Grant Agreement No.   ICT-2009-270082

Project Acronym   PATHS

Project full title   **Personalised Access To cultural Heritage Spaces**

D 1.1 User Requirements Analysis

Authors: **Paula Goodale (USFD)**

Mark Hall (USFD)

Kate Fernie (MDR)

Phil Archer (iSieve)

Contributors: **Francesca Tavanti (Alinari)**

Paul Clough (USFD)

Project funded under FP7-ICT-2009-6 Challenge 4 – "Digital Libraries and Content"	
Status	Final
Distribution level	Public
Date of delivery	30/06/2011
Type	Report
Project website	http://www.paths-project.eu
Project Coordinator	Dr. Mark Stevenson University of Sheffield

Change Log

Version	Date	Amended by	Changes
0.1	28/04/2011	Paula Goodale	Doc created with skeleton TOC
0.2	13/06/2011	Paula Goodale , Mark Hall	Content added to Sections 2-6 and 8
0.3	24/06/2011	Paula Goodale, Kate Fernie, Phil Archer	Additional content added to Sections 2-8
0.4	27/06/2011	Paul Clough, Paula Goodale	Content added to Sections 1and 9
0.5	29/06/2011	Paul Clough, Mark Hall Kate Fernie, Paula Goodale	Proof-reading and minor revisions, references updated; executive summary and annexes added
1.0	30/6/11	Paula Goodale	Final draft for peer review

Table of Contents

List of Figures

List of Tables

Executive Summary

The aim of this report is to identify the types and characteristics of potential users of the PATHS system in four domains (heritage, education, professional and general leisure users), and to develop an understanding of their needs when using this type of system, which are then translated into a set of user requirements for the first prototype. These user requirements will then be used to derive the functional specification of the prototype, as well as informing the initial interface design.

Methodology Adopted

The user requirements analysis for the PATHS system forms part of an overall user-centred approach to system design, and uses a mixed methods approach, with input from potential end users at every stage of the development process. Starting from a knowledge base derived from the research literature, we have designed a mixed methods approach which includes desk research, quantitative and qualitative survey methods, and controlled experiments with end users of the system.

Desk research includes the analysis of relevant secondary data to provide context for the user environment (e.g. approaches to user requirements in digital cultural heritage, and existing paths and path-creation tools) and key issues in the current research agenda (e.g. personalisation, recommendation and adaptive user profiles), and supplements the work done for deliverable D1.2 State-of-the-Art. Quantitative (online questionnaire) and qualitative (in-depth user interviews) survey methods providing detailed analyses of user personal and lifestyle characteristics, information behaviours and details of tasks relating to path creation, along with exploration of their views on the 'pathway' metaphor around which the system is to be developed. These surveys are complementary in that they cover different aspects of users' activities, and also enable triangulation of results on the critical area of user information behaviour and tasks, as the qualitative work investigates findings from the online survey in much greater depth. Experiments add an empirical dimension to the user requirements, introducing hands-on tasks as a means of understanding how users will interact with the system in practice. In the absence of a working system, at this stage of the project, this latter experiment-based work is somewhat hypothetical, and uses low- and medium-fidelity methods to implement a series of path-creation tasks to test the findings from the survey methods, particularly those relating to path-creation.

User Groups Investigated

For PATHS, we have identified the heritage, education and professional domains as being the main sources of 'expert' users (e.g. museum curators and archivists, teachers and lecturers, heritage sector education officers, academic researchers, and publishing and tourism professionals) whom we envisage will become the most regular and prolific users of the core path-creation aspect of the system, whilst the education, heritage and general user domains will provide the main groups of 'non-expert' or casual users (e.g. students, museum and gallery visitors, and culture enthusiasts).

In line with other recent research projects in the area of digital cultural heritage, the initial requirements analysis focuses primarily on the views of the expert users, and further, elicits their opinions on the needs of those non-expert users who form the audiences of organisations in the expert domains. Interviews have therefore been conducted entirely with expert users, and whilst the online survey was open to wider audiences, the bulk of respondents can be classed as expert users. Similarly, most of our initial user experiments have been carried out with contributors who have a reasonable degree of domain and subject knowledge, with the least experienced being postgraduate students taking a module on archives management.

Requirements of non-expert users, including those in the heritage (visitors), education (students) and general leisure user domains will be investigated more fully following the implementation of the first prototype, when, along with expert users, we will invite them to participate in experiments involving using the system to complete specific tasks.

Main Results

As we expected, our desk research shows that the 'pathway' metaphor is not new in either cultural heritage or web contexts, and indeed we find a large number of examples of paths or 'trails' available for both online and offline use. What is clear from the examples of published paths is that this is a niche activity, with a small number of people, most often experts, creating paths for the majority to use, often in an educational setting. These findings support our decision to focus on expert users in the first instance, and also provide valuable insights into the structure and content of paths, and the limitations imposed by their spatial and software constraints.

Results from the online survey reveal users with high levels of confidence in their abilities in internet searching, much higher than average levels of participation in cultural heritage for work, study and leisure, evidence of work experience across multiple domains, and common engagement in both work and study simultaneously, suggesting a desire or a need for ongoing professional development. Since users are confident in their abilities for internet searching, it is not surprising that they consult a wide range of sources, and do not feel unduly challenged by more complex information tasks. They do however exhibit a range of attitudes towards information seeking issues, revealing a range of cognitive styles across the Pask & Witkin dimensions of global-local and dependent-independent approaches to information seeking.

Combined with the interview results we then develop a set of domain and role-specific user profiles, which reveal both similarities and differences when combining users' general characteristics with path-related information tasks. So, for instance, curators, academic researchers and professionals in promotional roles take an approach of creating a path for consumption, whereas museum educators and teachers are more likely to focus on *enabling* other, 'non-expert' users to create paths as part of a learning exercise.

We validate the path-creation activities through a series of simple task-based user experiments, and then extrapolate them into a conceptual model comprising the key elements of engagement with the PATHS system: developing a *concept* or idea for a path; *collecting* relevant resources; *creating* a path; *communicating* with others about paths; and, and *consuming* paths that have been published. From the conceptual model we then demonstrate three generic behavioural path-creator profiles (expert path creator, non-expert path creator, and expert path facilitator), along with a fourth, more passive 'path consumer' profile, which may in time we hope, with support from a well-designed user interface encouraging exploration, evolve into a more engaged and interacting non-expert path-creator. All four interaction patterns are supported by the conceptual model and allow for the design of a single integrated system that incorporates the needs of all user types.

The four generic user profiles are then each developed further into specific use cases, using the findings from the domain and role-specific profiles to add richness and context. From these we derive a comprehensive set of implied user requirements for the use cases, and then a set of generalised requirements matching the five elements of the conceptual model, plus a small number of core functions which support general interaction functions.

Structure of the Report

The content of this deliverable report is structured as follows: Section 1 introduces the project and outlines the overall 'vision' for the PATHS system which underpins not only this deliverable, but the whole project. Section 2 describes the methodological approach to user requirements gathering for PATHS, and positions it in the wider project context. Sections 3-7 present the results of our data collection activities, including; reviews and analyses of a variety of secondary data via desk research methods; a quantitative online survey of expert users' personal characteristics and information behaviour; some in-depth qualitative interviews with expert users on their perceptions of the pathway metaphor and their own experiences of creating paths-like resources, and some exploratory experiments with expert and non-expert users involving medium- and low-fidelity methods for creating examples of paths. Included in these findings in Section 6 are a set of domain and role-specific user profiles drawn from synthesised findings from the survey and interview results. Next, in Section 8 we apply the findings of sections 3-7 to the development of a conceptual model of user interactions with paths, from which we then extrapolate four generic behavioural user profiles. These in turn are developed into scenario-based use cases, from which we derive a list of specific and generic user requirements which will in due course, inform the functional specification of the PATHS system. Section 9 offers our concluding remarks. There are also three annexes to this report, comprising the data collection instruments for the survey, interviews and workshop-based experiment presented in Sections 4, 5 and 7 respectively.

1. Introduction

This document describes the approaches used and results of the initial user requirements analysis for the PATHS project, which forms part of the WP1 work package and drives the design, implementation and evaluation of the PATHS system.

A user-centred approach to systems development necessarily entails clearly defining the target user groups and paying close attention to their requirements. In analysing the user requirements for PATHS, we focus on both expert and non-expert users in the cultural heritage, education, professional (e.g. tourism and publishing), and general leisure user domains, developing a rich profiles of their personal, lifestyle, experience and information behavioural characteristics, along with a detailed understanding of the context in which they might create and use paths, and the processes they would use to do so. Analysis of these data allows us to then develop a system which is suitable for our potential users, and supports their needs in accessing and interacting with cultural heritage collections in the context of the PATHS vision, summarised below.

1.1.   A Vision for PATHS

The PATHS project is exploring the metaphor of "paths" through a collection as a powerful and flexible model for navigation that can enhance the user's experience of cultural heritage collections and support them in their learning and information seeking activities. Paths can provide a history of where the user has been; suggestions of where they may go next and a narrative or story through a set of items.

The PATHS project aims to create a system that acts as an interactive personalised tour guide through existing digital library collections, offering suggestions about items to look at and assist in their interpretation by providing relevant contextual information from related items within specific collections and items from external sources (e.g. Wikipedia). This is particularly important to consumers of cultural heritage information with limited subject knowledge. However, our aim is to support the activities of both path consumers (e.g. students and general users) and producers (e.g. curators and teachers).

To summarise, the goals of the PATHS project are:

- To support user's knowledge discovery and exploration

- To use pathways/trails to navigate and explore the information space

- To use personalisation to adapt views/paths to specific users or

    groups of users

- To link cultural heritage items with items within the information space

    and externally to contextualise and aid interpretation
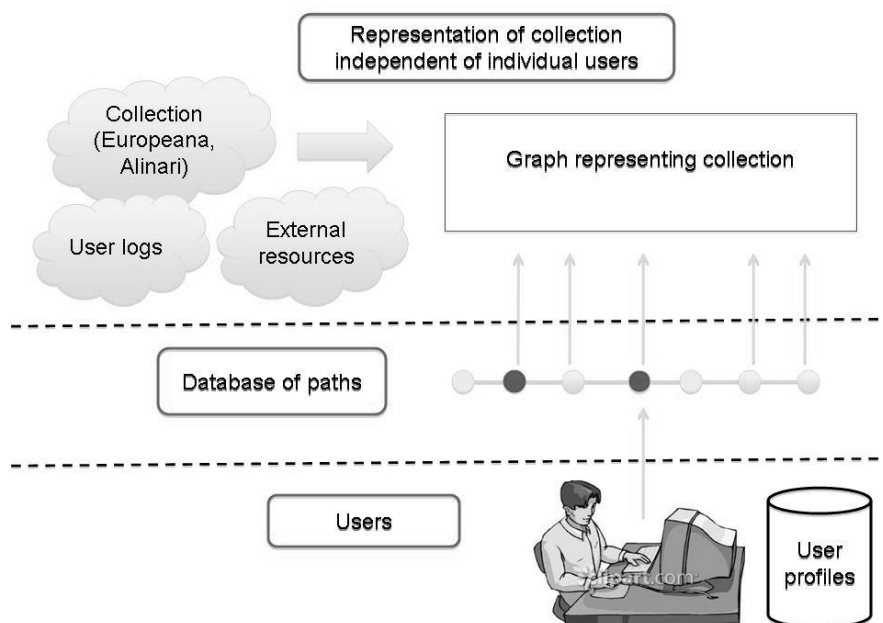
Fig. 1 A summary of the PATHS system

It is envisaged that the PATHS system will operate at three levels (Figure 1). At one level are the cultural heritage resources (e.g. the collections, existing user-system interactions or logs and external resources). These resources will be pre-processed and turned into a structure that is suitable for navigation and exploration through the user's searching and browsing activities.

At the next level pathways will be formed to provide guided narratives through the cultural heritage collections. These paths are independent of the underlying collection and can therefore be edited, shared and indexed as atomic objects. It is envisaged that users will be able to follow pre-defined "guided paths" created by domain experts (e.g. scholars or teachers) that provide an easily accessible entry point to the collection. Users will also be able to create and share their own "independent" paths, which may be based on following and then deviating from existing guided paths. Groups of users can also work collectively to create "collaborative" paths, adding new routes of discovery and annotations that can build on the contributions made by others.

