



SUPSI

Swissforages.ch the Free and Open-Source Borehole Data Management System

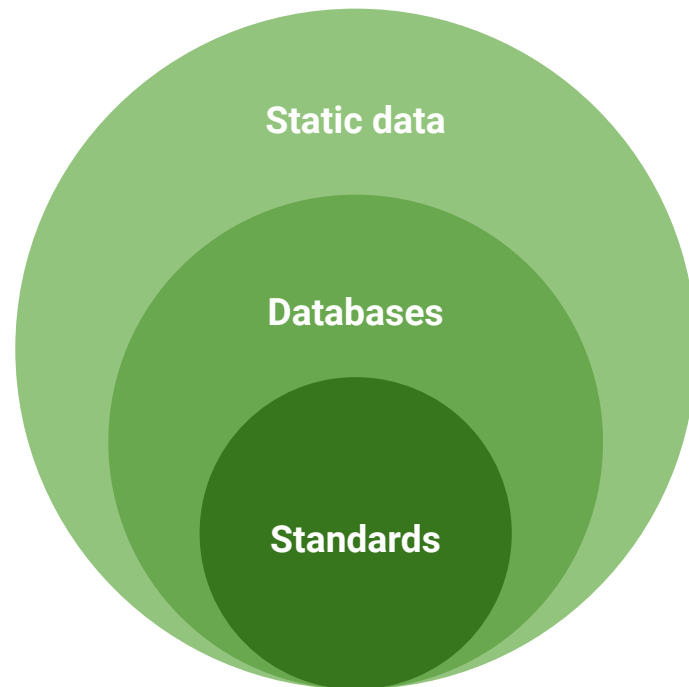
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- to
5
- construction
 - extraction of drinking water
 - mineral resources
 - installation of geothermal probes
 - etc.

Data handling: common practices

- Most used approach:
 - Geologist produces **static data reports** that describe the stratigraphy and the related characteristics
- Sometimes data are integrated into **database**
- Rarely borehole data are stored following **standards**

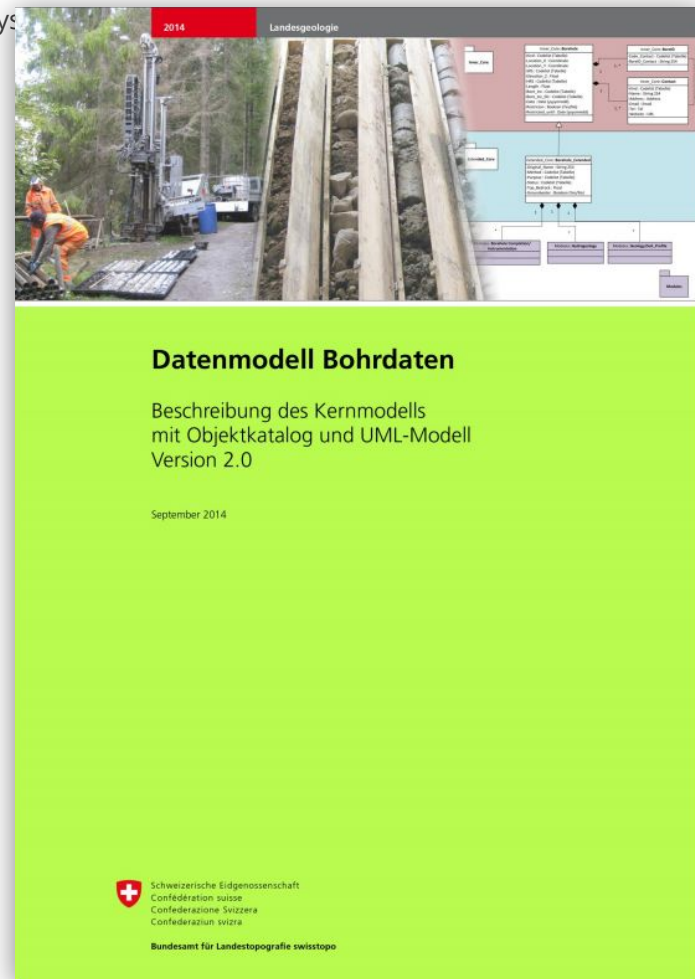


The Federal Borehole Data Model

Benefits:

