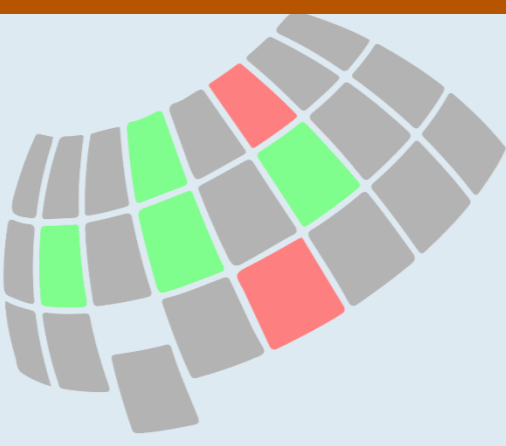




LACO-Wiki



LACO-Wiki: A land cover validation tool and a new, innovative teaching resource for remote sensing and the geosciences

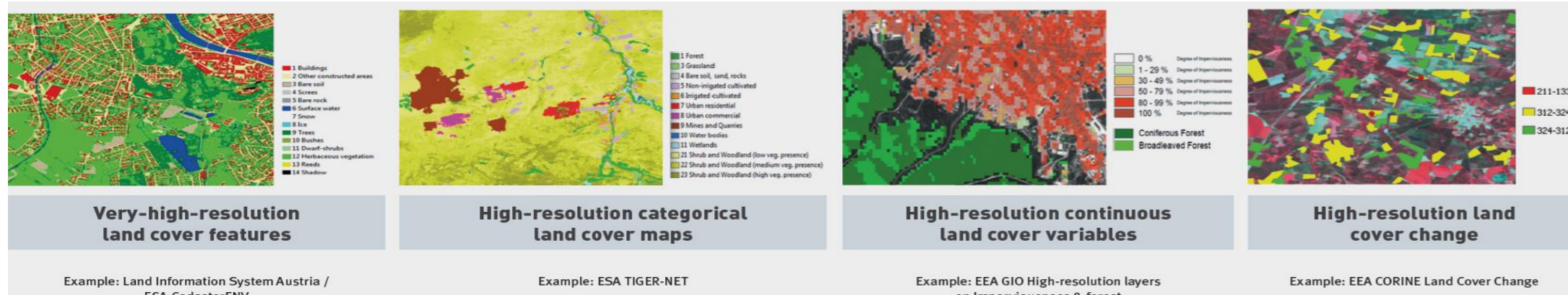
Linda See, Christoph Perger, Christopher Dresel, Martin Hofer, Jürgen Weichselbaum, Thomas Mondel and Steffen Fritz

Try it out at www.laco-wiki.net

Background

Validation is a key requirement for both users and producers of Earth Observation derived land cover and land cover change products, in order to provide evidence that a specific information service yields products of high quality.

Validation requires knowledge of sampling design, image interpretation and/or field-based in-situ reference data collection. The process of validation is taught within remote sensing courses at the undergraduate and graduate levels. However, it often requires specialized software or knowledge of computer programming. LACO-Wiki is the first online land cover validation tool that can be used by map producers, e.g. in validating products from the European Environment Agency (EEA) and the European Space Agency (ESA), as well as teachers and students of remote sensing.



The LACO-Wiki framework

LACO-Wiki provides a framework for combining land cover validation methods and workflows in a single web interface including:

