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D1.5 Functional Specification for second prototype

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Change Log

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0.2	21-09-2012	Mark Hall	Added main functional specifications
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Contents

1 Executive Summary

The implementation of the first PATHS prototype and its subsequent evaluation marks the beginning of a new phase for the PATHS project. Valuable data was collected during these stages and this will be taken into account in the implementation of the second prototype. This second prototype will address issues that surfaced in the initial prototyping and also offer enhanced and extended functionality.

This report describes the list of functions that are to be implemented in the second PATHS prototype. The functions have been prioritized for development. Functions that relate to resolving critical user interface issues are of high priority (MUST) and must be addressed successfully. Enhancements and new functions that were requested by users of the system follow next (SHOULD). Other additions that add new functionality suggested by users are included with low priority (COULD).

Although the majority of the top-priority functionality identified in the initial user requirements analysis was implemented in the first prototype, there were functions that were left out such as the ability to search within the user's workspace and all functionalities related to user rights and permissions. Both of these are added in the list of functions to be implemented in the second prototype.

The results of the evaluation activities enabled the identification of a set of recommendations, which were used to inform the functional specification of the second PATHS prototype and improve the PATHS system. Most of these recommendations were transformed into implementable functions; information on the evaluation findings is briefly included in each subsection of this report.

New functions were identified during testing in relation to user accounts including additional fields in the user profile and the ability to accept terms and conditions imposed by content providers. Enhanced functionality has also been defined for the user's workspace to provide the ability to re-order the items, edit annotations using a WYSIWYG editor and display thumbnails and other item metadata.

This functional specification defines enhanced and more efficient search functionality by adding result re-ordering according to the available amount of metadata, spell checking of search terms, number of results to be returned and grid/list display. It defines functions to enable users to control the item tags to be displayed according to their author. Enriched functionality is also defined for node and path creation by including a fine-grained access restrictions system and new functionality such as cloning and branching of paths along with an improved user interface. Overall the functional specification aims to improve the user interface of the second prototype by adding new collection overview techniques and closely integrated UI components, introducing more consistency and clarity, and addressing usability issues to enhance the user experience. Contextual help is specified for the different elements of the user interface.

The functional specification for the second PATHS prototype adds a flexible and personalised recommendation system. Functionality is specified to enable users to influence the recommendations they would like to see, alongside functionality to enable the system itself to personalise recommendations to meet the user's preferences based on items / topics the user has previously shown interest in.

2   Introduction

PATHS is a complex system with many different components. The first prototype implemented most of the system's key features and the majority of the top-priority user requirements identified in the first project phase. The evaluation of the first prototype reported that all participants had an overall positive response to PATHS, finding it mostly easy to use, interesting and useful. It was seen as offering novel functionality that could be useful in a number of different user scenarios.

Implementation of a second prototype following the results of the evaluation and testing of the first, forms part of PATHS user centred design and development process. This will enable issues identified during the evaluation to be addressed, the system to be enhanced and extended and more automation and polish, and a second prototype for the final round of user evaluation and testing.

This document specifies the list of functions that will be implemented during the development of the second prototype of the PATHS system. As part of this process, functions that were partially implemented or left out of the first prototype were reconsidered. Another valuable source of input is the collection of extensive evaluation data, utilizing several complementary methods (in the laboratory, in the field and across the project). Merging the data form both sources stated above forms the basic characteristics of the second prototype.

3   Methodology

Apart from the list of the user requirements (D1.1[1] and D1.3[2]), which formed the main source for the functional specification of the first prototype, data was taken into account from the evaluation phases of the project presented in D5.1[3].

The evaluation results proved to be valuable input for the final specification of the second prototype. By using demonstration sessions with groups of invited potential users, collection of more qualitative data and quantitative feedback was possible. Furthermore, project-wide evaluation results derived from testing with HCI experts gave a more specific and localised evaluation of the different elements of the PATHS system. These evaluations are concerned with the user interface design, individual components of the system, output from data enhancement processes, and with the underlying architecture.

The aim of this document is to provide a working functional specification for the second prototype of the PATHS system. Sections 5, 6 and 7 provide a list of functions that are to be implemented in the second prototype in a MUST, SHOULD and COULD priority order. It is a distillation of the functions derived from the user evaluation phase and the functions that were left out or partially implemented in development of the first prototype. A complete list of functions specified for the first prototype along with their implementation status can be found in Appendix 2.

Functions are grouped into related areas and for each section, a justification for the choice is provided as well as, in some cases, a section with some key-point evaluation data (suggestions, comments, …). This is followed by specific references to the user requirements.

As a reference, Appendix 1 lists all the user requirements that were identified in the analysis presented in D1.1 and D3.1. These are organised by priority (MUST, SHOULD and COULD).

4   Implementation Expectations

It is expected that the second prototype will include all of the functionality of the first PATHS prototype and will extend it by implementing each of the functions presented below in the order of priority in which they are listed. The level of implementation may vary according to the priority of each function. High priority functions should be completely implemented during the development of the second prototype.

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[1] D1.1 User requirements analysis, online: http://paths-project.eu/eng/Resources

[2] D1.3 Functional specification of the first PATHS prototype

[3] D5.1 Evaluation of the first prototype

5 Functions of the second prototype

5.1 User Accounts

These core functions of user registration and profile management were identified for the first prototype (more details for each function can be found in Appendix 2):

F.1 – F.5   Implemented

F.6   Not implemented

F.7 – F.8   Implemented

Functional specification for the second prototype

5.1.1 MUST

F.5   Users will be able to edit their Profile

Additional fields must be added to the user profile so that the user can:
- describe their personal interests (interests, affiliation, …).
- A field specifying the role of the user can also be used (e.g. museum curator, lecturer, visitor, student).

