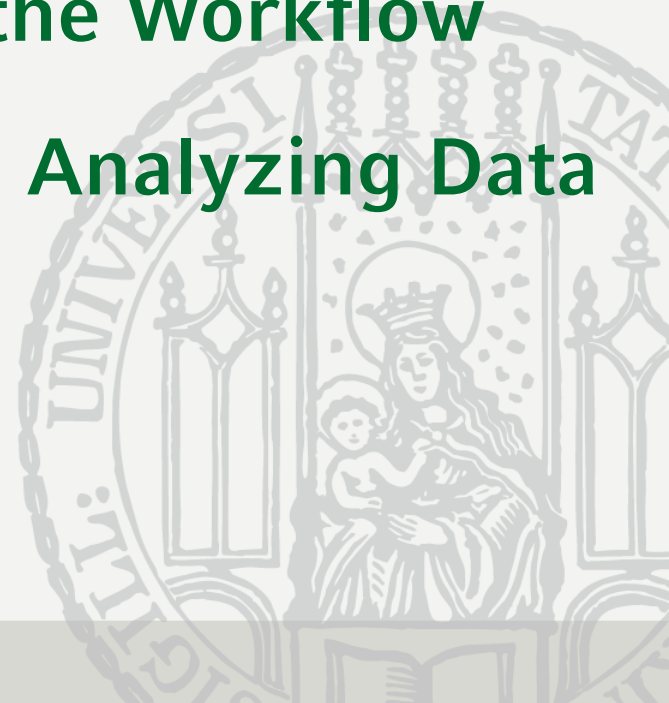


Ludwig-Maximilians-Universität München – Institut für Informatik –
Lehrstuhl für Datenbanksysteme und Data Mining

Presentation: Daniel Kaltenthaler

A Framework for Supporting the Workflow for Archaeo-related Sciences: Managing, Synchronizing and Analyzing Data

Daniel Kaltenthaler, Johannes-Y. Lohrer,
Peer Kröger, Henriette Obermaier

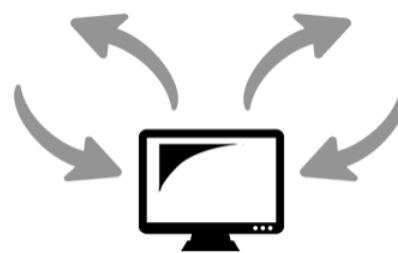




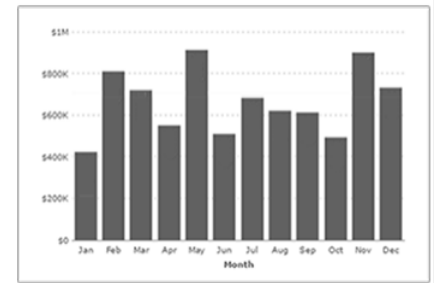
Excavation



Data Gathering



Data Sharing



Data Analysis

1. Data Gathering:

Saving of archaeo-related data digitally in a database.

2. Data Sharing:

Collaborating with colleagues and sharing data with other users.

3. Data Analysis:

Executing analyses on the available data.

Development and Implementation of the xBook Framework

Background:

- Workflow is similar in all disciplines
- Collected data is different in each special field.

Challenge:

- Provision of a generic database solution for all disciplines
 - As customizable as possible to allow required information about the specific data to be gathered
- **xBook**, a generic open-source framework including the common and basic features for a database for archaeo-related disciplines

xBook Framework

- Registration for users (**User Management**)
- Gathered data is separated to single data groupings (**Projects**)
- Dynamic and flexible **Data Entry Mask** that provides reusable input fields; custom input fields can be added to each Book
- All data can be displayed as a table form (**Data Listing**)
- **Data Search** to filter available data with specific terms or values
- Entered data can be exported to Excel Sheets / CSV (**Exporter**)
- **Project Right Management** to share data with specific users.
- **Update Function** to update program version / database scheme
- Wrapped into a **common GUI** which structure can be reused

OssoBook

OssoBook - Version 5.4.3

Projects Data entry Listing Search Sync Group Tools Help Log-out

Input fields

Skeletal element

Enter the skeletal element. The list can be filtered using words or parts of words. E.g. Inputting the word "carp" loads all entries into the drop down menu, which contain exactly this letter sequence. The Latin name or numeric codes can be entered. The skeletal part is not bound to species therefore it is up to you to decide which elements are possible.

A selection of numeric codes (from an earlier version of OssoBook) can be found in the 'Open Information' section.

Show available values

General

Add or edit the information of the entry. Simply fill out the necessary input fields.

After completing the data entry click the save button.