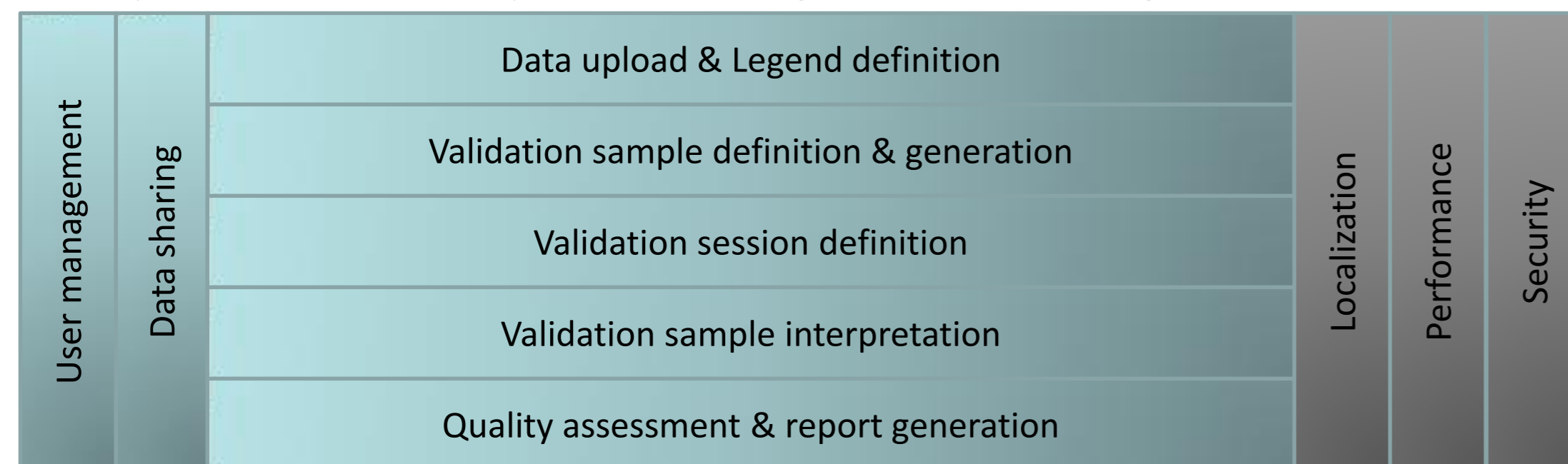
- Online storage, management and sharing of all necessary spatial data incl. user-generated maps;
- Guidance through the entire validation process in the form of “wizards”;
- Methodologically sound sampling designs and rapid interpretation of samples in a user-friendly environment; and
- The generation of state-of-the-art accuracy reports for communication to all types of users.

Users upload their own map for validation and then use satellite imagery from Google Maps® and Bing® as well as an OpenStreetMap® layer to validate a sample generated automatically by the system. In the near future it will be possible to upload your own reference data or access additional reference layers for validation using a Web Map Service, e.g. aerial photographs.

Feature overview

The main features of the system are shown in the figure below. The five horizontal features represent the overall workflow of the LACO-Wiki system from the start of the process when the data are uploaded, the actual validation process and the final reporting at the end. A step-by-step example of the validation workflow is shown in more detail on the right hand side of the poster.

User management, data sharing, localization, performance and security are cross-cutting features of the system as shown vertically on the left and right hand side of the figure below.



The user management has been simplified to make **use of different existing authentication providers (e.g. Geo-Wiki, Facebook and Google+)**. These providers allow users to access LACO-Wiki with existing user accounts on those platforms through the use of OAuth 2.0. This method will also appeal to students who are regular users of Facebook and Google+.