F.6   The user will be able to control which aspects of their profile are visible to the public.
- For each field the user must be able to specify whether the field is shown to everybody, only logged-in users, or nobody.

5.1.2 SHOULD

F.9   Users must be able to accept the terms and conditions as set out by content providers.
- Users must have a choice to accept or not the terms and conditions imposed by different content providers in order to be able to use the related content.

5.1.3 COULD

F.10   Users will be able to upload a profile image.
- Users would like to be able to use an image, photo or icon as their profile image. This image could be displayed in order to represent the path creator.

Original User Requirements

10.1.1 Registration - Users will be able to register on the PATHS system and gain privileges.

10.1.2 Profile - Registered Users will have an associated profile.

10.1.3 Edit Profile - Users will be able to edit aspects of their profile.

10.1.4 Visibility of profile - Path creators must be able to edit their Paths after publication.

10.1.24 User identity - Users who are not Path creators have an identity on the system.

5.2   Workspace

These core functions were identified for the first prototype (more details for each function can be found in Appendix 2):

F.11 – F.12   Implemented (both extended in second prototype).

Functional specification for the second prototype

5.2.1   MUST

F.11   Users will be able to add objects into a personal workspace, extended:
1. The original item's meta-data and thumbnail will be shown.
2. The workspace will be displayed in a way that does not hide primary site content.

F.12   Users will be rearrange and annotate the objects within the workspace, is extended to allow:
1. the user to re-order the items by dragging them around.
2. full WYSIWYG editing of the items' annotations.

Justification

The user's workspace should act as a precursor to creating Paths. The user should be able to collect objects, reorder them and annotate items.

Original User Requirements

> *10.1.7 Collect Objects - Objects can be added to and made available directly from some sort of holding space/workspace.*

> *10.2.2 Organise Personal Collection - It must be possible to annotate, edit and arrange objects within the holding space/workspace.*

> *10.3.1 Add any resource to holding space - Users can activate a control in their browser that adds the current page, whatever its location on the Web, to their workspace.*

5.3   Search

These core functions were identified for the first prototype (more details for each function can be found in Appendix 2):

F.13 – F.14   Implemented

Functional specification for the second prototype

5.3.1   MUST

F.14   Search result ordering.

F.16   Search list as a starting point for exploring using tag/image clouds.

5.3.2   SHOULD

F.17   Query spell check suggestions.

F.18   Enhanced search result display.

5.3.3   COULD

F.12   Search the user's workspace.

Justification

The search results should be re-ordered to take into account the amount of meta-data the items contain. Items with more meta-data should be ranked higher than items with less meta-data. Other basic sorting options should also be included.

The search result display should be more flexible allowing the user to decide how compact they wish the results to be displayed and how much they wish to see at one time. Specifying the number of results to be returned and a choice of grid or list view should help in this direction. Moreover, a spell check on the search terms could prove useful in returning more related items.

Evaluation results

Evaluation tests brought out some issues with the search results list not being complete when using either the singular or plural form of a word. These issues must be addressed in order to make the search function more efficient.

Evaluation users wanted to be able to use the search as a starting point for exploring using tag/image clouds. They also suggested that result filters (media, age, location, availability, option to filter out records without images/descriptions) should prove useful in displaying results and spotting the ones needed.

Furthermore a search terms spelling check could be useful in returning items by displaying smart suggestion links in the form of a list "Did you mean…". This should be potentially very useful for people searching for unfamiliar objects and ideas.

Original User Requirements

> *10.1.5 Search the collection - Users can search all objects in the collections within PATHS.*

> *10.1.8 Search workspace - Users can search their workspace.*

> *10.1.9 Search Paths by topic - Users will be able to search for Paths.*

> *10.1.10 Save searches - Users will be able to save their searches.*

> *10.2.11 Search via tags - Users can search collections based on user-generated tags (see 5.6).*

> *10.2.14 Time factor - When searching for Paths, users can specify a preferred duration for the Paths.*

5.4   Objects

These core functions were identified for the first prototype (more details for each function can be found in Appendix 2):

F.20 – F.21   Implemented

No changes will be made for the second prototype.

Original User Requirements

> *10.1.6 Primary object - Users will have access to the original image or other digital artefact that the metadata describes. Such access may be subject to licence or payment terms.*

> *10.1.12 Links to related content - Objects in the collections will be linked to related content and themes into which the object fits.*

> *10.2.4 No restriction on object type - Objects may include text, images, audio or video.*

5.5   Node and Path Creation

These core functions were identified for the first prototype (more details for each function can be found in Appendix 2):

F.22 – F.27   Implemented
F.28   Not implemented

The functional specification for the second prototype

5.5.1   MUST

F.22   Users will be able to create Paths is extended to include:
  1.   An annotated series of nodes.
  2.   A series of rich text only nodes.
  3.   Branches, that is, creating more than one linear series from a node.

F.28   Creators can set the visibility of their Paths is defined as being able to restrict the publication of paths to:
  1.   Only the path creator has access.
  2.   The path creator and specified other users have access.
  3.   Anybody who knows the URL has access.
  4.   Publicly visible.
  5.   Clonable.

