Software Requirements Specification

From Creative Ideas to Well-Founded Engineering

Anita Dieckhoff, Tom Bocklisch, Dominic Bräunlein, Tom Herold, Norman Rzepka, Thomas Werkmeister

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v.	author	date	rev. comment
1	BPG1-Team	25/01/2013	
2	BPG1-Team	31/01/2013	after talk to Axel, Thomas and Gregor
3	BPG1-Team	01/02/2013	
4	BPG1-Team	06/02/2013	requirements and use cases refined/added
5	BPG1-Team	22/03/2013	after meeting with Prof. Weinberg and Prof. Giese

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Preamble

This document serves as a foundation for discussing the focus and requirements for the bachelor project “From Creative Ideas to Well-Founded Engineering”. It documents the insights we have collected during interviews with Ulrich Weinberg, Claudia Nicolai, Axel Menning, Project Managers, PR, d.School teachers, Incom developers and d.School Students. Based on the feedback of our interviewees, we propose a solution that covers the most important requirements.
The listed requirements are not a complete specification and should be seen as a framework covering the most important needs. We are going to develop the software based on a user centered design approach.

Insights

Documentation

d.School students are currently documenting in a rather discontinuous way. During observation we recognized that some of the teams tend to document only in a short period of time before each milestone. The reason for that is the students’ lack of motivation to document their findings, due to not seeing their own benefit of it.
The documentation is spread across a number of different services, mainly file shares and *Dropbox*, without these being connected to each other. This shows the students need for freedom of documentation. Furthermore it is important that the students stay in control over their tools and external applications don’t change their file organisation.
The communication platform *Incom* was chosen by the d.School to be the place for collecting all the documentation files of each student group. This way, a group’s teacher as well as the group’s members can see the group’s current state in the process and can give feedback to the documented process steps.
Unfortunately, this is only done infrequently, due to many usability issues of *Incom*. Also, it is hard to separate data that is useful for documentation from messages that are used for short term communication.

Reuse of Documented Projects

At the moment the students cannot access documentations of previous projects, because projects are not stored consistently. Furthermore the students lack an overview of previous projects which are related to their own. Additionally, the documentations of most of the projects don’t allow the reader to get a quick overview and extract main insights of all process phases in a reasonable amount of time.

The staff suffers from the same problems. The documentation is spread over several services (including file shares, *Dropbox*, *Incom*) and parts of the documentation are prone to get lost over time. From the staffs point of view the documentations differ in quality and understandability. Sometimes documentations need some improvements—mostly visual.
Although the documentation is being reviewed there is an information loss especially in the phases *Observe* and *PoV*.

Findings

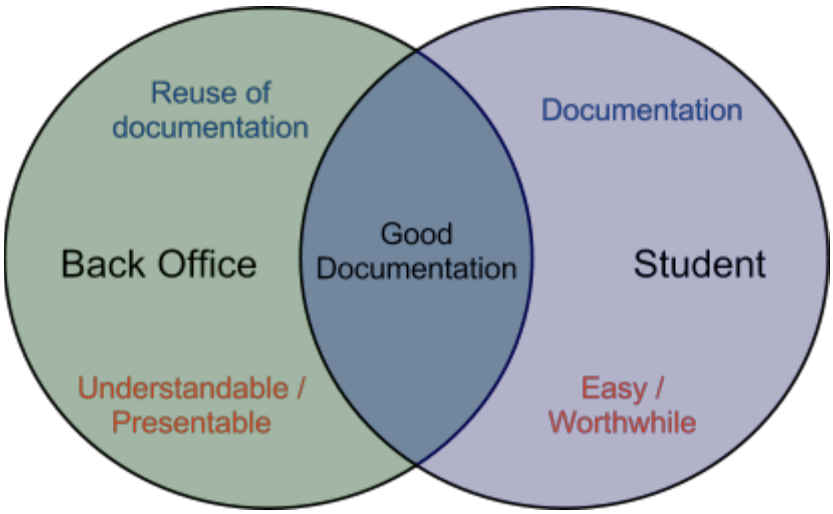

Figure 1: *Good documentation is the interface between the two challenges: supporting the students within the documentation process and supporting the back office within reuse of documentation. Without good documentation by students the back office has nothing to show and/or analyze.*

Documentation

d.School students would like to have a system that offers additional benefits to their project. This includes a better overview of the team's current status, the collected data, automated reports as well as clustering and tagging of items. Additionally, they need a system that improves on many of the shortcomings of Incom. The separation of documentation and communication assets is important to make information retrieval more efficient. Students would like to have the freedom to work the way they like and use their well-known tools. Many students use *Dropbox* and file shares. They need and easy way to manage and curate their documentation items. The whole solution has to be intuitive to use as the students only use the tool for a short period of time.

Reuse of Documented Projects

d.School staff members would like to have a tool which allows them to archive and organize all

sorts of d.School projects including the Executive Training program. The student's documentations and collected media items have to be aggregated and archived automatically. They want to add additional assets, like professionally-made photos or videos as well. For the purpose of organizing projects they also need to add meta information, like contact data of associated people and tagging to cluster similar projects. All pieces of information have to be recovered efficiently through a visual presentation and search. Besides data must not get lost after the project, e.g. when students delete their Dropbox. Instead this data should be automatically archived. Further the system must not alter the students Dropbox.

Students would like to review insights from previous or related projects to learn for their own task and to gain an in-depth view of their findings. Additionally students need a semantic and visual representation of their assets to get an overview of their progress.