At the level of the user the system will maintain user profiles that will be used to adapt the interface and provide different routes through the collection (e.g. different branches from a set path). The system will make user-specific recommendations about items of potential interest to users as they navigate through the collection. Individual user profiles may consist of explicit information such as cognitive style, expertise/subject knowledge, age, gender and language skills. Implicit data may also be collected (e.g. user-system interactions) to drive adaptive behaviour.
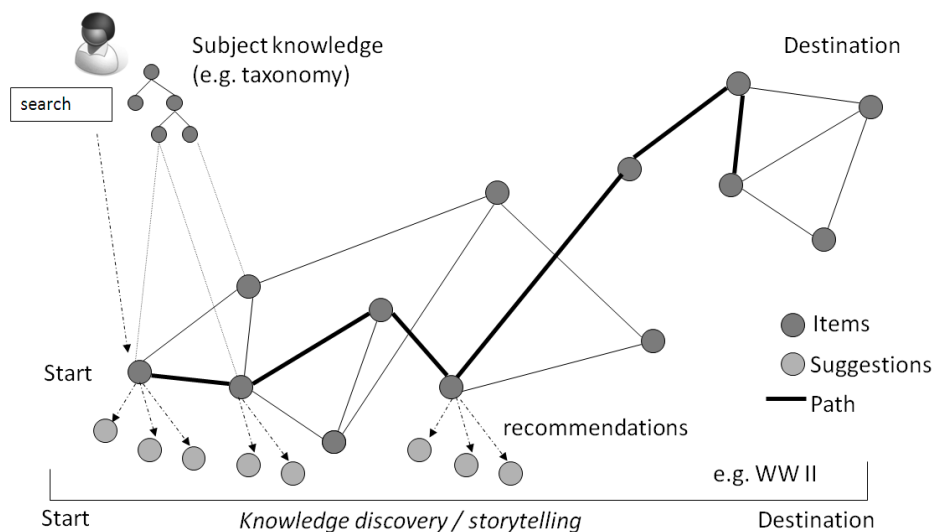
Fig. 2 Pathways through a collection

Figure 2 shows how the pathway might be formed. The dark nodes represent the underlying items in the collection (e.g. Europeana records) which have been linked and augmented through a pre-processing step (the collection level in Figure 1). Functionalities would be provided to enable users to locate specific items in the collection (e.g. search or browsing through subject categories), especially for those users forming guided paths. Items could be saved as a path (the darker thick line in Figure 2) representing specific themes or topics (e.g. WWII). The pathway reflects someone's journey through a subject as the path can then be saved and edited for future use (e.g. to form a guided path for others to follow). The system may also provide recommendations at various stages in the journey (e.g. links to similar items or potential items of interest based on the user's profile) which would allow users to deviate from a set path and generate independent paths. These suggestions are represented as the lighter coloured nodes (circles) in Figure 2.

2. Methodology

2.1. Systems Development

It is proposed that the PATHS system is developed via an agile, user-centred model of systems development, in line with the majority of recent projects in the area of digital cultural heritage (see, for example: Europeana, EuropeanaConnect, Multimatch, and others). Broadly, what this entails is an iterative process of requirements gathering, systems development, implementation (and/or prototyping), testing and evaluation, with test and evaluation results driving refinements and successive prototypes of the system (see Multimatch, 2006 for a comprehensive discussion).

In the case of PATHS, there are two planned prototypes; one each in the second and third years of the project. The novel combination of digital library exploration and path-creation functionality, matched with adaptivity via personalisation and recommendation, means that the PATHS system is designed to extend the state-of-the-art in information access in cultural heritage, and there is therefore little available for direct comparison at the outset. At this initial phase of the project then, we are tasked with gathering requirements for the first prototype, ostensibly working from the PATHS vision (summarised in Section 1.2) as the main framework for identifying users and determining the scope for requirements elicitation. This means that there is undoubtedly a strong conceptual element to the first phase of user requirements gathering, but as we progress onto the second prototype this work will be focussed on evaluating users' interactions with and responses to a working system (PATHS first prototype), and we will therefore have more concrete results based upon actual user experience.

In the remainder of Section 2 we will describe how we have approached the initial requirements gathering for the PATHS project, and outline the specific methods we have used. Further details about the actual design and implementation of the selected methods are presented in Sections 3-5 and 7.

2.2. Requirements Gathering

A key element of user-centred approaches to system design is the gathering and analysis of user requirements, and incorporation of these as primary inputs into the functional specification of the system. Requirements gathering exercises are concerned with studying and engaging with potential users of the proposed system as a means of identifying:

- Current activities and behaviours – what users do and how they do it

- Perceived needs – what users know they want

- New affordances – options suggested to users that they may not yet have thought of, due to lack of knowledge about what might be possible

The first two areas provide information about the status quo and can be ascertained to some degree prior to the development of any prototypes of the new system. The requirements generated in this way are invaluable in understanding the context in which people will be using the system and some of the challenges faced by users that are not currently addressed by existing systems. These requirements will most likely address the core functionality, around which novel aspects of the system will be built.

The third level of user requirements addresses new opportunities, and these requirements are often generated once a working prototype has been produced. Ideas for the prototype may therefore be somewhat exploratory, developed from knowledge of what is technically possible or from ideas around novel approaches to user problems. The prototype is then

used as a means of testing whether these new developments are viable and/or desirable. Feedback from users who interact with the prototype is then used to validate, refine and prioritise the requirements for the novel elements of the system.

For the PATHS project, we intend to gather requirements in all three of these areas, with the first two documented in this report, and the latter incorporated into later stages of the project and reported in due course, along with refinements of the system following testing and evaluation of each of our two prototypes. It is of course also imperative that these requirements are attributed to clearly defined user profiles, and these will also be developed as part of the overall requirements gathering activity.

Engagement with users for requirements gathering can involve a number of different techniques, which are selected according to the nature of the system being developed, and within the limits of constraints such as access to users, the experience and skills of the project team, available resources, and timescales for delivery. Increasingly, mixed methods are used to balance the strengths of quantitative and qualitative approaches, i.e. in offering measurable, concrete evidence on unambiguous elements of user profiles with their associated characteristics and behaviours, along with deeper elaboration of user tasks, and the less easily quantifiable affective (attitudinal) and cognitive elements of their experience.

2.3. PATHS User Requirements Methodology

Our approach to gathering and applying user requirements for the PATHS system supports the principles of user-centred design outlined above, and the following diagram summarises the overall methodology, and illustrates its relationship with other areas of the project.
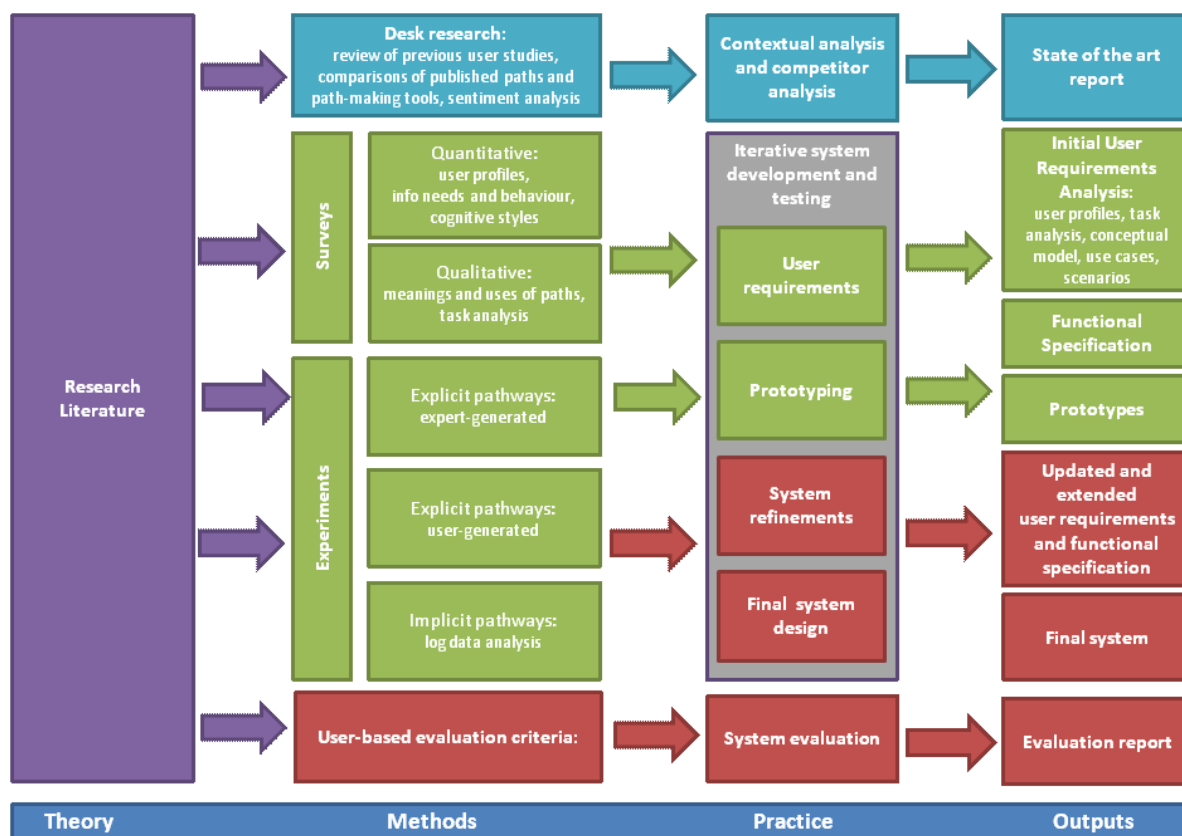
Fig. 3 PATHS user requirements methodology

Key

Knowledge base	All project deliverables
Context	D1.1 User Requirements and D1.2 State of the Art
System development	D1.1 User Requirements and WP2, WP3, WP4
System evaluation	WP5 and later stages of D1.1 User Requirements

As with the PATHS project overall, the user requirements activity is underpinned by sound theoretical principles and knowledge assimilated through extensive and ongoing reviews of the research literature. This knowledge informs the selection of methods for user requirements gathering, and the design and use of these methods to understand the needs of potential users of the PATHS system.

Primary methods for the PATHS user requirements gathering comprise surveys, both quantitative and qualitative approaches, and user experiments, incorporating task-analysis and user observation. This primary data is supplemented by desk research focused on contextual information, and understanding of the outcomes and learning from relevant previous projects in areas related to digital cultural heritage.

Data collected via these methods are then used in the practical context of system development and refinement, and are documented and evidenced through output of project deliverables in the form of reports and artefacts. Elements of the methodology directly relevant to this D1.1 User Requirements deliverable are explained in more detail below.

2.4.   Theory

Research literature from academic studies, as well as publicly available reports from previous public sector and commercial studies informs all of our work on the PATHS project. In the context of User Requirements Analysis, relevant subject areas include user studies with a focus on user requirements, usability testing and system evaluation, information-seeking behaviour, the impact of cognitive styles on information behaviour, and personalisation and recommendation. There are significant bodies of research on all of these topics. Therefore, as far as possible we limit our efforts to those studies most relevant to PATHS, specifically those focussing on users and systems in cultural heritage environments and, to some degree, in digital libraries.

Literature reviews will be updated throughout the course of the project and will inform our ongoing efforts in defining and refining user requirements for PATHS, both in relation to the selection of research methods used for this work, and the interpretation of results. Furthermore, the literature is evaluated in the wider context of the related literature informing our work on system development, interface design and user testing and evaluation.

2.5.   Data Collection Methods

The field of user-centred system development and human-computer interaction offers a wide range of established methods for user requirements gathering. In digital library studies these methods include questionnaires, interviews, focus groups, direct observation, diary studies and transaction log analyses amongst others (Bryan-Kinns & Blandford, 2000). These are also regularly found in digital cultural heritage user studies; for instance, the Multimatch project utilised both interviews and log file analysis, in addition to competitor analysis and the development of scenarios (Minelli et al, 2005). The TELplus project utilised focus groups, interviews, questionnaire surveys and log analyses (Agosti et al, 2008). The ECLAP project used a combination of desk research, user surveys, expert interviews, brainstorming workshops and case study development (Baltussen et al, 2010). Definition of initial user requirements for Europeana was mainly derived via expert workshops, where target users and scenarios of use were defined (Purday, 2005), whilst the later EuropeanaConnect builds upon this knowledge to define requirements for the mobile environment through additional desk research and a user survey (Hesselmann & Heine, 2009).

There are then several methods in common use, and the selection of those most appropriate to the project in hand seems to depend upon the nature of the project, availability of prior knowledge, and to some degree, the resources of the project teams involved.

For this initial stage of the PATHS User Requirements Analysis our methodology selection has been determined by the skills and experience of the project team developed in previous studies, access to potential users in the cultural heritage domain and consideration of time constraints. We were also limited by the availability of any existing systems that offers the scope and functionality of the proposed PATHS system, ruling out several of the observational methods in the first phase of the project.

Our selected methods are in three categories:

- Desk research – for contextual information and knowledge of the state of the art in systems and practices relating to the creation of paths.

- Surveys – both quantitative (questionnaire) and qualitative (interview) approaches, with users selected according to domain knowledge and availability

- User experiments – various observational techniques employed to understand actual user behaviour in tasks relating to path creation and use.

These will be employed throughout the PATHS project, although their exact nature and focus will evolve as the project progresses and prototype systems become available.

2.5.1. Desk research

A variety of secondary sources will provide insight into the contexts and environments in which the PATHS system will be used. For the User Requirements Analysis we focus on:

- Types of users and their domains
- Tasks that users may be engaged in
- Users' traits with regard to information behaviour
- Findings from previous digital cultural heritage user studies
- Examples of existing paths and path-creation tools
- Considerations for personalisation and recommendation in digital collections
- Considerations with regard to users' cognitive styles

The first four of these areas provide an initial understanding of users of cultural heritage collections, and how they have been studied in the past. This information establishes a foundation for the design of our primary data collection instruments, and offers a benchmark for analysis of results. Next, reviewing examples of paths and path-creation tools gives an understanding of the competitive environment, and also aids the development of more detailed qualitative questions and experiments relating to one of the core activities that the PATHS system will support, i.e. the production of paths. Finally, the last two areas provide insights into some of the more advanced aspects of the PATHS system and offer a framework for consideration of these issues in the development of the set of user requirements.