5.5.2   SHOULD

F.29   Users will have an Improved editing UI with
  1.   A good overview of the path.
  2.   Easy re-ordering of the path.
  3.   Shows the items original metadata.

F.30   Users will have an improved path overview.

5.5.3   COULD

F.31   Collaborative paths; a group of users able to work together in creating a shared path.

Justification

Paths must have fine-grained access restrictions, covering the following situations

- Only the path creator has access
- The path creator and specified other users have access
- Anybody who knows the URL has access
- Publicly visible

Only in the last case may the path be included in the search results.

It must be possible fully clone a path and edit this as a new path. This may only be done if the original path author has allowed the cloning of their path. Additionally the provenance of the path must be stored.

Apart from cloning paths, the users must be able to branch so that any path node can have more than one following path nodes. Loops are not permitted. Joining branches should be possible.

The improved path editing UI must

- Give a good overview over the path as a whole
- Allow easy re-ordering of the path
- Show the item's original meta-data

An improved path overview functionality must be provided that should also show the path nodes' thumbnails and how the path is embedded / cuts through the collection.

A new node type containing only text must be added. This can be used by the user to add narrative / link text that is not related to a specific item.

It should be possible for users to invite other users to collaboratively work on a path.

Evaluation results

Evaluation users suggested that branching a path would be a useful feature, e.g. in the form of a cloud or flow chart. Moreover, making it easier to reorder items, e.g. using numbers, or a grid view, as well as providing a more visual layout of the path would greatly enhance the process of path creation and editing.

Original User Requirements

> *10.1.13 Create Paths - Users will be able to create Paths.*

> *10.1.14 Edit Paths - Path creators must be able to edit their Paths after publication.*

> *10.1.16 Search engine friendly - Paths expose key information about subject matter.*

> 10.1.18 Describe themes and sub-themes - Users will be able to describe the themes and sub-themes of a Path.

> 10.1.23 Permission to clone - The Path creator can declare whether they give their permission for their Path to be cloned. If they do and the path is cloned, the original Path creator will be alerted (dependent on 10.2.13 Clone Paths).

> 10.2.5 Create Paths across multiple sessions - Work on creating a Path can be carried out across multiple sessions with the system preserving state between such visits.

> 10.2.8 Activity description - Path creators can describe the type of activities included in the Path.

> 10.2.12 Show/hide annotations - Path creators can choose to show or hide their annotations, links between nodes etc.

> 10.2.13 Clone Paths - Users can clone existing Paths and then edit and publish them under their own name.

> 10.3.8 Web content as object - As well as objects, nodes may point to any Web content which can be text, images, audio or video.

5.6   Path Cloning

These core functions were identified for the first prototype (more details for each function can be found in Appendix 2):

F.32 – F.33   Not implemented

In the specification for the second Paths prototype this functionality is included in 5.5 above.

Original User Requirements

> 10.1.23 Permission to clone - The Path creator can declare whether they give their permission for a Path to be cloned. If it is, the Path owner will be alerted when such an action takes place.

> 10.2.13 Clone Paths - Users can clone existing Paths and then edit and publish them under their own name.

5.7   User Generated Content

These core functions were identified for the first prototype (more details for each function can be found in Appendix 2):

F.34   Implemented

The functional specification for the second Paths prototype

5.7.1   COULD

F.35   Web content as object.

Justification

Paths consist of nodes, which in turn link to objects from a collection of the library or point to other web content. Web content can include text, images, audio or video. Users should be able to import every one of these types of web content into their workspace and finally into a path.

Original User Requirements

> *10.1.7 Collect Objects - Objects can be annotated.*
>
> *10.1.13 Create Paths - User can add annotations to explain the connections between the nodes in a Path.*
>
> *10.1.17Add content - Users will be able to add content.*
>
> *10.1.19 Add content tied to objects - Users will be able to add annotations, descriptions, narratives etc. to specific objects.*
>
> *10.1.20 User comments on Paths - Users will be able to comment on Paths and augment Paths with their own content.*
>
> *10.1.21 Attribution - All content added to the system will be attributed to the user that added it.*
>
> *10.2.15 User comments on items in a Path - Users can comment on individual items within a Path.*
>
> *10.2.3 Flexible design - Allow the same basic tools to be used in different ways.*
>
> *10.3.2 Rate Paths - Users will be able to rate Paths*
>
> *10.3.7 User content - Users can upload their own content, such as images and video, and save it to their holding area.*
>
> *10.3.8 Web content as object - Section 10.1.13 requires that nodes link to an object from a collection. Nodes may alternatively point to any other Web content, which can be text, images, audio or video.*

5.8   Tags

These core functions were identified for the first prototype (more details for each function can be found in Appendix 2):

F.36   Implemented

Functional specification for the second Paths prototype

5.8.1.1   COULD

F.37   Users could be able to control whether to display or not tags from a particular author.

Justification

The user should be able to see the author for each tag and then decide whether to trust them or not. Ideally, user should be able to promote/demote tags by individuals.

Original User Requirements

> *10.2.9 Tagging objects - Users can tag objects in the collection.*

> *10.2.11 Search via tags - Users can search collections based on user-generated tags.*

5.9   Rating

These core functions were identified for the first prototype (more details for each function can be found in Appendix 2):

F.38 – F.39   Not implemented

Functional specification for the second Paths prototype

5.9.1   COULD

F.38   Users could be able to rate Paths.

F.39   Users could be able to see aggregate ratings for each Path.

