

GreenDeLTA

sustainability consulting + software

LCA Collaboration Server: enhancing LCA data creation and sharing

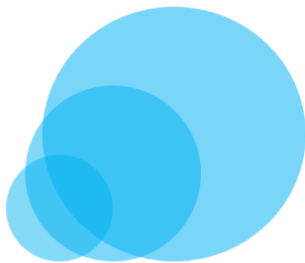
Sebastian Greve, Cristina Rodríguez, Andreas Ciroth
GreenDelta GmbH

Charleston, LCA XVI, 28 September 2016

What is the LCA Collaboration Server?

A platform to enable data creation and sharing

→ Teams of users can work on the same data sets independently and merge their changes together



LCA Collaboration
Server Web Service



LCA Collaboration
Server features in
openLCA

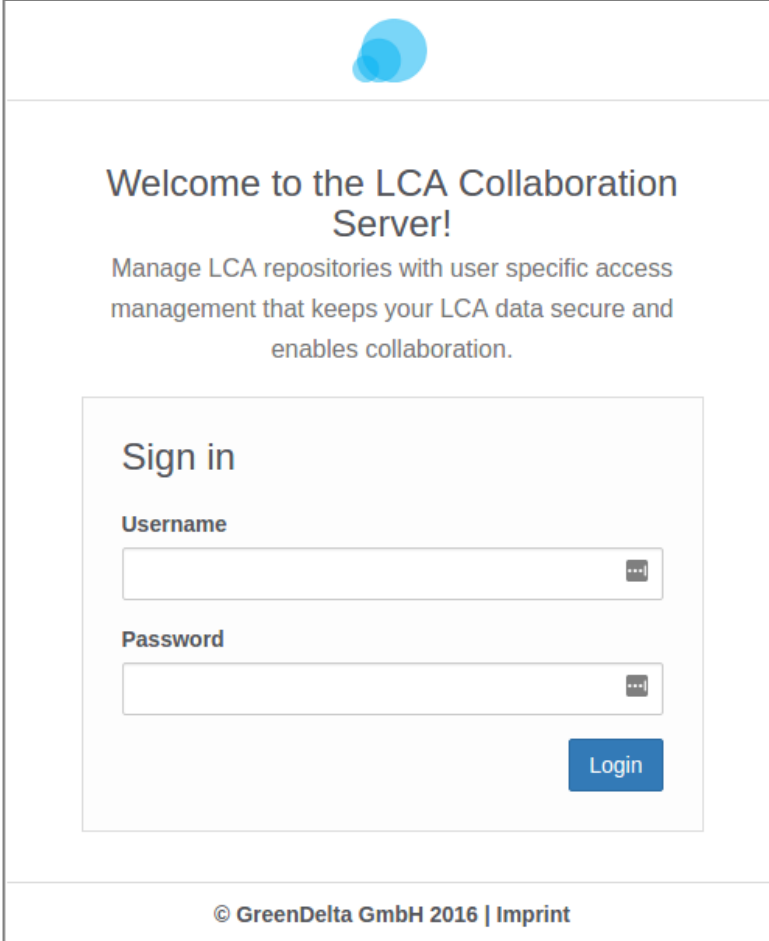
Main functionalities

- Upload, download, synchronize LCA data between a local openLCA database and a server repository
- Merging (possibly conflicting) changes in data sets
- History of changes
- User friendly web view of data in the repositories

LCA Collaboration Server Web UI

The LCA CS Web UI is the central access and management tool for LCA repositories

- RESTful web service for storing and providing LCA data in a uniform way
- Developed as a standalone web application
- Unlimited amount of servers possible → same application, different data



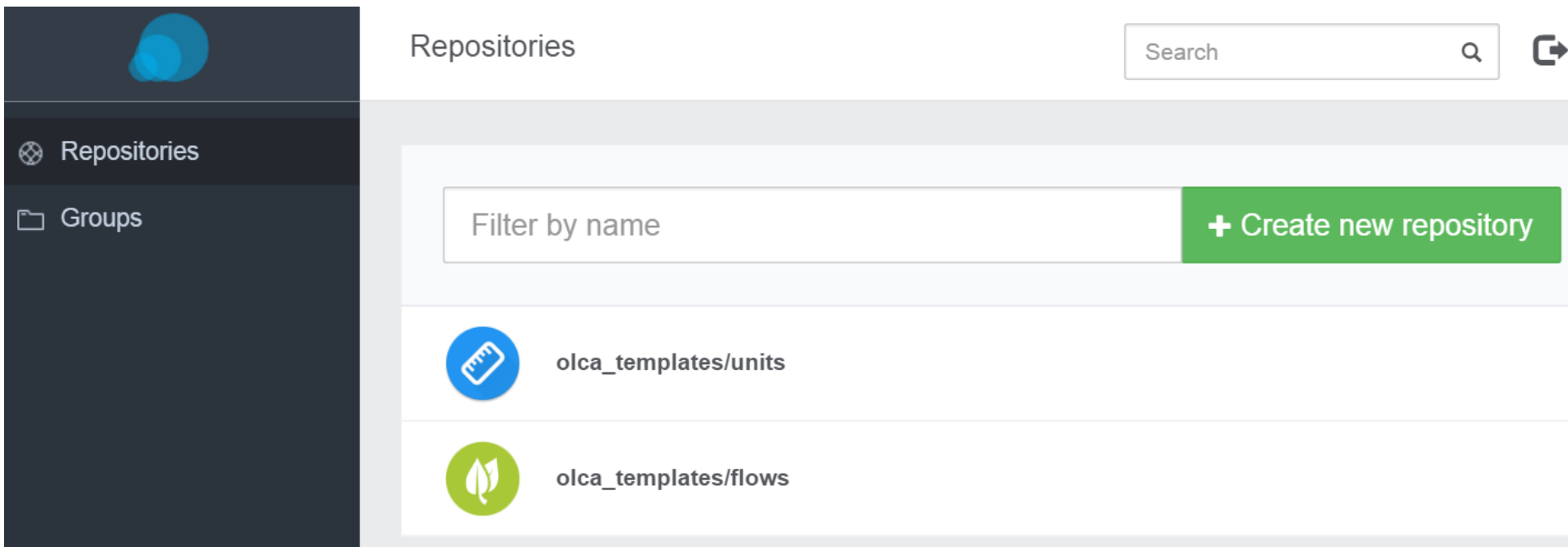
The screenshot shows the web interface of the LCA Collaboration Server. At the top, there is a blue circular logo. Below it, the text reads: "Welcome to the LCA Collaboration Server!" followed by a description: "Manage LCA repositories with user specific access management that keeps your LCA data secure and enables collaboration." The main section is titled "Sign in" and contains two input fields: "Username" and "Password". Each field has a small icon on the right side. Below the password field is a blue "Login" button. At the bottom of the page, there is a footer that reads: "© GreenDelta GmbH 2016 | Imprint".

