CBM Geometry Database

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Geometry Database Requests

- Store and retrieve the geometry of the CBM modules in TGeo format (binary);

- No need to be more granular (within module geometry)
  - typical size of ROOT file is small (several 10 kB);

- Two-dimensional versioning (time, context);

- Manage setups (combinations of module geometries);

- Direct interface to CBMRoot for geometry building;

- High availability, good performance for online access (during CBMRoot run);

- Possibility to create a full TGeo file for a given setup (for offline use). Can be also realized within CBMRoot;

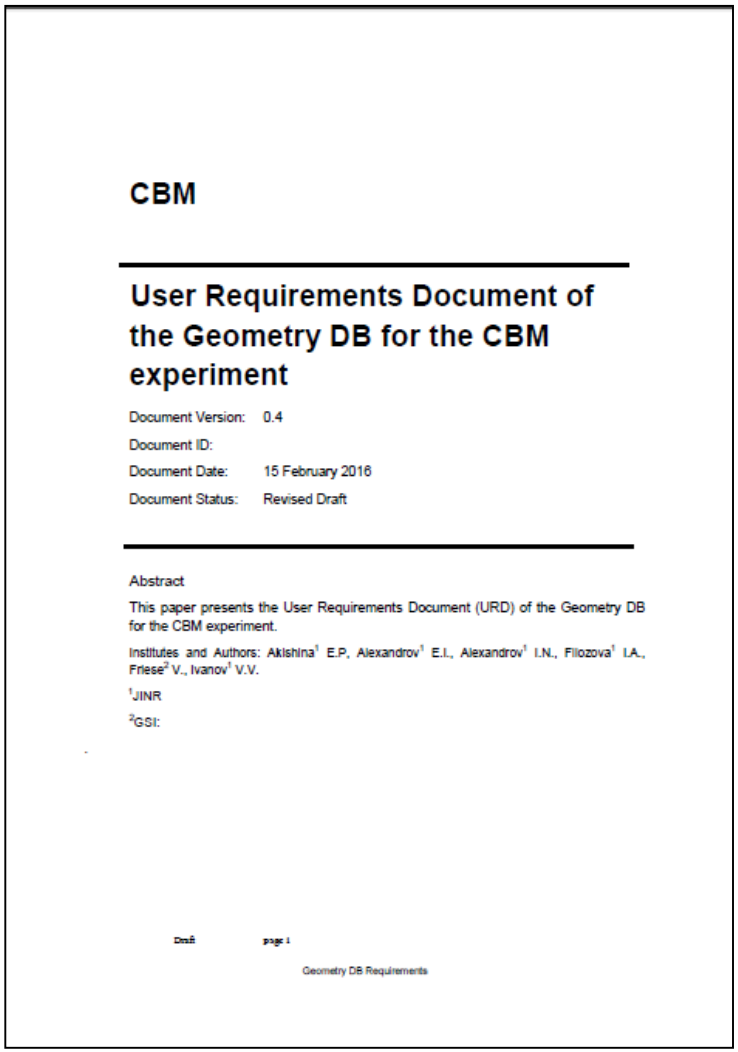
- Modular access patterns (read/write) on group/user levels.

Geometry Database

Geometry Database is the information system to:

- store the modules of CBM;
- load the geometry modules for setup construction;
- construct setup from the stored modules;
- support different versions of setup.

Geometry DB. User Requirements



CBM

User Requirements Document of the Geometry DB for the CBM experiment

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Abstract

This paper presents the User Requirements Document (URD) of the Geometry DB for the CBM experiment.

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Draft page 1

Geometry DB Requirements

Basis for Geometry DB development:

User Requirements Document of Geometry DB for the CBM experiment

http://lt-jds.jinr.ru/record/69336?ln=en

Basic definitions

Geometry Module

File in ROOT format with content of detector geometry

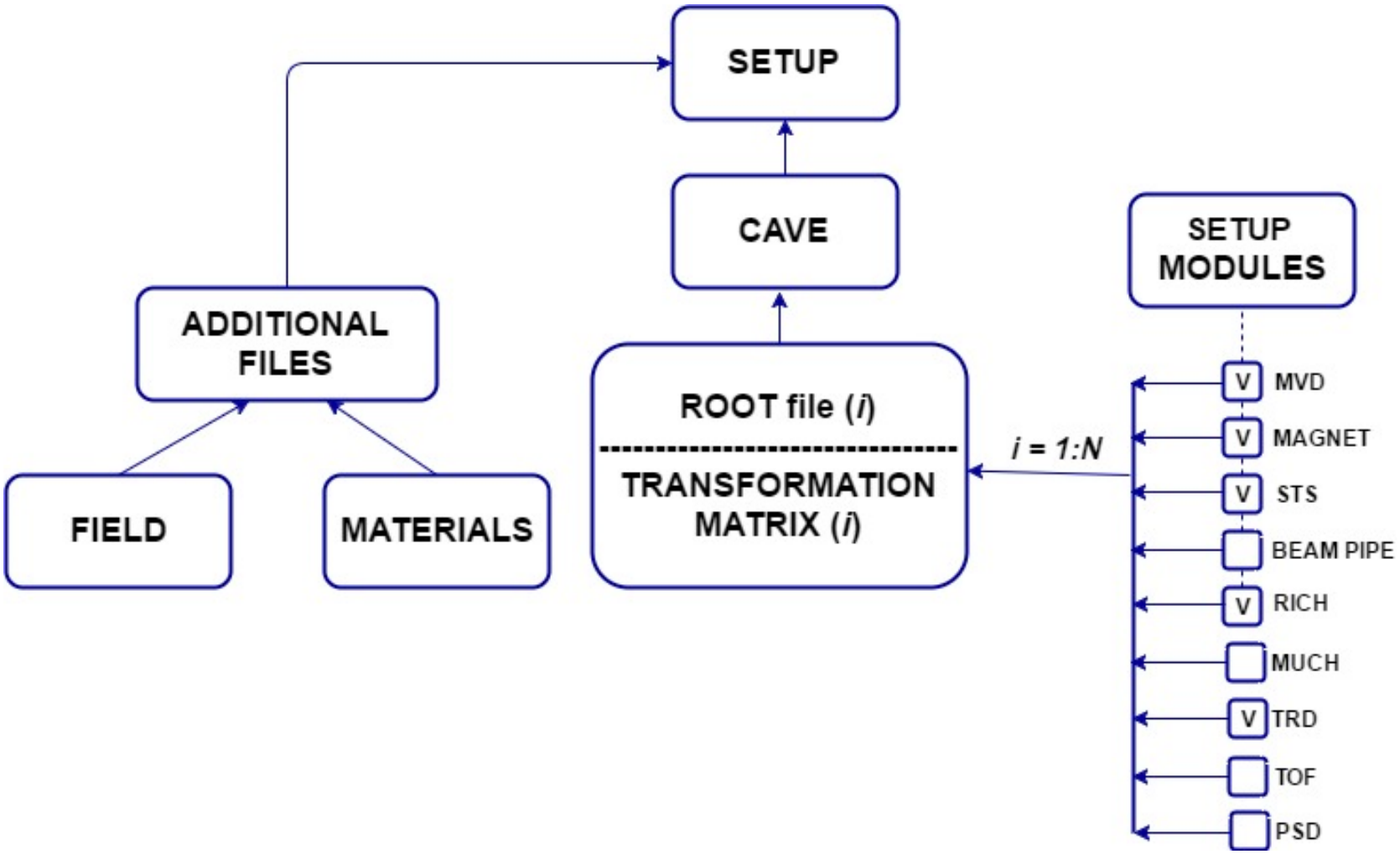
Setup Module

Geometry module, link to the mother geometry module, its placement in the mother module (transformation matrix or object of class TGeoMatrix)