Original User Requirements

> *10.3.2 Rate Paths - Users will be able to rate Paths*

5.10 Identity

These core functions were identified for the first prototype (more details for each function can be found in Appendix 2):

F.40   Implemented

No changes will be made for the second prototype

Original User Requirements

> *10.1.15 Identity - Paths, nodes, user comments & contributions must have a unique identity that can be referenced on the Web.*

> *10.1.16 Search engine friendly - Paths are search-engine friendly.*

> *10.1.25 Multiple platforms - The PATHS system will be available through multiple platforms.*

> *10.2.3 Flexible design - PATHS should use a flexible design, allowing the same basic tools to be used in different ways.*

5.11 Discovery

These core functions were identified for the first prototype (more details for each function can be found in Appendix 2):

F.41 – F.44   Implemented

In the specification for the second Paths prototype this functionality is included in F.49 (Section 6.1 below).

Original User Requirements

> *10.1.11 Find existing Paths - users will be able to discover existing Paths (via means other than search).*

> *10.1.26 Zoom - Users will be able to view a Path at different resolutions.*

> *10.1.27 Sense of discovery - Users will have a good deal of flexibility in how they use the PATHS system.*

> *10.2.1 Familiarity - The user experience will be based on familiar styles and concepts.*

5.12 User Requirements Not Covered

The preceding subsections are drawn either from the user requirements or from the first prototype's evaluation results. A small number of these remain uncovered so far however. These are discussed in the following short subsections.

5.12.1 Communication

10.2.7 Communication with Path creator and 10.3.3 Receive private comments are both covered by way of the provision of the Path creator's e-mail address in their profile (5.1User Accounts). The provision of a messaging system within PATHS, the primary purpose of which would be to allow communication without revealing e-mail addresses, would be a disproportionate use of resources.

5.12.2 Advanced Exploitation of Tagging

10.2.10 Aggregate tags and 10.3.4 Tag rewards both refer to the notion of Luis von Ahn's ESP Game[4] where game-play is used to encourage users to tag objects. When multiple players tag the same item the same way, they are rewarded in some way, as the tag is more likely to be useful to other people.

This would require significant investment in time and resources to implement on the PATHS system and is not foreseen as a function of the first or second prototype.

5.12.3 Geolocation

10.3.5 Geolocation data and 10.3.6 Matching Paths and objects to locations are both concerned with exploiting location data in the metadata.

Processing work already carried out on the Europeana data set suggests that this is rarely present. Due to the very limited amount of geo-location data available in the collection this feature would be impossible to deploy at the full scale of the data.

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[4] http://en.wikipedia.org/wiki/ESP_Game

6   System Functions

In addition to the functions that revealed by analysing the user requirements, this section of the functional specification includes functions that are either implied or required in order to make the system operable at a suitably robust level.

6.1   User Interface

The specification of for the first prototype identified as a core function that users would be able to visualise/browse the system (more details for each function can be found in Appendix 2):

F.45   Implemented

Functional specification for the second Paths prototype

6.1.1   MUST

F.46   Collection Overview Visualisations.

The collection overview techniques that have been developed must be surfaced and closely integrated into the search, browse, and path following aspects of the UI.

F.47   UI integration, consistency, and clarity.

The UI components should be closely integrated and similar looking / functioning elements should not be duplicated. Where duplication is necessary, the functionality should be equivalent. Choices the user has made must be clearly visible so that they can be reverted.

F.48   Integrated Help.

Initially the user must be shown contextual help that explains what they can do with the various UI elements that are visible. The user must be able to turn this off when they no longer need it.

F.49   Usability improvements.

The usability shortcomings identified in the evaluation of the first prototype must be corrected

1. Users must be able to easily skip/jump to a node of the path and/or start over at any point.
2. Several users confused the two search boxes (search paths/ main search).
3. Difficulties when trying to add nodes to paths they had previously created.
4. Difficulties with selecting (subsequently not deselecting) facets in the search results page.
5. More flexible navigation of the search results (e.g. go to specific page, jump ahead more than 2 pages).
6. Ensure that the workspace does not obscure search results.

Evaluation results

Evaluation users asked to be able to skip/jump to a node of the path and/or start over at any point of the path course.

Users also suggested the Wikipedia links to be shorter to improve the layout of the page and make them easier to read.

Other suggestions included to be able to switch between an image cloud and a tag/word cloud and that a "Paths followed" section should exist in the UI.

6.2   Access Object Similarity Data

6.2.1   MUST

F.50   The PATHS system will be able access the data processed in work package 2 in which the similarity between objects is calculated, along with links to external resources. This is the engine behind the requirement that objects will link to related items.

6.3   Calculate Path Relatedness

6.3.1   SHOULD

F.51   The system will be able to calculate the relatedness of Paths.

Justification

This is necessary in order to perform the functions set out in section 5.11 Discovery.

6.4   Behavioural Logging & Classification

6.4.1   MUST

F.52   The system will record users' behaviour: click rate, subjects viewed, links followed, search terms used etc.

6.4.2   SHOULD

F.53   Based on the behavioural log, the system will be able to classify the user, with increasing accuracy, as a rambler trekker, explorer.

F.54   For registered users, the cognitive style classification will be recorded in their profile (see 5.1 *User Accounts*).

Justification

This is an important aspect of the personalisation algorithm used by Paths.

6.5   Recommendations

These new functions are identified tor the second prototype:

6.5.1   MUST

F.55   Flexible recommendations.

F.56   Personalised recommendations.

F.57   'People who searched/viewed this, also looked for..." lists.