User Groups

User Group	Needs
Student	● Capture information in an easy way ● Don’t want to lose information ● Retrieve needed information easily
Teacher	● Status of team by personal contact
Project Management	● Status of teams ● Supervision of teams ● Creating new Projects
Head of d.School	● Overview of all projects, branches, project progression, persons and relations between all of them
Program Manager (PM)	● Same as Head of d.School
Knowledge Manager (KM)	● A tool that supports creating relations between projects and retrieving media files
Relationship Manager (PR)	● Find and get media files from the projects for PR purposes
HPI Academy Teacher	● A tool that supports documenting the whole process (especially insights and prototypes) ● An overview of all related projects
Design Thinking Research Program	● A knowledge base and source of examples
Project Partner	● Insights from all phases of the project
HPI Academy Administration	● Same as Head of d.School

Scenarios

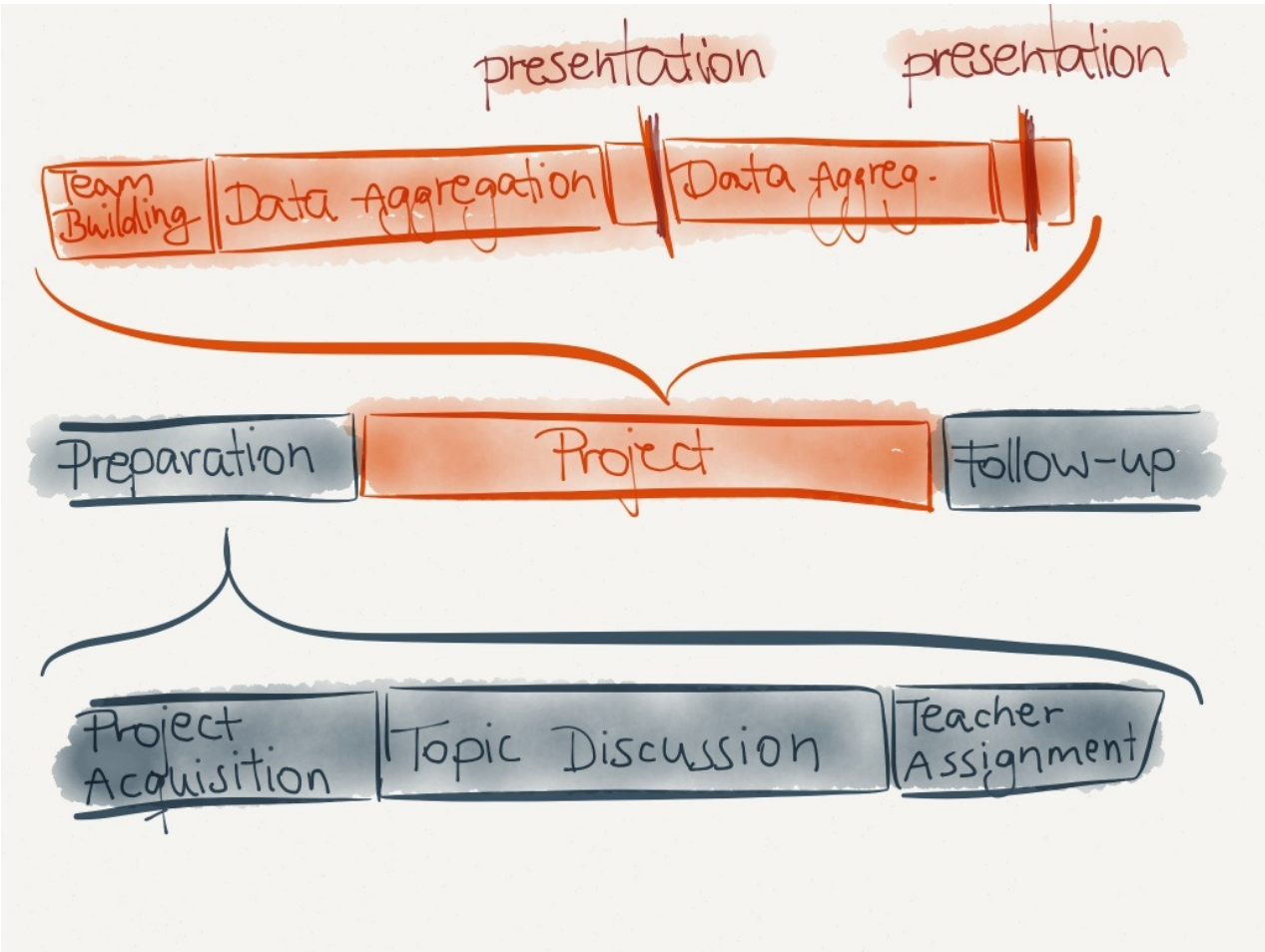

Figure 2: *The overall documentation lifecycle is parted into Project preparation, the Project itself and the Follow-up. In each phase there are different needs on the documentation.*

Project preparation

Project acquisition

A potential customer calls HPI Academy Administration and asks for executive training.

Usually a potential customer wants a product/service in terms of a Design-Thinking project. The Program Manager or Head of d.School then looks up prior projects with this customer or customers in a similar industry branch and checks if the project is worthwhile.

Topic discussion

Head of d.School meets a potential customer and discusses the specific topic for the planned project. Prior to this meeting Head of d.School recaps former projects of the customer's industry

branch to give the customer a view of possible outcomes.

Teacher assignment

The program manager searches for teachers who at best already guided a project with a similar topic / industry branch. To accomplish that he looks up previous projects and tries to find a good fit. A future project teacher can also be recruited out of good students.

Project Start

After all project topics are set the project manager creates new projects for each team in Project Zoom. So the students can start sorting their findings right on time.

Project

Team Building

The students receive their project topics, meet their teachers, learn how the d.School process works and get to know each other. The students decide which tools they are going to use and how they want to document their project and findings. At best they already decide who is responsible.

Data aggregation

The students gather information about their project. That includes internet research, interviews with professionals and their project partner as well as brainstorming about the problem domain. During this phase a lot of pictures and videos are taken. As a result prototypes are being created and documented. The students write down the insights and present their finding to the other teams during the weekly presentations.
The students would like to search, manage and view all their documents in one place.
The teacher would like to search all information as well to give feedback.

HPI Professional Documentation

During a HPI Academy Innovations-Coaching the HPI Academy teacher want to keep an overview over the process. The teacher connects in the evening all documentation materials that got produced during the day.

Presentation production

The students present their findings and prototypes in multiple presentations during their design process, most importantly in the final presentation. To create these presentations students need an overview of their process and have to retrieve their collected assets. The presentations are then added to the project.

Documentation production

At the end of the semester, the students finish their documentation document, usually a paper. They add the document to their project.

Project follow-up

Hand-over

After the semester is over, the students hand in their final documents to their teachers and project partners. Sometimes, the KM or the Head of d.School decides to enhance a project's documentation.

Adding media resources

PR is approached by the press. In reaction to this additional assets, e.g. professional pictures, articles are produced. The PR staff adds these to an existing project.

Documentation enhancing

Sometimes the Program Manager has additional documentation material like videos of prototype produced, or has professionals refine the final documentation visually. The Program Manager adds this additional material to the project, so everyone can find it later easily.