2.5.2. Questionnaires

Surveys are a useful way of gathering information on the characteristics, experiences and attitudes of end users. In questionnaire form, the focus is on measurable variables, and there are opportunities to survey larger numbers of users than there would be using more qualitative, interview techniques.

We use online questionnaires at the preliminary stage of the user requirements gathering to collect data about both expert and non-expert users of PATHS; to understand their general demographic and lifestyle characteristics, their information environment and reported information behaviour, and their attitudes about some of the experiential aspects of using cultural heritage information online.

This broad contextual data is then used, along with the more detailed interview data, to develop user profiles and case studies of typical users and their behaviour. It also provides input into the development of instruments for the user experiments elements of both the

ongoing user requirements work of WP1, and the system testing and evaluation in work packages WP4 and WP5.

2.5.3. Interviews

Surveys completed using qualitative interview techniques provide opportunities for deeper understanding of those less measurable, but nonetheless critical issues relating to users and their experiences, including the more affective and cognitive elements.

We use a semi-structured interview design to elicit open-ended discussion of key conceptual and experiential aspects of the PATHS system, both complementary to and an extension of information gathered using quantitative questionnaires. In particular we focus on gaining a deeper understanding of perceptions and uses of the pathway metaphor around which our system is built, and also on a detailed analysis of the 'path-creation' task in different domains and contexts.

This activity is targeted solely at expert users at this stage of the project, as these groups are predicted to be the primary users of the core path-creation functionality of the system. The analysis of this data is a primary input into the user profiles and use cases, along with the quantitative questionnaire data, and is essential for the development of a generalised conceptual model of uses of the PATHS system.

2.5.4. User experiments

Field and laboratory experiments are employed to validate what users say they do, by observing what they actually do in practice. This technique is an important element of the user requirements work (WP1), interface design and development (WP4), and system testing and evaluation (WP5). We propose to use experiments to observe the creation of both *explicit paths* (created intentionally), and *implicit paths* (created unintentionally). Explicit paths will be created by both expert and non-expert users with different objectives and intended use. Implicit paths will be created by anyone using the system and will be identified within the log stream data generated as users interact with the PATHS system.

At the early stages of user requirements gathering our attention is on explicit paths generated primarily by expert users. As we do not have a working system, paths must be created using either low-fidelity (e.g. paper and pencil) or medium-fidelity (e.g. electronic drawing tools, Powerpoint) techniques, or through the use of other systems with an element of path-creation functionality. Our use of this method is therefore limited to project staff, plus a convenient group of non-expert (student) users at a partner institution.

The purpose of these early experiments is to validate, to some degree, task and path-focussed findings of the data from our desk research, questionnaires and interviews, but also to act as a pilot for future experiments, allowing us to test format and task designs.

Going forwards, we will focus on more rigorous laboratory experiments where groups of users from each domain, both expert and non-expert, will be given representative tasks to complete using the PATHS prototypes. These experiments will generate both measurable and less measurable data that will inform the iterative process of system refinement.

Experiments on implicit paths will not be possible until we have a working system for users to test. We will then use log data generated during the experiments and from general use to extract typical paths based upon actual behaviour. We also intend to analyse these implicit paths for evidence of cognitive styles, as one potential basis for personalisation and recommendation within the PATHS system.

2.5.5. Future work

This report presents an initial set of user requirements for the PATHS system which will be used a basis for the development of the functional specification and interface design of the first PATHS prototype. Following the development of the first prototype, system evaluation and additional user requirements gathering (e.g. relating to more advanced functionality) will enable the refinement of the overall user requirements used for development of the second prototype, and so on.

In this future work we will continue to use the methods outlined here, but with greater emphasis on involving all groups of target users, both expert and non-expert. The exact nature, design and use of the research methods for this future work will therefore evolve to reflect this, and will be documented fully in future deliverables.

3. Secondary Data: Desk Research

In this section we report on several elements of desk research that are designed to inform on the overall context and operating environment of the PATHS project. Consideration is given to: the relevant domains, roles and tasks of the target users of the PATHS system; previous user studies in information behaviour and user requirements in digital cultural heritage projects; evidence of any existing published paths (or similar) and tools available for creating them; and, recent research in the areas of personalisation and recommendation, user profiles and the opportunities afforded by identifying and adapting to users' cognitive styles in relation to their information seeking behaviour.

3.1.   User Domains

In order to stratify system users into identifiable types it is common to classify them by their domain. This is a conceptual construct that may involve aspects of industry sector, type of use, and tasks performed.

3.1.1. Domain categories

Based upon partner knowledge and experience, and reviewing the research literature and state-of-the-art monitoring in those areas of digital cultural heritage relevant to PATHS, we have identified four primary user domains:

- Heritage Users
- Education Users
- General Users
- Professional Users (non-heritage sectors)

These have much in common with the domains selected for the Europeana and Multimatch projects (see Section 3.2.2). For instance, Europeana defines five types of users comprising General user, School student, Academic user, Expert researcher and Professional user, whilst Multimatch defines target groups as educational (including educator and learner roles), cultural tourism (consumers), and cultural heritage (creators, composers, managers and brokers). For PATHS we have included both expert and non-expert roles in each of the four domains, with the defining characteristic of each domain being the goals of the main actors within it.

Following internal discussion of the exact nature of these domains and their users, we envisage that the greatest level of usage of PATHS in terms of path-creation activities will come from users in the Heritage and Education domains; in fact there is potentially a significant degree of overlap between these domains in the area of informal learning activities. Professional users are also an important category, and again there is some degree of overlap with Heritage in sectors such as tourism, but we feel that these would less frequent users in the main, focussed more on one-off projects rather than regular use. General Users are identified mainly by the activities they are engaged in being non-work related, for example, they may have more of a leisure or entertainment focus, and in fact, it may be that many so-called General users may be employed in the other three domains.

These expectations are confirmed by the results of our primary data collection in Sections 4-7, where it is clear that there are relevant expert path creation tasks that have similarities across the domains and the main roles within them.

3.1.2. Expert and non-expert roles

PATHS users will be both expert and non-expert in the context of *creating paths*. Expert users will primarily be creating paths in the context of work activities, and are identified by a relatively high level of subject and domain knowledge. They can therefore be mostly, but not exclusively found in the Heritage, Education and Professional domains. Some General users might also be classified as expert, especially if they have worked in one of the other domains, or if they have studied a relevant subject area. General users will however be primarily non-expert, with much lower levels of subject and domain knowledge. Non-expert users will also be found in the Heritage and Professional domains, and especially in Education, where it is envisaged that students will often be tasked with creating paths as part of learning experiences.

3.1.3. Producer and consumer roles

Within each domain there are one or more types of path 'producers' (or path creators) and path 'consumers' (or path followers). It is possible for any individual to be both producer and/or consumer in the same or in different domains. Production and consumption activities are driven by 'tasks'. These tasks encompass the information or knowledge objectives of the user, in support of specific professional, learning and leisure pursuits. In undertaking specific tasks, a producer may or may not have one or more specific consumer types in mind, or they may simply be engaged in knowledge discovery and self-directed learning.

3.1.4. PATHS Domains & Users

Table 1 (following) illustrates the domains and users relevant to the PATHS project. Potential producers and consumers of paths are summarised across the four domains of Cultural Heritage, Education, General and Professional (non-cultural heritage expert) users. In the Heritage and Professional domains, all producers are experts; in the Education domain there are experts (e.g. teachers and researchers) and non-experts (learners), and in the General user domain, the majority of producers will be non-expert.

3.1.5. User Tasks

Table 2 then identifies key tasks for the main user types. Listed tasks represent some of the main activities engaged in by producers and consumers of paths in each of the four domains. These are generalised tasks, and used are for example purposes only; they are not intended to be a comprehensive list at this stage.

Some tasks may involve both producers and consumers working together, for example a teacher directing students in a learning activity that involves the creation of a path. Other tasks are undertaken solely by a producer or a consumer, although it is likely that most producers have one or more consumer groups in mind. Some tasks may be undertaken collaboratively; for example, students may be required to work together on a learning exercise, and designing an exhibition may primarily be the task of a curator, but they may receive input from their educator and marketing colleagues. Further details of user tasks are extrapolated from the interview data in Sections 5 and 6, and then developed into use cases in Section 8.

Table 1 PATHS domains, with producers and consumers

Heritage		Education		General		Professional	
Producer	**Consumer**	**Producer**	**Consumer**	**Producer**	**Consumer**	**Producer**	**Consumer**
• **Curator** • **Librarian / archivist** • **Education officer** • Outreach • Marketing / PR	• General visitors • Family visitors • Tourist visitors • Education visitors • Community groups • Producer's professional network • Producer and Consumers from all other domains	• **School teacher** • **University teacher** • Other teacher • **Learners** (directed by teacher) • **Researcher** • **Librarian / archivist**	• Learners • Producer groups in the Education domain • Producer's professional network	• 'Culture vulture' • Creative hobbyist (e.g. photographer / artist) • **Lifelong learner** • **Genealogist** • **Amateur historian** • **Tourist**	• Producer's social network (known) • Other general users (unknown) • Producer groups from the General domain	• **Tourism** • **Creative industries** • **Publisher** • **Librarian / archivist** • **Professional creative** (e.g. photographer / designer / journalist)	• Service users – general • Service users –professional • Producer's professional network • Producer groups from all other domains • Consumer groups from all other domains

Key

The primary producer types have been highlighted and classified by their primary task. Those producer categories that are not highlighted are seen as secondary users of PATHS at the present time.

Creative   **Teaching**   **Research**   **Information**   **Hybrid**

25

Table 2 PATHS domains, with producer and consumer tasks

Heritage		Education		General		Professional (non-heritage)	
Producers	**Consumers**	**Producers**	**Consumers**	**Producers**	**Consumers**	**Producers**	**Consumers**
• Create an exhibition • Create a learning resource or trail • Promote the collections / exhibitions • Showcase a research project	• Explore an exhibition • Learn about a subject • See the most important artefacts • Plan a visit	• Create a lesson / lecture • Create or amend a learning resource • Do homework assignment • Research for a publication or project • Prepare guide to digital collection	• Participate in class activities • Learn about a subject • Explore a theme or concept	• Create a collection of favourite works • Get inspiration for a project • Research a person or place • Write a blog article	• See what others have created • Get ideas for a visit • Be entertained • Share interesting resources	• Showcase a city or country • Explore design ideas • Publish a travel guide	• Keep up with current thinking • Get inspiration for a holiday • Read up on a cultural theme

3.2. User Studies

3.2.1. Information behaviour

A clear understanding of users' likely information needs and behaviour, and the tasks they engage in is critical in developing systems that support good information access and interaction (Allen, 1996). One premise of user-centred design is that users of information systems have differing profiles, tasks and behaviours, and it is therefore unsurprising that there is a growing body of literature reporting on studies that have attempted to understand information users in different domains and subject disciplines. Added to this are the issues of changing patterns of information behaviour prompted by an increasing dependence on digital information resources, as well as new types of behaviour afforded by use of technologies and new sources of information previously unavailable in the analogue information environment (Dempsey, 2006).

Our interest for the PATHS project is primarily in those few studies relating specifically to expert and non-expert information users in the cultural heritage domain. We supplement these studies on scholarly information behaviour in the arts and humanities disciplines, where cultural heritage collections are often used as primary sources of information.

Studies on the information seeking needs of cultural heritage experts (Amin et al, 2008) and on the information seeking behaviour of non-experts in the heritage domain (Skov & Ingwersen, 2008) provide both insights useful for exploring the context of the PATHS project, and also for the consideration of approaches to collecting data on information behaviour in this environment, the latter being used to inform the PATHS user requirements methods and instrument design. Other studies consider information seeking behaviour in specific collections and/or sub-domains (for example, Inskip et al, 2006; Matusiak, 2006; Ross & Terras, 2011), and Marty (2008) looks at the specific role and use of web sites as an adjunct to museum visiting. Key considerations across this area of research are:

- Definition of user characteristics (e.g. demographics, experience, subject knowledge...)

- Goals and objectives of information users

- Tasks in which users are engaged (e.g. fact-finding, collecting materials on a subject...)

- Sources of information used

- Behavioural traits (e.g. searching, browsing, exploring, saving, annotating...)

