



WIR SCHAFFEN WISSEN – HEUTE FÜR MORGEN

Chris Mutel :: Paul Scherrer Institut

Ocelot: Open source linking software for system models in LCA

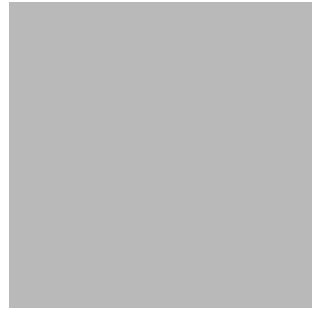
Ecobalance 2016, 4 October 2016

Creation of unlinked datasets

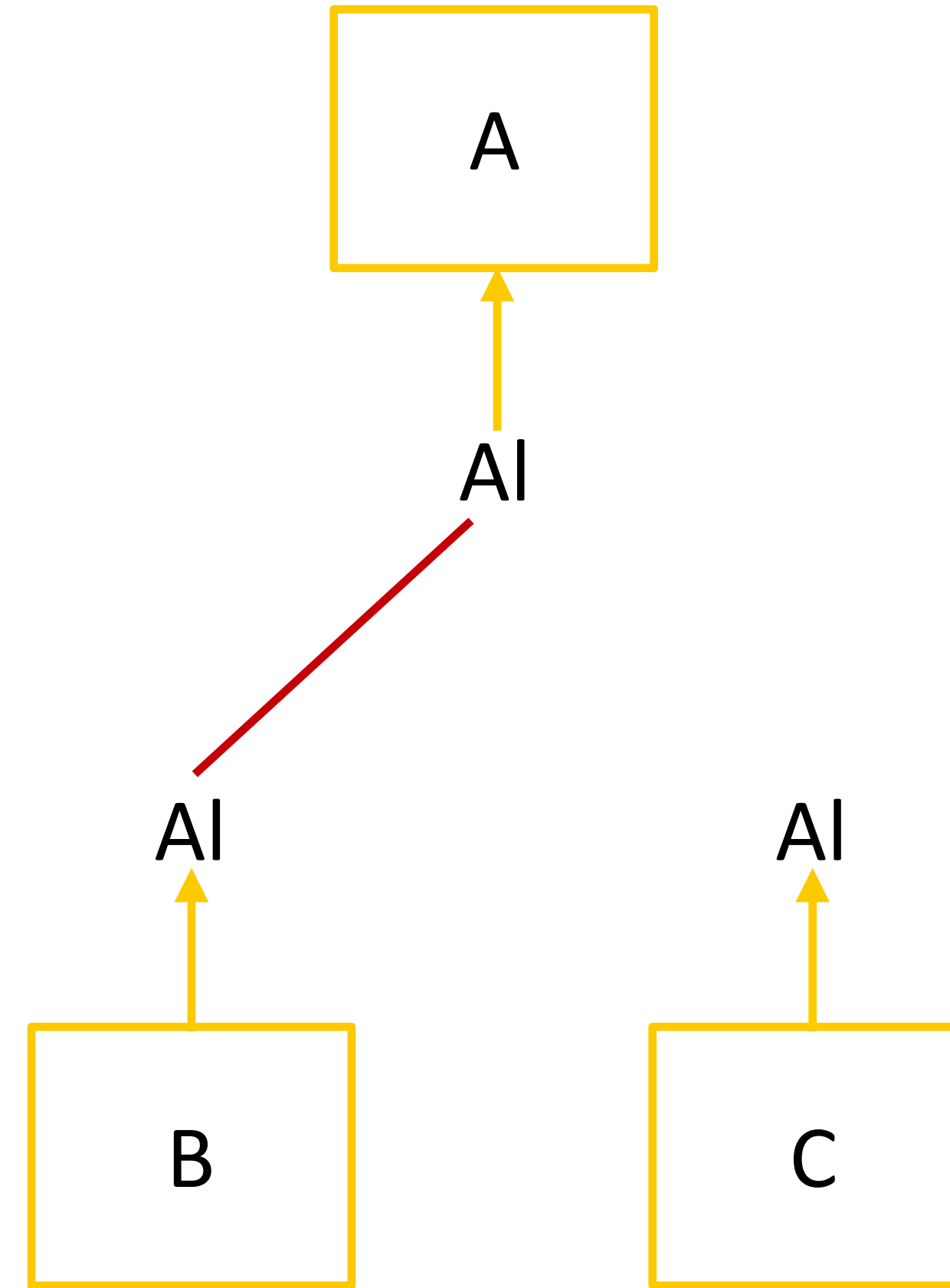


- Choices about what is an activity
- Positive and negative flows
 - Both technosphere and biosphere
 - Metadata about flows
- Choices about data
- Independent
 - Consistent names