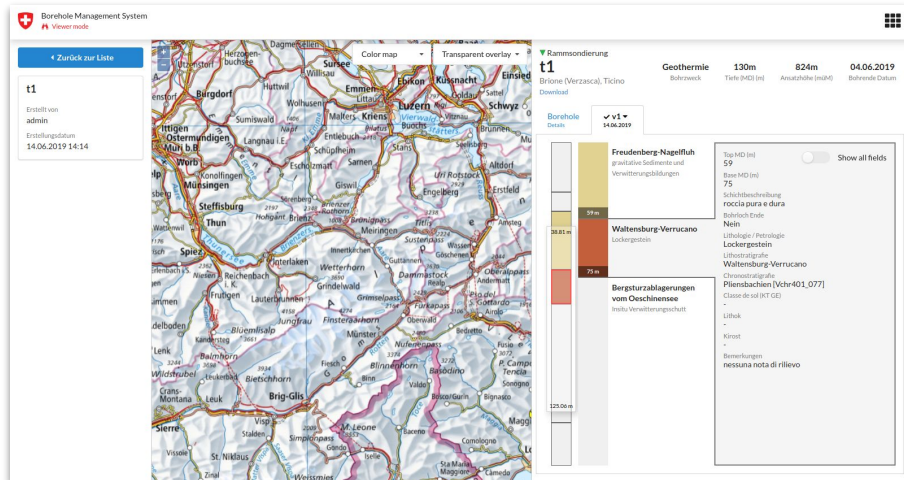
- The focus is on the **exchange**, the **usage** and **quality** of the data
- Data harmonization
 - **level of detail**
 - **precise definitions**
 - **relationships** and **dependencies** among the data
- **Common language** between stakeholders

<https://www.geologieportal.ch/en/>



The official web application standard compliant

- In 2018 Swisstopo financed SUPSI the development of a new Web Application to manage and exchange Borehole data with an Open Source License.

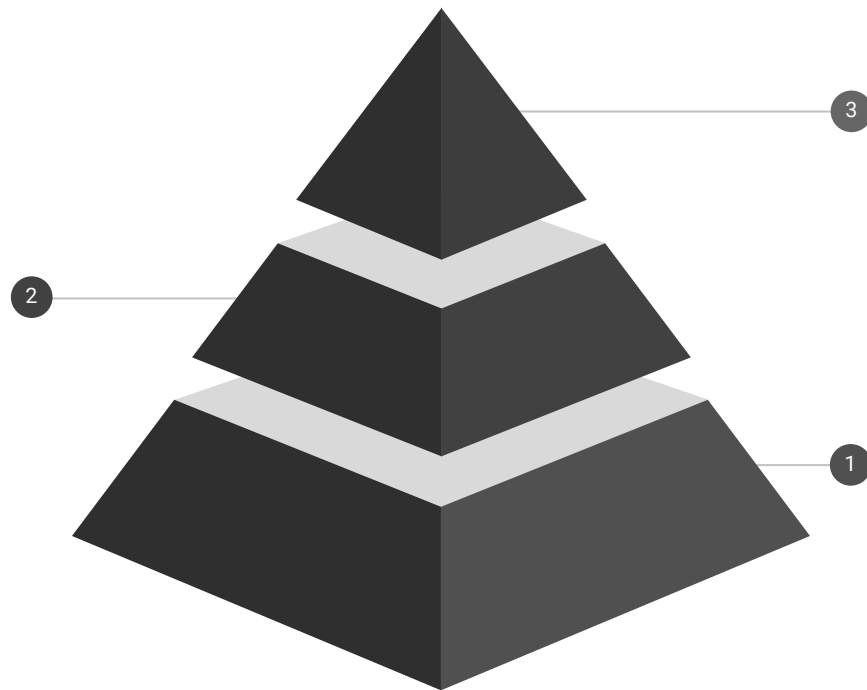


The screenshot displays the Borehole Management System (BMS) web application in 'Editor Mode'. The main interface shows the 'Stratigraphie' (Stratigraphy) form for a borehole. The form includes fields for 'Name / Version', 'Date', and 'Stratigraphie'. The 'Stratigraphie' field is filled with 'v1' and '14.06.2019'. The form also includes a 'Stratigraphie' section with a list of layers and their descriptions. The layers are: '0m Informell benannte Holozäne Subgruppe', '23m Bergsturzablagerungen vom Oeschinensee', '32m Freudenberg-Näpfli', '59m Waltenburg-Verrucano', and '75m Bergsturzablagerungen vom Oeschinensee'. The form also includes a 'Borehole' section with fields for 'Top MD (m)', 'Base MD (m)', 'Schichtbeschreibung', 'Bohrloch Ende', 'Lithologie / Petrologie', 'Lithostratigraphie', 'Chronostratigraphie', and 'Bemerkungen'. The form is dated '22.08.2019 14:23' and is in 'v1' version.