Data format

- Server runs the web application with a Derby database
- The JSON Id format is used for the exchange of data
 - Format recommended by W3C for linked data
 - It can directly be parsed as RDF triples and, therefore, be directly linked to ontologies

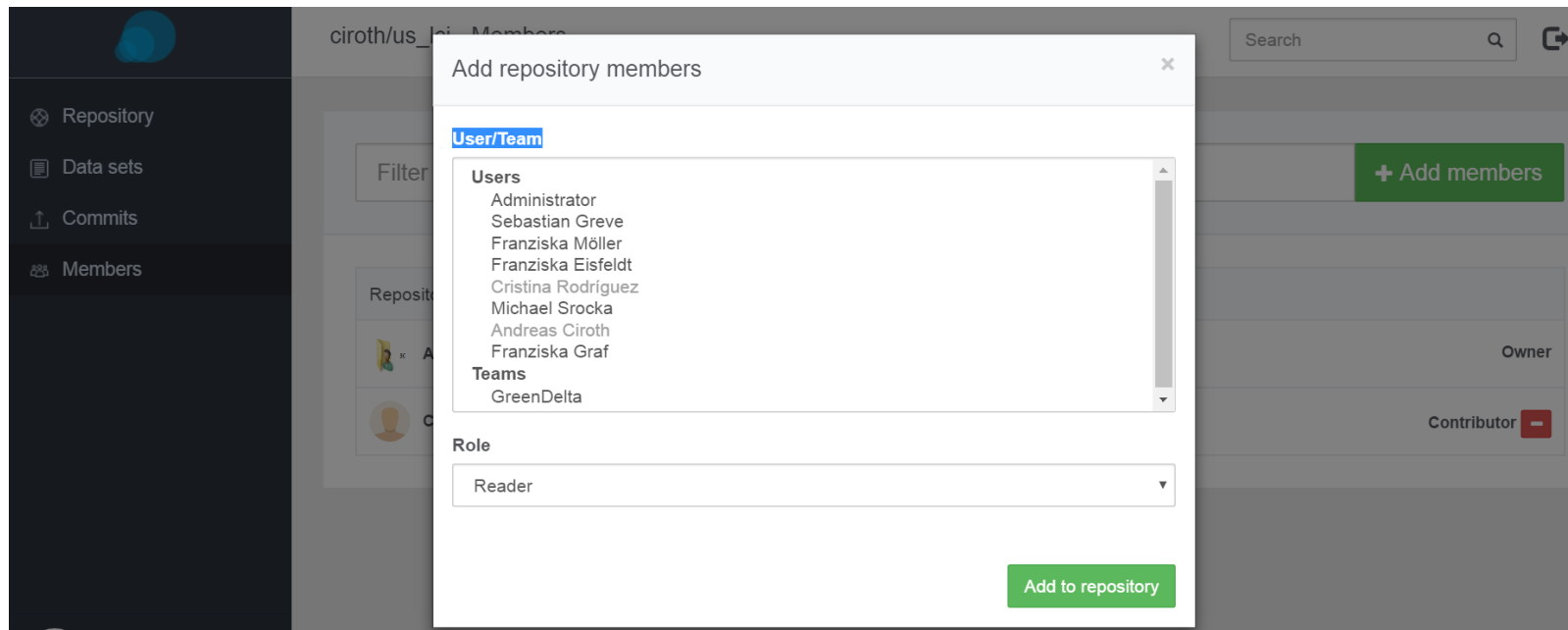
Features: Repository management

- Create/delete repositories
- Create/delete groups of repositories
- Clone repositories in a specific state (i.e. commit)



Features: User management

- Create/delete users and teams of users
- Roles: Owner, Contributor, Reader
- Set permissions per repository/group of repositories
- User profile



Features: Commit history

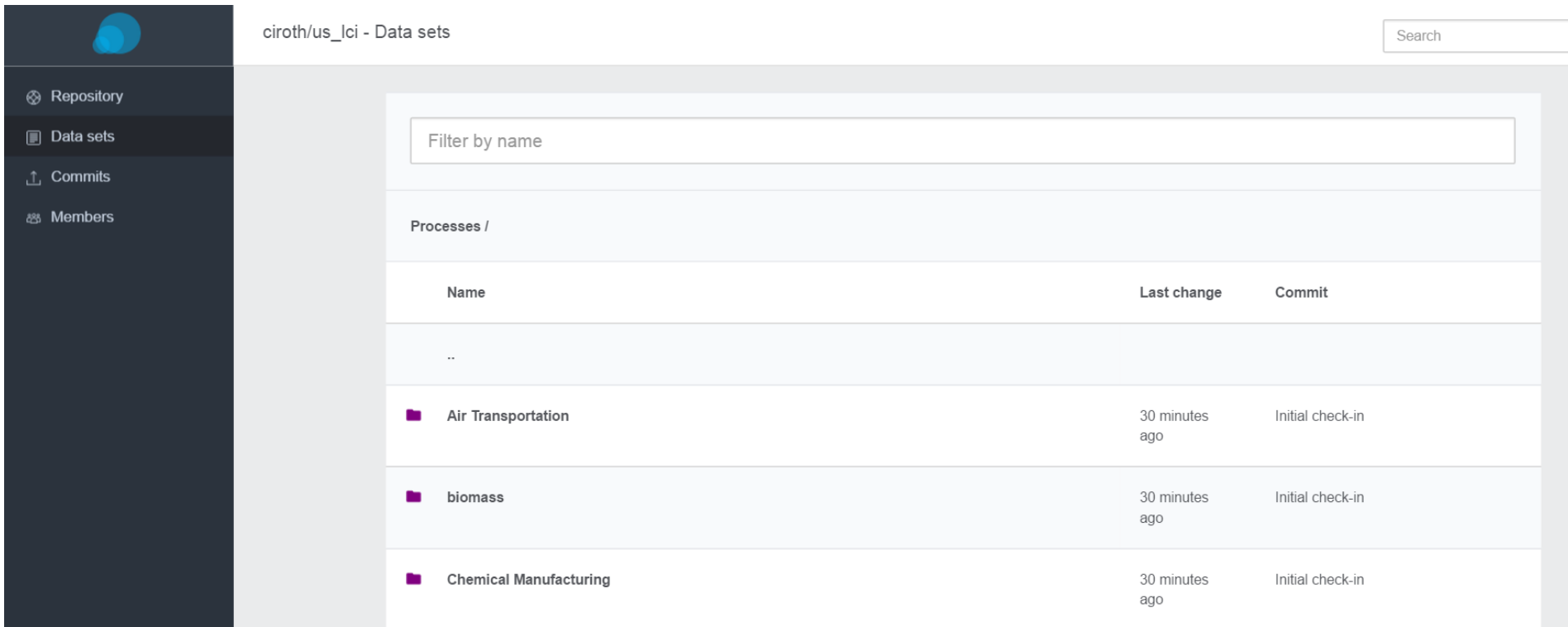
- View all changes per commit and navigate to the correspondent data sets

The screenshot displays a web interface for viewing commit history. On the left is a dark sidebar with navigation links: 'Back to group', 'Repository', 'Data sets', 'Commits' (highlighted), and 'Members'. The main content area is titled 'olca_templates/flows - Commits' and includes a search bar. It lists commits in a table-like format, grouped by date. Each entry shows the date, commit count, commit message, author, date, and commit hash with a 'Details' link.