System models

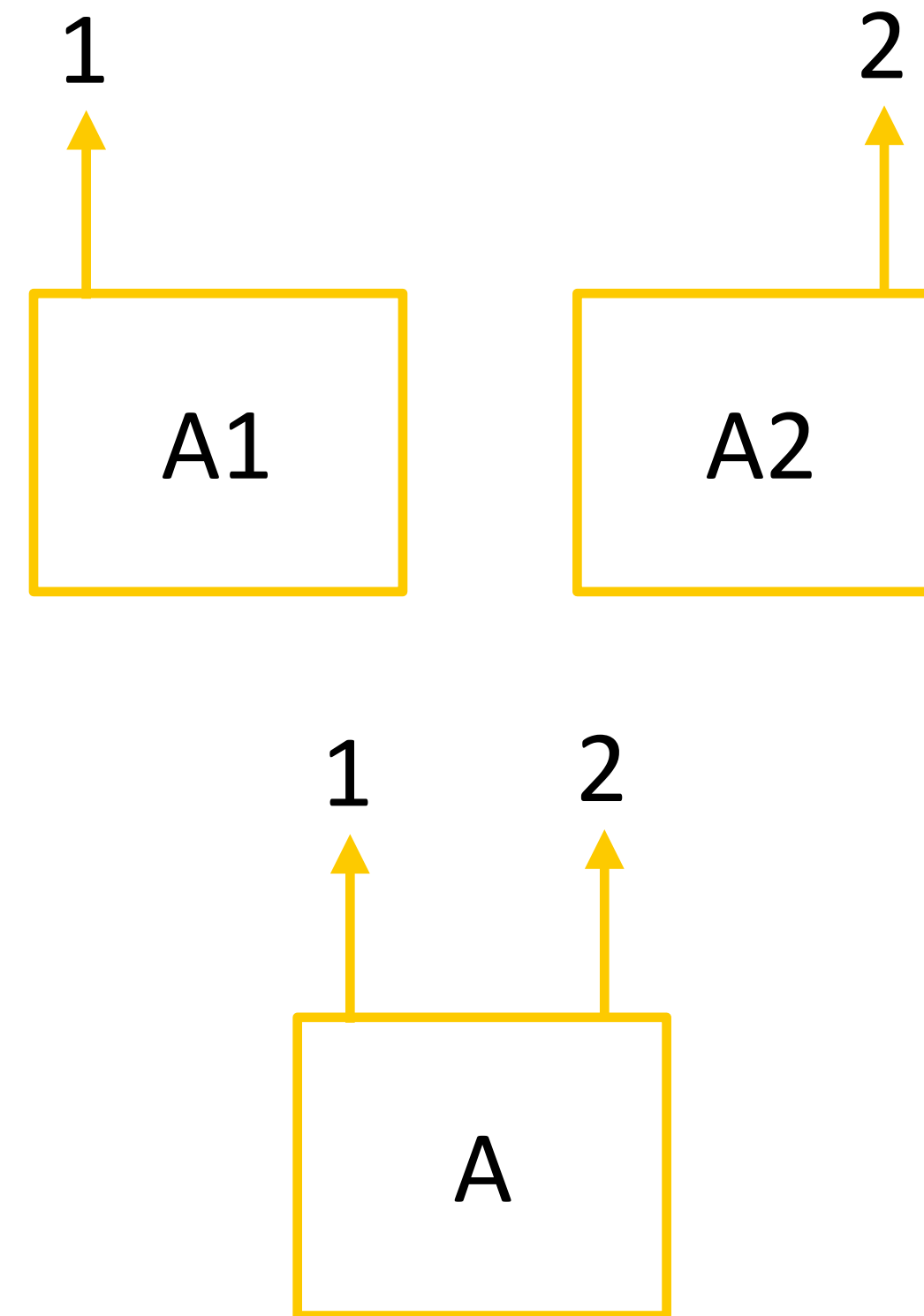


- Linking



