D1.3 Functional Specification for First Prototype

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Change Log

Version	Date	Amended by	Changes
0.1	28-07-2011	Phil Archer	Original document, including elements of design.
0.2	24-08-2011	Phil Archer	Advancement on version 1.0
0.3	31-08-2011	Phil Archer	Incorporating comments from KF, MS, MH
0.4	08-09-2011	Phil Archer	Beginning of restructured version based on further feedback
0.5	16-09-2011	Phil Archer	Continuation to near completion with new structure
0.6	22-09-2011	Phil Archer	Incorporation of comments from EA, IA, MH. Completion of content, application of document template etc.
0.6.2	23-09-2011	Phil Archer	Fixed a broken link, minor addition to the Methodology section stating that some complex functions may be in mock up only for the first prototype
1.0	09-10-2011	Phil Archer	Extended Exec Summary

Contents

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1. Executive Summary

PATHS aims to make it both enjoyable and easy for users to explore cultural heritage content in digital libraries.

One of the first steps to achieving this objective was collecting and analysing user requirements which are presented in D1.1. This deliverable presents the functional specification for the first prototype of the PATHS system. It supports the project strategy to bring users into an agile and iterative development cycle by:

- Gathering and analysing user requirements;
- Developing functional specifications for prototypes;
- Evaluating prototypes and reviewing the results to inform the next phase in the development.

The functional specification presented in this deliverable is based on the user requirements which were gathered during the first six months of the project. Together with the System Architecture Specification (D.3.1) it informs the development of the first PATHS prototype, which will be evaluated during year two of the project.

During interviews, potential users expressed opinions that were translated into a series of requirements with three levels of priority: Must, Should and Could. All the requirements identified in the study have been reviewed in preparing the functional specification of the first prototype. As far as possible, all 'Must' and 'Should' requirements will be met in the first prototype, as well as the 'Could' items that were easy to incorporate. However, more complex subsystems will be left for inclusion in the second prototype and final PATHS system. This is part of a research and development strategy to ensure that the available resources at this stage are directed to testing and evaluating the functionality of the system with the aim of producing a usable, robust and extensible system. In this first prototype, some aspects of functionality such as the personalisation and recommendation systems will be in a rudimentary stage with more advanced functionality being planned for later prototypes.

There will be three types of user: general users who are anonymous, registered users who are logged in to the system, and administrators.

General users will be able to search and explore the collections. Exploring in this context means that they will be able to follow Paths - annotated sequences of objects - and see links from objects to related resources. Where possible, the system will attempt to recommend further objects that the user will find interesting, however, the scope for this among unregistered users (or registered users who are not logged in) is very small since there is very little available data about the individual.

The interactive functions are primarily available to registered users who are encouraged to delve deeply into the collections and to share their knowledge and enthusiasm. Each user will have a workspace in which they can save and annotate objects and it is from this workspace that they will be able to select objects from the collection and create Paths. Each node in the Path comprises the object, the Path creator's notes about the object, and information linking the current node with the next one. Creating a Path may be completed in a single session or across multiple sessions - the system will preserve state between visits of each registered user. In addition to creating Paths, registered users will be able to comment on, tag and rate

other people's Paths. If the creator of a Path allows it, registered users will be able to clone, edit and republish the Path as their own.

At the time of creation, Paths will only be visible to their creator. However, they can be made available to groups of users or the public. Likewise, registered users will be able to control the visibility of information contained in their personal profile. Some will want to be open about themselves, others will with to be more private.

Since the system allows any user to register and to start adding their comments, administrators will be able to edit or delete user-generated content.

This deliverable consists of:

Chapter 2: Introduction. This chapter sets the context for this functional specification and describes the work which has been carried out to gather and analyse requirements.

Chapter 3: Methodology. This chapter describes how the user requirements have been distilled to provide the functional specification for the first prototype and plans for the second prototype and other applications.

Chapter 4: Implementation expectations. A series of functions have been identified for implementation in the first prototype, however the initial implementation may be in a manual process with automation in the second prototype following user evaluation.

Chapter 5: Functions derived from the user requirements. This chapter sets out in detail the functions identified through the user requirements analysis work.

Chapter 6: System functions. This chapter sets out the functions which are needed by the system in order to meet the user requirements. These functions include:

- Visualise/brows
- Access object similarity data
- Calculate paths relatedness
- Behavioural logging and classification
- Recommendations

Chapter 7: Access control. This chapter describes the classes of user and their privileges in the PATHS system. The three main classes are:

- General user
- Registered user
- Administrator

Chapter 8: Conclusion. This chapter provides a brief summary of the deliverable.

Appendices – The appendices list the user requirements by priority.