Date	Commit Count	Commit Message	Author	Date	Commit Hash	Details
04/25/2016	1 commit	test to see the new icons, plus parameter bug solved in this process	Andreas Ciroth	04/25/2016	5d58f61c-6d97-4c8b-90ca-40b6ec4f738c	Details »
04/23/2016	2 commits	second product added	Andreas Ciroth	04/23/2016	46a51944-55dd-46d2-bead-5a40d32c4942	Details »
		infrastructure added	Andreas Ciroth	04/23/2016	555fa661-2414-40f7-832b-65d7b286f5ec	Details »
04/21/2016	3 commits	now also the flows committed for the boku processes	Andreas Ciroth	04/21/2016	5122308d-2c19-4a81-8cf7-55cca8f53038	Details »
		1st commit test, artificial processes from boku	Andreas Ciroth	04/21/2016	ccd26a7d-8a71-4f85-ad85-b2c0e382d132	Details »
		Initial check-in	Sebastian Greve	04/21/2016	5357af20-1737-4b78-8203-5bde92e3e0c3	Details »

Features: Data sets browser

- Browse through the current state of the repository data sets (Filters by type and name)



The screenshot displays a web interface for a data repository. On the left is a dark sidebar with navigation links: Repository, Data sets, Commits, and Members. The main content area is titled 'ciroth/us_lci - Data sets' and includes a search bar. Below the search bar is a filter input labeled 'Filter by name'. A section titled 'Processes /' contains a table with three columns: Name, Last change, and Commit. The table lists three data sets: 'Air Transportation', 'biomass', and 'Chemical Manufacturing', each with a folder icon, a last change time of '30 minutes ago', and a commit of 'Initial check-in'.


Name	Last change	Commit
..		
 Air Transportation	30 minutes ago	Initial check-in
 biomass	30 minutes ago	Initial check-in
 Chemical Manufacturing	30 minutes ago	Initial check-in

Features: Data sets browser

- Download selected data sets as JSON format

Version

Latest

 Cristina Rodríguez on 05/21/2016 11:26:39

Download

Transport, aircraft, freight



P







1. Important note: although most of the data in the US LCI database has undergone some sort of review, the database as a whole has not yet undergone a formal validation process. 2. Please email comments to lcid@nrel.gov.

Inputs/Outputs

Documentation

Allocation

Flow	Category	Amount	Costs	Uncertainty	Provider
  Kerosene, at refinery		0.419919720019579 L		No distribution	

Flow	Category	Amount	Costs	Uncertainty	Avoided product
  Transport, aircraft, freight		1 t*km		No distribution	
  Carbon dioxide, fossil		1.05284715923147 kg		No distribution	
  Carbon monoxide, fossil		0.00441023010226202 kg		No distribution	

Version

00.00.000


Last change

04/06/2011 12:23:00


UUID

c5de39e3-4187-34be-9c19-67e9544c1458

Quantitative reference

 [Transport, aircraft, freight](#)

Location

 [RNA](#)

Valid from

01/01/2003 12:00:00

Valid until

01/01/2010 12:00:00

Time description

-

Geography description

United States

Technology description

Integration into LCA software

- Third party applications are able to integrate the services via HTTP calls:
 - Right now LCA Collaboration Server features only integrated in openLCA, but
 - Documentation publicly available and openLCA code is open source
 - other LCA software could connect to it too

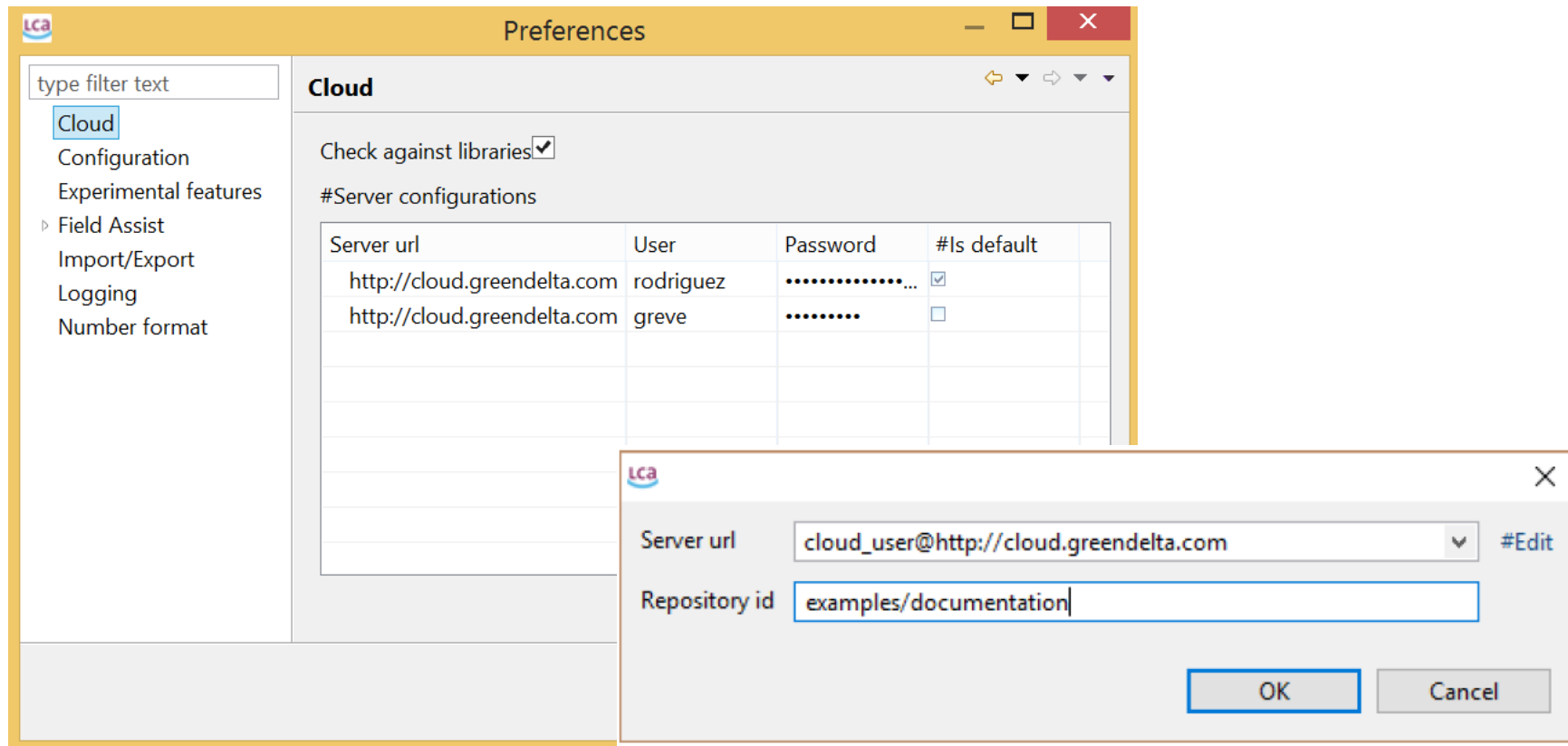
LCA CS integration in openLCA

openLCA integrates the usage of the LCA Collaboration Server features:

- enabling users to share their data through LCA repositories
- adding additional tools to make the workflow more user friendly

Features: Connection to a repository

- Configure remote server accounts
- Connect a local database to a remote repository