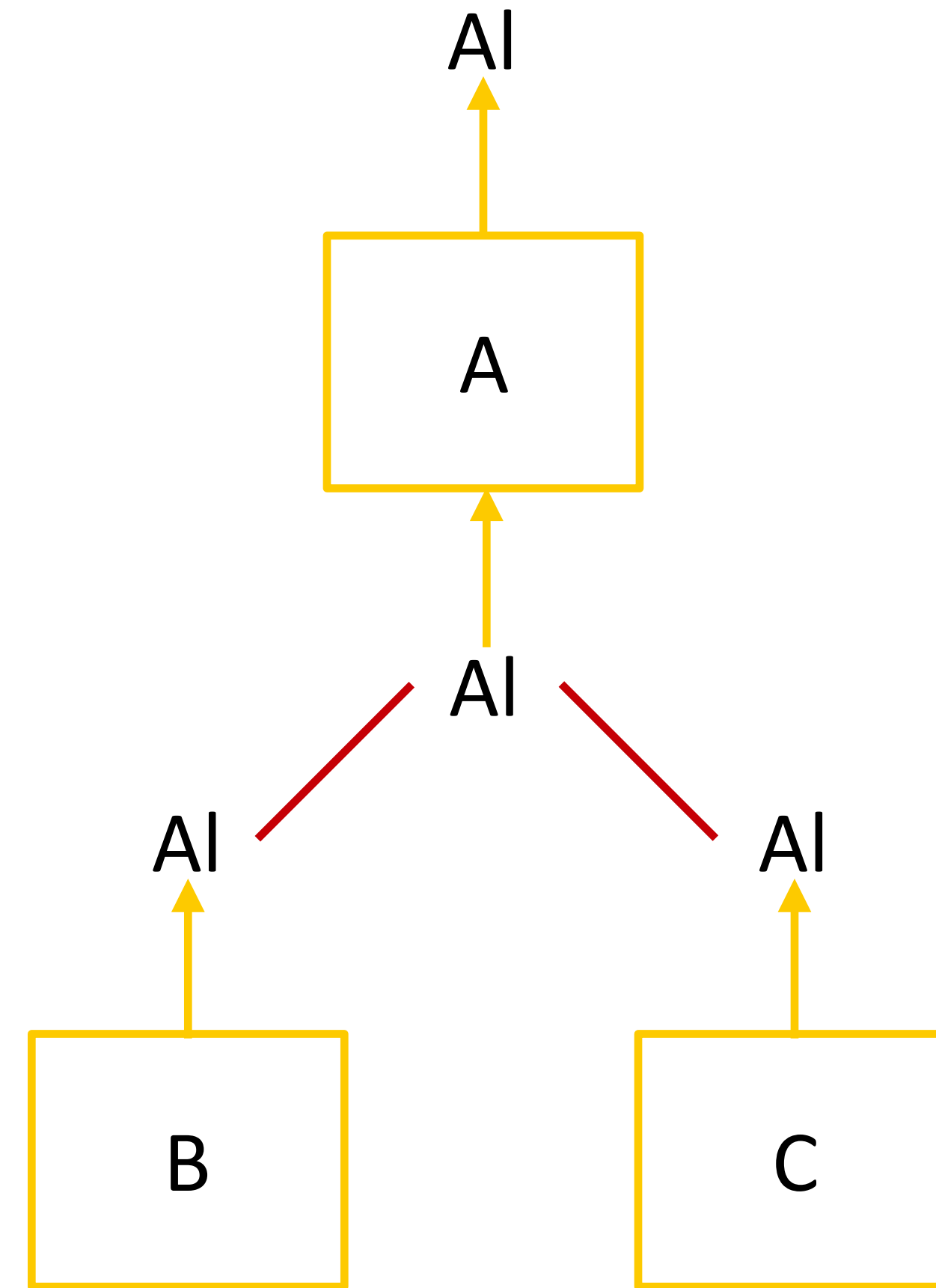
System models

- Linking
- Multioutput processes