2. Introduction

PATHS - Personalised Access to Cultural Heritage Spaces - is being designed not just to make it easy to access cultural heritage but to make it rewarding. Educators and curators will have a powerful tool for teaching and engaging an audience, users will be able to explore and share ideas, knowledge and perspectives. PATHS will present them with the cultural heritage collections and related material, making recommendations and suggestions for what to look at next, and those recommendations will be based in part on the user's own tastes and interests.

This is not a simple system. There are multiple data sources, multiple types of user and multiple tasks that need to be supported.

In the first phase of the PATHS project, partners conducted an extensive survey of the potential users of the system. These included face to face interviews and an online survey that were synthesised into a detailed research document, D1.1. As part of that process, use cases were prepared from which a set of user requirements were derived. This document takes those requirements and moves the process onto the next step which is to interpret them as functions within a system.

This document specifies what the first prototype of the PATHS system will do, complemented by D3.1, the Specification of the System Architecture, which defines how it will be realised in substantial detail.

3. Methodology

Section 10, which forms an appendix to the main body of this document, lists all the user requirements that were identified in the analysis presented in D1.1. These are organised by priority (MUST, SHOULD and COULD) and faithfully record the wishes of the target audience. Unsurprisingly, different users put different priorities on some functions than others and there was a good deal of repetition but the amount of rationalisation carried out was deliberately minimal so that the users' wishes have been reflected as fully as possible.

However, the aim of this document is to provide a working functional specification for the first prototype of the PATHS system to enable the evaluation of key functionality by end-users. The project has adopted an agile and iterative development methodology and a second prototype will be developed later in the project. Thus not all the user requirements are implemented in this specification. Section 5 therefore is a distillation of the user requirements taking into account several additional factors:

1. the importance of providing and proving the core system as a basis for evaluation and in a way that allows for it to be extended in the system development cycle;

2. dependencies between requirements;

3. the available time and resources.

Functions are grouped into related areas and for each section, a justification for the choice of functions to be implemented in the first prototype is provided. This is followed by specific references to the user requirements that are detailed in section 10, organised by MUST, SHOULD, and COULD priorities. Care has been taken to ensure that all user requirements are included.

In addition to the functions that were identified by the user survey there are also a series of additional functions are necessary for the system to work. These are set out in sections 6 & 7 and do not relate directly to the user requirements.

4. Implementation Expectations

It is expected that the first prototype will implement each of the functions marked by an f, however, the level of implementation may vary. In the first instance implementation may rely on manual intervention with automation of the feature following evaluation in the second prototype.

5. Functions Derived from the User Requirements

5.1.   User Accounts

f Users will be able to register on the system, thus creating a profile.

f Users will be able to login using a username and password combination.

f Users will be able to logout.

f A system will be implemented that will reminder users if they forget their password.

f Users will be able to edit their profile.

f The user will be able to control which aspects of their profile are visible to the public.

f 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 (see 7.4 Groups)

- whether they are a user or facilitator, meaning a teacher, cultural heritage curator etc.

- their cognitive style: such as rambler, trekker, explorer (see 6.4 Behavioural Logging & Classification);

- licences/permissions to view items in specific collections (see 5.4 Objects)

- their e-mail address (important for 5.12.2 Communication)

f Users will be able to delete their account entirely. This will remove their Paths and all contributed content (see 5.10 Identity).

5.1.1. Justification

These core functions of user registration and profile management are all listed as requirements that MUST be fulfilled. It is important that the data structure used in the first prototype is able to support an extensible list of fields.

5.1.2. Original User Requirements

MUST

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

SHOULD

None

COULD

None

5.2. Workspace

ƒ Users will be able to add objects, such as those presented in search results, into a personal workspace.

ƒ Users will be able to rearrange and annotate the objects within the workspace.

5.2.1. Justification

The concept of the individual's workspace is closely associated with a user's profile. It acts as a notepad where users can collect objects they find interesting, they can drag objects around to reorder them, and annotate them. This is useful tool for collecting and organising thoughts as a precursor to creating Paths.

Since the workspace reflects the user's tastes and interests, it is a potential source of data for the personalisation aspects of the system.

The ability to add any Web resource to a PATHS workspace requires the development of a browser bookmarklet[1] or add-on which is not considered essential for development alongside the first prototype.

5.2.2. Original User Requirements

MUST

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

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[1] http://en.wikipedia.org/wiki/Bookmarklet

SHOULD

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

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.

5.3.   Search

ƒ   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 (see 5.8).

ƒ   Users will be able to save searches to their workspace. The saved search will be labelled with the search term used.

5.3.1. Justification

A search function is clearly essential for any user, as is the ability to choose where to search. Being able to collect and organise information is a core part of the PATHS functionality.

5.3.2. Original User Requirements

MUST

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.