Information extraction

The Head of d.School / Program Manager meets with a potential client, and wants to present the projects and domains that the d.School has already worked with. They show the potential outcome and key findings of such a project in order to impress and motivate the client to start a project with the d.School.

The press calls the public relations manager to get more information about a specific project the d.School did a year ago. Therefore, the public relations manager can access the prototypes of this project and the main insights of predecessor projects which led to actual projects.

After the end of the semester, the KM wants to fill missing links and information to all advanced-track projects. Therefore, the KM would like to structure the overview of all projects, by adding associations among projects or linking people to them. All associations can be commented.

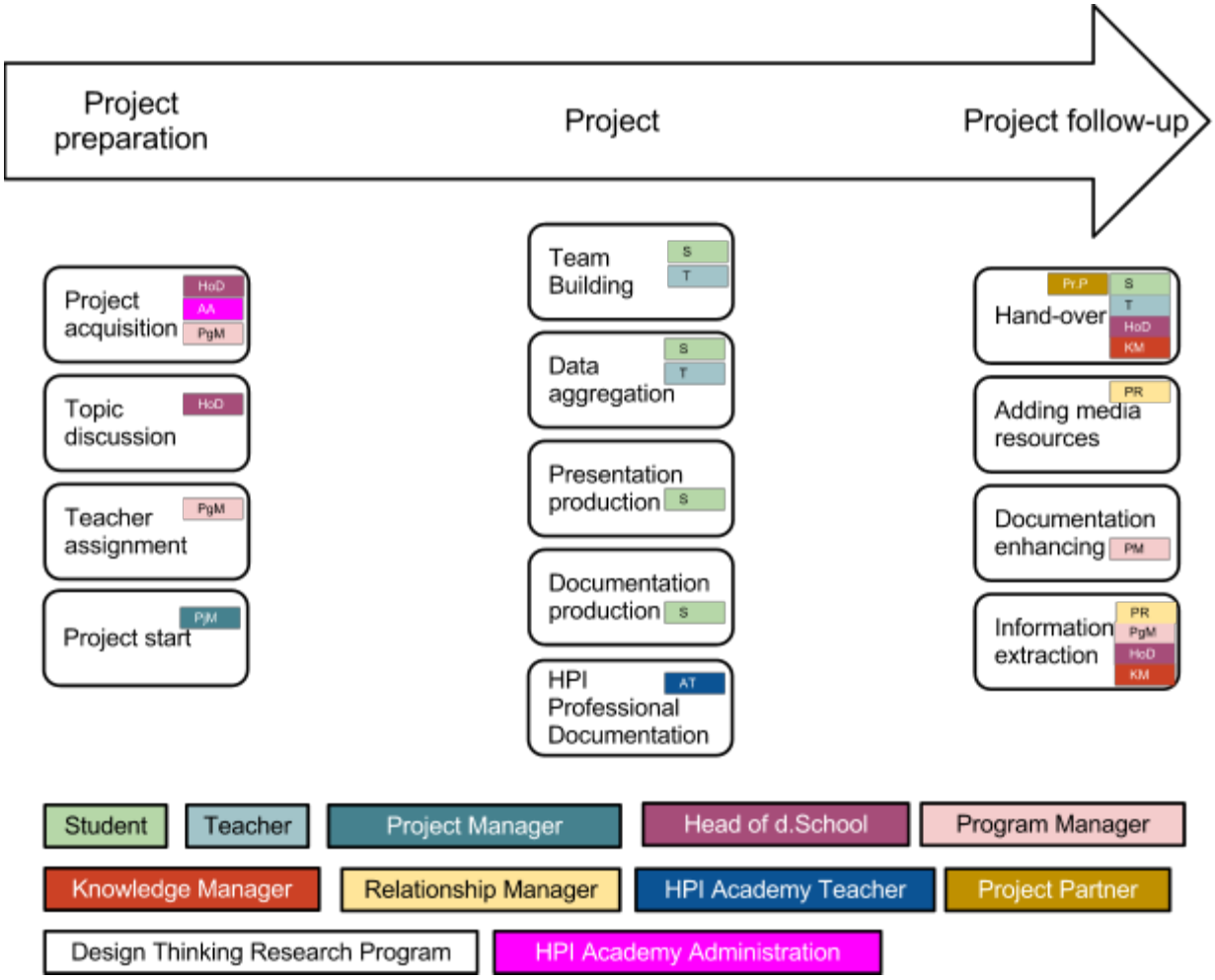

Figure 3: *Relation between users and phases of a project's life cycle*

Head of d.School

- overview of all projects with search and filter
- open projects and find insights

Relationship Manager

- overview of all projects with search and filter
- add professional media material to project
- retrieve media material and prototypes form projects

Knowledge Manager

- overview of all projects with search and filter
- open projects and find insights
- fill missing links between projects (and people)

Program Manager

- overview of all projects and people with search and filter
- open projects and find insights
- add professional media material to project

Teacher

- overview of all projects with search and filter
- open projects and find insights
- preview documents
- find current project information to give feedback later

Student

- overview of single project
- connect documents to form knowledge graph
- comment connections between documentation material
- preview documents

Project Manager

- create new projects in Project Zoom

Prototype “Project Zoom”