Setup

Combination of setup modules which represents the full CBM geometry

Setup Structure



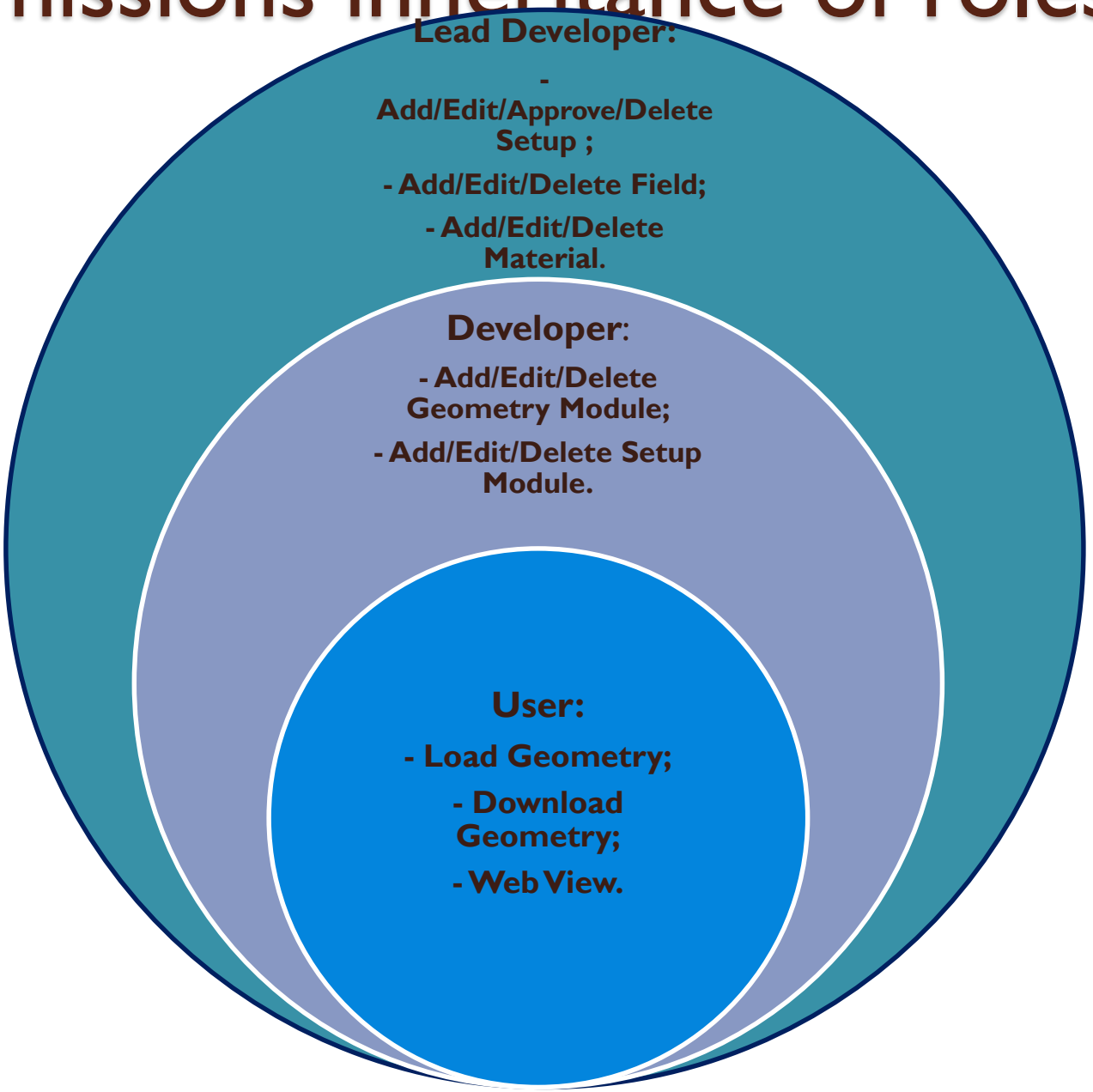
Users

Lead Developer
coordinator and responsible person for the entire CBM geometry

Developer
the responsible developer for one of modules

CBM user
CBM user can only read data. CBM user can be a human using GUI or an application using API