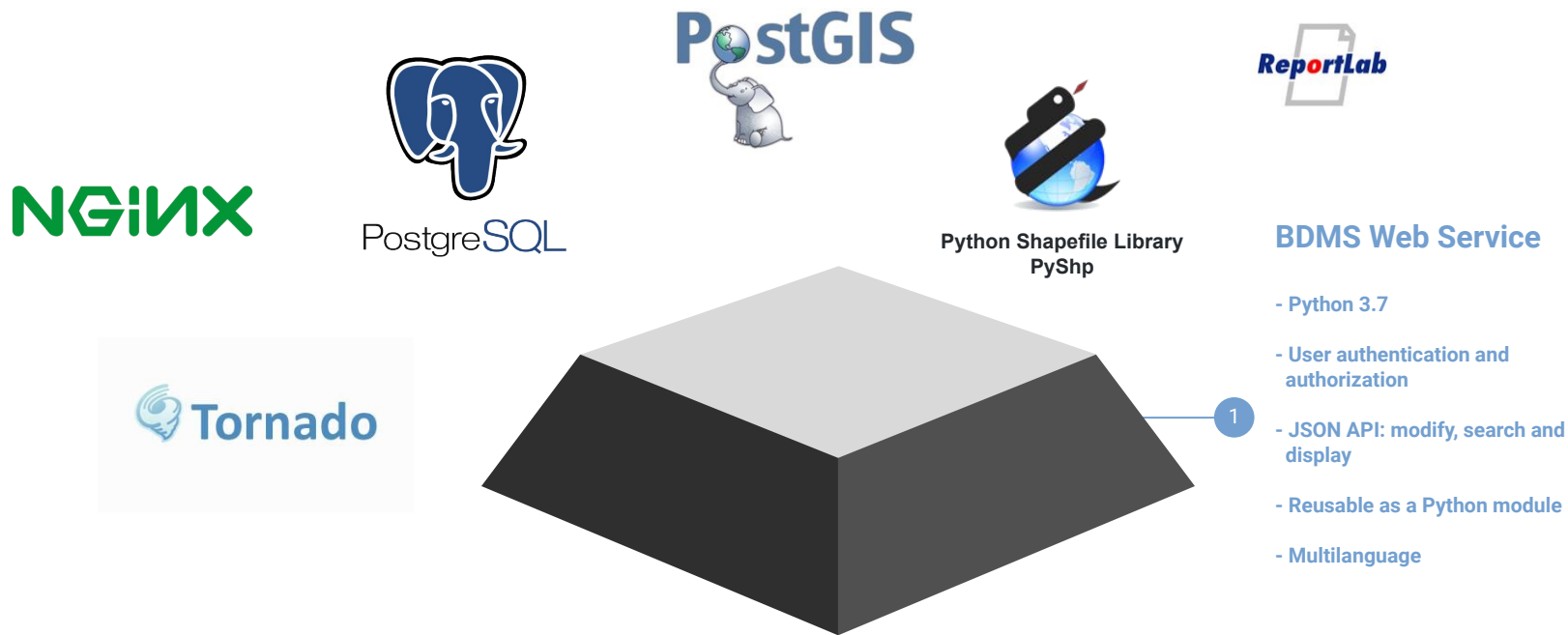
Borehole Data Management System

~ A modular architecture ~

There are three main modules



System Architecture: Web Service



System Architecture: JavaScript API



System Architecture: User Interface



BDMS JavaScript API

A JavaScript Library implementing the BDMS Server API

Packaged as NPM package

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BDMS User Interface

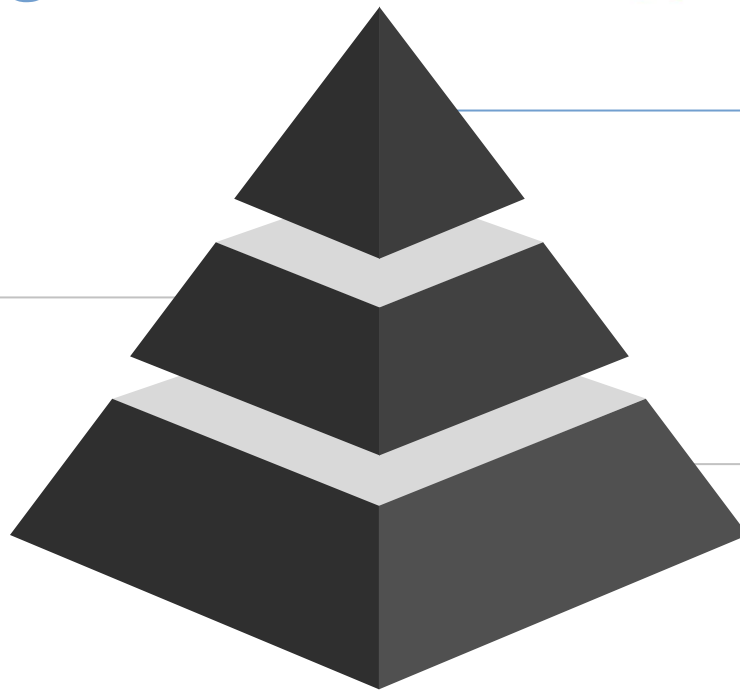
ReactJS single page user interface

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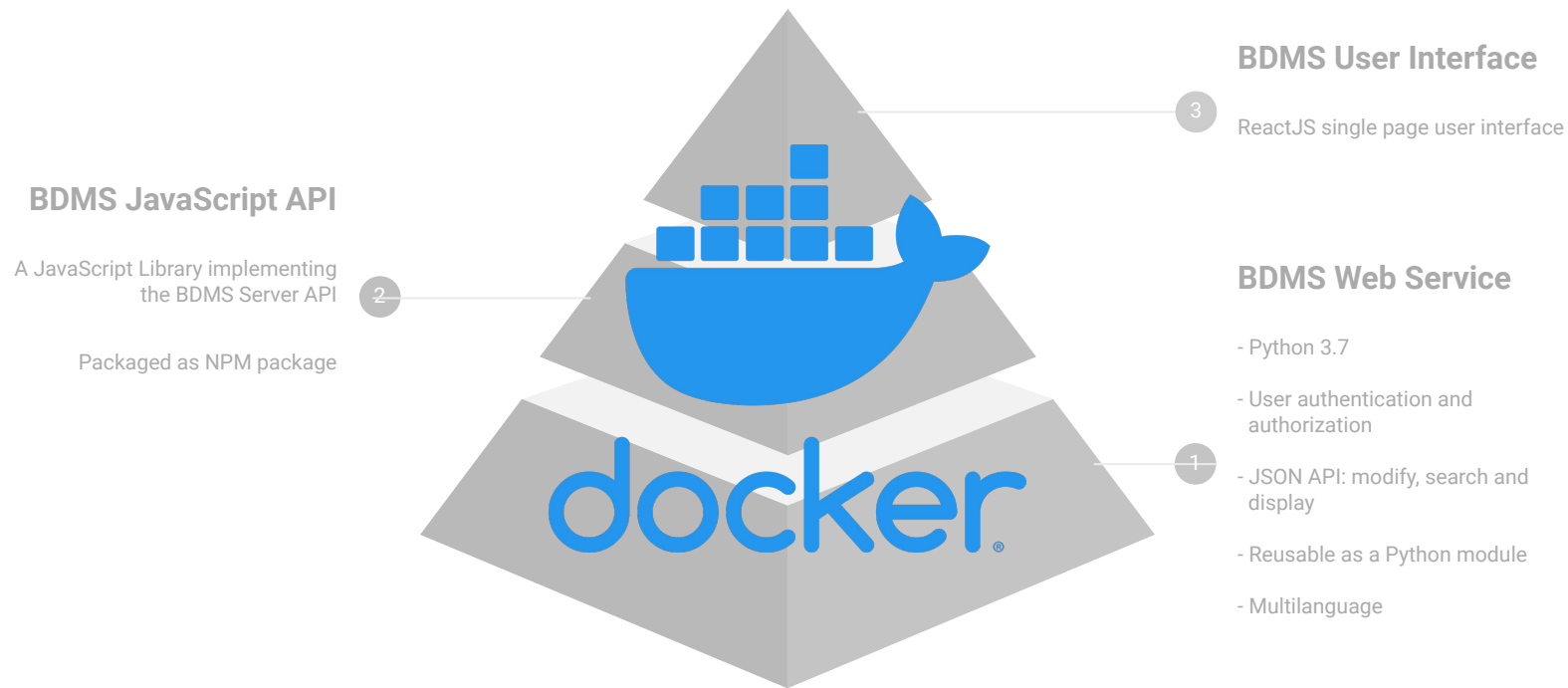
BDMS Web Service

- Python 3.7
- User authentication and authorization
- JSON API: modify, search and display
- Reusable as a Python module
- Multilanguage

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System Architecture: **ready for the cloud**



Borehole Data Management System

~ How it works ~

Two modes

Viewer mode (read only)

- Offering access to all the published data

Editor mode

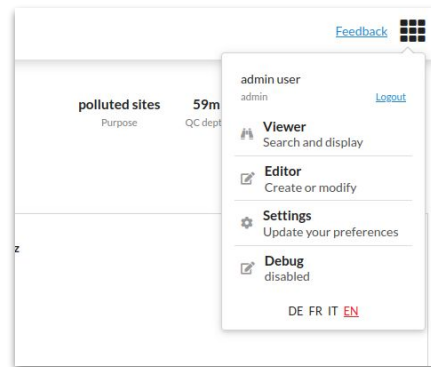
- Create new borehole metadata through the **quality control** process

EDITOR MODE

- **Insert** new borehole metadata
- **Validate** and check the quality
- **Publish** to viewers