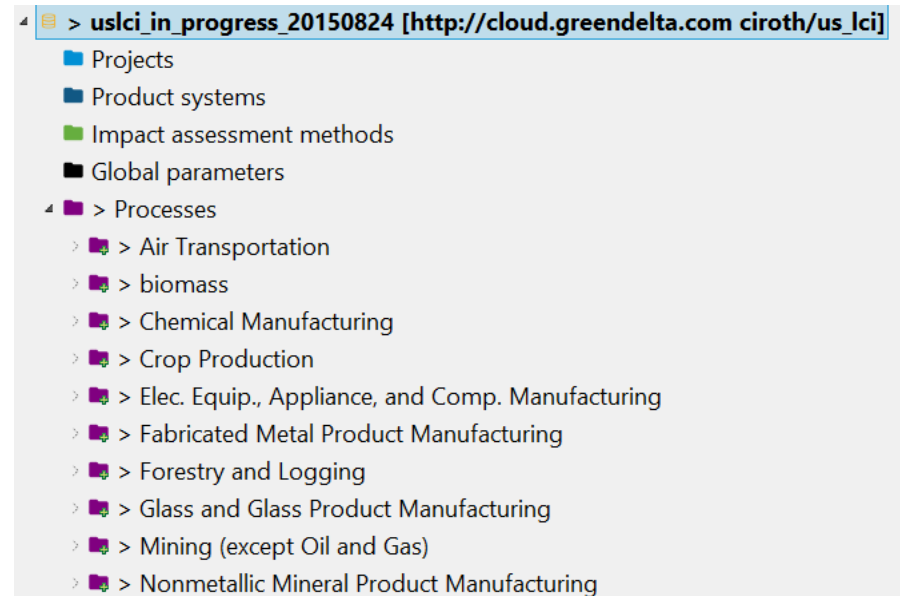


Features: Display of changes

- The data in the local database and in the repository is compared after the connection:

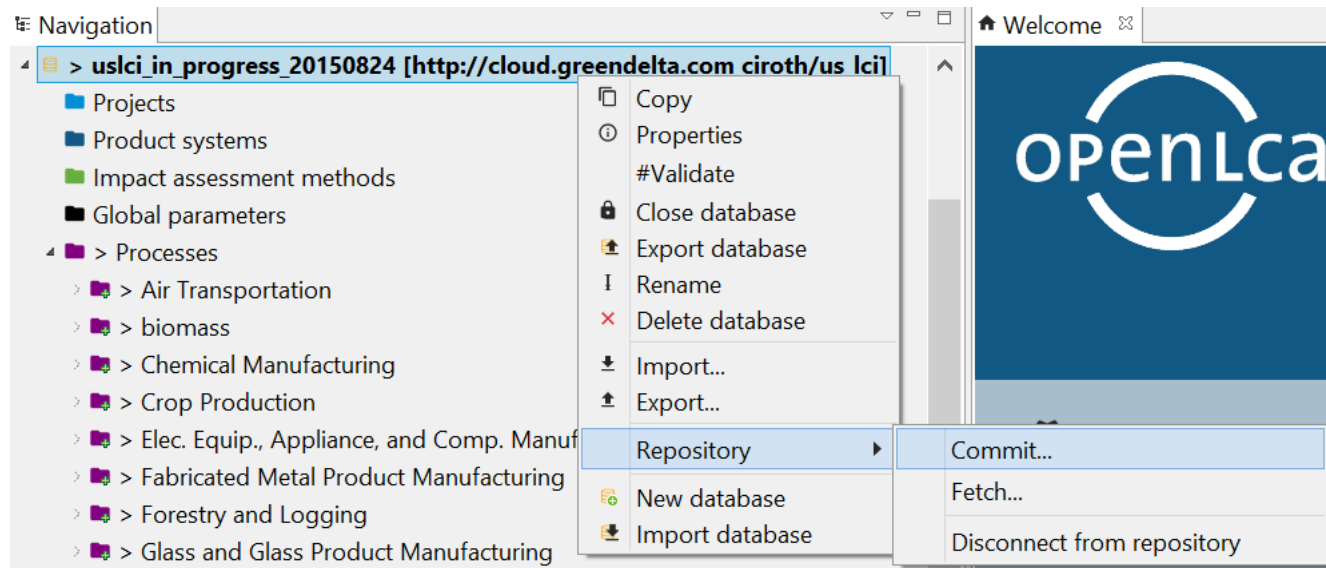
- > Indicates if a data set was changed

- + Indicates that there is new data in the local database



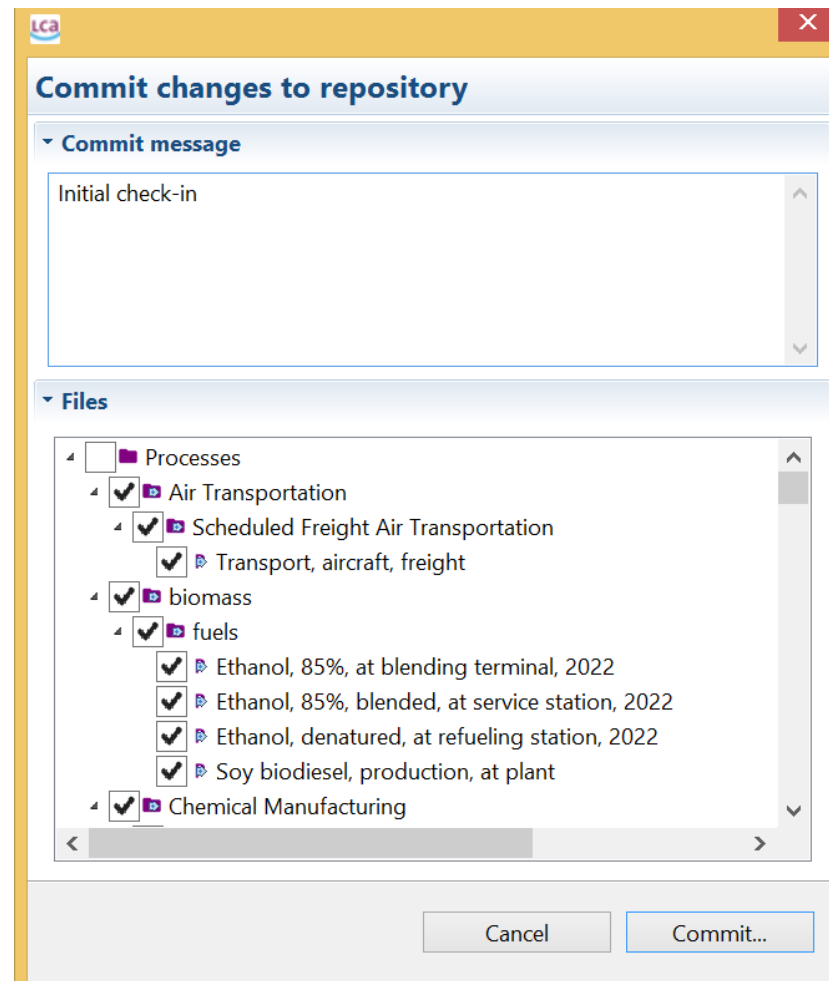
Features: Commit data

- Synchronize local changes with the repository (Commit)