Justification

Flexible recommendations must be added, where the user can influence what kind of recommendations they would like to see.

Recommendations must where possible be personalised to the items / topics the user has shown interest in.

Evaluation results

Evaluation users suggested that 'People who searched/viewed this, also looked for...'' lists could enhance user experience in finding new items.

6.6   Online Tutorial

The specification for the second prototype identifies this function as an optional addition to the system.

6.6.1   SHOULD

F.58   Online Tutorial

Justification

A series of online, video tutorials should be provided to those users who wish to be introduced to the Paths functionality.

7 Access Control

In order to function securely and flexibly, PATHS requires three different classes of user:

1. General user: An anonymous user who has not registered an account or not logged into their account.
2. Registered user: A user who has registered an account and logged into this account.
3. Administrator: An administrative user.

Each of these three classes provides different privileges (see following sections). In addition, PATHS supports the concept of groups

7.1 General Users

7.1.1 MUST

F.59   General users are anonymous users who have either not registered an account on the system or have not logged into their account. They have access to the following functionalities:

1. Search the collections.
2. Explore the collections.
3. Search the published paths.
4. Follow published paths.
5. View individual nodes and objects.
6. View user-comments on nodes, objects, or paths.
7. View the public sections of registered users' profiles.
8. Register an account.
9. Log in to an existing account. This action makes the user a registered user.

Search engines or other web-crawlers are also classified as general users and the same access rights apply to them.

7.2 Registered Users

7.2.1 MUST

F.60   Registered users have created an account and logged in to their account. They inherit all the access rights that a general user has. Additionally they have access to the following functionalities:

1. Add items to their workspace.
2. Create paths.
3. Edit their own paths.
4. Clone other paths.
5. Edit their profile.
6. Log out.
7. Delete their account.
8. Add tags to objects, nodes, paths.
9. Add comments to objects, nodes, paths.
10. Create, join, leave user groups.
11. Access groups of which they are a member.

7.3 Administrator

7.3.1 MUST

F.61   The administrator is a super-user who inherits all the registered users access rights. Additionally they have access to the following functionalities:
1. Edit or delete any path.
2. Edit or delete any user account.
3. Edit or delete any user-comment.
4. Edit or delete any user-generated tag.
5. Edit or delete any user-group.
6. Access any group.

7.4 Groups

7.4.1 COULD

F.62   Registered Users may create, join and leave groups.

F.63   Users can see a list of members of groups of which they themselves are a member.

Justification

It is useful for some Path creators, particularly teachers, to be able to create and maintain groups, which are a shortcut route to making Paths available to particular users. Support for groups in the first prototype will be simple but it is envisaged that the second prototype will support more advanced functions. In particular, a distinction between open groups that anyone can join, groups that are only open to invited members and groups to which users are assigned by the creator.

7.5 Visibility and Privacy

7.5.1 MUST

F.64   Users may set the visibility of their contributions to one of three levels:
- private (user only).
- group (visible to any group of which the user is a member).
- public.

F.65   Users can set visibility controls for:
- each item in their profile except their username & password.
- the Paths they create.
- comments they have made.
- their workspace.

Justification

User requirement 10.2.12 Show/hide annotations suggests that Path creators SHOULD be able to show or hide annotations on an individual Path. Although desirable for a later prototype, this fine-grained control will not be implemented in the first prototype where the emphasis is on proving the system. Nevertheless, it is important that the first prototype has sufficient flexibility to give users good control over their privacy so as to engender trust in the system.

8   Conclusions

Overall the majority of the top-priority functionality identified in the initial user requirements analysis was implemented in the first prototype. The results from evaluation and testing of the prototype, reconsideration of user requirements and functionality which was partially implemented in the first prototype with the intention of offering extended functionality following the initial trials, are taken into consideration in this functional specification for the second PATHS prototype. A series of functions have been identified to be implemented in this phase.

Both non-expert and expert evaluation input has been taken into account to prioritize these functions in a MUST, SHOULD, COULD priority order which reveals the importance of each function accordingly.

9   References

Other important documents from the PATHS deliverables include:

D1.1 User Requirements Analysis

D1.3 Functional specification of the first PATHS prototype

D3.1 Specification of System Architecture

D5.1 Evaluation of the first prototype

Public project deliverables are published on the project website at: http://www.paths-project.eu/eng/Resources

10 Appendix 1: User Requirements by Priority

The user requirements for PATHS were established in section 8.3 of D1.1. These are replicated in the following sections according to priority (MUST, SHOULD and COULD). The heading of each requirement serves as an identifier for reference in the main body of this document. Explanatory text is provided along with a cross reference to its original source in D1.1. For example "p124/5" means that the original user requirement is given on page 124 of D1.1 and its "Use Case Reference" is 5. This refers to the points within the use cases that precede the summary tables of requirements.

10.1 MUST

The following user requirements are those with the highest priority and that must be met in the first prototype of the PATHS system.

10.1.1 Registration

Users will be able to register on the PATHS system and gain privileges.

Source: p132/pA1

Tags Users, Access

10.1.2 Profile

Registered users will have an associated profile that, in addition to standard fields such as user name, e-mail address and so on will record various aspects such as:

-   Paths they have created.

-   Groups of which they are a member.

-   Whether they are a user or facilitator.

-   Their cognitive style (rambler, trekker, explorer).

Source: p132/A2 & A3

Tags: Users

10.1.3 Edit Profile

Users will be able to edit aspects of their profile. However, some details, such as the Paths they have created, will be calculated by the system and will not be editable.