Permissions inheritance of roles



Status of development

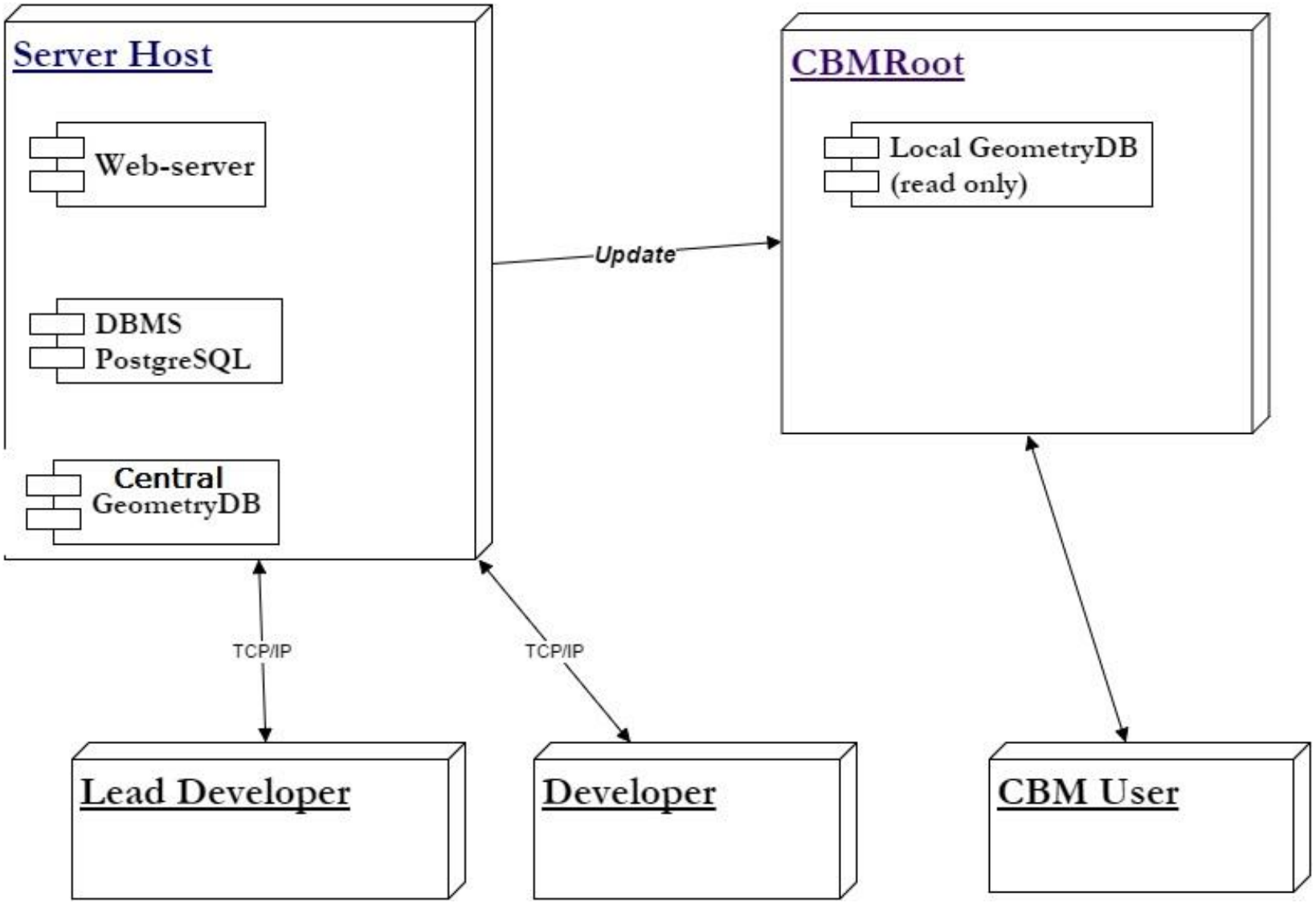
Operation
Load Geometry
Download Geometry
Web View
Add/Edit/Delete Geometry Module
Add/Edit/Delete Setup Module
Add/Edit/Delete Setup
Approve Setup
Add/Edit/Delete Field
Add/Edit/Delete Material