Features: Commit data

- A subset of the changes can be selected

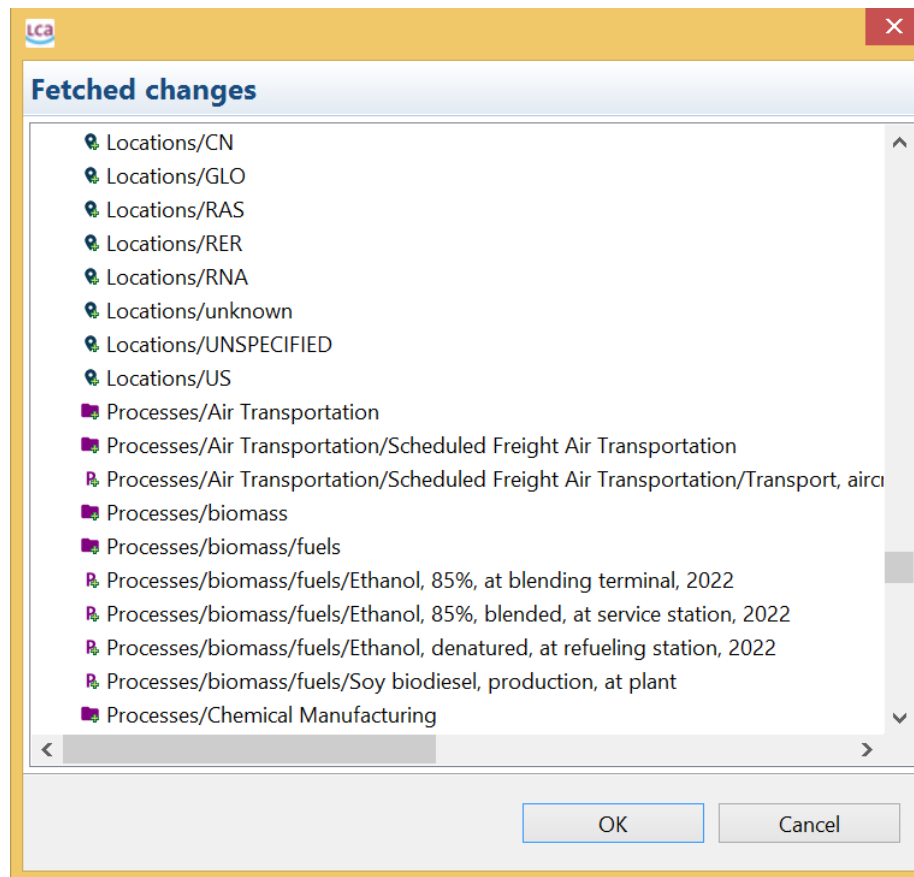


Features: Data integrity check

- Data integrity checks
 - Avoid deletion of linked data
 - Avoid upload of incomplete data
- Protection of library data
 - Warning is shown when trying to commit changes

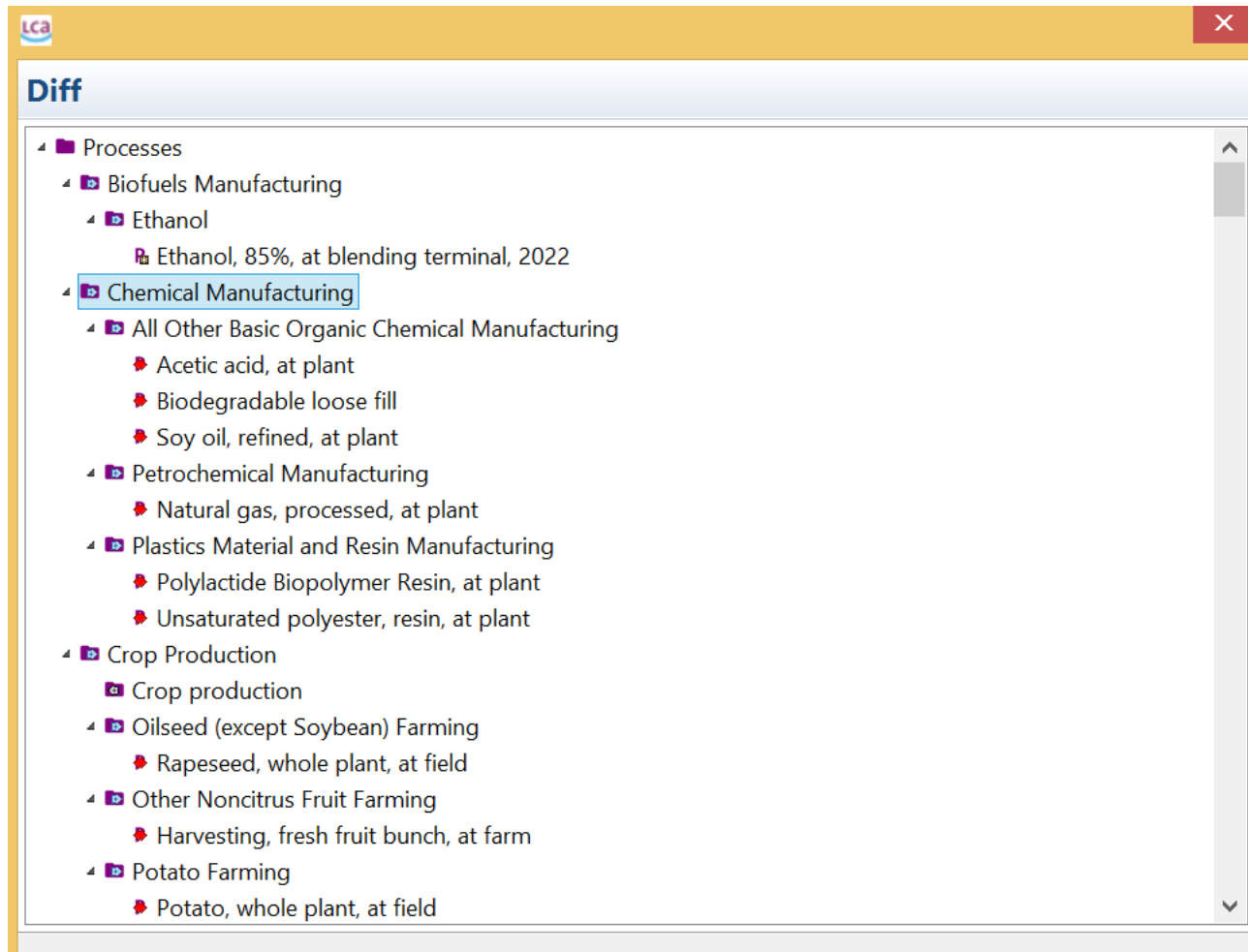
Features: Fetch data

- Synchronize changes on the remote repository with your local database (Fetch)



Features: Fetch data (Diff tool)

- Merge conflicting changes (Diff tool)



Features: Fetch data (Diff tool)

The screenshot displays the LCA Diff tool interface, which compares two models side-by-side. The window title is "Diff: biomass/fuels/Ethanol, 85%, at blending terminal, 2022". The interface is divided into two main panels: "Local model" on the left and "Remote model" on the right. Both panels show the same process details, including Name, Description, Category, Process type, Location, and Infrastructure process. The "Inputs" section is expanded in both, showing a list of inputs with their respective flow IDs and descriptions. The "Outputs" section is also visible. A "Mark as merged" button is located at the bottom right of the interface.