VIEWER MODE

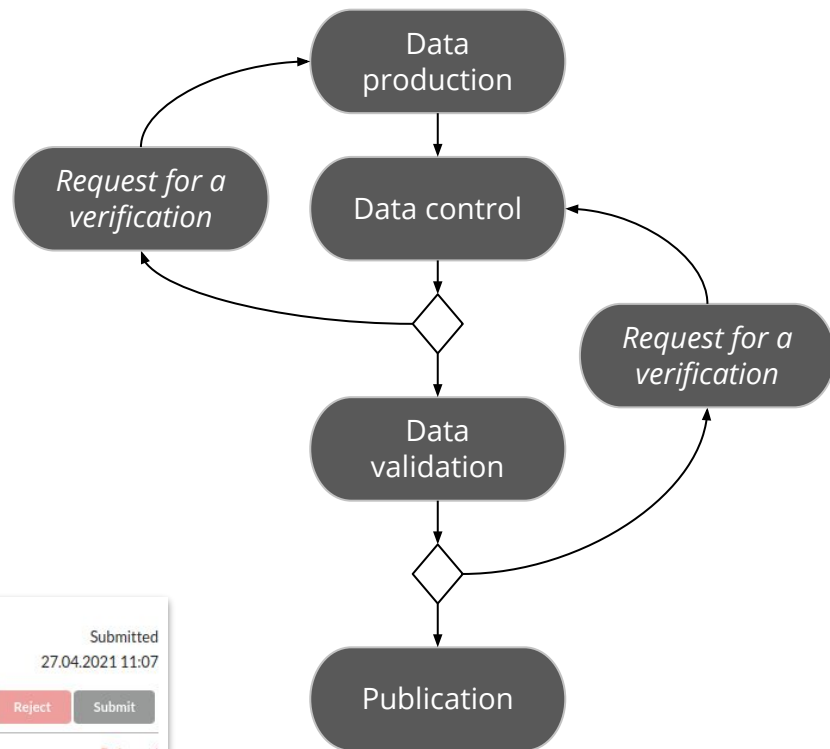
- **Explore** with an interactive map,
- **Search** data with attributes filtering
- **Export** selected borehole data & metadata in PDF, CSV and/or Shapefile



Quality control process

Roles:

- Data producer (EDITOR)
- Data controller (CONTROLLER)
- Data validator (VALIDATOR)
- System administrator (PUBLISHER)



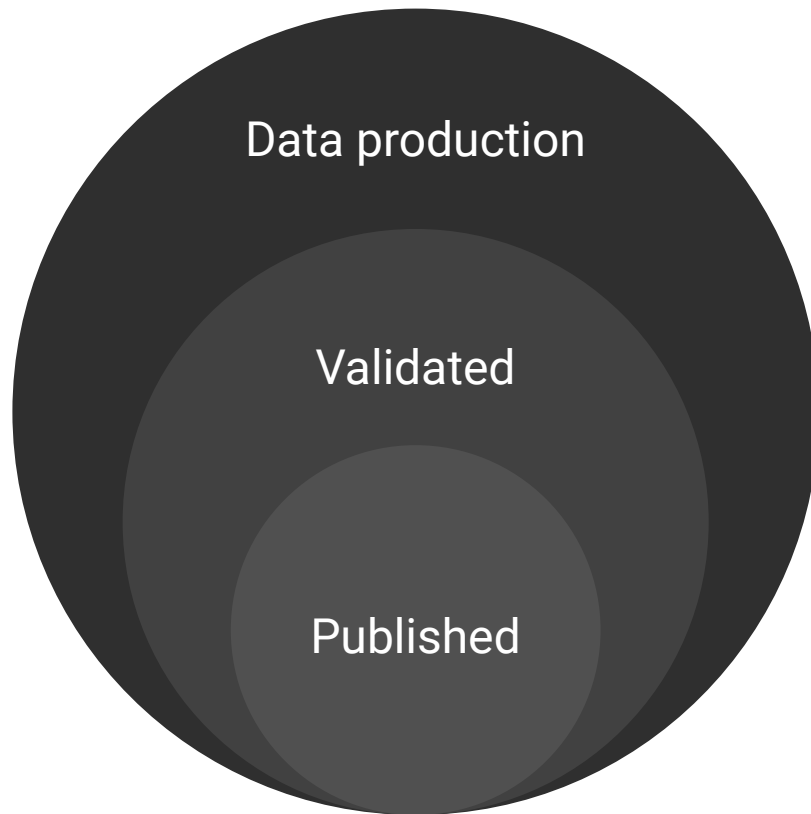
The screenshot shows the Swissforages web application interface. On the left, there is a sidebar with navigation options: Done, Location, Borehole, Stratigraphy, and Attachments. The main area displays a form for entering borehole data. The form includes fields for Identifier, Code, Original name, Project name, Public name, Drilling type, Revision, and Revision date. There are also fields for coordinates (Coordinate East, Coordinate North, Coordinate East, Coordinate North) and a map view showing the location of the borehole. On the right, there is a summary of the data entry process, including a status bar with a green circle indicating 'Change in progress' and a red circle indicating 'Validation'. The status bar also shows the date and time of the last update: 27.04.2021 11:07. Below the status bar, there is a table with columns for Status, Date, and Time, showing the history of the data entry process.