- Information-seeking processes

- User preferences and satisfaction with aspects of the system, the results of their information-seeking, and the nature of the content

- Challenges faced and areas for improvement

These are all relevant to the PATHS user requirements work and will be incorporated at the appropriate stages. Information tasks are of interest to us for their relevance to user requirements and also to inform the design of user experiments. Common tasks are fact-finding or known item searchers, those of a more exploratory or information gathering nature (Amin et al, 2008; Skov & Ingwersen, 2008), and keeping up-to-date (Amin et al, 2008). Fact-finding and known item tasks tend to revolve around search behaviours, whilst information gathering tasks lend themselves more to browsing and exploring. Searching behaviours are often more prevalent (Matusiak, 2006; Skov & ingwersen, 2008), and

searching may be a starting point that leads onto more exploratoy behaviour (Skov & Ingwersen, 2008). Information gathering tasks may involve a variety of sub-tasks including, comparison, relationship search, topic search, exploration and combination (Amin et al, 2008) and focus on one or more of these ultimately has some impact on the overall information-seeking process.

The types of information sources used have implications for how users will reach PATHS (e.g. via an external search engine), what types of functionality they are familiar with and might expect to see when they get there, and for decisions about which external content we might provide links to via our content enrichment activities. For cultural heritage professionals and for arts and humanities scholars, the credibility of sources is extremely important (Inskip et al, 2006; Amin et al, 2008; Audenaert & Furuta, 2010), and there is evidence of a wide range of different types of sources, including more generic search tools such as Google (Amin et al, 2008; RIN/Bulger et al, 2011; Ross & Terras, 2011) and more esoteric domain-specific sources (Inskip et al, 2006). There is also a marked preference for visual content from both heritage expert and scholarly information users (Amin et al, 2008; Ross & Terras, 2011), and from non-expert users (Skov & Ingwersen, 2008).

One of the most critical areas for PATHS however, is the *process* of information seeking, particularly in more exploratory contexts, since this a core process that our system will support. A key finding for PATHS is that in more exploratory tasks there is a need to collect items, often from multiple sources, and then to assess their relevance and synthesise them before they can be used. This often entails using manual processes, as these types of information behaviour are typically not well-supported by information systems (Amin et al, 2008). In this vein, a lack of standardisation across databases, a lack of research support tools such as annotation, and the ability of linking data across sources are cited as barriers to scholars making more frequent use of digital information sources (RIN/Bulger et al, 2011). Annotation is noted as an important part of the arts and humanities scholarship process (Benardou et al, 2010), as are activities involving collecting information (via berry-picking, chaining and searching techniques), comparison and combination of data, and collaboration, with the latter being highlighted as especially difficult due to a lack of appropriate digital tools. Some of these activities move on research activities from being purely information seeking to those more akin to 'curation' practices (Benardou et al, 2010).

3.2.2. Users and user requirements

Closely allied to the study of information behaviour is the acceptance that in order to develop successful information systems it is necessary to understand prospective users and their requirements for the system, not least in supporting their established patterns of information behaviour. User requirements studies are therefore a common feature of information systems development projects, particularly when there is a diverse range of users with potentially differing needs. We have therefore reviewed a number of user requirements studies relating to digital cultural heritage projects in order to ascertain insights into the design of the studies, any relevant findings on user requirements, and approaches to incorporating these findings into the projects' later phases of development.

As noted above in Section 2, the methods used for user requirements gathering in digital cultural heritage projects are varied, but tend to incorporate one or more of the staples of Human-Computer Interaction research and user-centred design practice, including quantitative surveys, qualitative interviews and focus groups, diary studies, log analysis and field or lab-based user experiments, using participant observation techniques and other methods to assess the experiment outcomes. For the studies that we review here reported user requirements gathering methods are as follows:

Table 3 Summary of user requirements methodologies for selected projects

Project	UR Methods: initial phase	UR Methods: post demo/prototype
Europeana	• Expert workshop • Development of use cases and scenarios	• End user focus groups • Online survey • Development of personas
EuropeanaConnect	• Expert user survey • Development of scenarios	Unknown
Multimatch	• Expert user interviews – questionnaire based • Expert in-depth interviews • Development of scenarios • Log analysis	• Questionnaire • Internal evaluation • End user task-based experiments
The National Archives (TNA): Online Strategy	• Review of previous studies • Expert and end user interviews • Online diary study • Interview follow-up to diary studies • Development of personas	N/A

User domains for the Europeana and Multimatch studies are outlined in Section 3.1.1, and have much in common with the users of interest to the PATHS project. Additional findings of relevance to PATHS include identified user goals from Europeana, the types of searching identified by the UK's National Archives (TNA) study, the characteristics used to define personas and the patterns of information behaviour informing personas developed by the TNA.

The generic user objectives identified by Europeana are:

- To be entertained

- To increase their knowledge of a subject or person

- To locate an item in the physical museum or collection

- To be part of a community of interest

The Europeana personas include both contextual parameters (demographic and lifestyle characteristics that may vary across users from country to country, and non-contextual parameters that have cross-national similarities, including personality, IT knowledge, digital literacy, task knowledge and language. These are incorporated with personal characteristics along two dimensions: natural search behaviour (navigational / explorative), and search literacy (inexperienced to experienced), which appear to have some similarity the Pask & Witkin model of cognitive styles (see Section 3.6) which informs our approach to later work on adaptivity.

29

The TNA work on identifying types of user is interesting from a different perspective in that it focuses directly on information behaviour, which a core interest for the PATHS project. TNA identify three information-seeking strategies amongst their users, of which known-item seeking and exploratory seeking are relatively commonly reported in information behaviour studies (see Section 3.2.1), but the third, 'exhaustive research', is novel, and involves the scenario of the user wanting to find everything available about a topic, and is a typical trait of those searching in the context of family history projects, and on a different level, with academic historians and other scholars looking for unique perspectives, both of which TNA has large user bases.

From these three types of information seeking strategy, TNA then identify three types of information behaviour that inform the development of their user personas. These are:

- Ramblers – who may be less-experienced researchers, and engage in lots of exploratory searching, but in a repetitive way, using familiar sources and strategies for each new search

- Explorers –who are likely to be much more experienced researchers, engaged in exhaustive searches, using tried and tested techniques, but also making extensive forays into the unknown

- Trackers – often professional researchers, with good domain knowledge, including knowing exactly what can be found via which sources, therefore being much more targeted in their searching efforts and using high levels of known-item searching

Whilst these behavioural types may be somewhat specific to TNA, their approach to developing user profiles which are much more behavioural in nature seems to be relatively novel at the present time, and given our strong interest in the processes involved in path-creation and consumption, it may be useful to try to develop behavioural profiles for PATHS users in due course. This is likely to be most fruitful once we have a working prototype for users to engage with, and can observe actual behaviour in relation to specific tasks and activities supported by the system.

3.3. Paths and Path-Creation Tools

In the absence of system for creating paths at this stage of the PATHS project, we have used a variety of alternative means of understanding what the paths people might create would look like and how they would be created. To this end, we have reviewed a number of cultural heritage paths that are freely available online, as well as some of the software available that might be able to support path-creation activities. The latter are discussed in more detail in report D1.2 State of the Art, although a few salient findings are summarised here. In addition, the preliminary user experiments documented in Section 7 of this report provide some early indications on the types of paths that might be created using PATHS and the processes involved.

3.3.1. Examples of published paths

The pathway metaphor is in fairly common usage in cultural heritage environments, e.g. in the form or guided tours and trails, and we have therefore been able to identify a number of examples that illustrate current activity in this area, of which selected examples are presented in Table 4.

Many of these resources are designed mainly for use in traditional ways, onsite at the museum or gallery whose collections they relate to, whilst others are designed purely for the web environment, providing inter-connected links for web pages from one or multiple sources. The content of the path is generally selected and assembled or 'curated' by a cultural heritage or an education expert. It is interesting that one of the most recurrent uses of the paths (or trails) concept online is to support activities in the area of teaching and learning, and indeed Walden's, Trailmeme and the trails feature in the First World War Poetry Digital Archive have this explicit purpose. This may be a legacy from the printed trails that have become a staple of the museum learning environment, where they are used to encourage deeper engagement with the collections through activities supporting exploration and discovery. In the physical museum, trails appear to be primarily targeted at school age children visiting with their teacher or in a family group, although there are a few exceptions. The same is true for online trails, although these may support older children and college students in more advanced learning settings.

Table 4 Examples of published paths

Organisation	Web site	Type of Paths	Audience	Use
Walden's Paths	http://walden.csdl.tamu.edu/walden/server/	Learning resources + path-creation tools	Students	Online
Trailmeme	http://trailmeme.com/trails/recent	Learning resources + path-creation tools	Teachers & students	Online
First World War Poetry Digital Archive	http://www.oucs.ox.ac.uk/ww1lit/education/pathways	Learning resources	Teachers & students	Online
The Louvre	http://www.louvre.fr/llv/activite/liste_parcours.jsp?bmLocale=en	Visitor resources	General visitors	Onsite & Online
Connected Histories	http://www.connectedhistories.org/research_connections.aspx	Research resources	Academic researchers	Onsite
Consortium of Yorkshire Art Galleries	http://www.yorkshiresfavourites.org/trails.html	Visitor resources	Adult visitors	Onsite & online
Culture 24: JRR Tolkein Trail	http://www.culture24.org.uk/places+to+go/west+midlands/birmingham/tra14268	Visitor resources	General visitors	Onsite
International Slavery Museum	http://www.liverpoolmuseums.org.uk/learning/worksheets/ISM_trail_revised.pdf	Learning resource	Education visitors	Onsite
NMOLP Webquests	http://nmolp.tate.org.uk/webquests/	Learning resources	Students & teachers	Online

Common characteristics seen across these published path resources include:

- Nodes – the essential building blocks of a trail in the online environment are nodes that represent a digital object

- Object info / image / web page – each node provides primary information or 'content' relating to the object or web page it represents. This might include selected object metadata, a thumbnail image, full description, or a view of the complete object record or web page represented

- Connections – in order for the nodes to become a path that can be followed, they are usually ordered and/or connected in some way to enable a progression through the path from one node to the next

- Navigation tools – simple back and forward arrows are most common, along with a linear trail of the nodes in the pathway, and occasionally a 'map' or overview of complete trail

- Annotations – the addition of user-generated notes, instructions (e.g. where to go next), activities or questions relating to the content, and possibly simple tags

- Links – to relevant other content, wither within the same collection or elsewhere on the web. It is not clear in most cases whether these are system or user-generated.

Other important findings are that most paths currently available are:

- Static – i.e. they are published, not generated on the fly, and can only be updated or edited by the original author

- Linear – with the exception of those in the Trailmeme site, where the system allows for more complex structures in the form or mind-maps or networks.

- Standalone - they are generally presented in isolation of other paths, and there is no inter-linking between paths to encourage wider user exploration

These findings make a useful comparison with our primary data results, and it may also be interesting to retrospectively compare them with the finalised user requirements, to see where the PATHS system varies from current practice.

3.3.2. Analysis of published paths

In order to understand more of the nature of paths that are created by expert users, we have undertaken a brief, mainly quantitative, analysis of the paths (trails) that are publicly available via the Trailmeme[2] web site. These paths were selected for review for two reasons; firstly the site is targeted at educators creating resources for use in class, a primary user category for PATHS; second, data about the published trails is available via the Trailmeme Application Programming Interface (API), making possible analyses of metadata associated with the trails.

---

[2] http://www.trailmeme.com/

In June 2011 there were almost 700 publicly available trails in the Trailmeme web site, created by more than 320 users, and covering a wide range of topics including technology, history, science, social media, business, and more. Summary data about these trails and their creators and users are presented below.

The vast majority of trails have no more than 20 nodes, with the most common range being 6-10 nodes. The average (mean) number of nodes is 12, whilst the median is only 9, and a more representative measure of the centrality of the data, given the skewed distribution illustrated below, with a few very large trails affecting the overall picture.

The overall size of the trails may be partly determined by what is feasible to show on a single computer screen without scrolling, but it would be interesting to monitor this further as we observe users creating paths with the first PATHS prototype, as it may have implications for interface design and parameters set within the software.
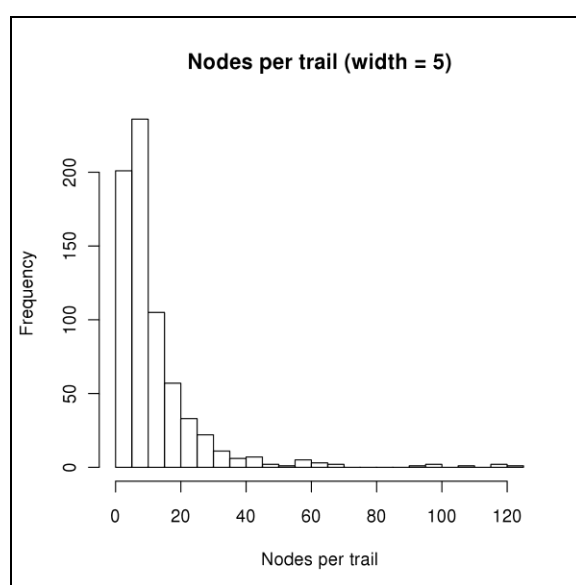
Fig. 4 Trailmeme: nodes per trail

Within each trail it is possible to follow one or more paths, determined by the connections established between nodes and choices made by the user when following the path. It is possible to identify continuous paths through each trail, starting from any selected point and continuing through unique nodes until a dead-end is reached (i.e. no further connections are available), or all of the nodes have been viewed. The length of a path is largely dependent on the number of nodes in the trail and given the size of trails noted above, it is therefore no surprise that the majority of continuous paths contain less than 10 nodes.