Local model

- Name: Ethanol, 85%, at blending terminal, 2022
- Description: transport of gasoline is accounted by using the ecoinver
- Category: Ethanol
- Process type: Unit process
- Location: RNA
- Infrastructure process: No
- Process documentation
- Inputs
 - 1: Energy, output, from gasoline
 - 2: Ethanol, denatured, at refueling station, 2022
 - 3: CUTOFF Liquid storage tank, chemicals, organics
 - 4: Electricity, at grid, US, 2008
 - 5: Gasoline, at refinery
 - 6:
- Outputs

Remote model

- Name: Ethanol, 85%, at blending terminal, 2022
- Description: transport of gasoline is accounted by using the ecoinver
- Category: fuels
- Process type: Unit process
- Location: RNA
- Infrastructure process: No
- Process documentation
- Inputs
 - 1: Energy, output, from gasoline
 - 2: Ethanol, denatured, at refueling station, 2022
 - 3: Dummy_liquid storage tank, chemicals, organics
 - 4: Electricity, at grid, US, 2008
 - 5:
 - 6: Gasoline, at refinery
- Outputs

Mark as merged

Features: Commit history

- View commit history
- Check out at specific commit states

Commit history

#Id	#Message	#Committer	#Committed date
5d58f61c-6d97-4c8b	test to see the new icons, plus parameter bug solved in this process	ciroth	5 months ago
46a51944-55dd-46d	second product added	ciroth	5 months ago
555fa661-2414-40f7	infrastructrure added	ciroth	5 months ago
5122308d-2c19-4a81	now also the flows committed for the boku processes	ciroth	5 months ago
ccd26a7d-8a71-4f85	1st commit test, artificial processes from boku	ciroth	5 months ago
5357af20-1737-4b78	Initial check-in	greve	5 months ago

#Selected commit

Name: test series no 1

Process type: Unit process

Infrastructure process: No

Process documentation

Inputs

Outputs

1: test series no 1

2: Carbon dioxide, fossil

3: test series no 2

Allocation factors

#Previous commit

Name: test series no 1

Process type: Unit process

Infrastructure process: No

Process documentation

Inputs

Outputs

1: test series no 1

2: Carbon dioxide, fossil

3:

