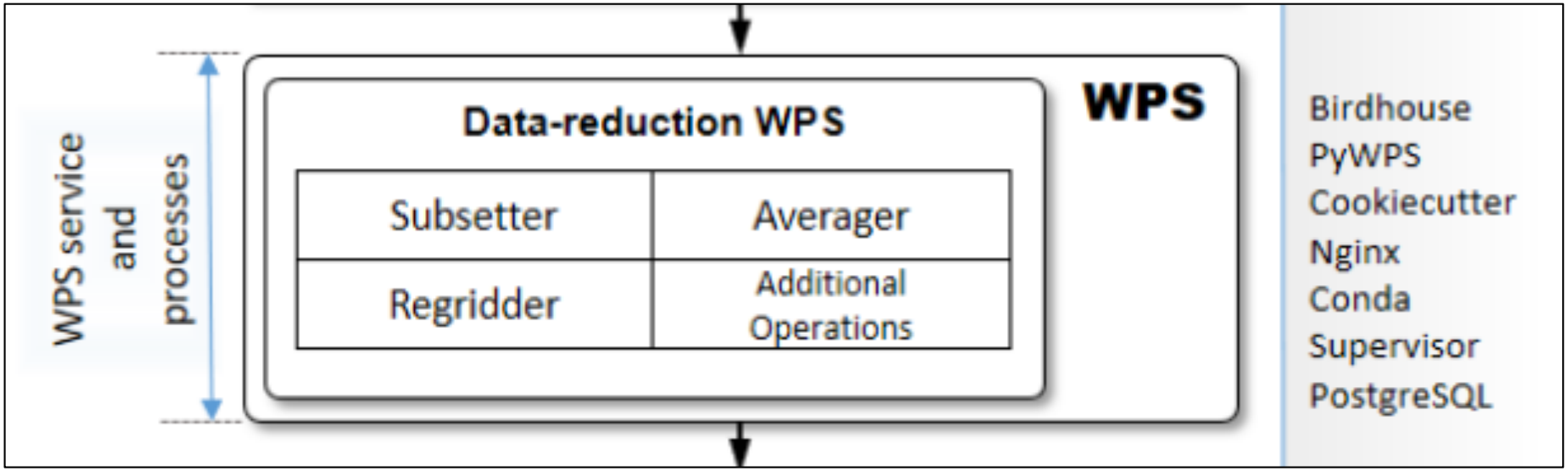
- STFC CEDA / DKRZ
- Input from Ouranos/CRIM (Canada)
- Layered approach



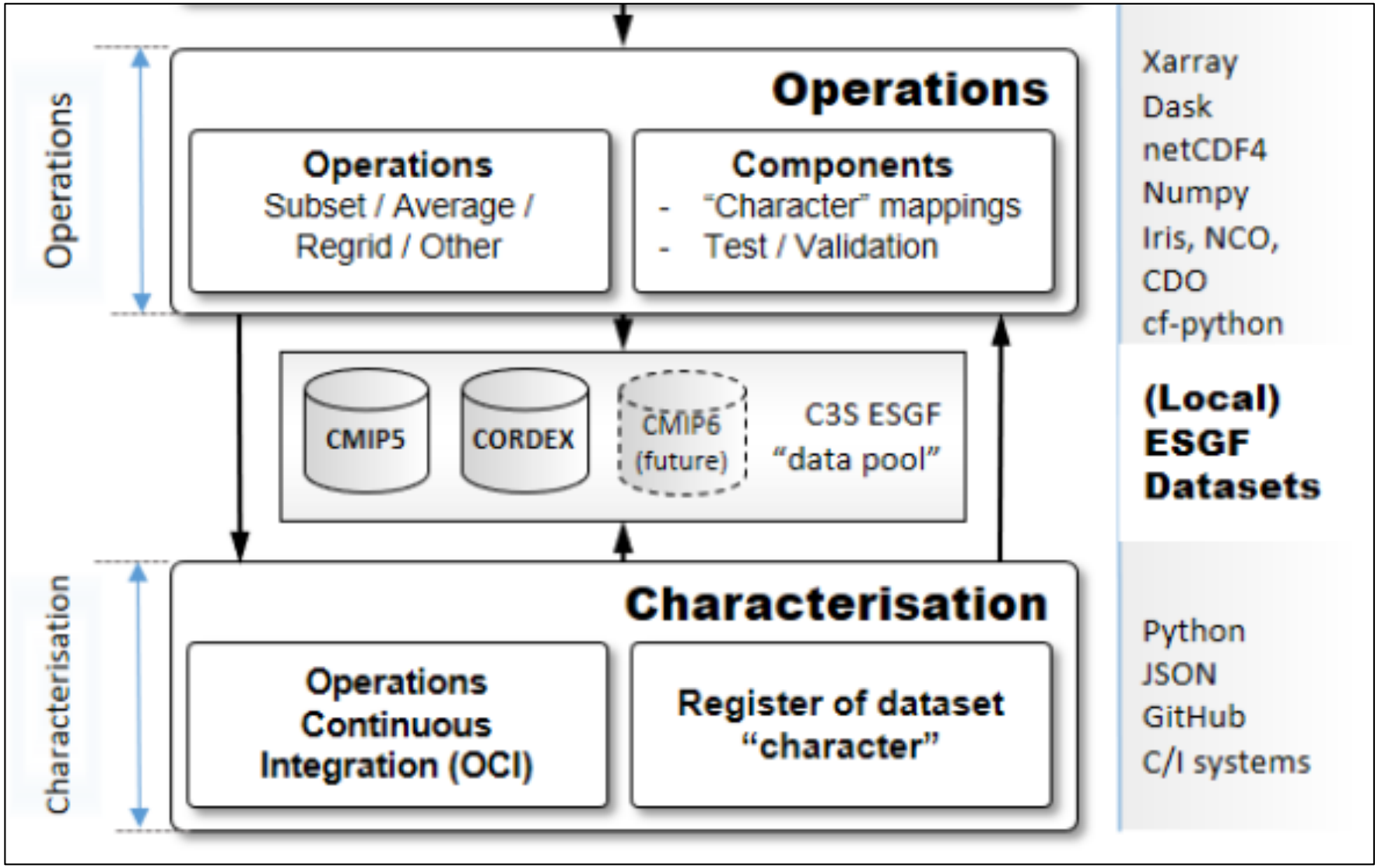
Client Layer



WPS Layer


WPS service and processes
Data-reduction WPS
Subsetter
Averager
Regridder
Additional Operations
WPS
Birdhouse
PyWPS
Cookiecutter
Nginx
Conda
Supervisor
PostgreSQL

Operations and Characterisation Interactions



Next steps

- Project funded (I hope).
- By mid-2020:
  - Design and initial implementation
- By end of 2020:
  - Subsetting and averaging processes deployed
- By mid-2021:
  - Regridding and additional processes deployed

Your thoughts/input?

- Do you disagree with this rationale/approach?
- Would you like to collaborate on any aspects?
- What should the “characterisation” register look like?

Thanks for listening