Description of the prototypes features

Process view

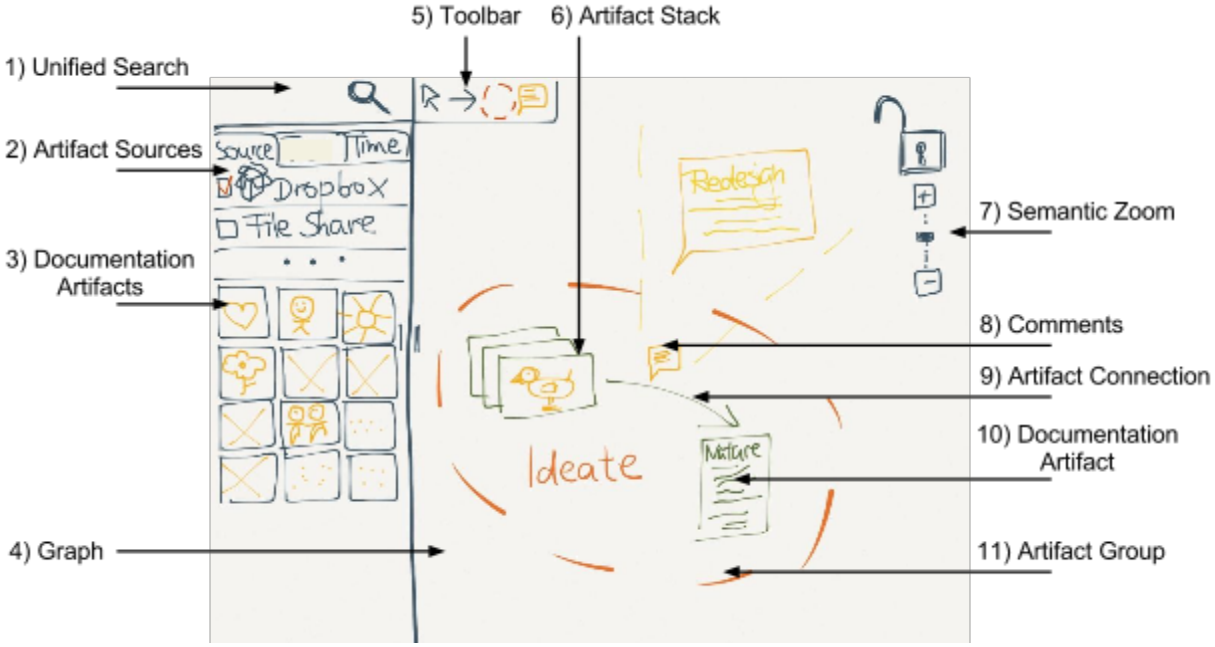

Figure 4: *The process view shows the connection between documentation artifacts in a single project and gives an overview over the project.*

Projects overview

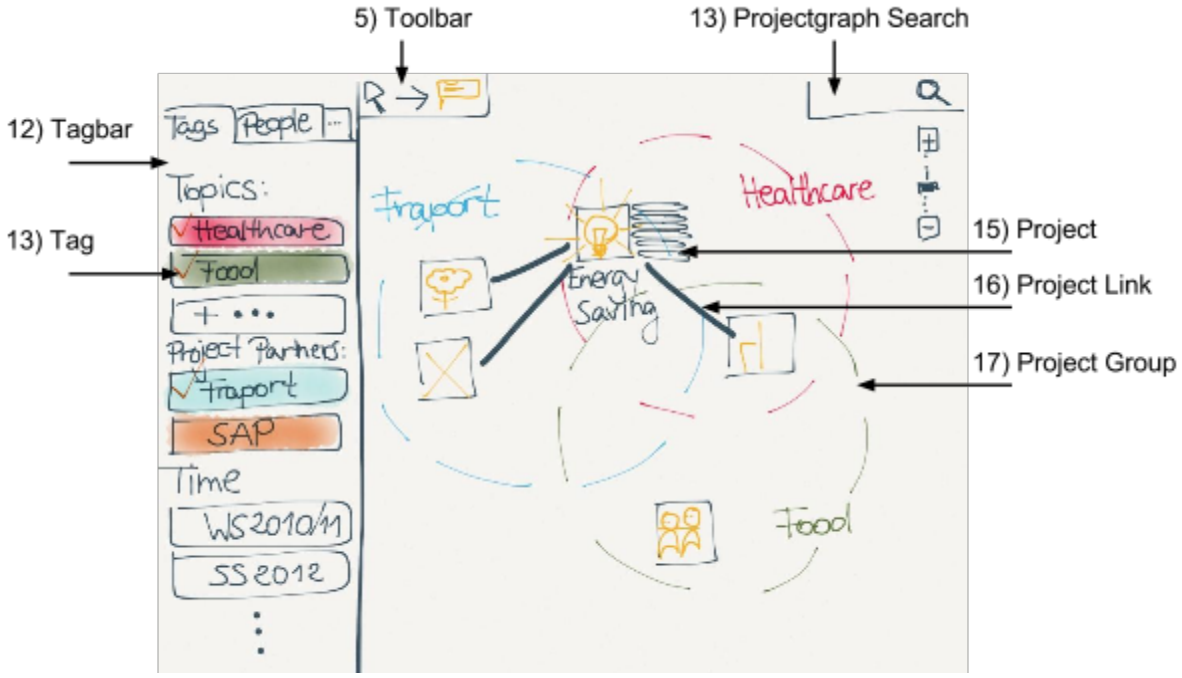

Figure 5: *The project overview shows all projects and gives the possibility to filter using tags.*

Project details

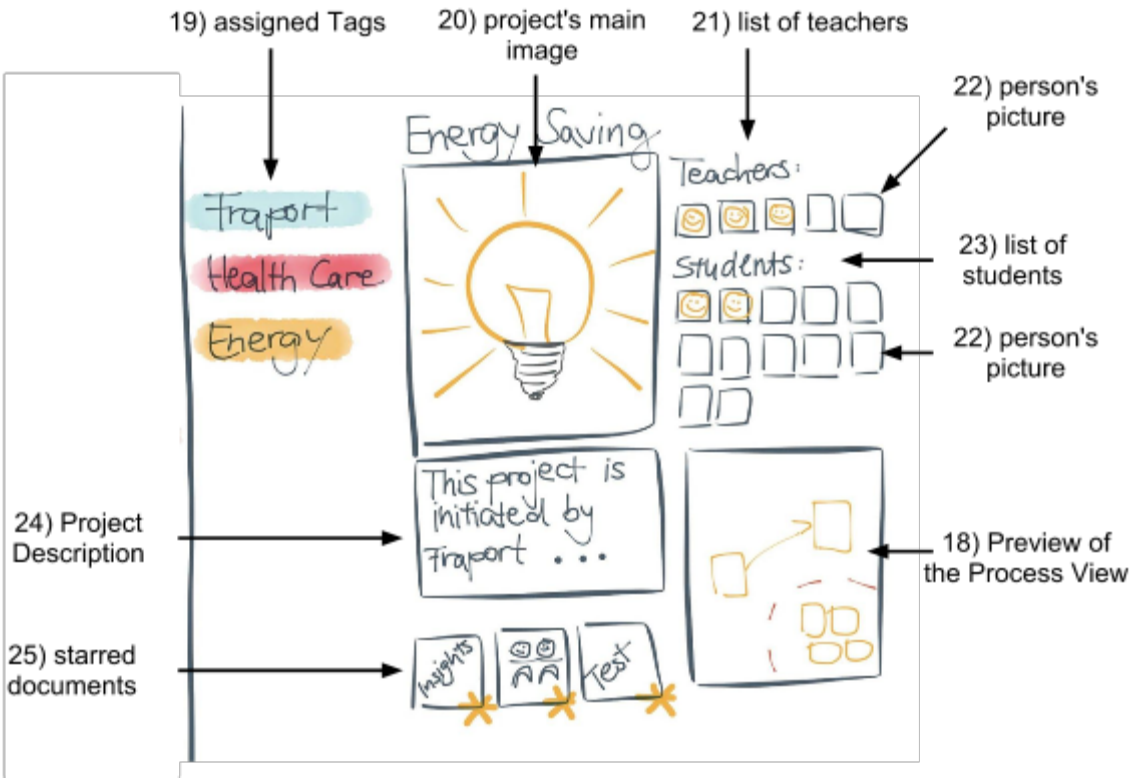

Figure 6: *The project detail view provides information about a project, its team members and assigned assets.*