Allocation factors

test series no 5

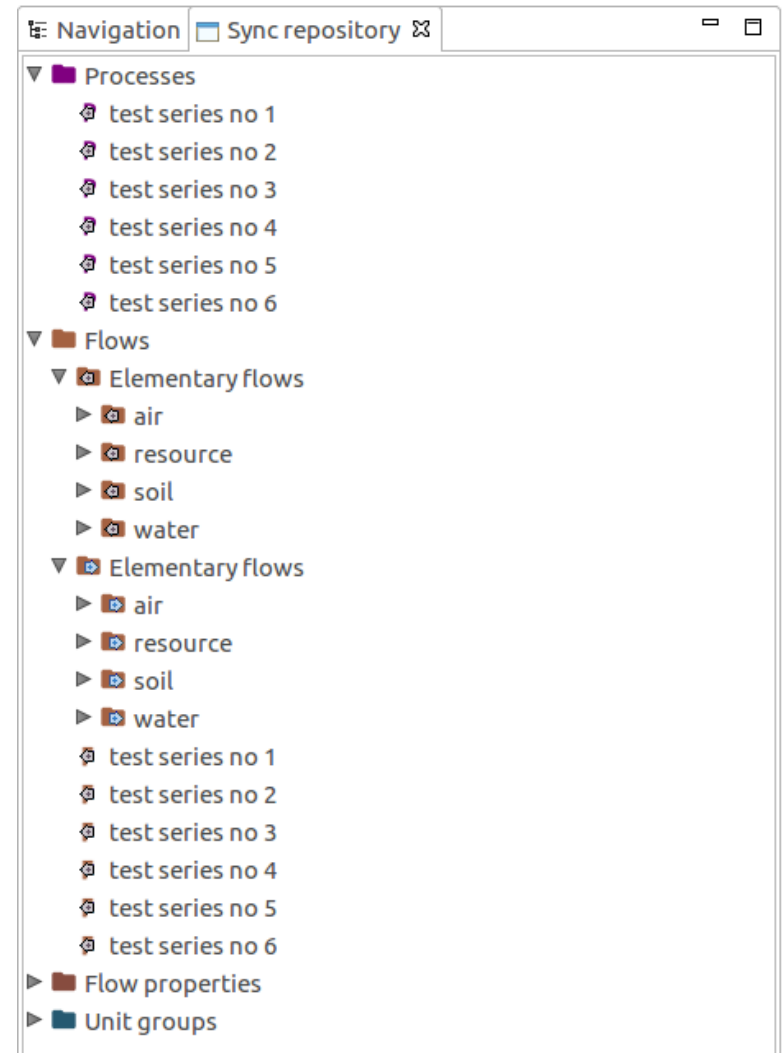
test series no 3

test series no 1

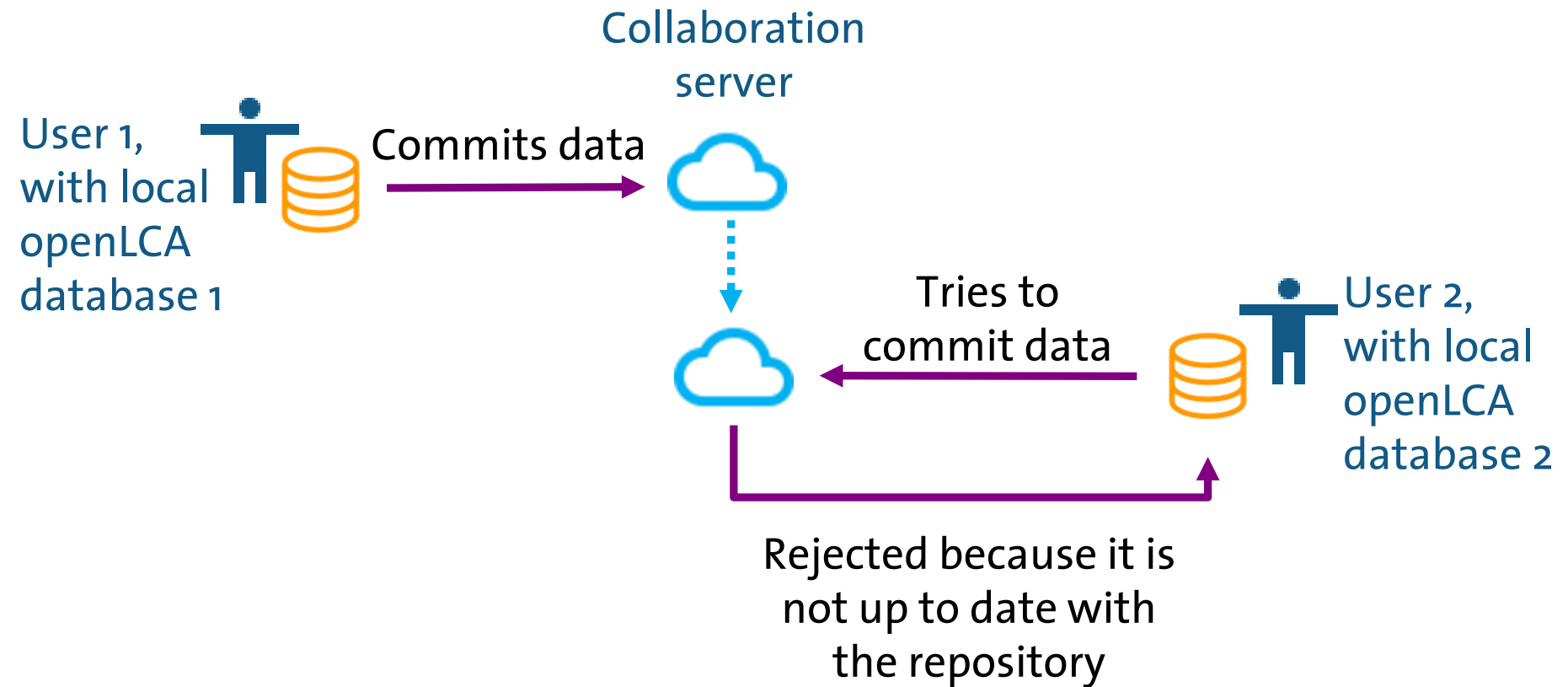
P test series no 1

Features: Sync view

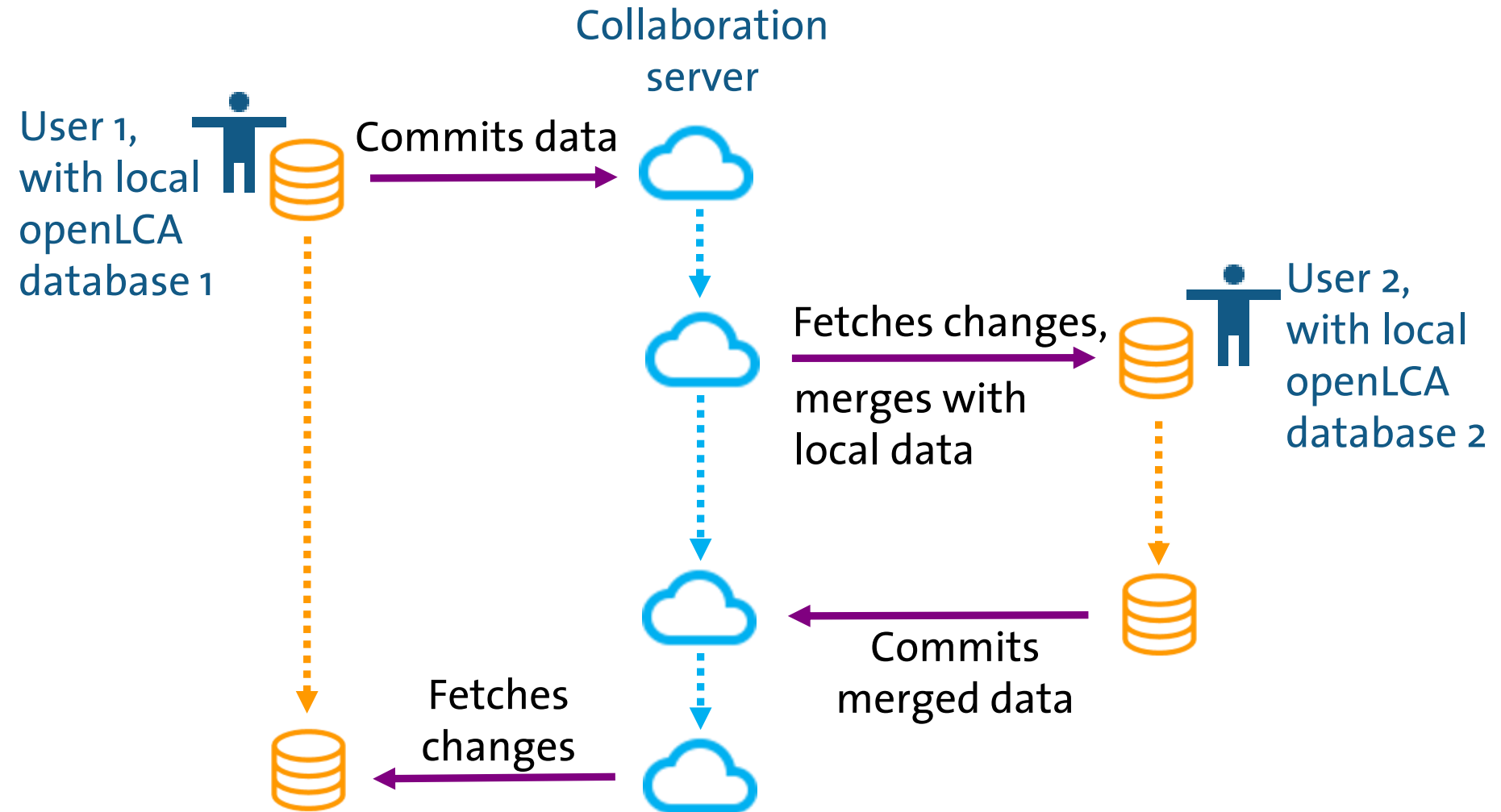
- Compare local state with the state at a specific commit
- Overwrite local model with the one at a specific commit state and commit it back