Implemented

Not Implemented

Partially Implemented

Component Diagram

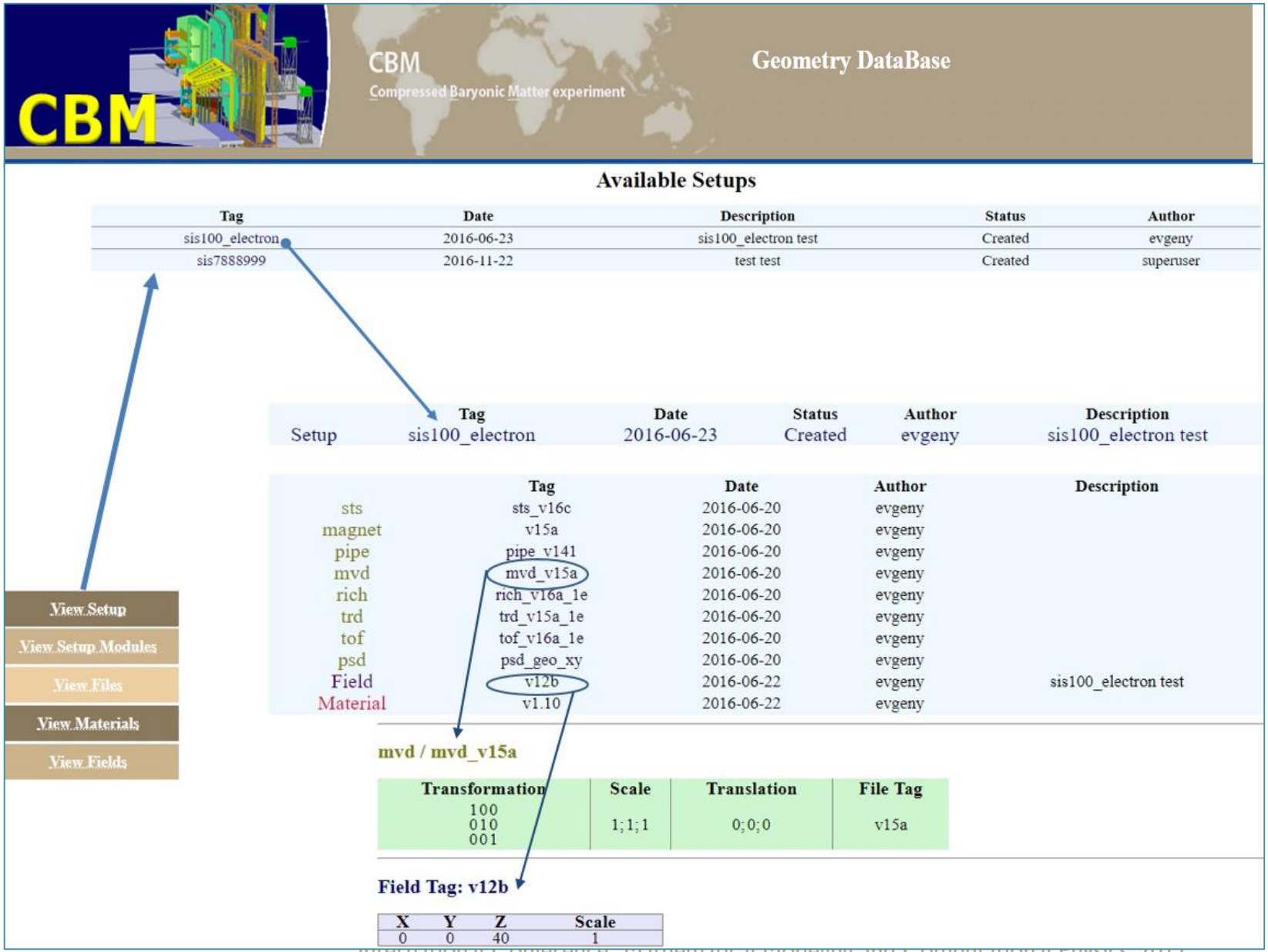


The implementation of GUI and API

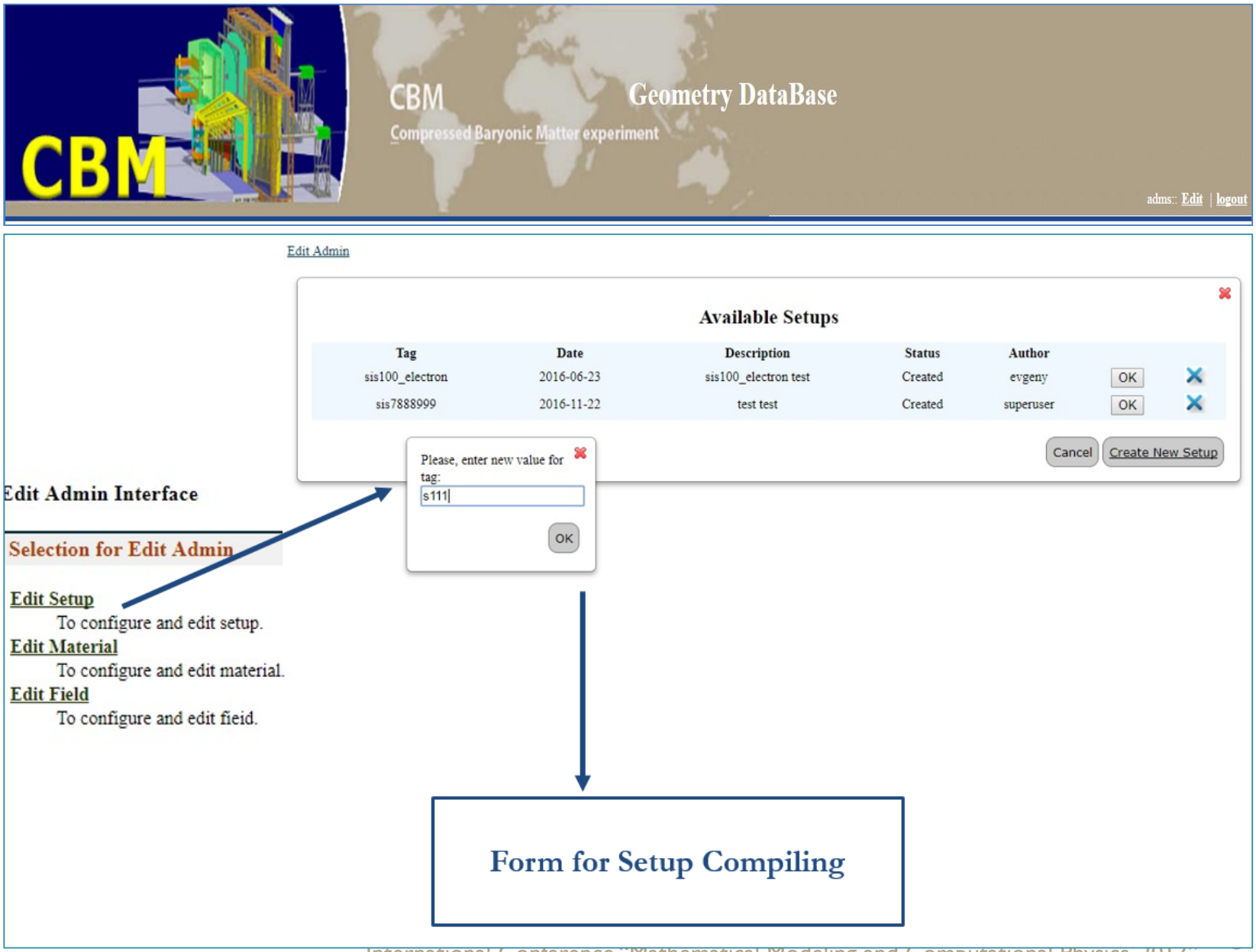
All type of Users can view the information from Geometry Database. **Lead Developer** and **Developer** use Database to update data files corresponding to any object of Geometry DB. They can use:

- **GUI (Graphical User Interface)** - supported through Web-Server that is implemented by Apache server and PHP scripts.
- **API (Application Programming Interface)** - implemented as macros of the ROOT environment. Any macro can be used as executable file or can be called from other ROOT macros. There are 2 types of macros: *Upload* and *Download*.

Web-interface. View Mode.