Artifact view

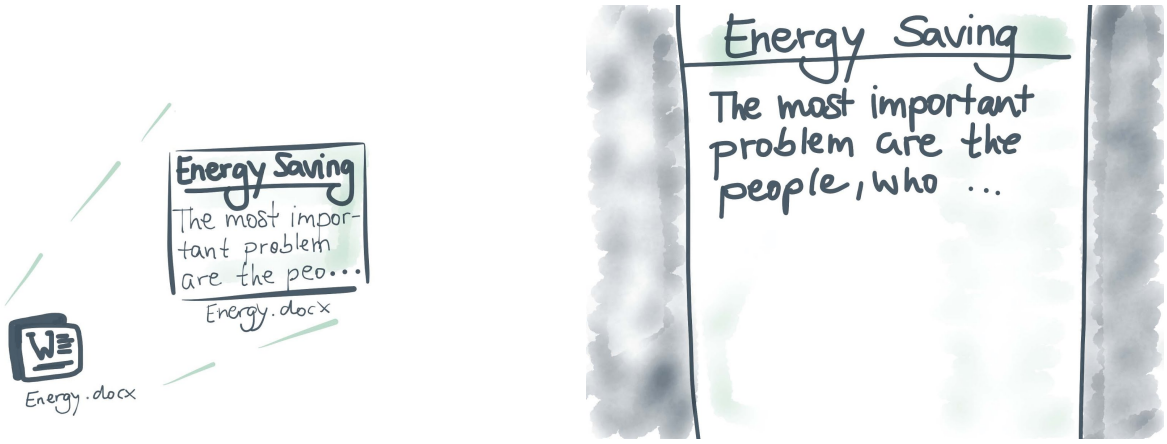

Figure 7: Semantic zooming of text documents (left), fullscreen preview (right)

The prototype is a software system for organizing the projects of the d.School based on metadata like tagging and different types of files.
Students use the tools to arrange (5), connect (9) and cluster (11) their files visually, thus creating a semantic representation of their project. The system is designed to automatically import the projects' files from services like Incom, Dropbox or File share (2).
The d.School staff members use the system to organize and archive the projects by adding links (16), tags (12) and additional media files for further reference.

The prototype has a large canvas as its main element. The user experience relies on the concept of semantic zooming (7). Different levels of zoom present varying levels of details. In the most detailed level there is a view on the project (4). Users arrange a selection of their files on the canvas and use visual tools for clustering the items by design phase and for visualizing connections between them. A higher level displays the relationship between projects and the involved people. Users view and edit the metadata of the projects. A variety of filters allows for efficient retrieval of this information.

Showcase of different zoom levels

The artifacts in the process view and in the project overview are displayed depending on the viewers zoom level. Hence, it is possible to zoom out and get an overview and at the same time zoom in to view the items in detail. It is possible to view the artifact in a full screen preview, if the document type allows it.