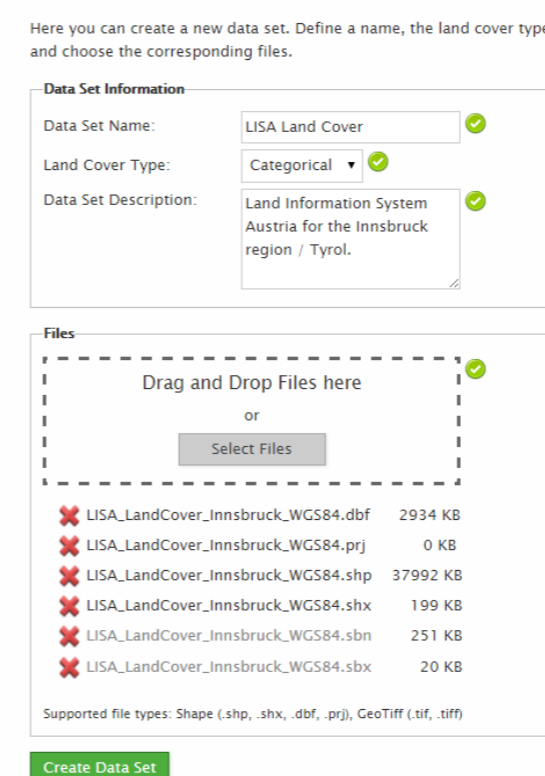
The data sharing feature captures the functionality of **managing and sharing the data, and the processing of results between users and groups**. This includes published data sets, validation samples, validation sessions and reports. This feature will allow teachers to either set individual student projects on validation or have students work in groups to complete a validation exercise.

Random sampling options are available for vector and raster data as well as point sampling options. Stratified sampling is currently available for raster and will be implemented in vector soon. This will allow students to compare the results of different sampling strategies and gain an appreciation for the differences.

A range of accuracy measures are available including standard measures such as **kappa, overall and producer's/user's accuracies** as well as others published in the literature. The **confusion matrix** can also be provided as part of the downloadable report so students can calculate other accuracy measures. New accuracy measures will be added in the future based on user needs.

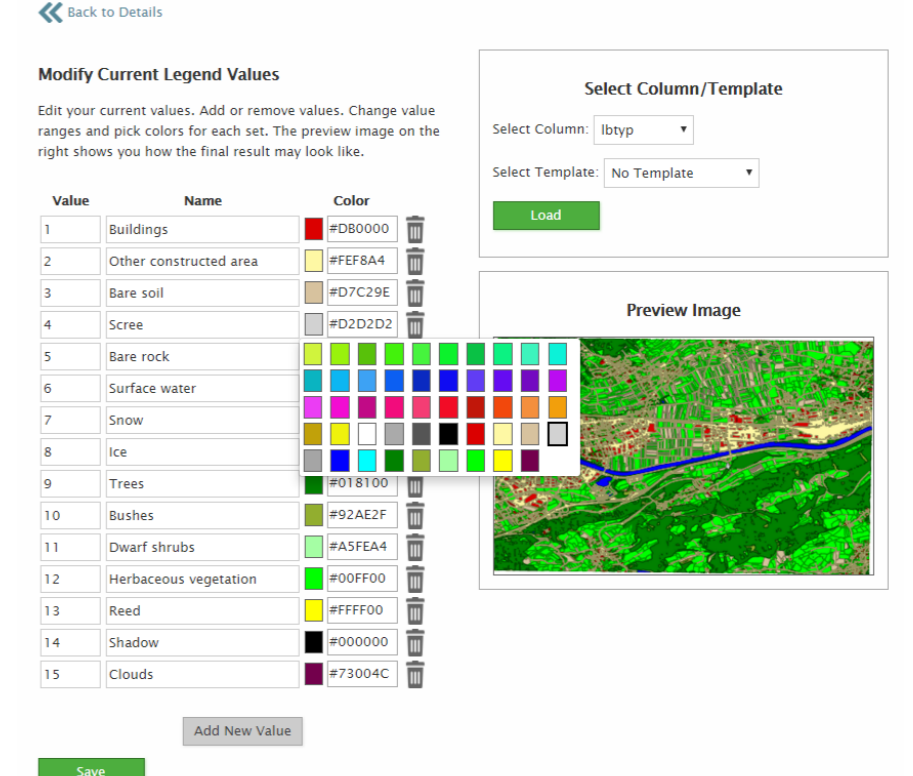
The LACO-Wiki validation workflow as a step-by-step process