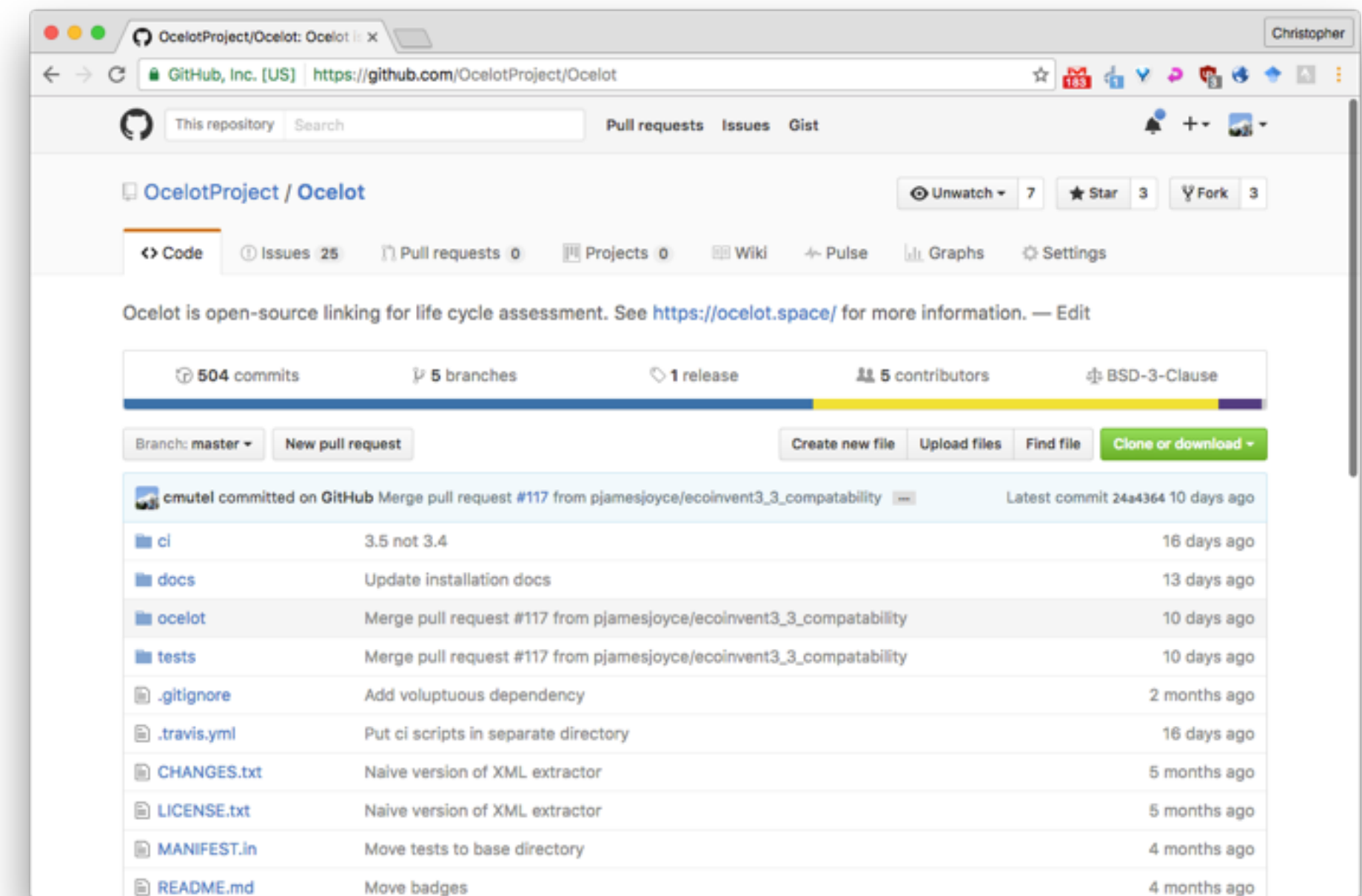
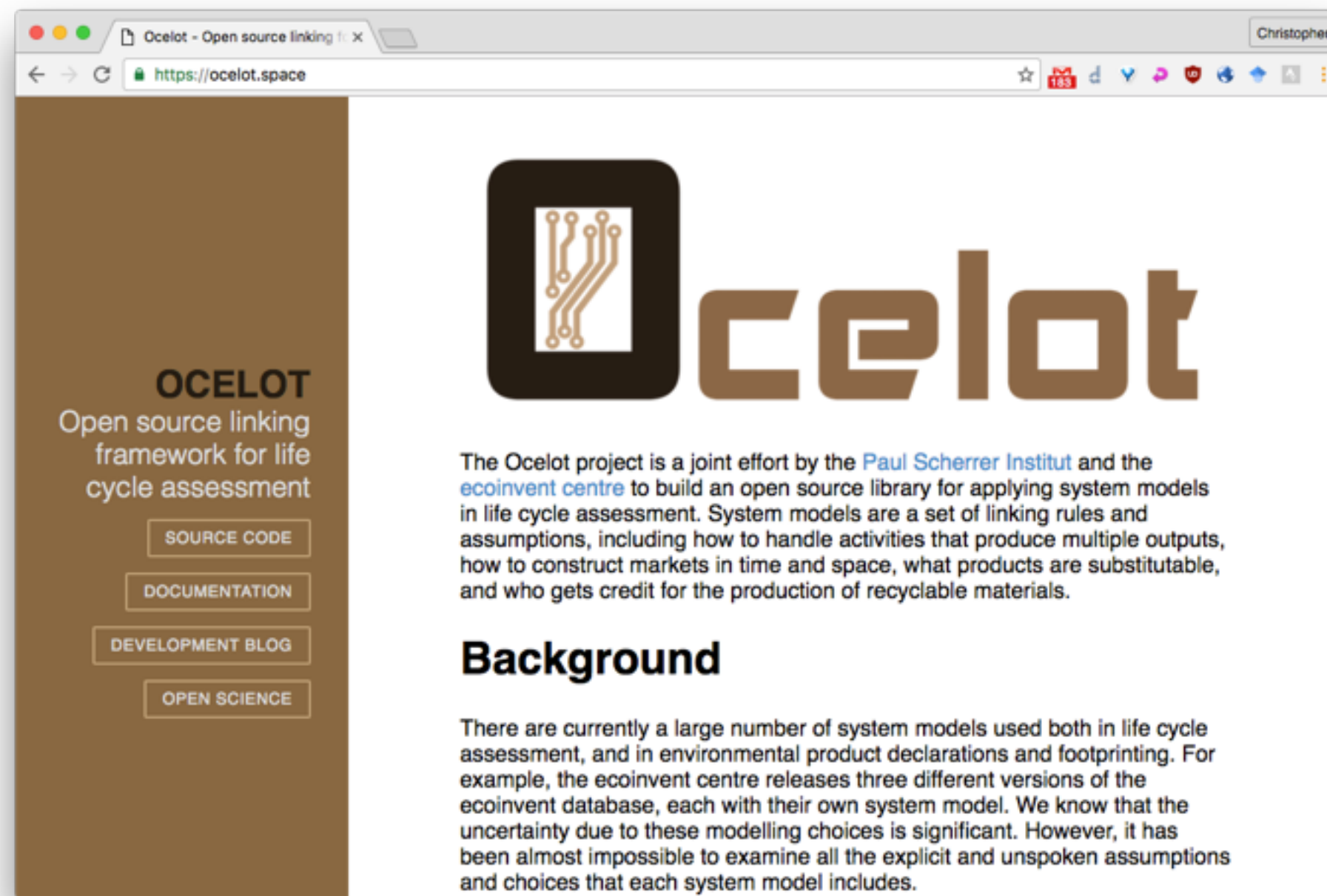
System models