The shortest path available consists of only one node, and the longest continuous route is 67 nodes. However, again the data is skewed by a very few unusually long paths, and it is therefore interesting to note that the mean number of nodes in a path is 5, whilst the median is only 5 nodes. Comparing these results with the mean and median nodes in a complete trail, and it is clear that paths are generally shorter than the trails, and it may therefore be surmised that it will be necessary to follow more than one path in order to visit every node in a trail, i.e. that a trail supports more exploratory forms of information behaviour.
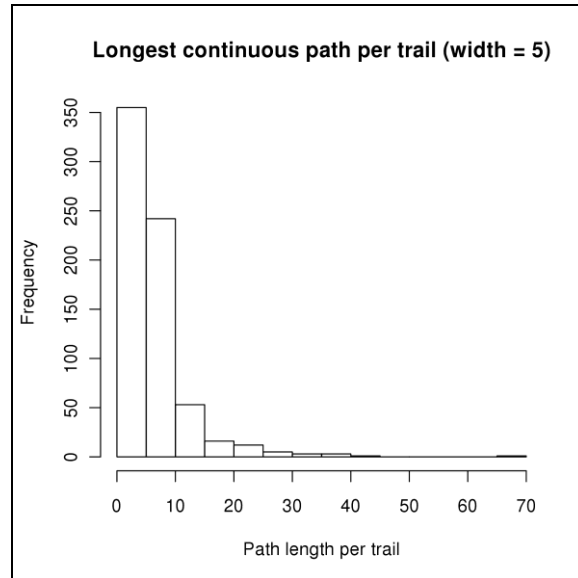
Fig. 5 Trailmeme: path length per trail

Trails within the Trailmeme web site can have a variety of annotations added by their creator, including a title, description, commentary and link for each node, and tags that enable the trail to be located through searching. It is clear from the data below that the majority (significantly more than half) of the published trails have 0-1 tags attributed to them, and that most of the remainder have between 2 and 5 tags. The mean number of tags is less than 2, whilst the median is zero, suggesting that tagging is not a well-developed behaviour in this context.
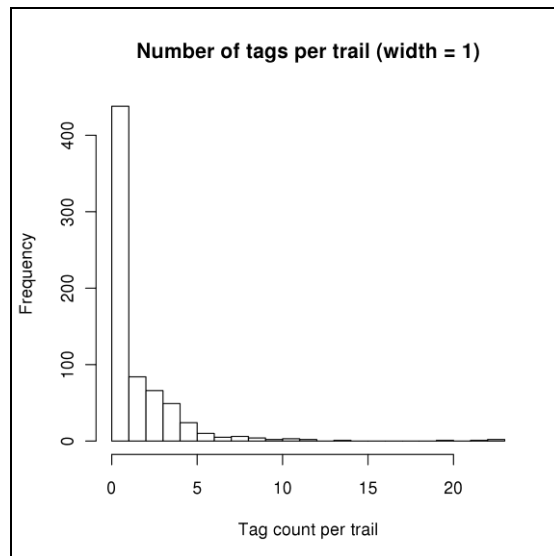
Fig. 6 Trailmeme: tag count per trail

In terms of the volume of trail-creation activity, there is again a picture of a majority of users engaging at a very low level with this activity. More than 300 of the total 321 users have only created one trail to date, although there are a very small number of extreme cases of high activity, with the most prolific user contributing 108 trails, which is more than 15% of all of the trails published. The mean number of trails is however only 2, and the median, taking account of the skew in the data, is one trail.

Without access to the Trailmeme users we can only make guesses as to why most users have not yet published more than one trail. It may be partly due to the Beta status of the software, or that it is an activity that is extremely novel to most users, and it has not yet led to more frequent engagement. It could also be that the user base follows the general 80:20 rule in that most activity is generated by a only a small proportion of people, or even that those users that have tried it out have not yet been convinced of the benefits of creating paths, or they found it to be too difficult to get the results they wanted. Once we have a prototype for the PATHS system it will therefore be important to explore some of these issues with users to understand how we might encourage more frequent engagement.
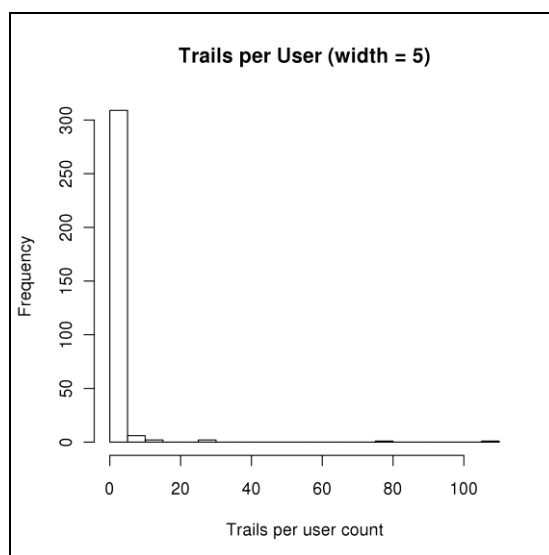
Fig. 7 Trailmeme: trails per user

Results for the number of times each trail has been 'walked' are much more encouraging and lend some credence to the 80:20 Pareto principle. The lowest number of walks for a trail is 43, whilst the highest is an astonishing 10,280. As with the previous data, there is a skew affected by a small number of outliers at the high end of the data range, and it is therefore interesting to note that the mean is 496 walks, and the median is 304, suggesting that a figure in the low hundreds is more usual.
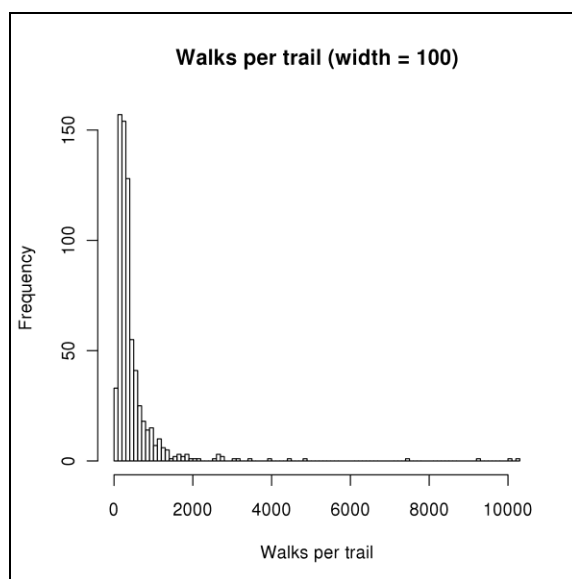
Fig. 8 Trailmeme: walks per trail

Unfortunately, it is not possible to ascertain which types of trail are the most popular with followers, for example, long or short, specific subject matter, or specific users, nor what the relationship is (if any) between path followers and the creators of the paths they follow. These issues may all therefore be worthy of investigation during the PATHS system evaluation if we think they will shed light on how to ensure that the system supports the type of activities that generate high levels of use, be it in creating or in following paths.

3.3.3. Existing path-creation tools

One of the core elements of PATHS system will be functionality to support the development of paths, as a means of exploring, signposting and engaging with cultural heritage collections. This functionality is not entirely novel, and a review of the state of the art (see PATHS Deliverable D1.2), reveals several systems that offer facilities to support this type of activity to a greater or lesser degree and there are others emerging on a regular basis as we progress through the project. Selected examples of these types of systems are presented in Table 5, and some of which have been used in the early experiments relating to PATHS user requirements, the results of which are presented in Section 7.

Table 5 Examples of existing path-creation tools

Path-creation tool	Web site	Type	Site specific	Audience
Walden's Paths	http://walden.csdl.tamu.edu/walden/publisher/	Paths	N	Teachers
Trailmeme	https://trailmeme.com/home	Paths	N	Teachers & general
First World War Poetry Digital Archive	http://www.oucs.ox.ac.uk/ww1lit/education/pathways	Paths Timeline Mind map	Y	Teachers
Storify	http://storify.com/	Content curation	N	Bloggers & social media users
Pearltrees	http://www.pearltrees.com/	Mind map Tree	N	Bloggers & general
Flickr Galleries	http://www.flickr.com/galleries/	Content curation	Y	Flickr users
Dipity	http://www.dipity.com/	Timeline	N	Bloggers, teachers, general

It will be especially important to monitor developments of this type of software in support of digital cultural heritage collections, of which there are few to date, but the Trailmeme and First World War Poetry project show that this may change, especially in contexts where there is a need or a desire to create learning resources that are then to be shared freely amongst other peer groups and professional networks, or simply to support students' informal learning opportunities with regard to key topics within a collection.

3.4.   Personalisation and Recommendation

Personalisation is a core aspect of modern Cultural Heritage experiences, both in a physical museum context and in a digital museum context. The idea is that by personalising the way the cultural heritage artefacts are presented to the viewer, the viewer will have a more satisfying experience (Filippini-Fantoni, 2002) and this will lead to an improved learning outcome (Fisher Twiss-Garrity, 2007). While personalisation is possible both in the physical context and the digital context, this Section will focus on digital personalisation, as that is the context of the Paths project.

Personalisation can either be based on a limited set of personas or stereotypes or on full adaptability. Stereotypes offer a simpler approach, as they limit the amount of choice that the system has to support. The difficulty with stereotypes is that users do not want to be forced to choose between stereotypes before using a system, particularly as at that point it is unclear what effect the stereotype-choice has (Filippini-Fantoni, 2003).

Full personalisation can be provided via two routes, either by allowing the user to explicitly state their preferences through the user-interface (*adaptable* system) or by automatically setting these preference based on the user's behaviour (*adaptive* system) (Filippini-Fantoni 2002). The difficulty with a fully *adaptive* system is that the user's goals might change as they interact and the adaptive system will always lag slightly behind these changes. It is thus necessary to always maintain the *adaptability* of the system, so that the user can always explicitly change any preferences that the system has automatically determined.

Adaptive personalisation can use different data-sources to personalise the cultural heritage experience. These data-sources can be classified as either being based on the individual objects' meta-data (*information-based* personalisation), the type of objects the user wants to see (*object-based* personalisation), the relationships between the objects (*structure-based* personalisation), or the order in which the objects are viewed (*arrangement-based* personalisation) ([Filippini-Fantoni 2002). To enable two of the core tasks of the Paths project, namely exploring large digital cultural heritage collections and creating paths through these collections, the focus will be on *structure-based* and *arrangement-based* personalisation. The *structure-based* personalisation will aim at tailoring the elements and information available in the user-interface to the user's cognitive style, which will enable the users to more easily gather the information they are looking for. At the same time the *arrangement-based* personalisation will be achieved through the core idea of paths through the cultural heritage collection that are effectively personally tailored exhibitions (cmp. Stuer et al, 2001; Rutledge et al, 2007). The *arrangement-based* personalisation can also take the user's cognitive style into account in order to recommend expert-curated paths that are likely to be of interest and match the user's cognitive style (cmp. Eliens & Wang, 2007).

3.5.   User Profiles

Both personalisation and recommendation depend on an accurate user profile. The difficulty with user profiles is the initial period where the system knows only very little about the user, known as the *cold-start* problem (Adomavicius & Tuzhilin, 2005; Ahn, 2008). The effect is that every action the user takes has a large impact on the user-profile and thus the recommendations and personalisations can fluctuate widely. To overcome this issue and to provide the user with instant recommendations and personalisations a small set of stereotypes will be developed that draw on the existing personas identified by Europeana and combine these with cognitive styles to create cognitive-interaction stereotypes.

The initial assignment of a stereotype will be based on the implicit feedback generated by the user using the Paths system (cmp. Joachims et al, 2007). Basing the stereotypes on cognitive-styles will allow the system to quickly determine the closest stereotype for the user and assign an initial profile that is then further customised either implicitly as the user uses the system (*adaptive*) or explicitly when the user modifies their preferences (*adaptable*).

3.6.   Cognitive Styles

The cognitive style refers to a person's preferred way of dealing with information or tasks. A number of cognitive style dimensions have been defined over the years, with varying focus. In the context of the Paths system we will be focusing on the Pask & Witkin dimensions, which are *dependent-independent* and *local-global*. The location along the *dependent-independent* dimension specifies how much guidance a person likes to receive, someone at the *dependent* end prefers very specific step-by-step instructions, while at the *independent* end a more general instruction is preferred. At the same time the *local-global* dimension specifies the amount of contextual information that the person likes to be exposed to. At the *local* end this will only include very specific information, while the *global* end will include more general and overview information.

In PATHS the aim is to use the user's preferred cognitive style to adapt the system. This should improve the usability of the system and also the learning outcomes (cmp. Schaller et al, 2007).

Examples of how the cognitive style could be used to adapt the system are

- Type of recommended items - when a user views an item they are recommended a number of similar items. The *local-global* dimension could be used to determine how dissimilar the recommended items can be to the current item

- Context information - when a user views an item they are shown the organisational hierarchy that the item is embedded in. The *local-global* dimension could be used to determine how much detail to show in this hierarchy and also how much contextual information to show in the hierarchy.