1 – Upload a new Data Set



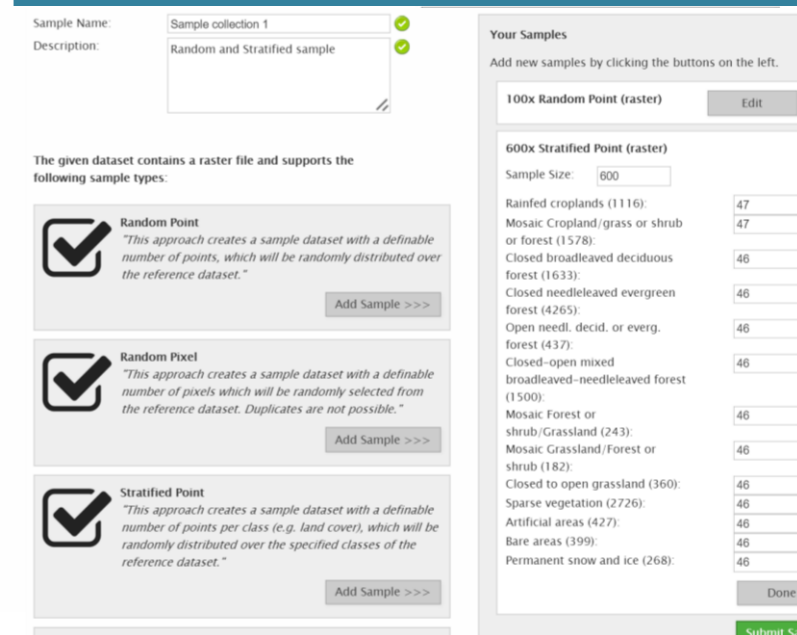
Upload data: categorical or continuous raster or vector

2 – Legend Designer



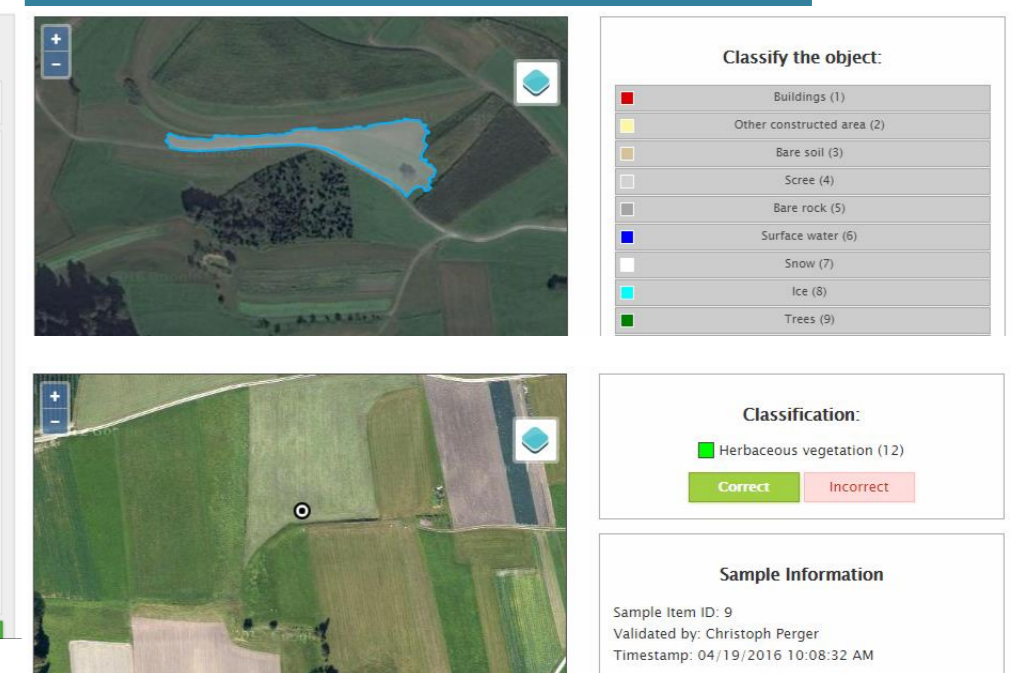
Define a legend: for vector select the column and then apply your settings to the automatically populated classes or ranges