- Linking
- Multioutput processes
- Markets
- Everything else



Ocelot

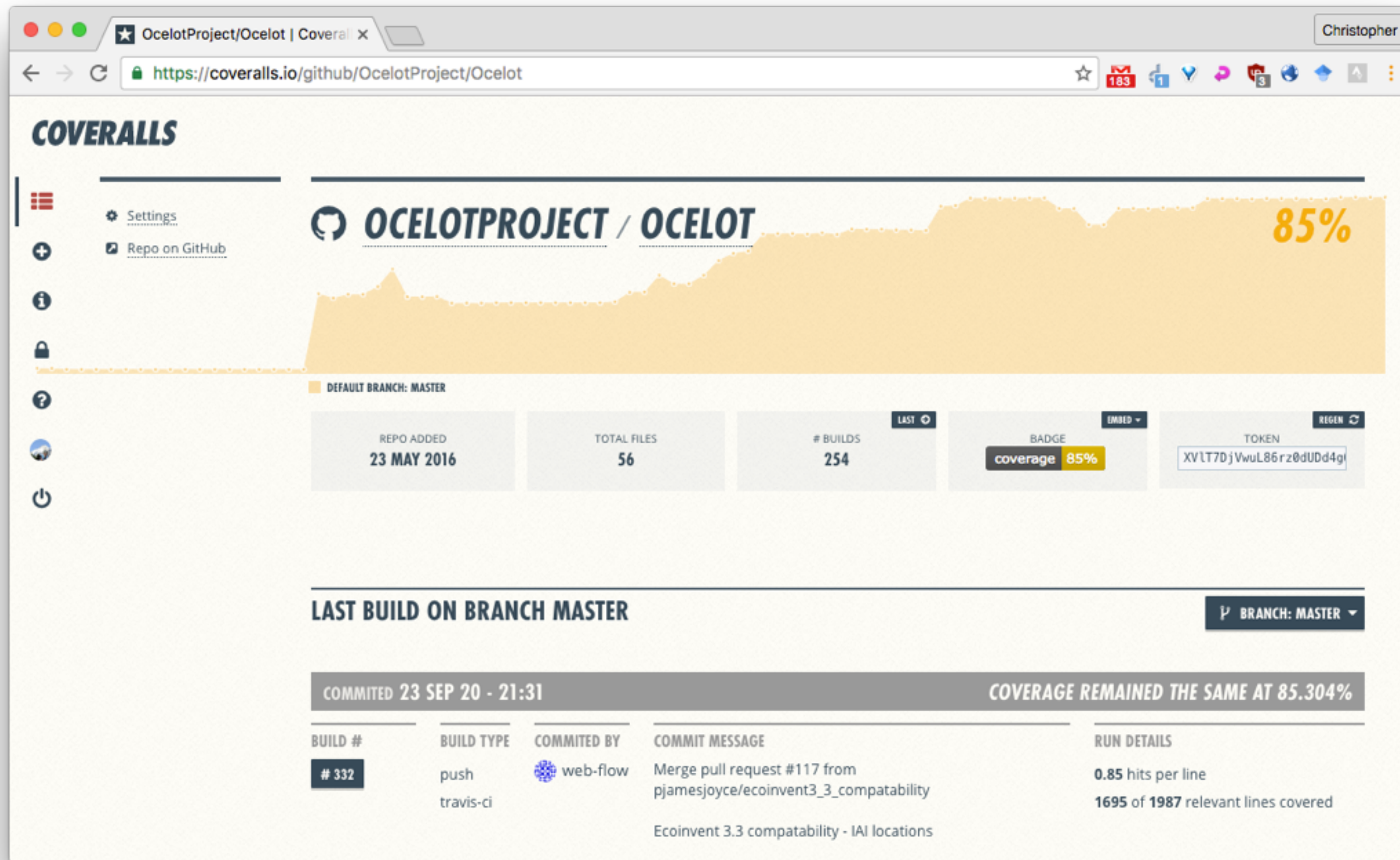
- Implementation of system models
- Open