- Path following - when a user follows a path they are informed of potentially interesting items similar to the current node and of other paths that pass nearby. The *dependent-independent* dimension could be use to determine whether or not to show such information and if showing it, how much distracting information to show.

4. Primary Data: Survey

4.1. Survey Design

An uncompleted pro-forma of the survey can be seen in Annex 1, showing how each question was presented to participants, with full details of the categories and scales used for responses. Questions are ordered to facilitate ease of use of the survey, and to allow for the possibility of early exit.

Questions 1-11 are straightforward demographic questions, and are positioned at the beginning of the survey to quickly settle participants into the response process. Q11 is about internet experience and transitions to the next set, Questions 12-20, which ask about the use of cultural heritage collections online. Several of these questions are presented in a matrix format, requesting either differentiated responses by work, study and leisure activities or an appropriate 5-point Likert Scale for attitudinal responses. Questions 21-24 then probe deeper, and are somewhat more complex, requiring some free text qualitative responses or a degree of judgment relating to the participant's experience of more complex information tasks. Questions 25-29 are more straightforward again, and transition to less critical information (for the PATHS project) relating to engagement with cultural heritage institutions in the physical real world context, along with additional information about personal knowledge and engagement with relevant leisure activities. Questions 30-31 round-up the survey by requesting contact information for future participation in PATHS user research.

The table that follows provides a full list of the survey questions, grouped by the four main areas of data collected:

- Personal and lifestyle characteristics

- Cultural participation and knowledge

- Information behaviour in cultural heritage

- Complex information task

It should be noted that questions are not entirely sequential through the four categories; rather they have been grouped as they have been used for analysis purposes. Information is given about the style and format of each question, and the purpose of the questions in the user requirements work, and the PATHS project as a whole.

Table 6 User requirements survey design

Category	Question	Style	Purpose
Personal & Lifestyle Characteristics	**Q1** Gender	Nominal, select one	• To collect demographic information and other descriptive information about potential PATHS users • To contribute to user profiles • To identify differences in activity by domain and role • To identify potential differences in activity by relevant generic characteristics
	Q2 Age Group	Ordinal, select one	
	Q3 Which country do you live in currently?	Nominal, select one, mandatory	
	Q4 What is your current student status?	Nominal, select one	
	Q5 Which of the following types of education have you completed?	Nominal / ordinal, select many	
	Q6 If you have studied at higher or further education level, what is the subject of your current or last course?	Open, free text	
	Q7 What is your current employment status?	Nominal, select one	
	Q8 What is your current or last job title?	Open, free text	
	Q9 Have you ever worked in any of the following industry sectors?	Nominal, select many	
	Q10 If you have worked in an education role, please list your area(s) of subject expertise	Open, free text	
	Q11 How experienced are you in using the internet?	Ordinal, select one	

Category	Question	Style	Purpose
Cultural Participation and Knowledge	**Q25** Have you ever visited any of the following types of cultural heritage institution in person?	Nominal, select many	• To enrich the user domain and role-specific user profiles
	Q26 How many times have you visited cultural heritage institutions in person during the last 12 months?	Ordinal, select one	• To understand the broader context of cultural participation
	Q28 How would you describe your knowledge of the following?	Ordinal, matrix of 6 categories, each rated on a 5-point Likert Scale from Poor to Excellent	• To identify users' lifestyle and domain knowledge characteristics
	Q29 Do you participate in any of the following leisure interests or hobbies?	Nominal, select many	• To inform the targeting of users for future user requirements and evaluation activities
Information Behaviour in Cultural Heritage	**Q12** Have you ever used the web sites of any of the following types of cultural heritage institution?	Nominal, matrix of 6 categories, each with 4 options, select many	• To understand the broader context of online cultural heritage information
	Q13 Have you ever used any of the following web sites for information about cultural heritage?	Nominal, select many	• To inform decisions about which type of content and links may be of interest to PATHS users
	Q14 List any other cultural heritage web sites that you can remember using in the last year	Open, free text	• To aid the design of tasks for future user experiments
	Q15 What are your main reasons for using cultural heritage web sites?	Nominal, select many	• To understand the information needs and preferences of PATHS users
	Q16 What types of cultural heritage information do you look for online?	Nominal, matrix of 12 categories, each with 4 options, select many	• To aid the design of tasks for future user experiments
	Q17 How useful do you find the following information resources when you use cultural heritage web sites?	Ordinal, matrix of 12 categories, each rated on a 5-point Likert Scale from Not Needed to Essential	

Category	Question	Style	Purpose
Information Behaviour in Cultural Heritage	**Q18** I use cultural heritage collections for...	Nominal, matrix of 7 categories (tasks), each with 4 options	• To understand the information behaviour of online cultural heritage users
	Q19 When looking for cultural heritage information online...	Ordinal, matrix of 10 statements (cognitive / behavioural), rated against a 5-point Likert Scale from Strongly Disagree to Strongly Agree	• To identify potential differences in cognitive style of online cultural heritage users
	Q20 How often on average do you access cultural heritage information online?	Ordinal, matrix of 5 categories (activities), matched against time-related options	• To understand the broader context of information behaviour in online cultural heritage users
	Q27 How often do you use the following information resources when you visit in person?	Ordinal, matrix of 10 categories, rated against a 5-point Likert Scale from Never to Always	
Complex Information Task	**Q21a** List any specific activities for which you might need to search for cultural heritage information	Open, free text	• To identify the types of tasks that PATHS users might want to be able to do
	Q21b Do any of these activities entail looking for a variety of materials relating to a topic, theme or concept?	Nominal, yes/no/maybe	• To aid the design of tasks for future user experiments
	Q21c Please give examples...	Open, free text	

Category	Question	Style	Purpose
Complex Information Task	**Q22** When looking for a range of information on a cultural heritage subject or theme, how would you rate the difficulty of the following aspects of the activity?	Ordinal, matrix of 7 categories (cognitive / decision focus), rated against a 5-point Likert Scale from Very Difficult to Very Easy	• To understand the challenges and complexity of information tasks in online cultural heritage • To provide context for the development of the PATHS functionality and interface design
	Q23 How long would you generally spend on this type of information task?	Ordinal, select one	
	Q24 How would you rate the overall complexity of this type of information task?	Ordinal, numeric scale from 1 (Low) to 7 (High)	
Contact	**Q30** Would you be interested in participating in further research relating to the PATHS project?	Nominal, yes / no / maybe	• To generate contacts for future stages of the project, including interface design, prototype testing and evaluation, updated user requirements, dissemination.
	Q31 If yes or maybe, please provide your email address	Free text	

4.2. Survey Creation and Distribution

The survey was primarily conducted using online survey software. The software supported the question design features required and collated data to from full and partially completed responses. Response data for nominal and ordinal variables was exported from the survey software in an electronic format which was imported into Excel and SPSS for analysis purposes. Free text questions were exported verbatim, and the software also produced a 'wordle' or tag cloud from the most popular terms used.

An introduction screen was branded with the PATHS logo, and provided information about the project, the survey and research ethics compliance, along with contact details for enquiries about the project and the survey.

PATHS User Requirements Survey

You are invited to participate in the PATHS User Requirements survey. PATHS is a 3-year research project funded by the EU involving 6 academic, technical and industry specialist organisations, including the University of Sheffield who are running the current survey.

About PATHS
PATHS aims to build a system for exploring online collections from cultural heritage institutions such as museums, art galleries, archives, specialist libraries and historic sites. Exploration will enable users to discover items within collections related to a concept, theme, person, place or idea in which they are interested. Items of interest can also be saved as a 'pathway' for future reference, for sharing with other users, or even for telling a story.

About the survey
In this survey, we are investigating what users currently do when they use cultural heritage collections online. Your input is incredibly valuable to us and will be used to help us design the first prototype of the PATHS system.

It will take approximately 15 minutes to complete the questionnaire. Your participation in this study is completely voluntary. you can withdraw from the survey at any point by clicking on the 'Exit Survey' button.

By starting the survey, you agree to the data you supply being used for research purposes. Your survey responses will be strictly confidential and results from this research will be reported only in an aggregated or anonymous form, unless your prior consent has been given. Your data will not be shared with third parties unassociated with the PATHS project. This research has received full ethical approval from the Information School at the University of Sheffield.

Contact
If you have questions at any time about the survey or want further information about the PATHS project, please email either Dr Paul Clough (p.d.clough@sheffield.ac.uk) or Ms Paula Goodale (p.goodale@sheffield.ac.uk).Thank you very much for your time and support.

Continue

Fig. 9 Online survey introduction: screen-shot

The majority of questions simply required the user to select from available options, from a single list or in a matrix format, with multiple categories using the same options. It was also possible to preset whether a user could select one or select many answers for each question. Two example screen-shots of the online version of the survey are presented below.

Fig. 10 Online survey examples of simple questions: screen-shot

Fig. 11 Online survey examples of matrix questions: screen-shot

A small proportion of the data collection was completed offline, with a printed version of the survey pro-forma distributed by Alinari, during interviews, and at a conference workshop. These responses were then keyed into the online survey software by project staff. The printed and online surveys were identical in every respect other than media, and the printed version of the pro-forma is shown in Annex 1.

4.3. Survey Sample

Given that we had limited direct access to digital cultural heritage audiences at this stage of the research, the sample for the survey was derived along convenience and purposive lines. Participants were recruited via existing connections within the identified domains and the survey was distributed via:

- internal email list at the University of Sheffield (USFD)
- a PATHS workshop at the EVA conference in Italy (Alinari)
- onsite visitors to The National Archives reading room in the UK
- social media contacts of project partners
- interviewees for the qualitative research

The heritage, education and professional domains were targeted by selecting specific contacts (several of whom were also interviewed) to invite to participate in the survey, as well as via the USFD email list and the EVA conference workshop. Whilst all participants can be judged as general users to some degree, this domain was the hardest to target, and we sufficed with the USFD email list, which goes to staff and students of the university, and an onsite visit to The National Archives where we had limited access to members of the public visiting the reading room.

At 1st June 2011, a breakdown of survey participation was as follows:

- 86 people started the survey
- 61 people completed the survey (70.9%)
- 18 additional people completed a majority of the survey (20.9%)
- 7 viewed the survey, but did not answer any questions (8%)
- i.e. a total valid sample of 79 participants (91.8%)

Of the 79 valid cases, completion of individual questions varies from approximately 60-100%, or around 50-79 people, providing a medium-sized sample, from which it is possible to filter the key questions by category and to undertake cross-tabulations of one variable against another

4.4. Survey Results by Individual Question

Preliminary results for each question in the survey are presented below, including commentary about the data and findings, along with graphical representation for most questions.

Q1) Gender

There are slightly more female than male respondents, which may reflect a degree of female bias in arts and humanities subjects.
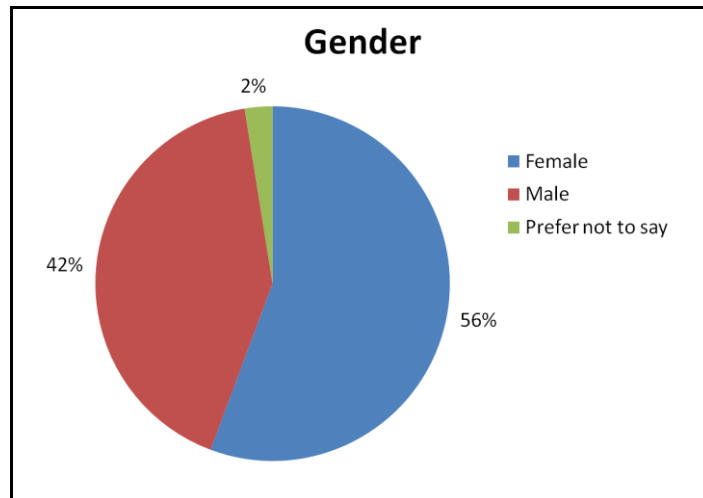
Fig. 12 Survey response: Gender

Q2) Age group

The largest age group is 36-50 years (36%), and the 26-35 years and 51-65 years are also well-represented.
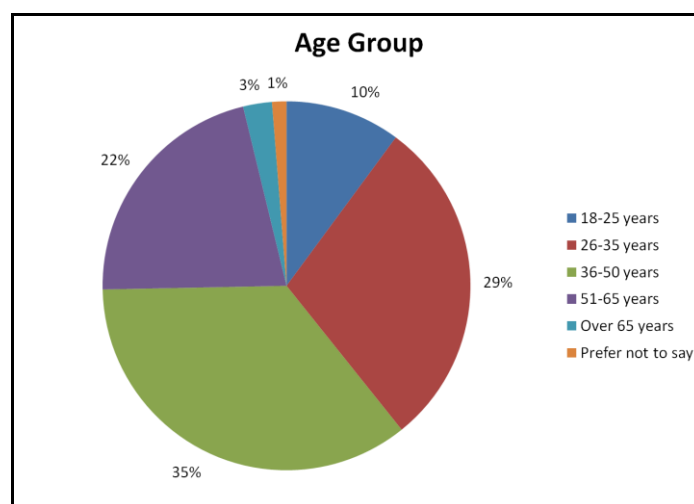
Fig. 13 Survey response: Age Group

Q3) Which country do you live in currently?