3 – Sample definition



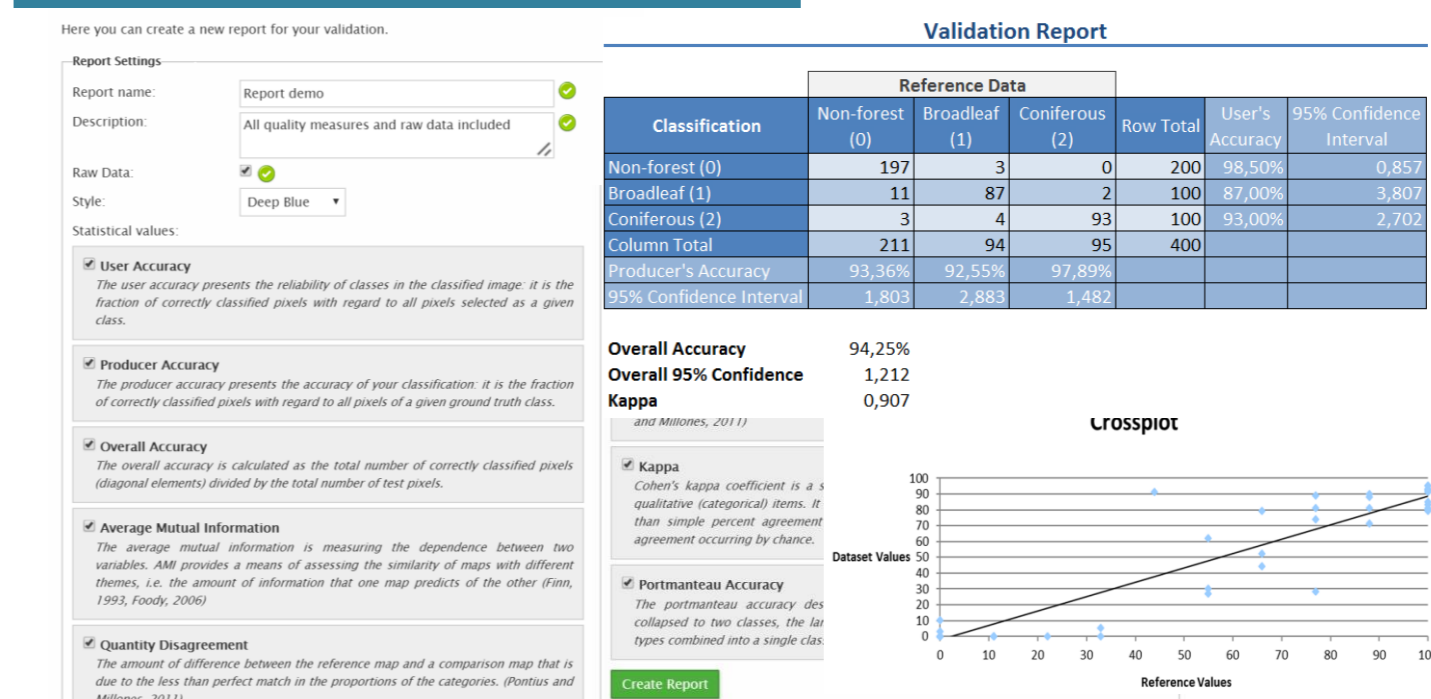
Sampling: generate samples (random or stratified) and validation sessions (blind and plausibility)

4 – Sample interpretation



Validate: use the generated samples to validate the uploaded dataset using base imagery (e.g. Bing®, Google Maps®, OpenStreetMap®)

5 – Reporting & Download



Report: after interpreting the samples, the validation report can be compiled by selecting different quality measures to be included.

Export: The samples and the validation report can be downloaded in MS Excel format (*.xlsx).

Partners:



Supporting institutions:



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