Website: ocelot.space

Code philosophy: Tested

- Continuous integration for all commits + test coverage



```
(ocelot)psivpn165:ocelot cmutel$ py.test
----- test session starts -----
platform darwin -- Python 3.5.2, pytest-2.9.1, py-1.4.31, pluggy-0.3.1
rootdir: /Users/cmutel/Code/ocelot, inifile: pytest.ini
plugins: cov-2.2.1, mock-1.0, xdist-1.14
collected 302 items

tests/collection.py .....
tests/data_helpers.py .....
tests/filesystem.py .....
tests/logger.py .
tests/results.py .....
tests/utils_tests.py ....
tests/wrapper.py ...
tests/cutoff/allocation.py ....
tests/cutoff/combined.py .....
tests/cutoff/constrained_markets.py .
tests/cutoff/cutoff_cleanup.py ....
tests/cutoff/cutoff_utils.py ..
tests/cutoff/cutoff_validation.py .....
tests/cutoff/economic.py .....
tests/cutoff/recycling.py ....
tests/cutoff/true_value.py .....
tests/cutoff/waste_treatment.py .....
tests/cutoff/waste_treatment_utils.py ....
tests/io/ecospold2_meta.py ..
tests/io/extractions.py .....
tests/locations/linking.py .....
tests/locations/locations_validation.py ...
tests/locations/markets.py .....
tests/locations/rest_of_world.py .....
tests/locations/topology.py .....
tests/parameterization/ecoinvent_specific.py ..
tests/parameterization/implicit_references.py .....
tests/parameterization/parameterization_validation.py ..
tests/parameterization/parameterization_uncertainty.py .
tests/parameterization/production_volumes.py ....
tests/parameterization/python_compatibility.py .....
tests/transformations/activity_links.py ..s.....
tests/transformations/identifying.py ...
tests/transformations/pv_transformations.py ...
tests/transformations/transformations_cleanup.py ...
tests/transformations/transformations_utils.py .....
tests/transformations/transformations_validation.py .....
tests/uncertainty/distributions.py .....
tests/uncertainty/init.py ....
tests/uncertainty/pedigree.py .....

----- 301 passed, 1 skipped in 3.88 seconds -----
(ocelot)psivpn165:ocelot cmutel$
```

Code philosophy: Functional

```
@valid_recycling_activity
def recycling_allocation(dataset):
    """Allocate a recycling activity.

    Returns a list of new activities.

    A recycling dataset has a reference product of the material to be recycled, and a byproduct
    market. For example, aluminium recycling has a reference production of -1 kg of ``aluminium
    melting``, and allocatable byproducts of ``aluminium, cast alloy`` and ``aluminium oxide``.

    This function will change the reference product to an input (meaning that this activity will
    then perform economic allocation on the byproducts.

    Note that recycling allocation is not applied to ``recyclable`` byproducts, as the cutoff s
    production and consumption of these types of materials.

    The net effect of ``recycling_allocation`` and ``flip_non_allocatable_byproducts`` is that
    byproducts are moved to technosphere inputs.

    """
    rp = get_single_reference_product(dataset)
    rp['type'] = 'from technosphere'
    rp = scale_exchange(rp, -1)
    return economic_allocation(dataset)
```


Summer school

- 22 students (PhD postdoc), 5 days in September
- Custom system models in 3 days