Status	Date	Time
Change in progress	27.04.2021	11:07
Validation	30.03.2021	10:27
Publish	30.03.2021	10:27

Data status

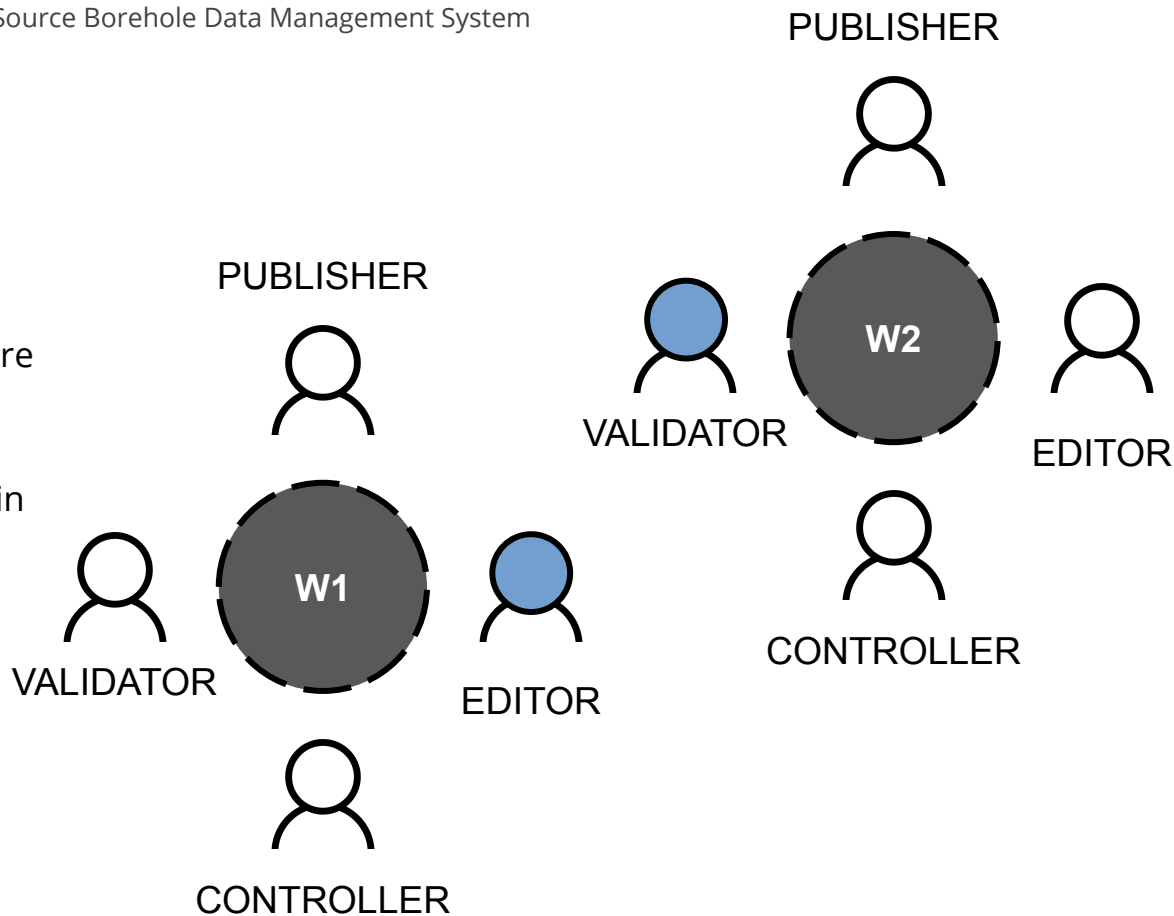
Three different statuses:

- **Data production:** borehole data that are inside of the quality control process.
- **Validated:** all the data that are valid but not yet published (or will not be published).
- **Published:** all the borehole data that have passed the quality control process and are available to the viewers.