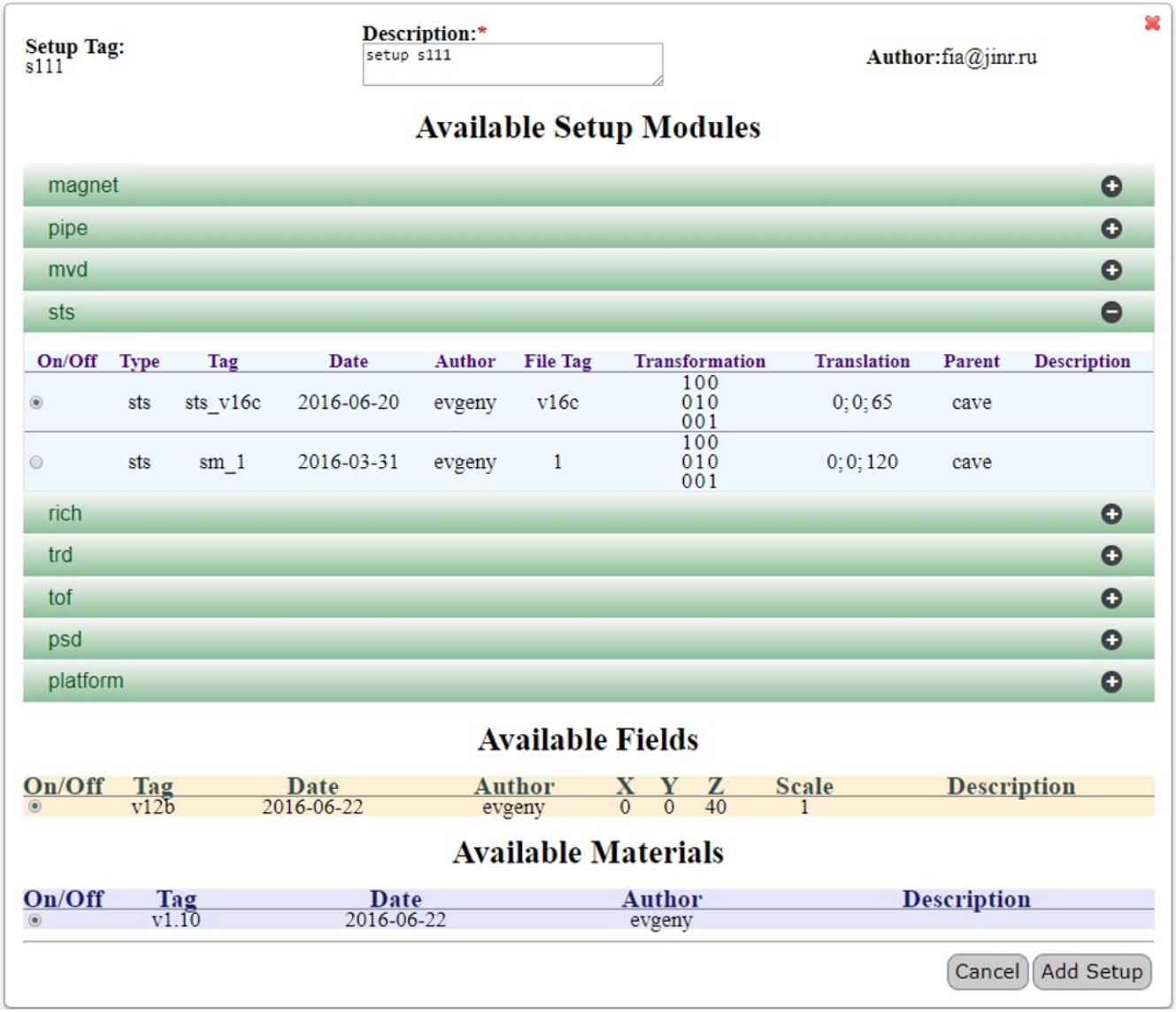


Web-interface. Edit Mode.