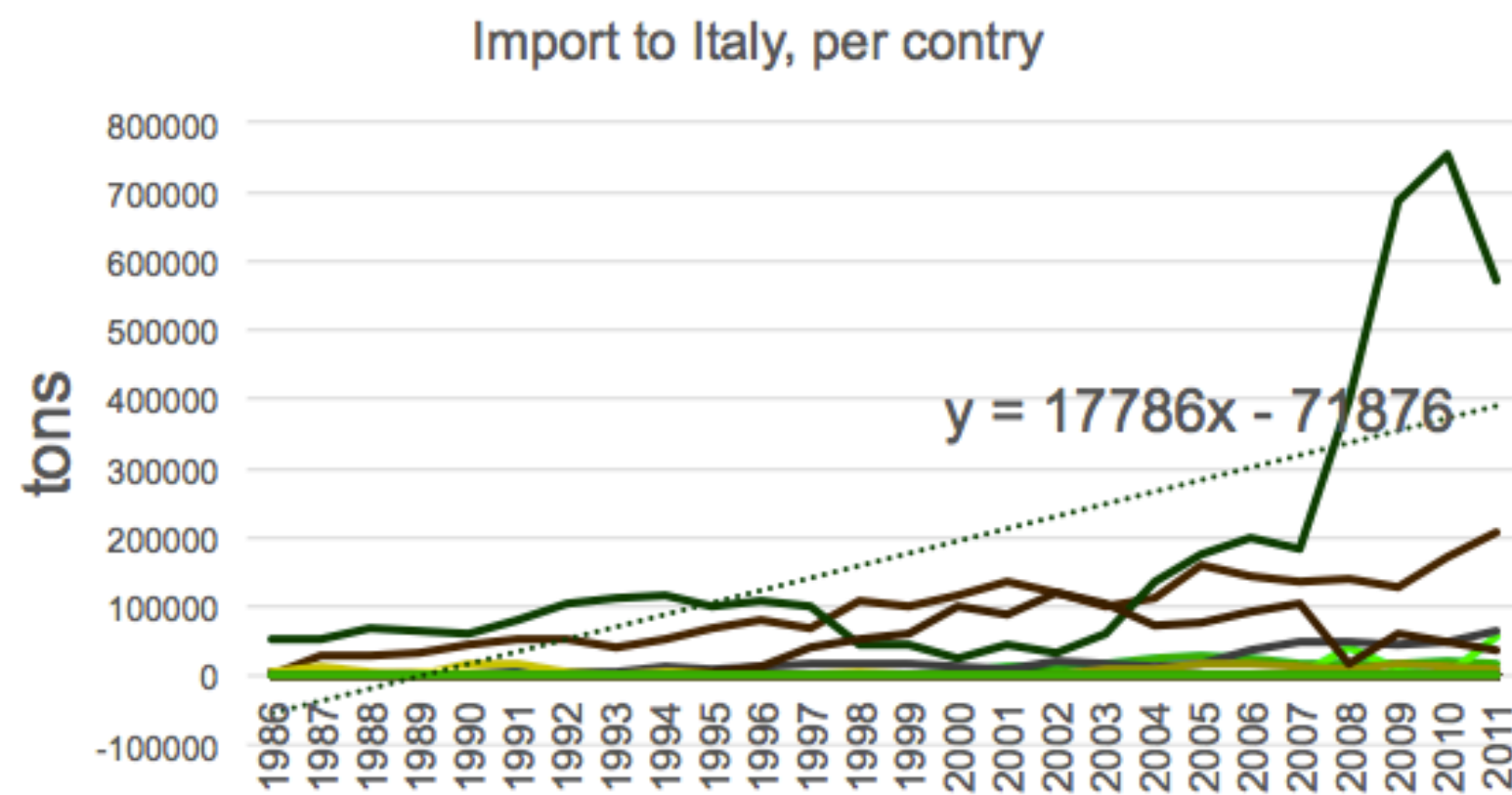
Summer school

1. Change consequential market choices based on trade data

1. Determine countries import increments from FAO



Step 2. Where will the palm oil come from?



Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Slope	Slope %
Indonesia	46874	31249	60406	135116	176475	198476	182005	398328	686677	756286	570444	17786,25	54%
Malaysia	136058	118491	102342	111508	161070	145948	138053	139938	127558	172273	206466	6502,255	20%
Papua New Guinea	88865	122104	105093	73142	77979	90899	102550	18377	59014	47770	38604	3728,843	11%
Netherlands	11245	19242	16874	13450	15761	35631	48164	49865	46810	49640	64679	2027,299	6%
Germany	11349	13710	18273	25071	27943	24227	18617	16704	19037	21106	16194	1100,544	3%
Thailand	0	64	147	147	63	167	63	40981	8084	63	56222	804,8202	2%
Spain	703	1502	7553	9746	15866	17232	13685	11162	16020	15138	8934	686,5662	2%