Source: p132/A2

Tags: Users

10.1.4 Visibility of profile

The user requirements imply, but do not explicitly state, that the user will be able to choose which aspects of their profile are visible.

Tags: Users

10.1.5 Search the collection

Users can perform a free text search all objects in the collections within PATHS.

Source: p124/5

Tags: Search

10.1.6 Primary object

PATHS will do its processing based on metadata, however, users will also have access to the original image or other digital artefact that the metadata describes. If such access is subject to licensing agreement, subscription or other condition, following the link will direct the user to a page giving details of the terms under which the object is available and how to meet them (where to agree to the terms, where to buy the subscription etc.).

Source: p137/D13

Tags: Access, Object

10.1.7 Collect Objects

Objects can be added to and made available directly from some sort of holding space/workspace. Objects can be annotated. See also 10.2.1

Source: p124/5 p133/B5

Tags: Workspace, UGC

10.1.8 Search workspace

Registered users, who may be Path creators, can search within their own holding area.

Source: p133/B1

Tags: Search, Workspace

10.1.9 Search Paths by topic

The user requirement states that registered users can search for objects via related Paths. For the first prototype we interpret this to say that all users (registered or not) should be able to search for Paths about a given topic.

Source: p133/B1

Tags: Search, Paths

10.1.10   Save searches

Users will be able to save their searches.

Source: p137/D15

Tags: Search

10.1.11   Find existing Paths

Closely allied to 10.1.9, users will be able to discover existing Paths (via means other than search).

Source: p133/B4

Search: Discovery

10.1.12   Links to related content

Objects in the collections will be linked to related content and themes into which the object fits.

Sources: p124/5, p133/B3, p126/3

Tags: Objects

10.1.13   Create Paths

Users will be able to create Paths, that is, an annotated series of nodes. A node includes a pointer to an object from a collection together with an annotation provided by the Path creator and a description of the link to the next node in the Path.

Source: p124/8 (this talks about objects but later requirements modify this to talk about nodes), p134/C4

More specifically, users will be able to:

- Select items from search results and add them to a Path in an organised way, e.g. identifying nodes, connections between nodes, the main pathway and branches (this implies the existence and minimum functionality for the user's workspace, see 10.1.7);

- Add annotations to explain the connections between the nodes in a Path;

- Create links to related items without fully integrating these into a path (if you're interested in X you might also like to see Y).

Source: p134/C1

Tags: Path Creation

10.1.14   Edit Paths

Path creators must be able to edit their Paths after publication. This includes the ability to insert new nodes and delete existing ones. See also 10.2.5.

Source: p134/C7 & C8

Tags: Path Creation

10.1.15   Identity

Paths, nodes, user comments & contributions must have a unique identity that can be referenced on the Web.

Sources: p124/9 and 10, p131/2, p135/C16, C17, p137/D15

Tags: UGC, Access, Architecture

10.1.16   Search engine friendly

Paths are search-engine friendly, i.e. they expose key information about the Path's subject matter etc. See also 10.1.18

Source: p127/1, p136/D10

Tags: Architecture, Paths

10.1.17   Add content

Users will be able to add content. As a minimum, this will be as plain text although hypertext, images and audio/video should also be considered.

Source: p124/Note on Point 7, p134/C6, p137/D12

Tags: UGC

10.1.18   Describe themes and sub-themes

Users will be able to describe the themes and sub-themes of a Path. This is related to the Path, not any specific object within the Path. See 10.1.17.

Source: p124/7a, p143/C5, p137/E1

Tags: Path Creation

10.1.19   Add content tied to objects

Users will be able to add annotations, descriptions, narratives etc. to specific objects. See section 10.1.17

Source: p124/7b

Tags: UGC

10.1.20   User comments on Paths

Users will be able to comment on Paths and augment Paths with their own content. See also 10.2.15 which extends this functionality to comment on individual nodes.

Sources p126/5, p124/8a & 8b, p129/5b, p136/D6

Tags: UGC

10.1.21   Attribution

All content added to the system will be attributed to the user that added it. This includes tags, comments and annotations, Paths and, if supported, uploaded images etc. (see 10.3.7). Attribution will be visible to users.

Source: p137/D12, E2

Tags: UGC, Access

10.1.22 Grant access to specific users & user groups

By default, a Path is only visible to its creator. However, the user can choose to make it available to:

- Other specific users;

- Specific groups of which the user is a member;

- All users;

- The public.

Source: p126/5, p126/6&8, p135/C10. See also 10.2.6, 10.2.12

Tags: Path Creation, Access

10.1.23 Permission to clone

If 10.2.13 is implemented, Paths may be cloned by a user, edited and republished as their own. The Path creator can declare whether they give their permission for this. If a Path is cloned, the Path owner will be alerted.

Source: p135/C15

Tags: Clone, Path Creation

10.1.24 User identity

Users who are not Path creators have an identity on the system.

Source: p129/5

Tags: Users, Access

10.1.25 Multiple platforms

The PATHS system will be available through multiple platforms.

Source: p131/1, p137/E4

Tags: Architecture

10.1.26 Zoom

Users will be able to view a Path at different resolutions so that they can see an overview or focus on a particular node.

Source: p131/6, p136/D1

Tags: UI

10.1.27 Sense of discovery

To foster a sense of discovery each object will be linked to related objects in the collection and resources elsewhere on the Web.

Users will be able to choose to switch to another Path whenever they are at an intersecting node or one that is thematically nearby.