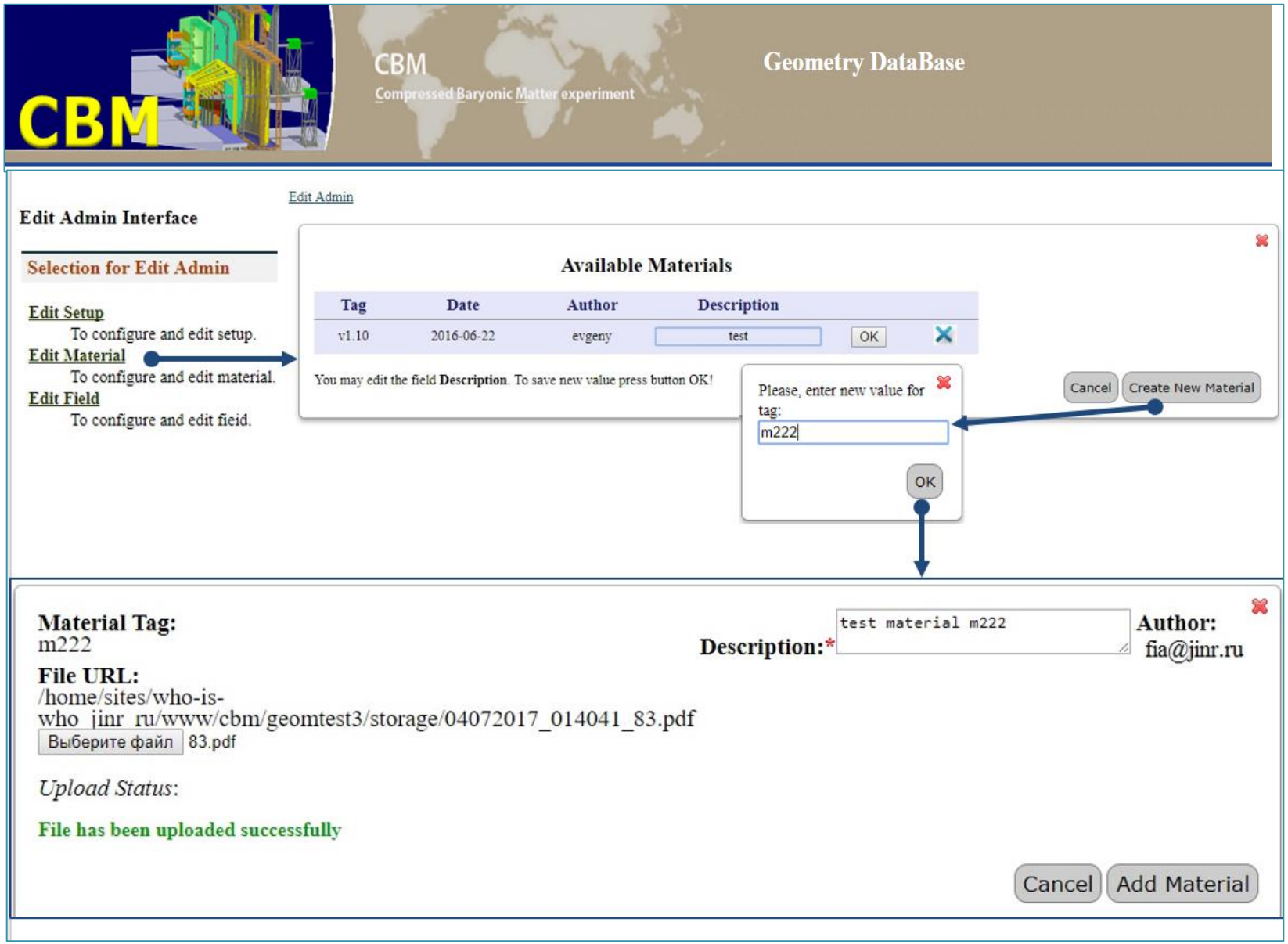


Web-interface. Setup Compilation.

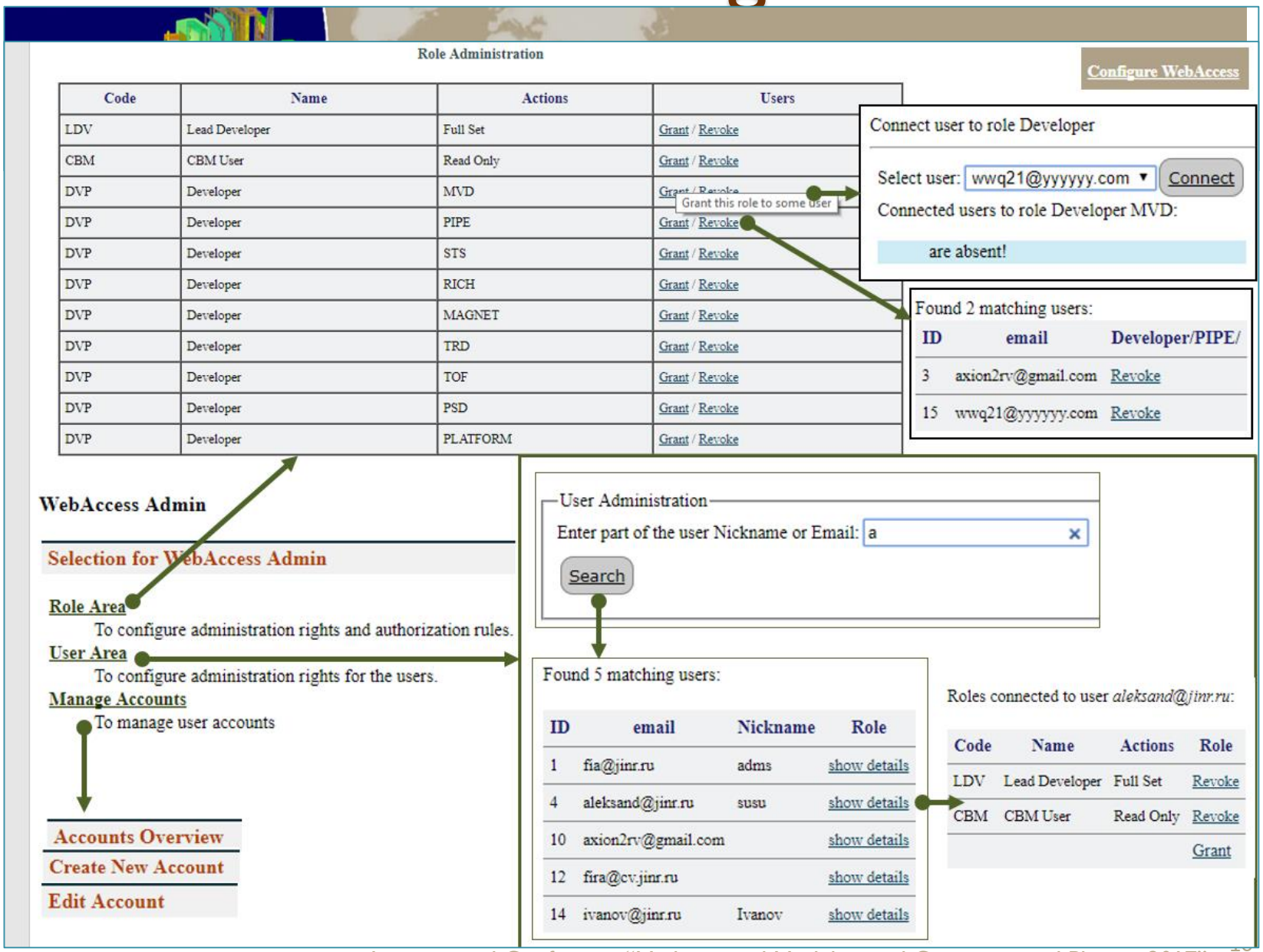
Add Setup



Web-interface. Add/Edit Material.