2. Localized production of agricultural products

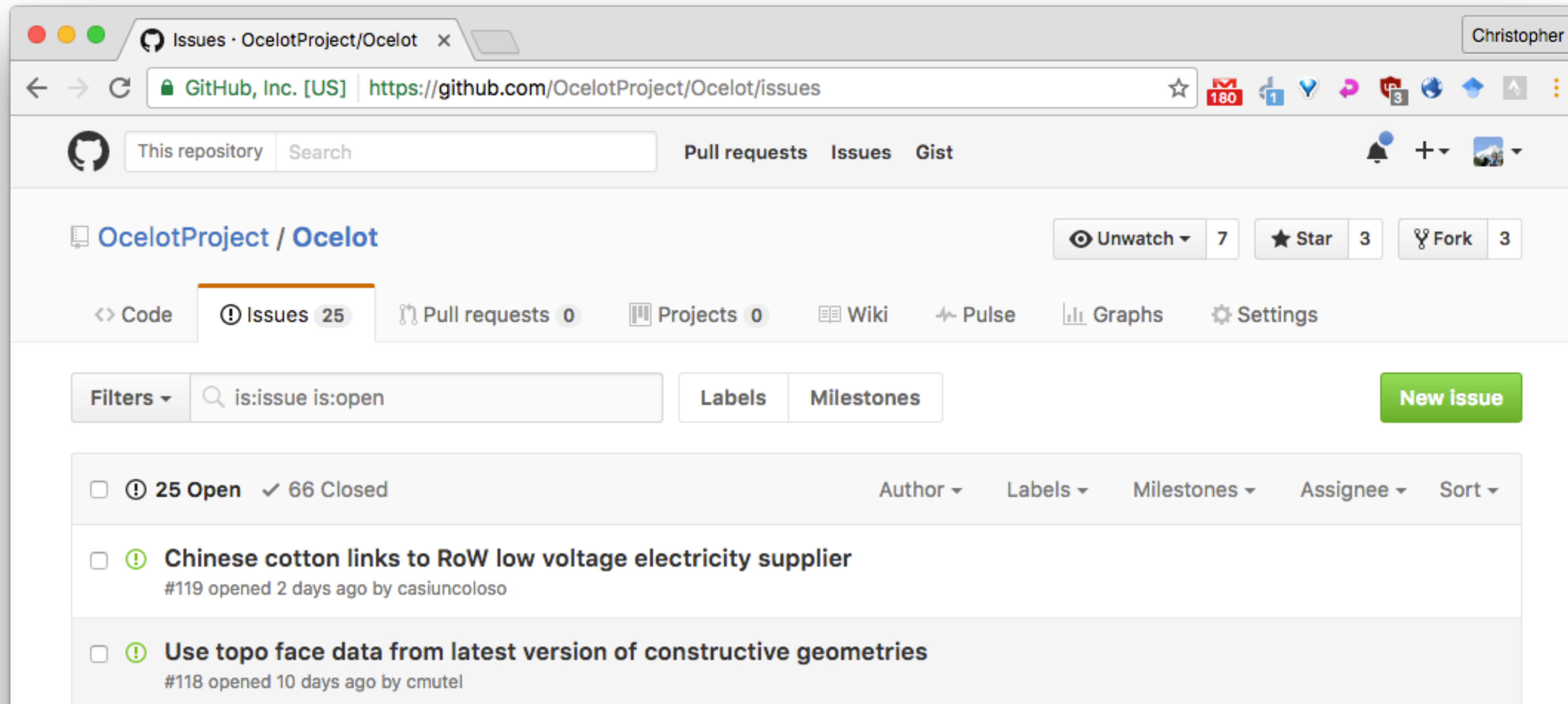
3. Future efficiency improvements

4. Treat some wastes as recyclables

5. Change allocation (price) values

Future

- Address uncertainty due to choices
- Test aspects of system models
- Community focus
 - Expand/adapt format (?)
- 90% done with cutoff and consequential system models
 - See Github issues and commits pages
 - 1.0 release in 2016



The screenshot shows a web browser window displaying the GitHub repository page for OcelotProject/Ocelot. The browser's address bar shows the URL <https://github.com/OcelotProject/Ocelot/issues>. The repository name is "OcelotProject / Ocelot". The page is currently on the "Issues" tab, which shows 25 open issues and 66 closed issues. The top navigation bar includes "Pull requests", "Issues", and "Gist". The main content area shows a list of issues, with the first two visible being:

- Chinese cotton links to RoW low voltage electricity supplier**
#119 opened 2 days ago by [casiuncoloso](#)
- Use topo face data from latest version of constructive geometries**
#118 opened 10 days ago by [cmutel](#)

The page also features a search bar, a "New Issue" button, and various repository statistics like "Unwatch 7", "Star 3", and "Fork 3".

Thanks:

- Guillaume Bourgault
- Gregor Wernet
- Summer school
instructors &
participants