Users will be able to change direction, either to retrace their steps or simply follow the path backwards, or follow links to related material.

Users may join and leave a Path at any point and may come back and recommence their journey where they left off.

Source: p131/2, p136/D2, D3, D4, D14, D15

Tags: Object, UI, Architecture

10.1.28   Delete user profiles and user-generated content

Administrators will be able to delete any user from the system as well as individual items such as tags, annotations and, if supported, images and videos (see 10.3.7).

Source: p136/D11

Tags: Access

10.2 SHOULD

10.2.1 Familiarity

The user experience will be based on familiar styles and concepts rather than offer something entirely novel.

Source: p132/A5

Tags: UI

10.2.2 Organise Personal Collection

It must be possible to annotate, edit and arrange objects within the holding space.

Source: p124/5

Tags: UI

10.2.3 Flexible design

PATHS should use a flexible design, allowing the same basic tools to be used in different ways. Paths should be accessible and viewable in different ways (see 10.1.26) with support for different types of linking material between nodes.

Source: p124/8, p134/C9

Tags: Architecture, UI

10.2.4 No restriction on object type

Objects may include text, images, audio or video.

Source: p131/4 & 7

Tags: Architecture

10.2.5 Create Paths across multiple sessions

Work on creating a Path can be carried out across multiple sessions with the system preserving state between such visits.

Source: p124/8a, p126/6

Tags: UI, Architecture

10.2.6 Grant access to specific groups

Path creators can grant access to a specific Path to a group of users. This does not imply that the Path creator is in control of that group's membership. Such access can be rescinded.

Source: p126/5, p126/6&8

Tags: Access, Groups

10.2.7 Communication with Path creator

Uses can communicate directly and privately with a Path creator, at least to alert them that a comment has been left.

Source: 126/5a, p125/C13

Tags: Comms

10.2.8 Activity description

In addition to the metadata defined in 10.1.18, Path creators can describe the type of activities includes, the likely time to complete the Path and any other related information.

Source: p127/6

Tags: Path Creation

10.2.9 Tagging objects

Users can tag objects in the collection.

Source: p129/5a, p136/D9

Tags: UGC

10.2.10   Aggregate tags

User-defined tags are aggregated (see 10.2.9).

Source: p129/5a

Tags: Architecture, UI

10.2.11   Search via tags

Users can search collections by matching user-generated tags.

Source: p133/B6

Tags: Search

10.2.12   Show/hide annotations

Path creators can choose to show or hide their annotations, links between nodes etc.

Source: p129/5b, p135/C11

Tags: Path Creation, Access

10.2.13   Clone Paths

Users can clone existing Paths and then edit and publish them under their own name.

Source: p129/5c, p131/10 & 11, p135/C14, p137/E2

Tags: Clone

10.2.14   Time factor

When searching for Paths (10.1.9), users can specify a preferred duration for the Paths. (see 10.2.8)

Source: p136/D5

Tags: Search

10.2.15   User comments on items in a Path

Users can comment on individual items within a Path.

Source: p124/8b, p136/D7 (the former is COULD, the latter is SHOULD)

Tags: UGC

10.3 COULD

10.3.1 Add any resource to holding space

Users can activate a control in their browser that adds the current page, whatever its location on the Web, to their workspace.

Source: p126/3, p134/C2

Tags: Architecture

10.3.2 Rate Paths

Users will be able to rate Paths.

Source: p136/D8, p126/5c (the former has this as COULD, the latter as SHOULD).

Tags: UGC

10.3.3 Receive private comments

A Path creator can receive private comments on their Path.

Source: p126/7, p135/C12

Tags: Comms

10.3.4 Tag rewards

In an application of the ESP game4, users are rewarded for tagging an object in the same way as others have already done. See 10.2.9 and 10.2.10.

Source: p135/E3

Tags: UGC

10.3.5 Geolocation data

Where available, object metadata should include geolocation data (so they can be shown on a normal map).

Source: p131/3

Tags: Architecture

10.3.6 Matching Paths and objects to locations

Paths can offer information about objects associated with a specific location and users can search for content associated with a specific location, perhaps via a map.

Source: p131/9, p133/B2

Tags: Architecture, Search

10.3.7 User content

Users can upload their own content, such as images and video, and save it to their holding area. Such content must have associated structured metadata.

Although not explicitly stated, the implication is that such content could be used in a Path. See also 10.1.17.

Source: p131/5, p136/D11

Tags: UGC

10.3.8 Web content as object

Section 10.1.13 requires that nodes link to an object from a collection. Nodes may alternatively point to any other Web content, which can be text, images, audio or video.

Source: p135/C3

Tags: Object

11 Appendix 2: List of Functions specified for the First Prototype

The table below shows of all functions specified for the first prototype together with their implementation status (for the first prototype). Three implementation status are used:

- Complete: The function is fully implemented in the first prototype.
- Partial: Not all sub-functions were implemented in the first prototype.
- Not implemented: The function was not implemented in the first prototype

#	Function	Status
User Accounts		
F.1	Users will be able to register on the system, thus creating a profile.	Complete
F.2	Users will be able to login using a username and password combination.	Complete
F.3	Users will be able to logout.	Complete
F.4	A system will be implemented that will reminder users if they forget their password.	Complete
F.5	Users will be able to edit their profile.	Complete
F.6	The user will be able to control which aspects of their profile are visible to the public.	Not implemented
F.7	In addition to standard fields such as user name and so on, the profile will automatically record various aspects such as: - Paths they have created. - groups of which they are a member. - whether they are a user or facilitator, meaning a teacher, cultural heritage curator etc. - their cognitive style: such as rambler, trekker, explorer. - to view items in specific collections. - their e-mail address.	Partial
F.8	Users will be able to delete their account entirely. This will remove their Paths and all contributed content.	Complete
Workspace		
F.11	Users will be able to add objects, such as those presented in search results, into a personal workspace.	Complete
F.12	Users will be able to rearrange and annotate the objects within the workspace.	Partial