Click the check box besides specific input fields to store the value of the field for following entries. Those unchecked will be emptied. This feature

ArchaeoBook - Version 5.4.3

It is for app

Project information: Stuttgart 2017 | Baden-Württemberg | Deutschland

Entry information: 1 | Ampulle | Glas > Glasschlacke

Objektinformationen

Number of objects: 1

Object description: Generic term: Gefäß

Object condition: restaurant

Object note

Technique: vv

Measurements: Bodendurchmesser: 8,5 cm

Datation: Mittelalter

Material: Glas > Glasschlacke

Set

Weight: 150 g

ASM Number

Additional object description

Literature

User: Daniel Kaltenthaler
Project: Stuttgart 2017

ArchaeoBook

ArchaeoBook - Version 5.4.3

Projects Data entry Listing Search Sync Group Tools Help Log-out

Input fields

Material

Sobald Sie eine Materialgruppe wählen, erhalten Sie weitere Auswahlmöglichkeiten. Über den Button „Verfügbare Werte“ erhalten Sie ein PDF aller Wahlmöglichkeiten. Um mehrere Materialien einzugeben, drücken sie den >> Button, wenn Sie über die Menüs eine Auswahl getroffen haben. Diese erscheint dann im Fenster rechts, und Sie können über die Menüs und >> weitere Optionen hinzufügen. Um ein Material zu löschen, klicken Sie auf den Wert im Fenster rechts und dann auf den Button.

Show available values

General

Add or edit the information of the entry. Simply fill out the necessary input fields.

After completing the data entry click the save button.

Click the check box besides specific input fields to store the value of the field for following entries. Those unchecked will be emptied. This feature negates the need for entering the same values for different data entries.

It is also possible to hide and show individual input fields in the properties area of the program. Further information as to the specific requirements for each input field can be found by clicking the appropriate field.

User: Daniel Kaltenthaler
Project: Stuttgart 2017

Synchronization of Data

Background:

- Collaborating/sharing data with others required, or storing data
- Working offline must be possible:
 - data must be synchronizable to the global server at any time
 - updated/added entries must be synchronized to the local db
- Existing synchronization methods do not fulfil all requirements

Challenge:

- Creation of a Synchronization process

Synchronization: Concept

- Uses timestamps to keep track of the last time the entry was updated in the global database
- Status is saved for each entry in the local database:
 - *synchronized*,
if the entry was not updated locally
 - *updated*,
if the entry was updated locally
 - *conflicted*,
if a conflict was detected
(when entry is updated on two different local databases
without synchronizing the entry in between)

Synchronization: Implementation

- Each update of an entry updates sets the status to *updated*
- Start of synchronization process: each input unit is checked which entries are not synchronized
- The single unsynchronized data sets are
 - sent to the server
 - updated on the server
 - the status is set to *synchronized* locally (if no conflicts occur)
- A trigger on the server sets the timestamps to the current time, every time an entry is uploaded or updated
- If there is no unsynchronized entry left the entries are synchronized back to the local database

OssoBook - Version 5.4.3

Projects

Data entry

Listing

Search

Sync

Group

Tools

Help

Log-out

OssoBook

Local projects

☒ Aislingen Vicus [2266] Hannes Napierala [OK]
☐ Didyma Tax [914] Henriette Obermaier [UNSYNCED]
☐ Elephantine gesamt [16319] Henriette Obermaier [O]
☒ Gürcü I 1997 [581] Nadja Pöllath [DIFF]
☒ Milet Athena [35211] Henriette Obermaier [DIFF]
☐ Milet Bothros [3272] Henriette Obermaier [OK]

All

none

Global projects (Server)

☐ Göbekli Tepe -- Anlage C [1299] Nadja Pöllath
☐ Göbekli Tepe I - II [17] Nadja Pöllath
☒ Gürcü I 1997 [570] Nadja Pöllath
☒ Gürcü I 1998 [355] Nadja Pöllath
☒ Gürcü II 1995 [2991] Nadja Pöllath
☐ Gürcü II 1996 [2586] Nadja Pöllath
☒ Milet Athena [34955] Henriette Obermaier

All

none

Overall progress

Progress current project

Progress current data set

Information

[7:02:40 PM] Please note that the displayed entries may not take into account global changes!

[7:02:40 PM] Initialising synchronisation...

[7:02:40 PM] Loading projects...

[7:02:40 PM] Loading detailed project information...

[7:02:46 PM] Completed

Synchronisation

You can use the synchronisation to download projects that are saved on the xBook server to your local database. You only have access to your own projects and to projects for which you have read and/or writing rights.