Web-interface. Configure Access.



Upload Type Macros

API is implemented as macros of the ROOT environment.

Upload type macros can be used by **Lead Developer** and **Developer** to load the geometry into the Central Geometry DB according to access privileges.

Download Type Macros

Download macros are used by CBM users to obtain information about existing Setups and to load the needed Setup from Local Geometry DB into the memory of applications.

```
$root -b -q 'getSetupList.C("test2.db")'
```

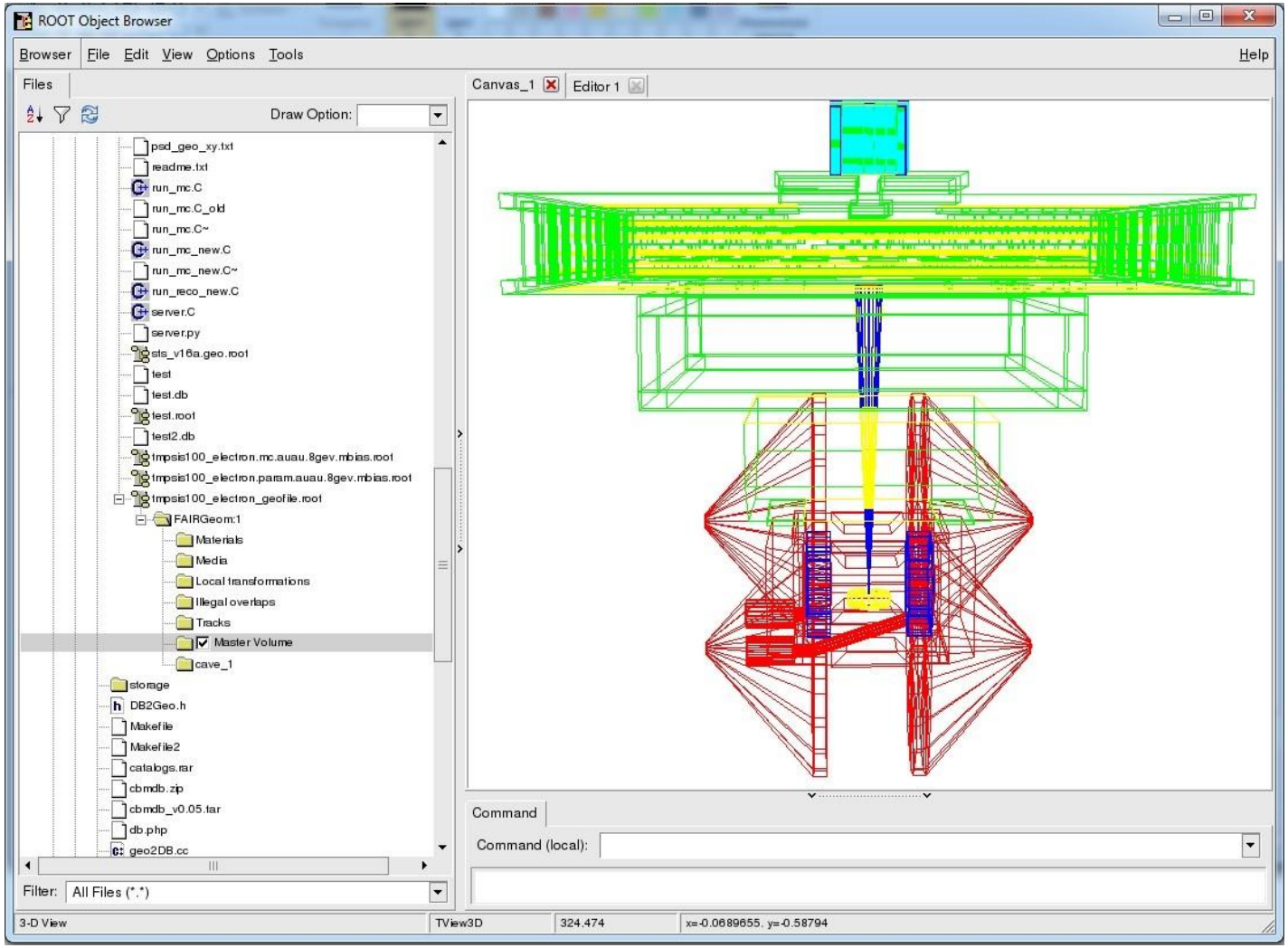
Setup list:

Tag	Date	Author	Description
sis100_electron	23.06.2016	evgeny	desc sis100_electron

Load Setup Macro

gROOT->LoadMacro("loadSetup.C");

loadSetup("sis100_electron");



Conclusion and Next Steps

- Geometry DB for storing and retrieving the geometry of CBM modules is developed in PostgreSQL DBMS
- Most of GUI (Graphical User Interface) tools were implemented
- Most of API (Application Programming Interface) tools as a set of ROOT macros (Upload and Download) were implemented

- To develop GUI and API:
  - Approve Setup
- To upgrade GUI:
  - Add/Edit/Delete Geometry Module
  - Add/Edit/Delete Setup Module
  - Add/Edit/Delete Field
  - Download Geometry
- Improve web-interface