SHOULD

10.2.11

Search via tags - Users can search collections based on user-generated tags (see 5.8)

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

COULD

None

5.3.3. First Prototype

5.4. Objects

ƒ Where available, links will be made from objects to their original source, typically a high resolution image, audio recording or video.

ƒ 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.

5.4.1. Justification

Links from objects to related objects is a core function of the PATHS system. Such links are based on the pre-processing carried out in WP2.

Alinari provides an example of a commercial collection: high resolution images are only made available to paying customers. It is anticipated that the second prototype will support a system through which access can be granted to original digital resources to specific users. However, this is a complex area and not a core function of the system. In the first prototype, the simplest possible system will be implemented, one that will require manual editing of the relevant user's profile.

5.4.2. Original User Requirements

MUST

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.

SHOULD

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

COULD

None

5.5. Node and Path Creation

ƒ Users will be able to create Paths, that is, an annotated linear series of nodes.

ƒ   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 (see 5.7).

ƒ   Users will be able to add a description of the link to the next node in the Path.

ƒ   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).

ƒ   Users will be able to return to their Paths and perform edits.

ƒ   Creators can add metadata that describe their Paths.

ƒ   Creators can set the visibility of their Paths (see 7.5 Visibility and Privacy)

5.5.1. Justification

The creation of Paths is a core feature of the system. It is how users add value to the collections by annotating them and linking them together into a narrative. The concept of a node follows from this: it is a container for the object and the Path creator's interpretation. Such interpretation may include links to other objects, nodes or Paths but the first prototype will not support Paths with multiple branches.

5.5.2. Original User Requirements

MUST

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).

SHOULD

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.

COULD

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. Cloning

ƒ Users will be able to clone a Path if the original creator has given his/her permission.

ƒ The cloned Path is attributed to the new owner.

5.6.1. Justification

Cloning existing Paths is seen as a way for individuals to improve upon an existing Path that goes beyond simply commenting on the nodes and objects

5.6.2. Original User Requirements

MUST

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.

SHOULD

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

COULD

None

5.7. User-Generated Content

This section covers free-flowing text. Section 5.8 covers the more specialised issue of Tags.

ƒ Users will be able to add text to the system.

ƒ Users will be allowed to include markup in the text (so that they can include hyperlinks).

ƒ During the Path creation process (see 5.5 Node and Path Creation), text will be associated with objects, nodes or Paths as part of the content.

ƒ Outside the Path creation process, text will be associated with objects, nodes or Paths as user comments.

ƒ All user-generated text, including tags, will be attributed to its author.

5.7.1. Justification

In order to encourage exploration and foster accidental discovery, it is important that Paths allows users to contribute their ideas and knowledge whether as Path creators or consumers. Therefore it is important that all users can add text to the system. For consumers, these will be comments on an object, node or Path (or perhaps a comment on a previous contributor's comment). Adding text is core to the process of creating Paths.

The first prototype will therefore allow users to input text which can include markup. This allows the inclusion of hyperlinks to related content, although it also imposes a burden on system administrators to ensure content is appropriate (see 7.3 Administrator).

It is anticipated that the second prototype will extend the functionality to allow users to include other media as well as text.

5.7.2. Original User Requirements

MUST

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.

SHOULD

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.

COULD

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.

5.8.   Tags

ƒ   Users will be able to tag objects, nodes and Paths.

5.8.1. Justification

Although cited in the under requirements as a SHOULD, rather than MUST, the first prototype will facilitate tagging as:

- technically it is simply a specialisation of user generated content;

- it is well understood by users as a means of making connections between different ideas and themes;

- tags provide data for the linking and recommending elements of PATHS.

5.8.2. Original User Requirements

MUST

None

SHOULD

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

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

COULD

None

5.9. Rating

ƒ   Users will be able to rate Paths.

ƒ   Users will be able to see aggregate ratings for each Path.

5.9.1. Justification

It is perhaps surprising that the user survey gave the ability to rate Paths a low priority. However, it is included in the first prototype because:

- it is easy to implement using software modules already available to the project;

- ratings provide a useful method for ranking search results, the ordering of lists of elements in a user interface, and input to the recommender system

5.9.2. Original User Requirements

MUST

None

SHOULD

None

COULD

10.3.2 Rate Paths - Users will be able to rate Paths

5.10. Identity

ƒ   Paths, nodes and user comments will each be assigned a URI (objects in the collection already have their own URI).

5.10.1. Justification

Providing URIs for all data components allows them to be referred to flexibly within the system and visible on the Web in general. This addresses the need for PATHS to be available on multiple platforms. As well as being important for search, it is also important for administrative monitoring of the content on the system (see 7.3 Administrator). Giving URIs to each data object also greatly aids the design of a User Interface that fosters a sense of discovery (5.11).

5.10.2. Original User Requirements

MUST

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.