Additional you can use the synchronisation to upload your local projects to the xBook server. This is necessary if you want to share your projects with other users. Furthermore you can recover your data in case of a local loss of data.

If you have activated the automatical synchronisation in the settings your local projects are synchronised with the xBook server by default.

To download projects from the server to your local database please select the desired projects at 'Global projects' and click on 'Synchronize'.

If the automatical synchronisation is deactivated and you want to synchronize your local projects with the xBook server please select the projects at 'Local projects' that you want to save on the xBook server and click on 'Synchronize' afterwards.

The data will be synchronized in background so you can continue using other areas of xBook.

User: Daniel Kaltenthaler

Project: Stuttgart 2017

Embeddable Analysis Tool

Background:

- Use of extern analysis tools is still common practise
- This method is aggravating, time consuming, error-prone

Challenge:

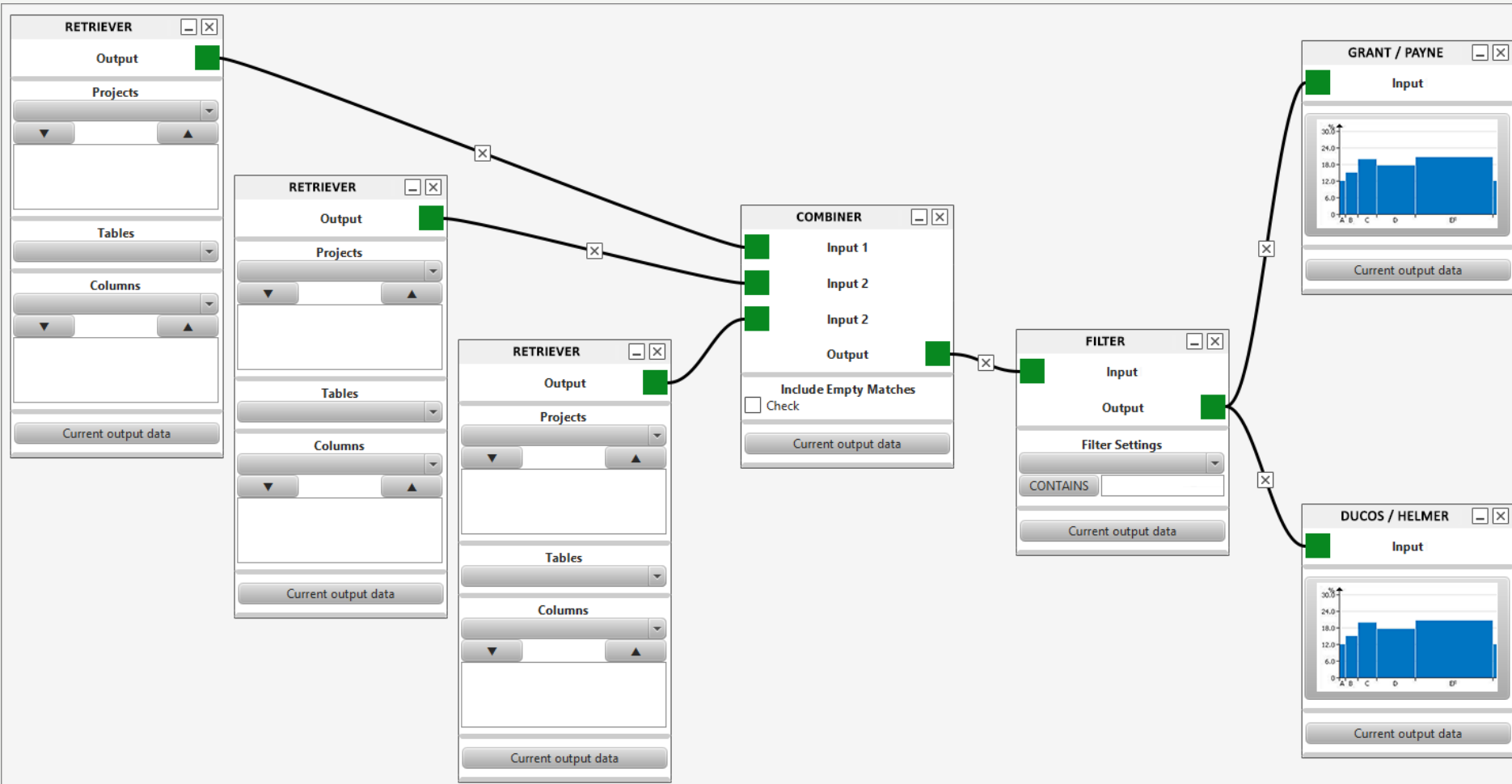
- Providing a dynamic, flexible, and powerful tool that allows specific queries from (archaeological) databases without having any prior knowledge of programming
- Must be embeddable to existing Java applications