Search		
F.13	The user will be able to select what s/he wishes to search. Options will be to search: - the collections - the user's workspace - for objects only, Paths only, or both - on user-generated tags	Partial
F.14	Users will be able to save searches to their workspace. The saved search will be labelled with the search term used.	Partial
Objects		
F.20	Where available, links will be made from objects to their original source, typically a high-resolution image, audio recording or video.	Complete
F.21	System administrators will be able to record in a user's profile that the user has access to the Alinari collection. When an authorised user follows a link from an object to the relevant Alinari image, they will have access. If a user without authorisation follows the same link they will be redirected to a page giving information on how a licence may be purchase.	Partial
Node and Path Creation		
F.22	Users will be able to create Paths, that is, an annotated linear series of nodes.	Partial
F.23	Therefore users will be able to create nodes. A node includes a pointer to an object selected from search results or the user's workspace together with an annotation provided by the Path creator.	Complete
F.24	Users will be able to add a description of the link to the next node in the Path.	Complete
F.25	Users will be able to create links to related items without fully integrating these into a path (if you're interested in X you might also like to see Y).	Complete
F.26	Users will be able to return to their Paths and perform edits.	Complete
F.27	Creators can add metadata that describe their Paths.	Complete
F.28	Creators can set the visibility of their Paths.	Not implemented
Cloning		

F.32	Users will be able to clone a Path if the original creator has given his/her permission.	Not implemented
F.33	The cloned Path is attributed to the new owner.	Not implemented
User-Generated Content		
F.34	Users will be able to add text to the system. - Users will be allowed to include markup in the text (so that they can include hyperlinks). - During the Path creation process, text will be associated with objects, nodes or Paths as part of the content. - Outside the Path creation process, text will be associated with objects, nodes or Paths as user comments. - All user-generated text, including tags, will be attributed to its author.	Partial
Tags		
F.36	Users will be able to tag objects, nodes and Paths.	Complete
Rating		
F.38	Users will be able to rate Paths.	Not implemented
F.39	Users will be able to see aggregate ratings for each Path.	Not implemented
Identity		
F.40	Paths, nodes and user comments will each be assigned a URI (objects in the collection already have their own URI).	Complete
System Functions		
F.41	Users will be able to follow links from one object to related objects and/or resources on the Web.	Complete
F.42	Users will be able to choose to switch to another Path whenever they are at an intersecting node or one that is thematically nearby.	Partial
F.43	Users will be able to change direction, either to retrace their steps or simply follow the path backwards, or follow links to related material.	Partial
F.44	Users may join and leave a Path at any point and may come back and recommence their journey where they left off.	Partial

F.45	Users will be able to browse the collection, follow Paths, follow links to related items.	Complete
F.50	The PATHS system will be able access the data processed in work package 2 in which the similarity between objects is calculated, along with links to external resources. This is the engine behind the requirement that objects will link to related items.	Complete
F.51	The system will be able to calculate the relatedness of Paths.	Not implemented
F.52	The system will record users' behaviour: click rate, subjects viewed, links followed, search terms used etc.	Partial
F.53	Based on the behavioural log, the system will be able to classify the user, with increasing accuracy, as a rambler trekker, explorer.	Not implemented
F.54	For registered users, the cognitive style classification will be recorded in their profile.	Not implemented
Access Control		
F.59	General users are anonymous users who have either not registered an account on the system or have not logged into their account. They have access to the following functionalities: 1. Search the collections 2. Explore the collections 3. Search the published paths 4. Follow published paths 5. View individual nodes and objects 6. View user-comments on nodes, objects, or paths 7. View the public sections of registered users' profiles 8. Register an account 9. Log in to an existing account (this action makes the user a registered user) Search engines or other web-crawlers are also classified as general users and the same access rights apply to them.	Partial
F.60	Registered users have created an account and logged in to their account. They inherit all the access rights that a general user has. Additionally they have access to the following functionalities: 1. Add items to their workspace 2. Create paths 3. Edit their own paths 4. Clone other paths 5. Edit their profile	Partial

		6. Log out 7. Delete their account 8. Add tags to objects, nodes, Paths 9. Add comments to objects, nodes, paths 10. Create, join, leave user groups 11. Access groups of which they are a member	
F.61		The administrator is a super-user who inherits all the registered users access rights. Additionally they have access to the following functionalities: 1. Edit or delete any Path 2. Edit or delete any user account 3. Edit or delete any user-comment 4. Edit or delete any user-generated tag 5. Edit or delete any user-group 6. Access any group (sect. X.Y.Z)	Partial
F.62		Registered Users may create, join and leave groups.	Not implemented
F.63		Users can see a list of members of groups of which they themselves are a member.	Not implemented
F.64		Users may set the visibility of their contributions to one of three levels: - private (user only) - group (visible to any group of which the user is a member) - public.	Not implemented
F.65		Users can set visibility controls for: - each item in their profile except their username & password; - the Paths they create; - comments they have made; - their workspace.	Not implemented