SHOULD

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

COULD

None

5.11.   Discovery

ƒ   Users will be able to follow links from one object to related objects and/or resources on the Web (see also 5.4)

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

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

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

5.11.1. Justification

These functions are all about engaging the user, allowing them to follow their interests. Their implementation is largely at the User Interface layer rather than in the data layers.

5.11.2. Original User Requirements

MUST

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.

SHOULD

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

COULD

None

5.12.   User Requirements Not Covered

The preceding subsections are drawn directly from the user requirements. A small number of these remain uncovered so far however. These are discussed in the following short subsections.

5.12.1. Access Control

10.1.22 Grant access to specific users & user and 10.1.28 Delete user profiles and user-generated content, 10.2.6 Grant access to specific groups are all covered in section 7.3 Administrator.

5.12.2. 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.

5.12.3. 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[2] 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 feature of the first or second prototype.

5.12.4. 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 although the potential is such that the issue will be re-examined for the second prototype.

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

6. System Functions

In addition to the functions that are revealed by analysing the user requirements, there are a number that are either implied or that are required in order to make the system operable at a suitably robust level. Rather than user requirements, these can be thought of as functions required within the system in order to meet the user requirements. These are all effectively at the level of MUST.

6.1. Visualise/Browse the System

ƒ Users will be able to browse the collection, follow Paths, follow links to related items

6.1.1. Justification

This function is included to indicate that PATHS will have a user interface through which the system will be accessible, something not explicitly set out in section 5.

6.2. Access Object Similarity Data

ƒ 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.

6.2.1. Justification

This 'obvious' function is included for the sake of completeness.

6.3. Calculate Path Relatedness

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

6.3.1. Justification

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

6.4. Behavioural Logging & Classification

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

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

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

6.4.1. Justification

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

6.5. Recommendations

A critical part of PATHS (Personalised Access to Cultural Heritage Spaces) is the ability for the system to recommend objects and Paths to a user based on their cognitive style and interests. This will not be implemented in the first prototype but will be in the second.

6.5.1. Justification

This function is at the core of PATHS, however, it is necessary to build the basic system and see what data can reasonably be collected from users before detailed work on this module can be carried out.

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

ƒ   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:

  ⚔ Search the collections (section 5.3 Search).
  ⚔ Explore the collections (section 5.11 Discovery).
  ⚔ Search the published paths (section 5.3 Search).
  ⚔ Follow published paths (section 6.1 Visualise/Browse the System)
  ⚔ View individual nodes and objects (section 5.10 Identity).
  ⚔ View user-comments on nodes, objects, or paths (section 6.1 Visualise/Browse the System).
  ⚔ View the public sections of registered users' profiles (section 6.1 Visualise/Browse the System).
  ⚔ Register an account (section 5.1 User Accounts).
  ⚔ Log in to an existing account (section 5.1 User Accounts). 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

ƒ   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:

  ⚔ Add items to their workspace (section 5.2 Workspace).
  ⚔ Create paths (section 5.5 Node and Path Creation).
  ⚔ Edit their own paths (section 5.5 Node and Path Creation).
  ⚔ Clone other paths (section 5.6 Cloning).
  ⚔ Edit their profile (section 5.1 User Accounts).
  ⚔ Log out (section 5.1 User Accounts). This action makes the user a general user.
  ⚔ Delete their account (section 5.1 User Accounts).
  ⚔ Add tags to objects, nodes, Paths (section 5.8 Tags).
  ⚔ Add comments to objects, nodes, paths (section 5.7 User-Generated Content).
  ⚔ Create, join, leave user groups (section 7.4 Groups).
  ⚔ Access groups of which they are a member (section 7.4 Groups).

7.3. Administrator

ƒ The administrator is a super-user who inherits all the registered users access rights. Additionally they have access to the following functionalities:

- Edit or delete any Path.
- Edit or delete any user account.
- Edit or delete any user-comment (section 5.10 Identity).
- Edit or delete any user-generated tag.
- Edit or delete any user-group (section 7.4Groups).
- Access any group (sect. X.Y.Z)

7.4. Groups

ƒ Registered Users may create, join and leave groups.

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

7.4.1. 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

ƒ 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.

ƒ 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.

7.5.1. 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. Conclusion

The functions detailed in sections 5-7 describe a complex system with many facets. Where possible, the requirements suggested by the users have been accommodated. Where necessary, the requirements have been managed in a way that allows for evaluation of functionality and development to within the agile and iterative research cycle adopted in this project.

9. References

Other important documents from the PATHS deliverables include:

D1.1 User Requirements Analysis

D3.1 Specification of System Architecture

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

10. Appendix: 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, 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. [There's some confusion here since D9 says 'objects in the Path' which may mean nodes rather than objects].

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 game[2], 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