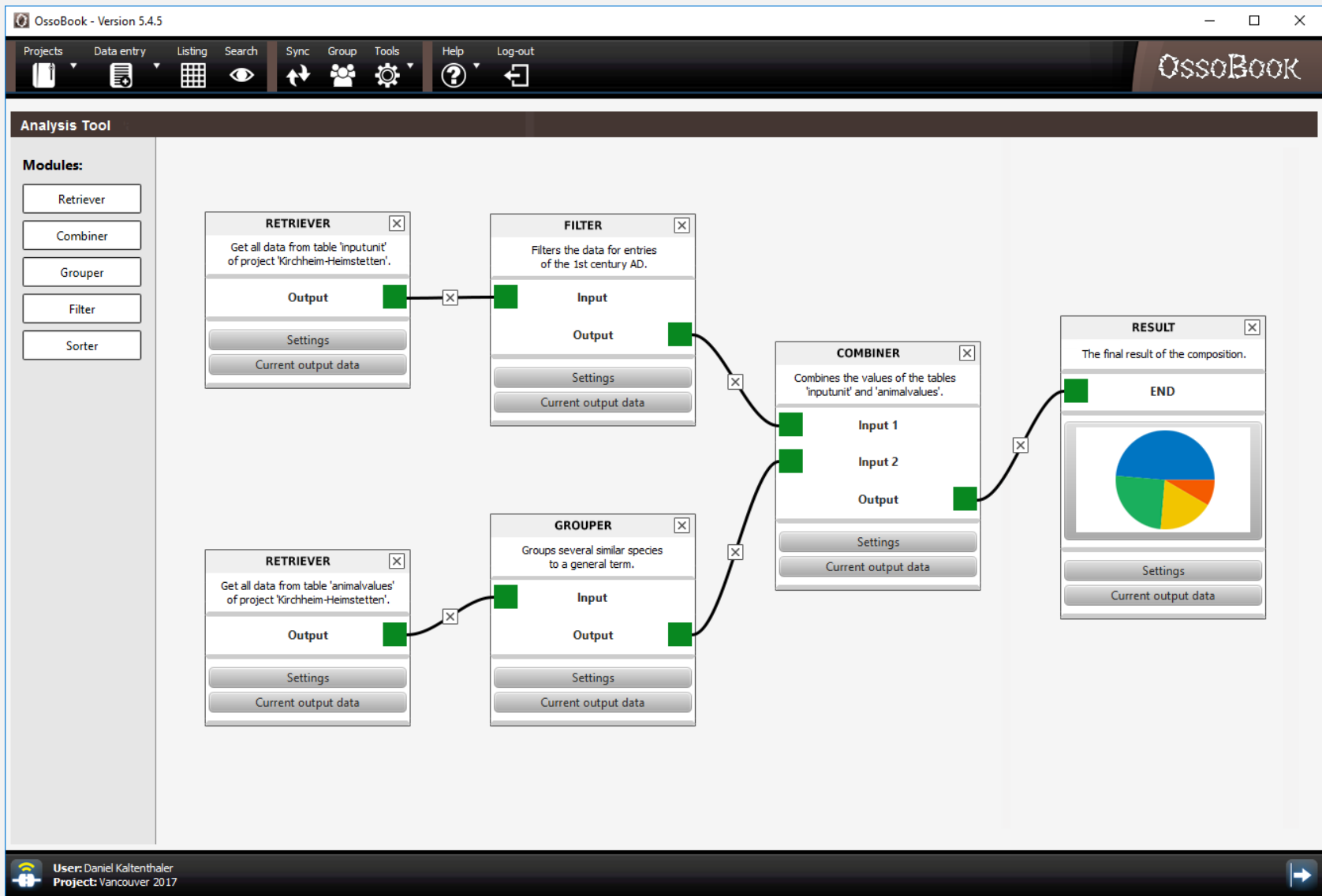
→ Development of the **Analysis Tool**

Analysis Tool: Concept

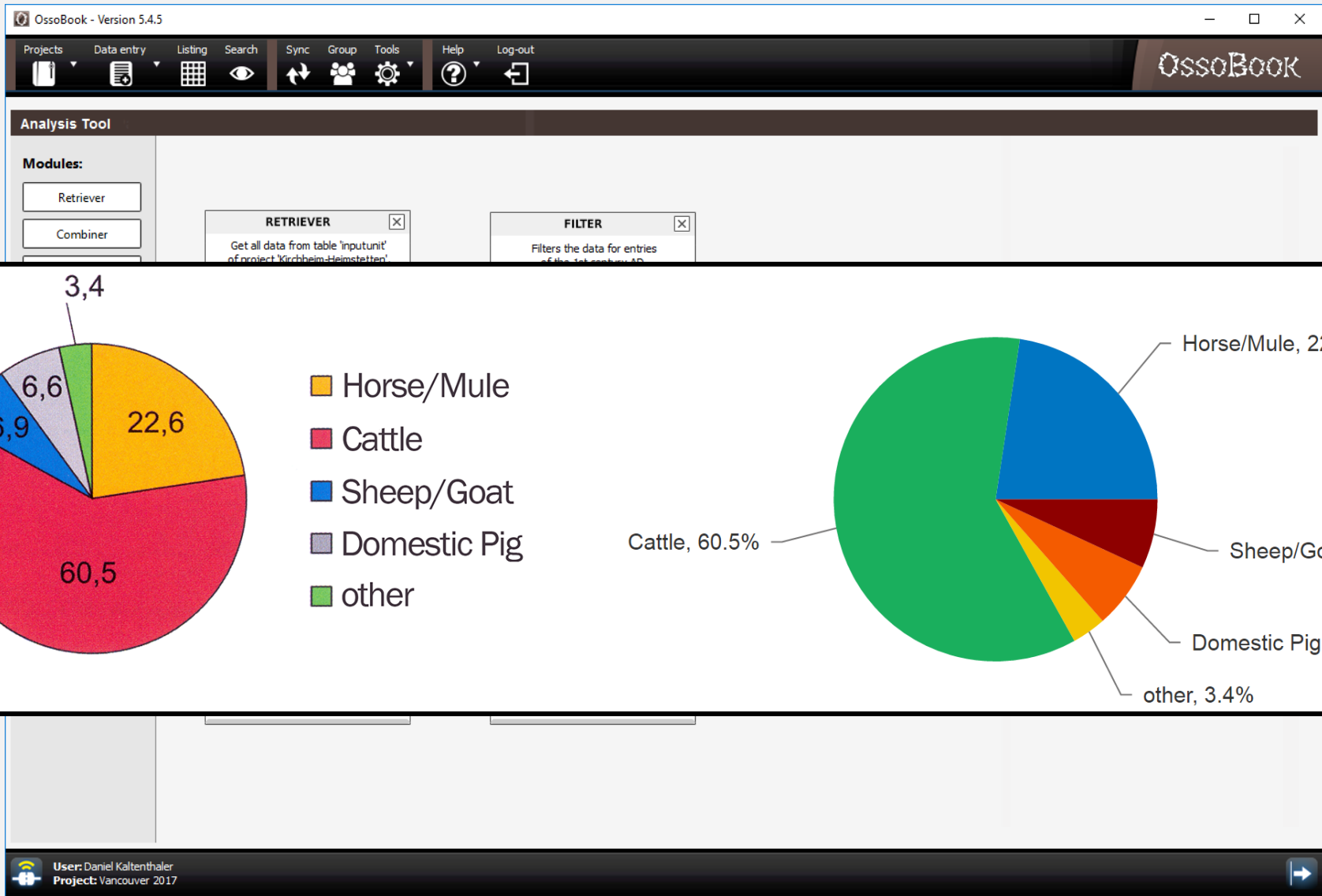
- Some functions have to be implemented by the application (e.g. the Analysis Tool cannot know how the data is stored, or how the connection to the data is realized)
- Provides a set of standard components to handle the data
- API to allow new specific components to be registered to an application
- Components have inputs/output – can be connected by the user
- Once a composition is completed, the result can be calculated and be viewed in tables or diagrams
- Generic communication between the components (connected components are not known beforehand)

Example: Simplified composition of the age distribution of animals





Example: Percentage of the most important livestock in settlements of the Heimstettener Gruppe (Heimstetten, Germany) in the 1st century AD, based on the number of bones



Example: Percentage of the most important livestock in settlements of the Heimstettener Gruppe (Heimstetten, Germany) in the 1st century AD, based on the number of bones

Synchronization:

- Improvements of the performance necessary, e.g.
 - using compressing methods for the transmitted data
 - using special data type to decrease the size of the data
- Solution to be able to delete the file sets in the database

Analysis Tool:

- Currently an early stage of development!
- Creation of further Workers would extend the possibilities (especially Workers for predefined calculations)
- Frequent used combinations of single Workers may be integrated as own Workers
- Number of provided diagrams for the graphical representation
- Possibility to save, export, and share a composition

Thank you for your attention!

Questions...?