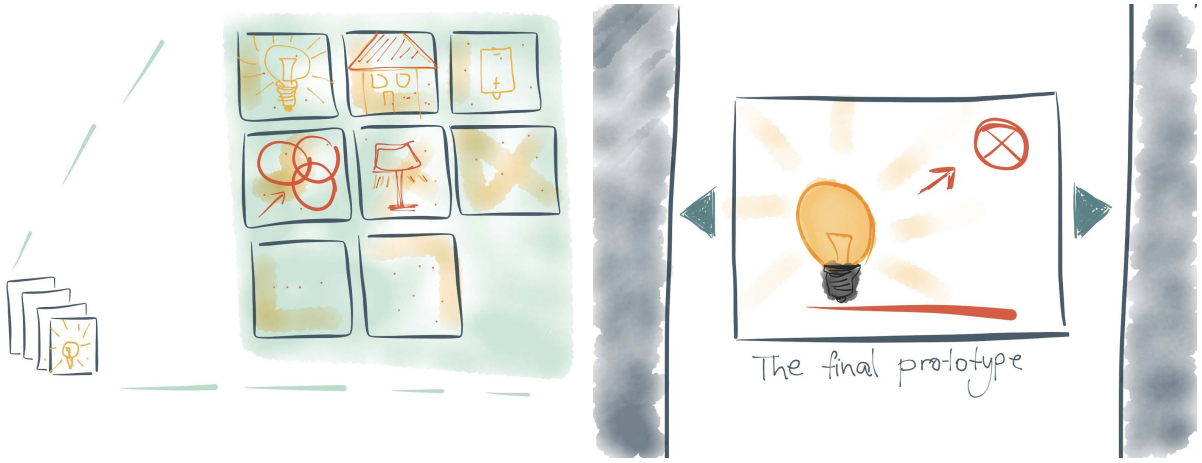

Figure 8: *Semantic zooming of image stacks (left), fullscreen gallery (right)*

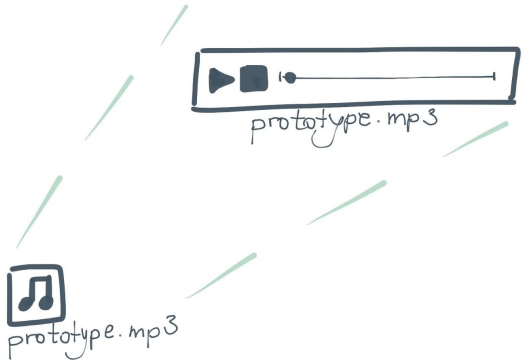

Figure 9: *Audio preview*

Figure 10: *Semantic zooming of videos (left), fullscreen preview (right)*

Requirements this prototype fulfills

Project Preparation

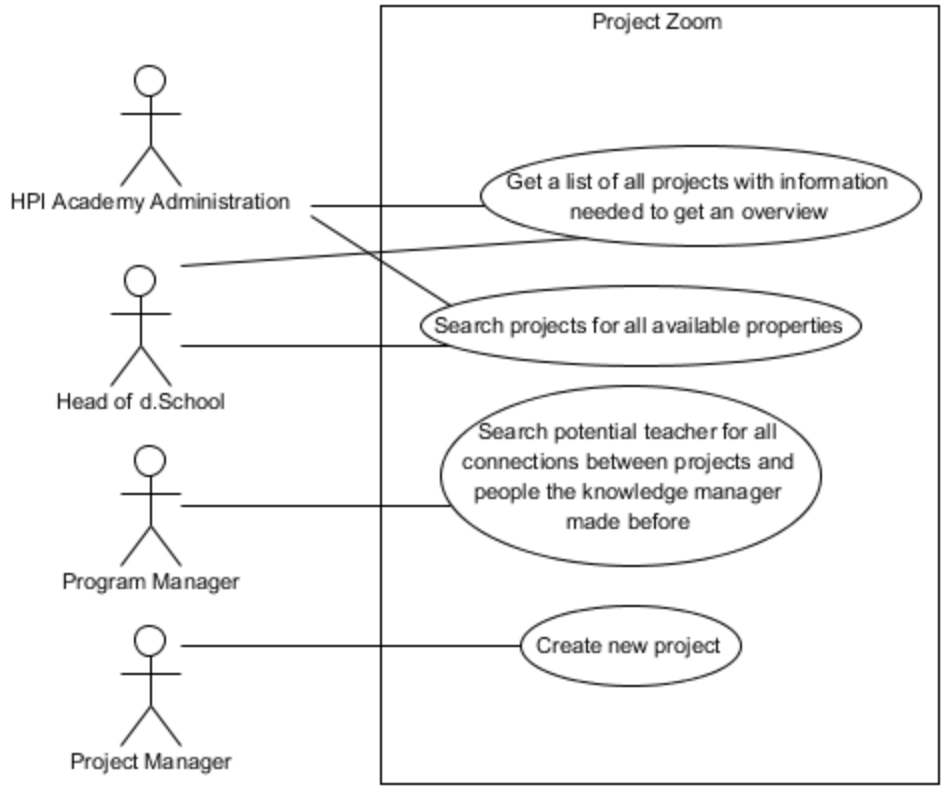

Figure 11: *Use cases during the project preparation phase*

1. The head of d.School / HPI Academy Administration should be able to get an overview about all projects.
   Prerequisite: The Project Manager has created projects.
   Postcondition: The format of presentation of all project allows you on computers and on tablet computers to get an overview within seconds.

2. The head of d.School / HPI Academy Administration can filter and search all projects.
   Prerequisite: The PM/KM has created projects and added metainfo to them.
   Postcondition: The list of search results is complete and no projects are missing

3. The Program Manager can search for all potential connections between projects and people.
   Prerequisite: The PM/KM assigned people to their according projects. There are both projects and people available in the system.
   Postcondition: All connections are visible without scrolling.