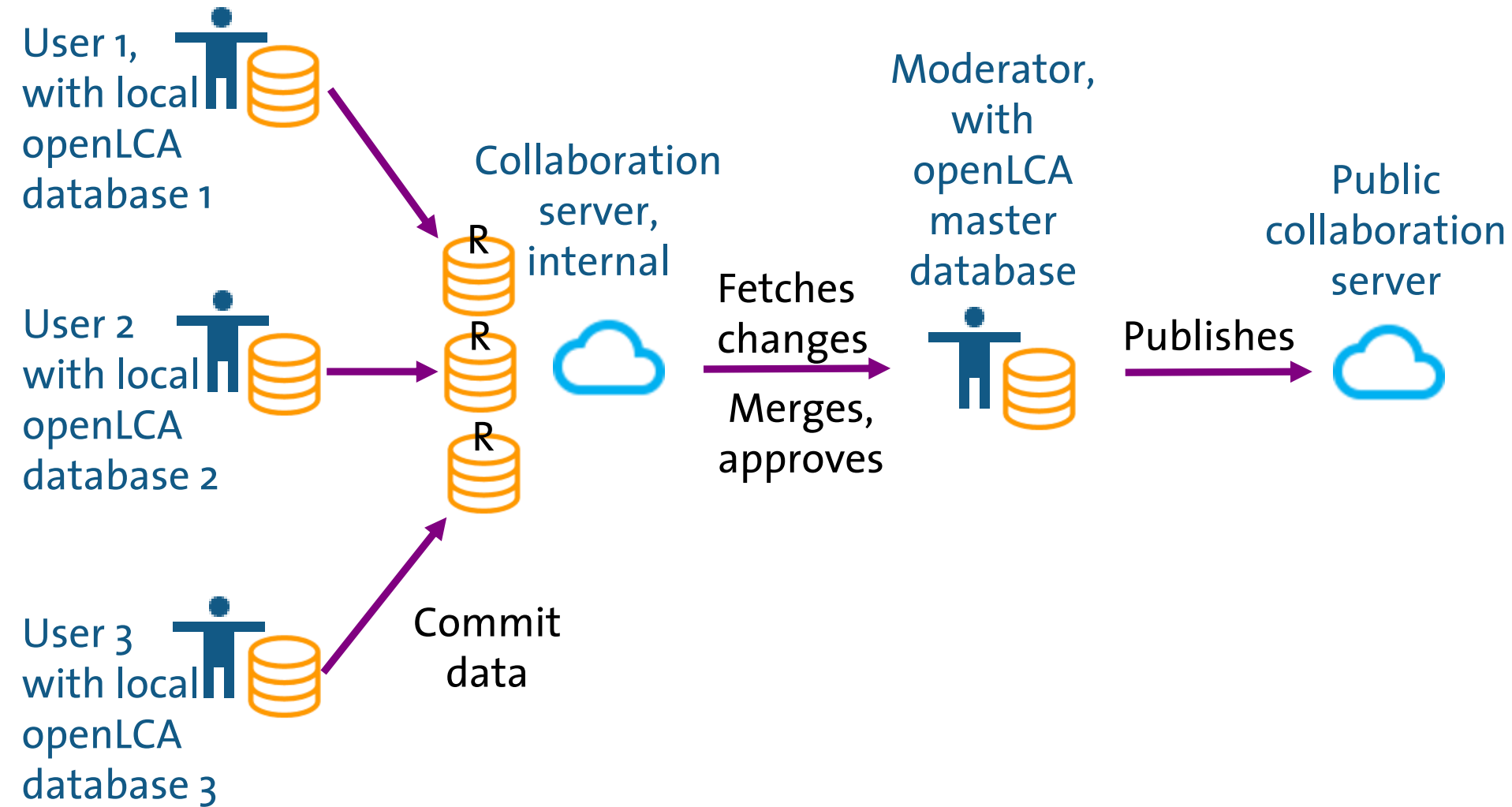
Use case scenario I: Data collaboration



Use case scenario I: Data collaboration

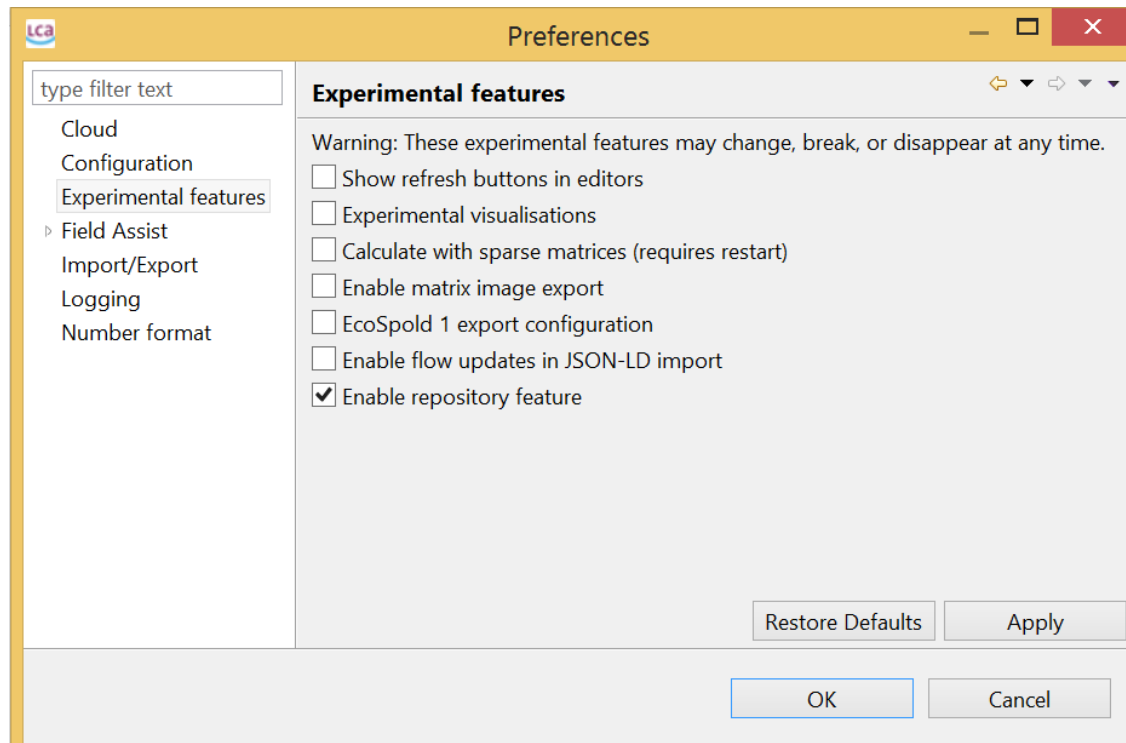


Use case scenario II: Editorial



Status of LCA Collaboration Server


- Basic functionalities included as “Experimental feature” in:
 - openLCA 1.5.0 beta 1, January 2016
 - openLCA 1.5.0, September 2016




Outlook

- Fall 2016: new openLCA version 1.6 with advanced features (sync view, data quality systems)

Version
Latest
Download

 Sebastian Greve on 07/26/2016 01:48:48

Pedigree Matrix



	A	B	C	D	E
Reliability	Verified data based on measurement	Verified data partly based on assumptions or non-verified data based on measurement	Non-verified data partly based on qualified estimate	Qualified estimate (e.g. by industrial expert)	Non-qualified estimate
Completeness	Representative data from all sites relevant for the market considered, over and adequate period to even out normal fluctuations	Representative data from > 50% of the sites relevant for the market considered, over an adequate period to even out normal fluctuations	Representative data from only some sites (<< 50%) relevant for the market considered or > 50% of sites but from shorter periods	Representative data from only one site relevant for the market considered or some sites but from shorter periods	Representativeness unknown or data from a small number of sites and from shorter periods
Temporal correlation	Less than 3 years of difference to the time period of the data set	Less than 6 years of difference to the time period of the data set	Less than 10 years of difference to the time period of the data set	Less than 15 years of difference to the time period of the data set	Age of data unknown or more than 15 years of difference to the time period of the data set
Geographical correlation	Data from area under study	Average data from larger area in which the area under study is included	Data from area with similar production conditions	Data from area with slightly similar production conditions	Data from unknown or distinctly different area (North America instead of Middle East, OECD-Europe instead of Russia)
	Data from enterprises	Data from processes and materials under study	Data from processes	Data on related processes	Data on related processes

Version
00.00.044
Last change
07/26/2016 01:47:51
UUID
78161430-cb46-4212-a532-21d32a572adc

Source
test

Outlook

- 2017: new project planned to extend features, e.g.:
 - Review process of datasets
 - Adding new elements in the Collaboration Server (product system view, calculation results, etc.)
 - Chat/messaging system in the web application
 - Optional 2-Factor authentication (more secure login)
 - Export of datasets in common LCA formats (ILCD) in the web service
 - Public Access to repository
 - Make possible to limit the amount of space available for each user in the repository

Conclusions

- Very powerful and complete tool for group work and data sharing:
 - Independent repositories and group of repositories
 - User/Team roles per repository/group
 - Data integrity: linear workflow, validity checks
 - Web-view of repositories and download of data sets
- Very flexible:
 - Selection of data to commit
 - Merging of conflicting changes
 - All features in openLCA open source

Acknowledgments

Thanks to the US Department of Agriculture (USDA), National Agricultural Library for their support in the development and implementation of the openLCA LCA Collaboration Server under cooperative agreement number 58-8220-2-112F.



United States Department of Agriculture
National Agricultural Library

GreenDeLTa

sustainability consulting + software

Thank you!

Contact: Cristina Rodríguez
GreenDelta GmbH
Müllerstrasse 135, 13349 Berlin, Germany
rodriguez@greendelta.com
www.greendelta.com