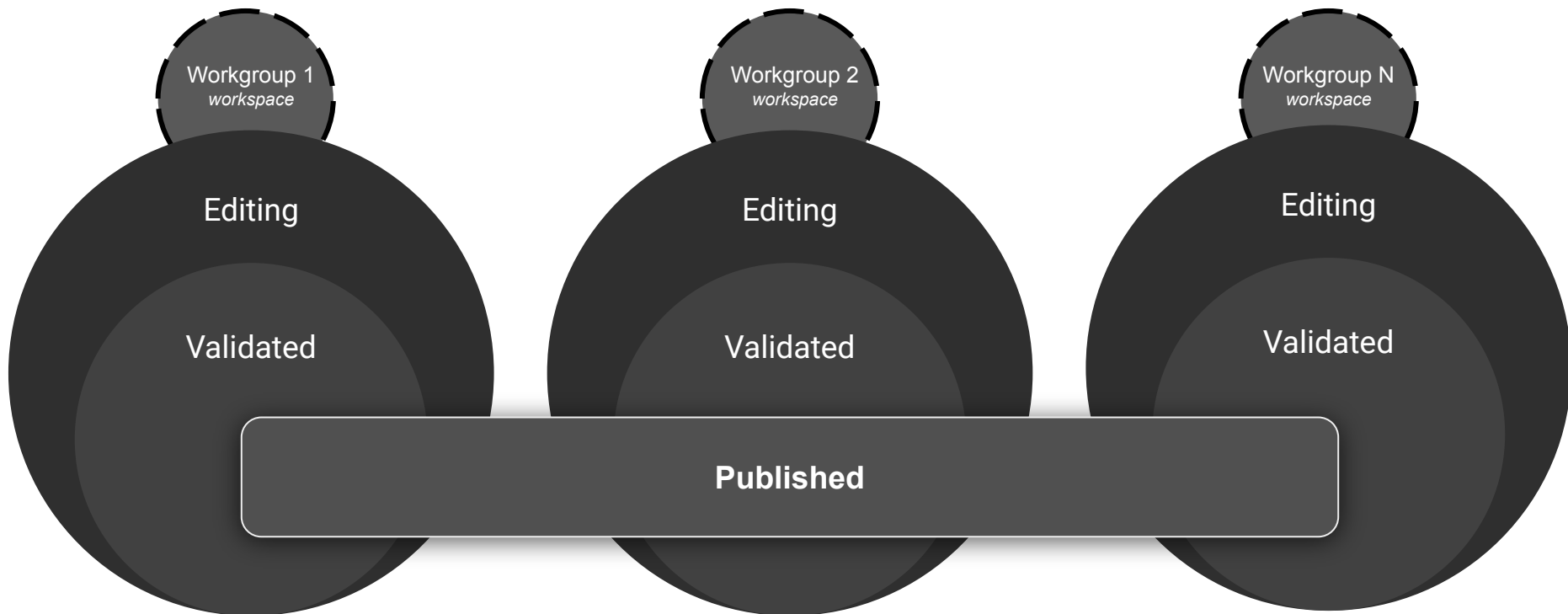


Workgroups

- A user can belong to one or more workgroups.
- A user can have different roles in different workgroups
- Users from one workgroup cannot interact with data belonging to other workgroups