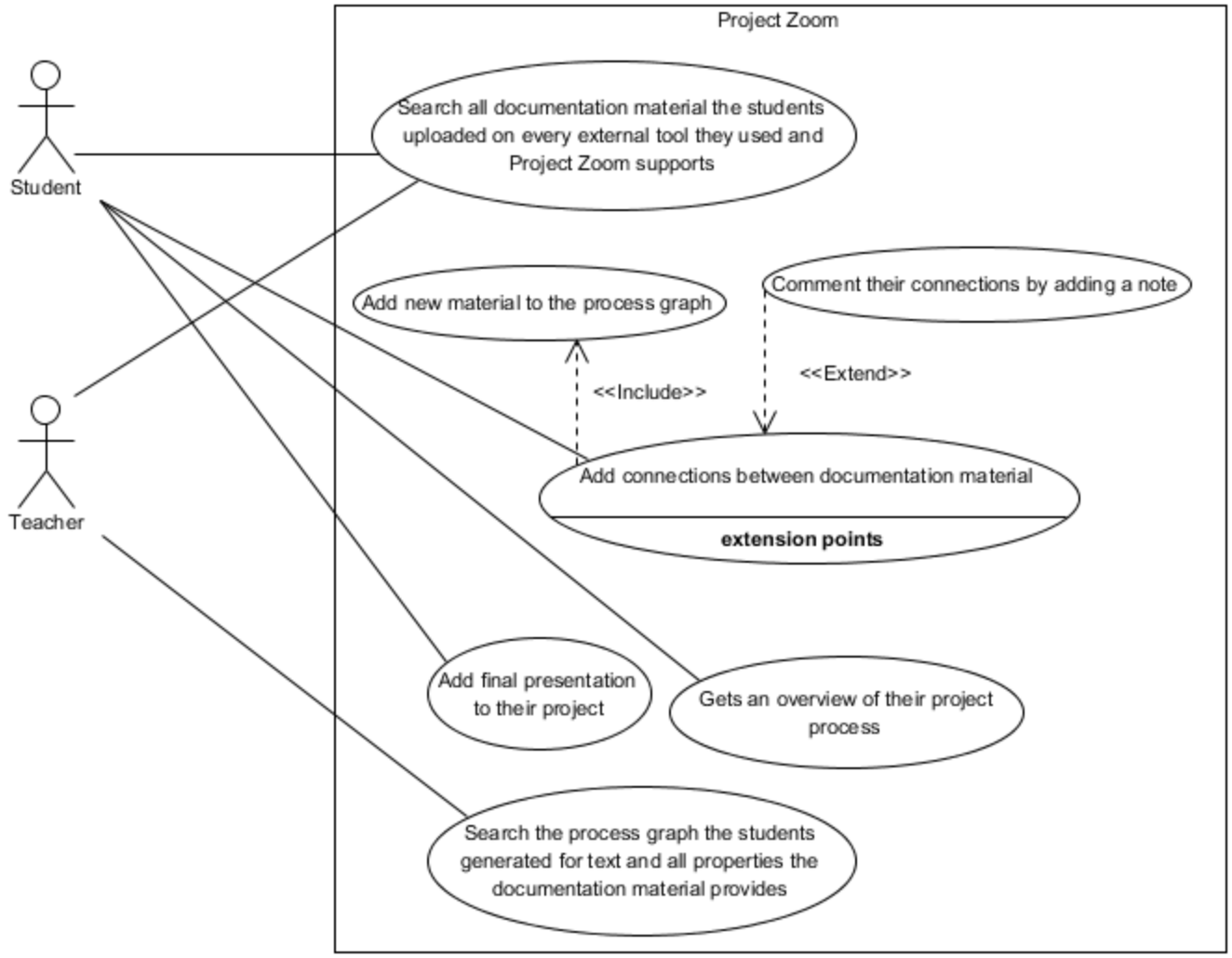

Figure 12: *Use cases during the project*

4. A student / teacher can search through all the documentation materials that were aggregated by the system.
   Prerequisite: A user granted the system access to every service the team would like to use.
   Postcondition: A user finds a document that was previously posted/uploaded to a connected service within 60 seconds in the search result list.

5. A student drag and drops aggregated documentation materials on a the canvas and connects these items to form a knowledge graph. A connection can be commented on.
   Prerequisite: The system has aggregated documentation material from all connected services.

Postcondition: A knowledge graph is being created.

6. A student adds the final presentation to the project.
   Prerequisite: The team has to finish its final presentation.
   Postcondition: The system aggregates the final documentation and adds it to the search index.

7. A student examines the team's knowledge graph and gets a better understanding of project and its current status.
   Prerequisite: The students need to create a knowledge graph.
   Postcondition: The student gets an overview of the whole process without scrolling

8. A teacher can search for text or others properties in a knowledge graph.
   Prerequisite: The students need to create a knowledge graph.
   Postcondition: The result are being highlighted within the graph.

Project Follow Up

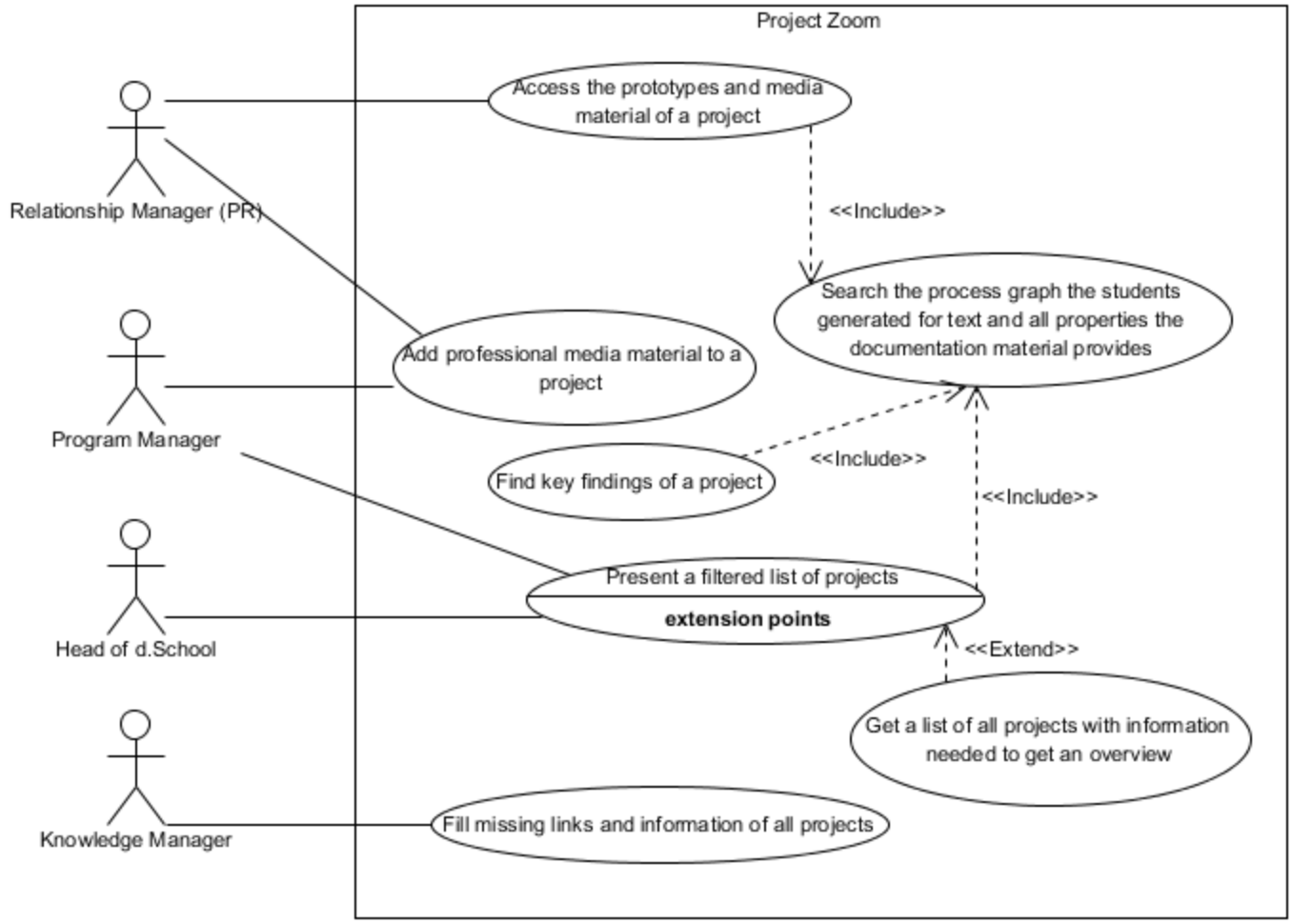

Figure 13: *Use cases during the project follow up*

9. The relationship manager (PR) can access all the documentation materials of every projects. The manager can download different media, e.g pictures and videos, especially documentation relating to a team's prototypes. It is possible to search for text, key findings and other meta-informations.
   Prerequisite: The system has aggregated all of the project's documents from connected services and has them backup up for later use. The students have to tag key findings and prototypes in the knowledge graph.
   Postcondition: Relationship manager (PR) has access to all media files from current and previous projects.

10. The relationship manager (PR) / the program manager add professionally created materials to a project.
    Prerequisite: The project manager created projects for every team.
    Postcondition: The system aggregates the materials and adds them to the search

index.