68.4% of respondents are from the UK and 12.7% from Italy, reflecting the nature of the lists and contacts used to invite people to participate in the survey. There are a few respondents from other European nations, and one from the USA. It may be desirable to extend geographic coverage of later data collection activities, although it is likely that more equitable coverage by domain would be the most beneficial improvement.
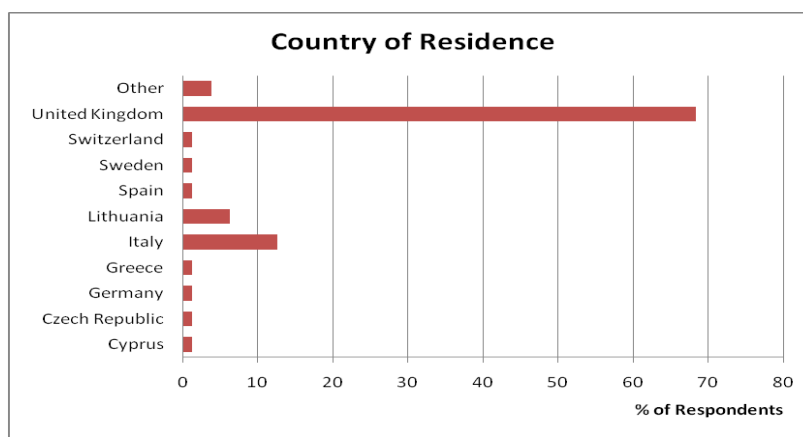
Fig. 14 Survey response: Country of residence

Q4) What is your current student status[3]?

58% are not studying at present, whilst 21% are either in full-time or part-time education. The level of PT study (9%), compared to FT study (11%) is surprising, suggesting perhaps a degree of commitment to ongoing professional development or lifelong learning. All respondents who are studying are also in employment, with FT students more likely to be working on a part-time basis (75%) and PT students split equally between full-time and part-time employment. The large percentage of Other responses is accounted for by people using this to indicate employment status. In total, only 15 respondents are students at the present time.
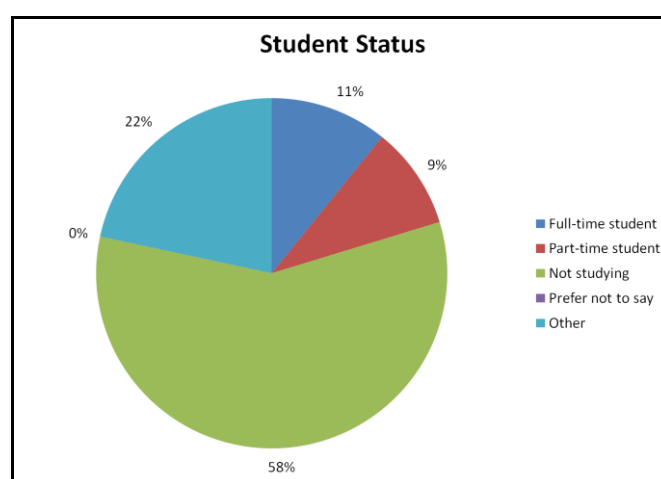
Fig. 15 Survey response: Student status

---

[3] Student status does not substitute for employment status – both are given independently of each other.

Q5) Which of the following types of education have you completed?

More than 55% of question respondents have completed a UG degree, higher than the UK average and the current target for participation in higher education (EU comparison unavailable). There are also higher than average levels of postgraduate taught (37%), research (31%) and professional education (27%). High levels of respondents with completed postgraduate levels of education are possibly attributed to the large number of respondents from UFSD, but it may also indicate the importance of professional development for cultural heritage experts.
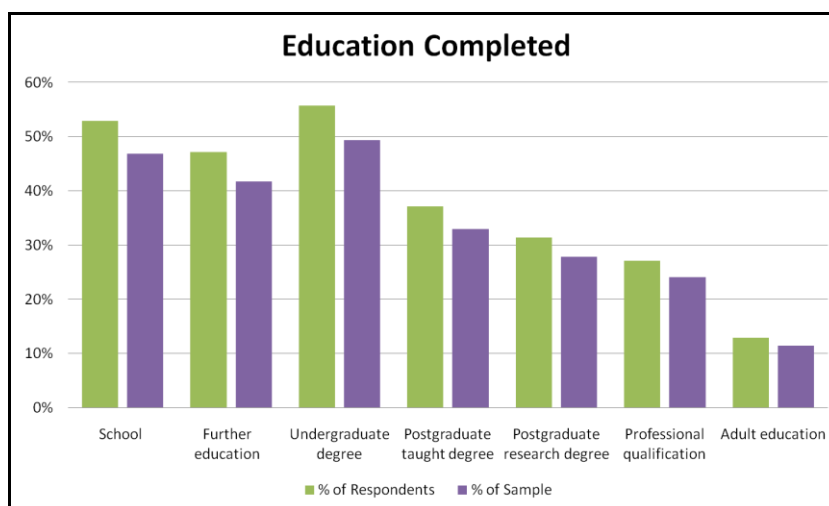
Fig. 16 Survey response: Education completed

Q6) If you have studied at higher or further education level, what is the subject of your current or last course?

Responses to this free text question are represented in the word cloud[4] below. Note the weighting of:

- History
- Cultural
- Science
- Information

Otherwise, there is broad coverage of other arts and humanities subjects, plus a smaller number of science and technology subjects.

---

[4] A word cloud is generated from textual analysis of a document, or in this case, a set of free text responses. The relative sizing of the words indicates commonality of appearance in the results for the question.

Fig. 17 Survey response: Tag cloud of subject studied

Q7) What is your current employment status?

More than 87% of respondents are in full-time or part-time employment. Further cross-tabulation of results shows that more than 47% of part-time employees are also studying, possibly indicating a need or commitment to continuing professional development in the industry sectors represented.

Fig. 18 Survey response: Employment status

52

Q8) What is your current or last job title?

A word cloud has been generated from the free text responses. Note the weighting of

- Information
- Research
- Manager
- Assistant

In addition, there are a number of academic roles, and to a lesser degree, cultural heritage and communications roles. These results may be significantly influenced by the proportion of participants from UFSD. It is therefore worthwhile considering this in the light of coverage of subject expertise, shown in the education subject expertise word cloud for question 10, below.

Fig. 19 Survey response: Job title

Q9) Have you ever worked in any of the following industry sectors?

73% of respondents have worked in higher education, although these account for only 32% of all responses given to this 'select all that apply' question, suggesting that some respondents have worked in several different areas. 47% have worked in cultural heritage and 30% have worked in professional domain. Further analysis reveals that the average number of industry sectors worked in is 2, whilst the most is 6. A significant minority have worked in multiple domains. Overall, 59% have worked in only one of the three domains, 29% have worked in 2 domains, and 12% in all 3 domains.

Fig. 20 Survey response: Industry experience

Q10) If you have worked in an education role, please list your area(s) of subject expertise.

A word cloud has been generated from the free text responses to this question. There is quite a mixture of responses, with a strong emphasis on information subject areas, and some emphasis on cultural heritage and education, plus science. These subject areas are somewhat different to education subjects studied. Only 62% of those who have worked in an education sector responded to this question.

Fig. 21 Survey response: Education employment subject expertise

Q11) How experienced are you in using the internet?

60% of respondents see themselves as *Advanced* internet users, 33% are *Intermediate* and 7% are *Basic* users. The low number of basic users may be in part due to the low number of respondents in the over-65 age group. The high number of advanced users is surprising, and it may have been reasonable to expect the proportions for intermediate and advanced users to be transposed. Again, the results may be influenced by the large number of respondents who have worked in education, but it is also possible that people have overrated their abilities. Importantly, this degree of confidence is likely to have some bearing on questions relating to complex information tasks, particularly perceived difficulties.
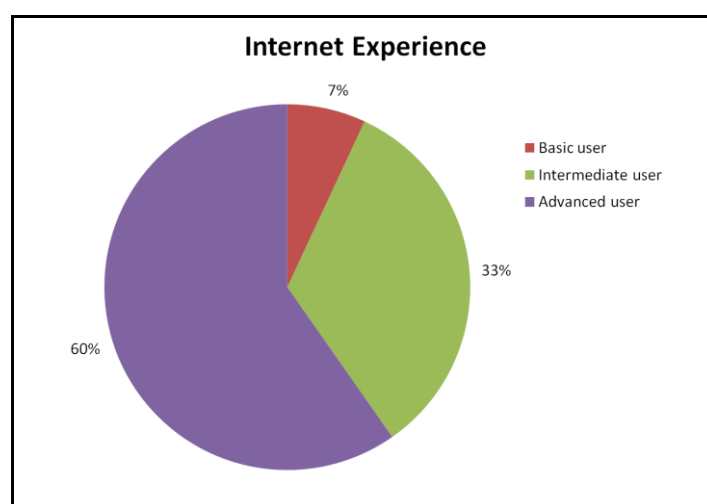
Fig. 22 Survey response: Internet experience

Q12) Have you ever used the web sites of any of the following types of cultural heritage institution?

For work, the most used cultural heritage web sites are museums (53%), archives (50%) and special collections (40%). For study, it is archives (35%) and special collections (32%). For leisure, it is museums (70%), historic houses (63%) and art galleries (60%). Leisure use of cultural heritage web sites appears to outstrip both work and study.

The differences between the three areas of work, study and leisure possibly reflects, to some extent, the differing tasks and information needs associated with each. Leisure use is not necessarily dominant in terms of time spent, as it is likely that a significant proportion of leisure use relates to looking up practical information about what is on and how to get there, whilst work and study tasks are likely to be more in-depth and research focused.
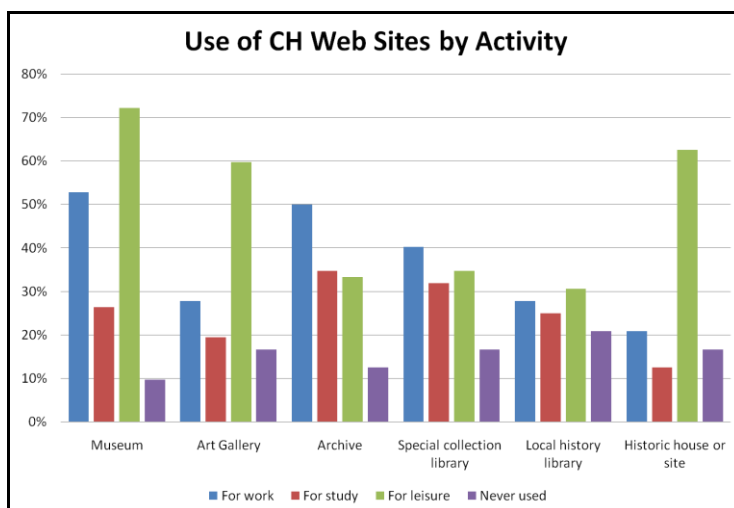
Fig. 23 Survey response: Use of cultural heritage web sites by activity

Q13) Have you used any of the following websites for information about cultural heritage?

Wikipedia appears to be fairly ubiquitous as an information resource, used by 89% of respondents. Next most popular are tourism and travel sites (78%), and local authority sites (75%). Use of news and magazine web sites (58%) outstrips what's on guides (42%), and surprisingly, despite their popularity in cultural heritage marketing at present, social media sites are trailing all of these. Social media use in order of popularity is YouTube, Facebook, Flickr, Twitter and LinkedIn. Only 25% of respondents have used Europeana, which is the only cultural heritage-specific resource on the list.

It is again interesting to see support for some of the key sectors in the professional domain. In addition to developing the PATHS user requirements, this information may be somewhat useful in the long term for considering outlets for public dissemination, and in the interim, as guidance on where to recruit participants for ongoing data collection activities. Results may also support decisions on what links we provide out from PATHS and whether or which social media platforms to support later in the project.
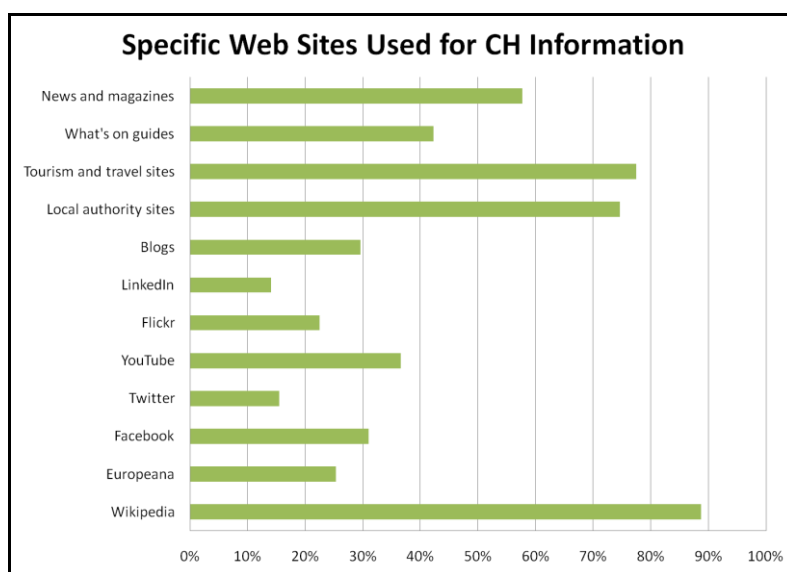
Fig. 24 Survey response: Specific web sites used for cultural heritage information

56

Q14) List any other cultural heritage websites that you can remember using in the last year.