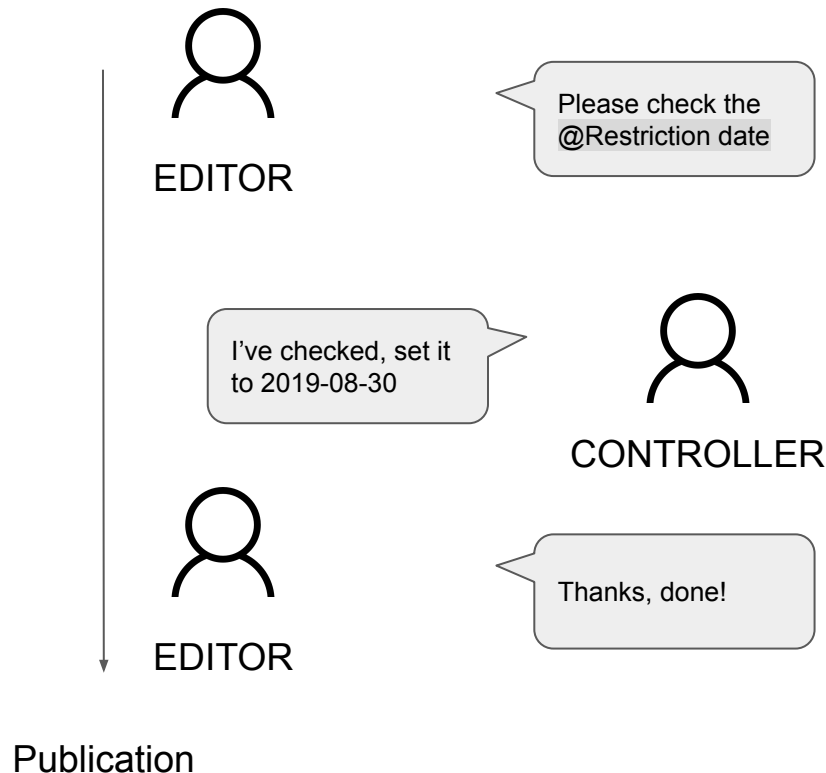


Data Access Control



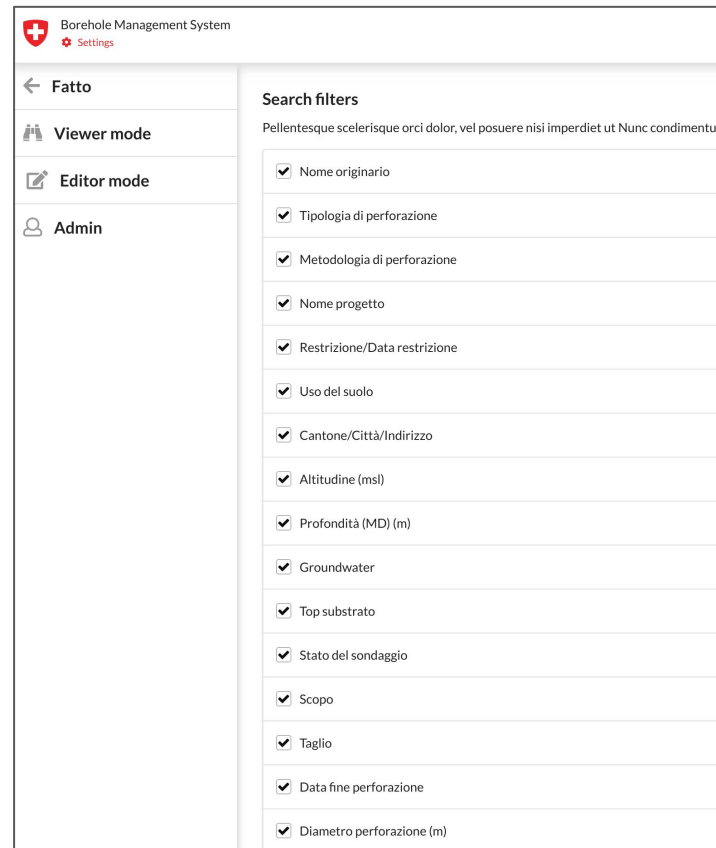
Validation and comments

During the quality check process, users can add comments, nominating form fields so that editors can visually see which fields are wrong.



High Degree of Customization

- Define visible fields
- Select search filters
- Choose between 6 display modes
- Add external WMS overlays



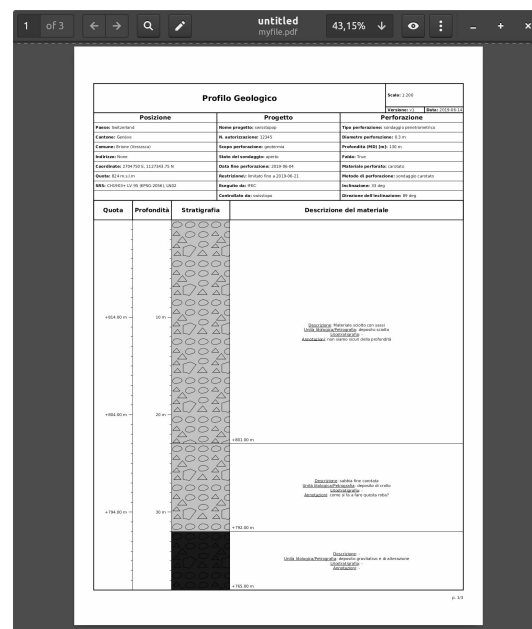
Export data as:

Select Boreholes and download:

- ShapeFile
- CSV
- PDF

2 boreholes selected. (Reset selection) Export as: ☒ PDF ☐ CSV ☒ Shape File [Download](#)

Original name Drilling type	Restriction Restriction date	Elevation (masl) (HRS) Depth (MD) (m)	Status of borehole Drill end date	
● test-001 drilling	free	287 m (LN02) 15 m	filled 23.07.2019	-
● Kernbohrung, M. 1:50 drilling	free	556.6 m (LN02) 8.4 m	not specified 16.03.2016	-
● test_ON drilling	free	559.8 m 500 m	20.07.2019	+



Thanks for your attention

You can find all the source code on GitHub:

BDMS Service

<https://github.com/geoadmin/service-bdms>

BDMS JS API

<https://github.com/geoadmin/js-bdms>

BDMS UI

<https://github.com/geoadmin/web-bdms>

Go to see how it works:

<https://www.swissforages.ch>

*Special thanks
to Swisstopo
for financing
this project*