11. The program manager / the head of d.School has access to a list of all projects and can examine to the knowledge-graph to gain additional insights. The list can be filtered by all available properties.
    Prerequisite: The project manager has to create projects and the students need to connect their documents to form a knowledge-graph.
    Postcondition: The result list is complete and the user needs just one interaction to get to the knowledge-graph.
12. The knowledge manager can create connections among projects. He can tag these and add additional information to them.
    Prerequisite: The project manager has created projects.
    Postcondition: The system adds the new tags to its search index.

Priorization

The specific connectors and the different views of the prototype to be implemented were prioritized.

Connectors

1. Filemaker
2. Incom
3. Dropbox
4. HPI-Share
5. Mail
6. Facebook

Views

1. Process view
2. Projects overview
3. Project details
4. Artifact details

What this prototype is not intended to do

The prototype does not support students creating basic documentation artifacts such as pictures and texts. The students create their documentation artifacts using their desired tools (e.g. Incom, Dropbox or File Shares). The prototype is not intended to replace any existing tool.
Furthermore, the prototype does not help students to structure and organize the content of their documentation documents. The students need to find their own way of documenting their process and insights. Consequently, the prototype does not introduce a predefined structure or structural requirements.
Using the prototype does not help organizing a teams' assets in the first place. For example, it is

the teams' responsibility to organize their dropbox using folders to group documents.

Comparison with the prototype of Christoph Peschel

The prototype of Christoph Peschel (http://www.hrnstrm.de/kunden/DPM/prototype/) has nearly the same focus as this project. But Christoph Peschel has proposed a solution, which requires a lot of work to be done by the d.School staff after a students' challenge has been finished. In his proposition "Projektdatenbank D-School" (PDS) he focuses mostly on the d.School staff and the values in reusing the documentation. PDS took place before the d.School introduced Incom and therefore would have been a replacement for the wiki system, which was used at that time.
In contrast, our solution focuses on the tools the students are already using. The prototype handles files only in context of an archive and for preserving the files. During user interviews we found out that there is no need for direct file input from users.
The PDS focuses on the assets separation into the different phases of the design thinking process. This is done using the integrated file upload and management.
Our solution aggregates the available assets instead and lets the user assign them to groups like "Testing Phase" later on. This has the advantage of fitting better to the usual process. Typically, a team goes through the different phases for several times. Hence, we enable them to group their assets in multiple groups referring to the same phase. Furthermore, a user gains additional insights about the project's process by using the graph view.

Functional requirements

1. The system automatically backs up all its connected services (e.g. dropbox), in order to provide a fallback in case a user disconnects a service.
2. The system should prevent the user from accidentally deleting data, aggregated by the system.

Non functional requirements

1. The system should be accessible independently from the client's platform and needs to support Chrome 24+, Firefox 18+ and Safari 6+.
2. Access to the system should be possible from outside the d.School.
3. The system should be designed to be usable from both iPad 3+ and desktop computers.

Performance Requirements

Server Side requirements:

- The maximum satisfactory response time (excluding network transportation time) to be experienced in 99% must be less than one second.
- The server software is able to handle 100 requests per second.

- The server should process updates from connectors within one minute.

Client Side requirements:

- 1000 graph nodes can be displayed and interacted with a minimum of 5 FPS.

Technical Requirements

Minimal Hardware requirements

- x86_64 processor architecture
- 4 core processor at 1.6 GHz each
- 4 GB main memory
- 1 TB hard drive *
- 10 Mbit Internet connectivity
- Internet server capable (external IP address or virtual host proxying)

* Christoph Peschel suggests 6-7 GB for each team. Based on our observations of the advanced track 2012/13 we recommend 6 GB per project. Assuming there are 6 advanced track teams, 12 basic track teams and 3 HPI Academy teams, that results in 126 GB per semester. A hard drive with 1 TB capacity could accommodate about 7 semesters. Additionally, an appropriate solution for backup purposes is needed (e.g. RAID 5, incremental backups).

Software requirements

- Linux operating system (e.g. Debian squeeze)
- JDK 1.6.0
- Mongo 2.4

External Requirements

Filemaker

- JDBC connection to d.School's Filemaker database
- Required schema needs to be transformable to the following schema:
    - People
        - Name
        - Email
        - Picture (optional)
    - Projects
        - Name
        - Picture (optional)
        - Date
        - Type (6 weeks BT, 12 weeks AT etc)

        - Visibility (public, private)
    - Tags
        - Name
        - Type (branch, partner company, WS 2012 etc)
    - People <-> Projects
        - Role (student, teacher, partner etc)
    - Projects <-> Tags
- Each dataset needs a unique primary key

Non-free Services

- Dropbox Pro Account

Appendix

External Interfaces

Dropbox

General Notes	• OAuth Authentication • SSL only • Multiple file revisions (30 days)
Data types	• Files
Metadata	• Path • Modified Date • Size of the file in Bytes • IsFolder • IsDeleted • Hash • Contents (List of all containing files/folder of a folder)

(https://www.dropbox.com/developers/reference/api)

Incom

General Notes	• Relies on the cooperation of Incom developers. • Till now, feasible extraction of data is only possible for projects, but not for workspaces.
Data types	• Text • Images • Files

Metadata	• Projects:
	  ○ Title
	  ○ Description
	  ○ Category
	  ○ Author(s)
	  ○ Workspace
	  ○ Image
	• Posts:
	  ○ Title
	  ○ Text
	  ○ Media

File Share (Samba)

General Notes	• Kerberos Authentication
Data types	• Files
Metadata	• Path • Created/Modified/Accessed Date • Size of the file in Bytes • IsFolder • Hash • File permissions

Facebook group

General Notes	• User permission required • Access to specific groups is possible • All chat messages can be read, but only on single user basis (requires special permission)
Data types	• Text • Images • Files
Metadata	• Wall / Feed • Comments • Likes • Members • Name • Description • Update Time • Events

(https://developers.facebook.com/docs/reference/api/group/)

d.School DB (FileMaker)

General notes	• Network access to the d.School-Server needed.
Data types	• People's names • Projects list • Addresses

Mailinglist

General notes	● A dedicated email client is added to email-lists or explicitly used as receiver. ● Depending on the receiver / sender of the email the conversation gets assigned to a project.
Data types	● Email text ● Attachments
Metadata	● Sender ● Receiver(s) ● Attachment names ● Subject ● Date