36 respondents answered this question, and more than 90 specific web sites were mentioned, along with a number of generic types. The most popular category was museum web sites, with many institutions listed by name. Other popular categories included archives, genealogy, university collections, tourism and general heritage sites. Web sites mentioned by more than one respondent are shown in the chart below.
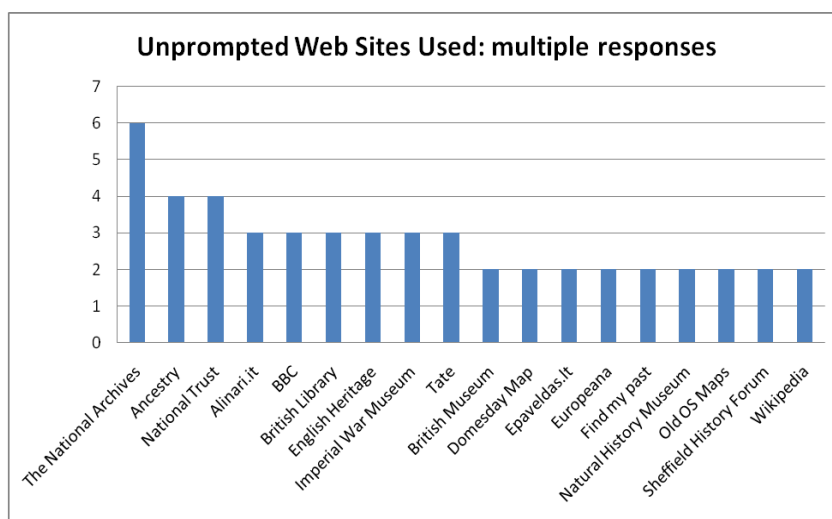
Fig. 25 Survey response: Unprompted web sites used

Q15) What are your main reasons for using cultural heritage web sites?

The highest level of use is for general information (78%), and activities relating to preparing for a visit (66%), research for work and research for leisure (both at 61%) are also popular. Less than half of respondents use cultural heritage web sites for entertainment (46%), and all other tasks are much lower in popularity. It is interesting to compare preparing for a visit (66%), with following from a visit (24%); perhaps this indicates a missed opportunity.

It may be useful to get users to elaborate on the perceived differences between research for work and research for leisure, as these activities score relatively equally with high level of response for each. These options were intended to signify more complex information needs, which for example in leisure activities might be gathering information relating to a project rather than simply finding somewhere to visit, but it is possible that they have been interpreted differently.

57
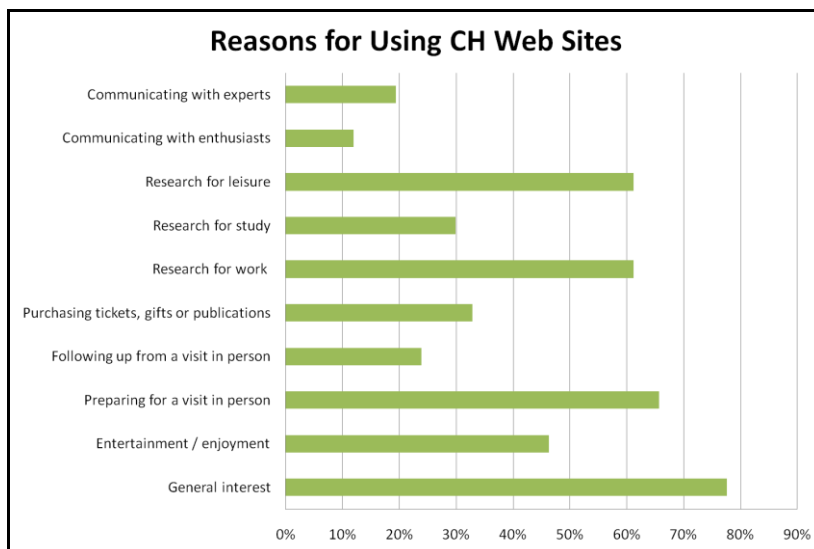
Fig. 26 Survey response: Reasons for using cultural heritage web sites

Q16) What types of cultural heritage information do you look for online?

Reports and data, object descriptions, academic literature and expert comments are used much more for work than for other activities, whilst news, magazine features, audio, video, object images, user comments and reviews are used much more for leisure than other activities. Use of collection catalogues use for work and leisure is broadly similar, and both are higher than for study. Study use is generally lower than both work and leisure, and the most used information for this activity is academic literature, expert comments, catalogue, object descriptions, object images and reports and data (all falling in the range of 22-30% of respondents).
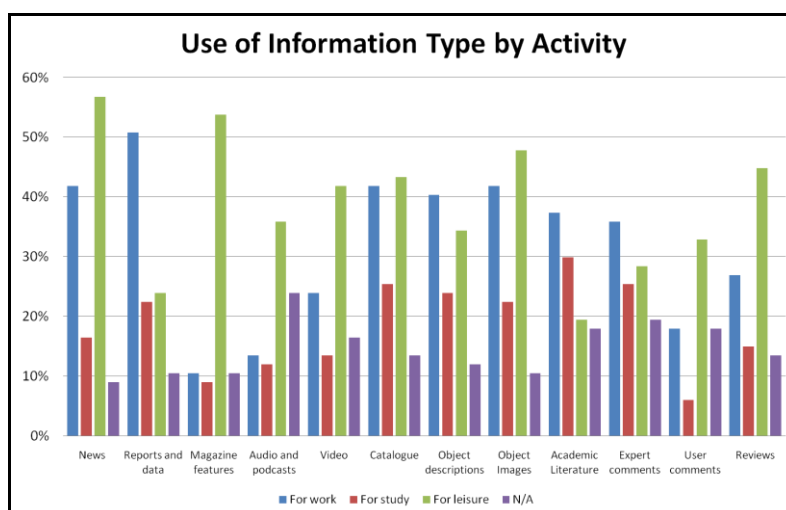
Fig. 27 Survey response: Use of information type by activity

Q17) How useful do you find the following information resources when you use cultural heritage web sites?

The least useful (not needed and rarely useful responses) types of information are audio and podcasts (33%), Enquiry form (32%), 3D representation 31% and themed trail (25%), whilst the most highly regarded resources (useful and essential) are the catalogue (71%) and object descriptions (70%). Video and 3D resources are seen as more useful than audio, indicating the importance of the visual nature of cultural heritage objects. Audio, video, trails and FAQs all score relatively well in the 'somewhat useful' category, perhaps indicating that their use is variable, dependent on the task in hand.

It seems somewhat odd that the map/floor plan is more useful than a what's on guide when using a web site. Attitudes towards trails may reflect either that these are seen as being more appropriate in the real world, or perhaps that they are a niche resource. Themed trails also receive the highest level of 'don't know' responses at 15%, indicating that a number of people have not encountered this type of resource or that it is not targeted at their needs.
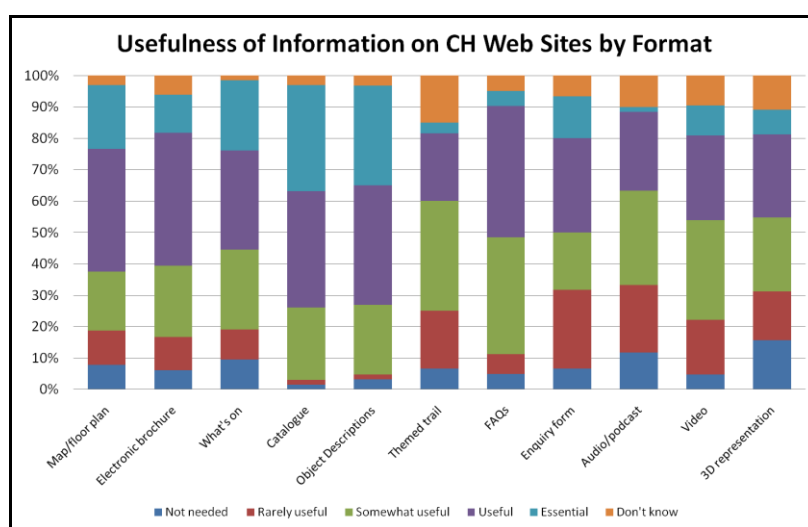
Fig. 28 Survey response: Usefulness of information on cultural heritage web sites by format

Q18) I use digital cultural heritage collections for:

All tasks, except networking, score highly for work-related activities, with finding facts and producing materials scoring highest at 51% each. For study, the two most favoured tasks are finding facts (33%) and researching a topic (28%). For leisure, are finding facts (48%) and exploring ideas (43%). This latter is the highest score for exploring ideas over all 3 areas. The 'producing materials for others to use' task scores low at 11% for both study and leisure activities. The former may be in part due to the phrasing of this task, as it would be expected that students produce a significant number of materials that are used, or at least assessed, by their teachers. Lower scores for study-related tasks are affected by the lower proportion of students in the sample.
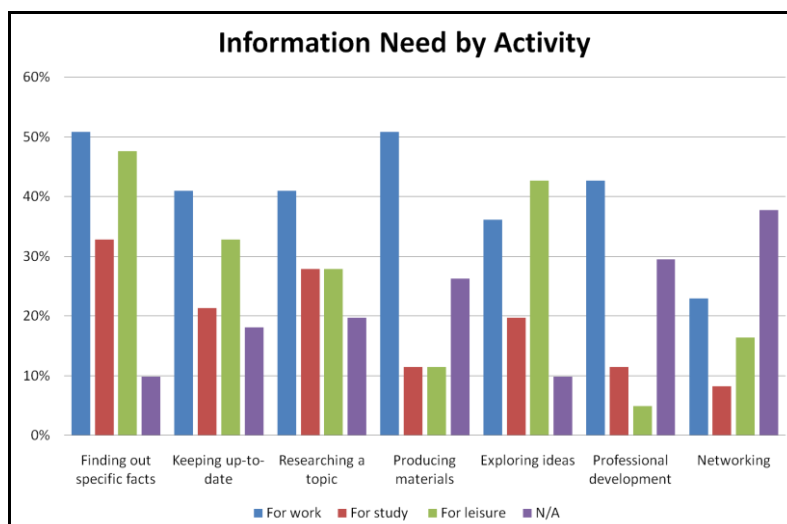
Fig. 29 Survey response: Information need by activity

Q19) When looking for cultural heritage information online:

Respondents are more likely to want to see everything available rather than just the highlights of a collection, or only those items with images. Responses for just the highlights and only items with images follow a similar pattern, as do responses for getting to the facts quickly and browsing around a topic. The commonality between seeing highlights or just items with images is perhaps to be expected, but it might be expected that getting to the facts quickly and browsing around a topic would not follow the same pattern as these would appear to stem from different cognitive styles (local vs global dimension in the Pask-Witkin model).

Respondents do not appear to be too concerned about finding information (69% are confident in finding what they are looking for) or in the volume of it (only 10% feel there is too much information). Almost 50% of respondents prefer not to follow a guided tour.
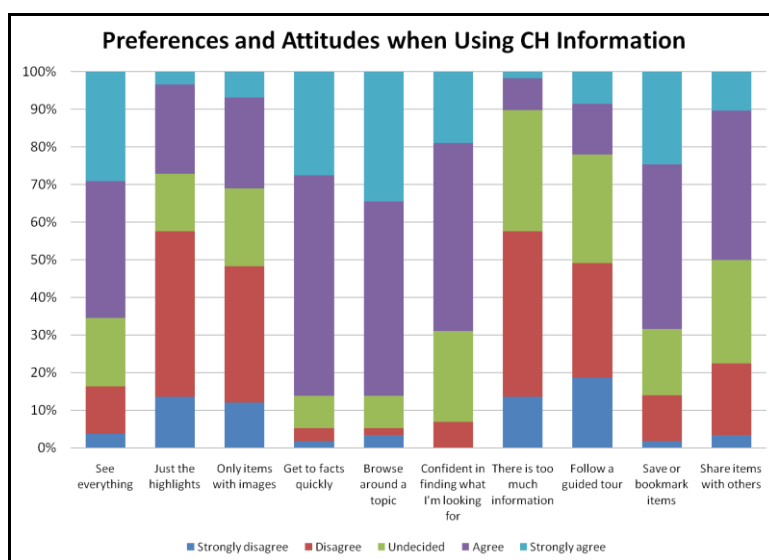
Fig. 30 Survey response: Preferences and attitudes when using cultural heritage information

Responses for wanting to see everything compared to wanting to see only the highlights or images, and those for confidence in finding information compared with feeling there is too much information are somewhat opposite. These differences are to be expected in the light of what is suggested by the dimensions in Pask & Witkin's model of cognitive styles in information seeking. However, some of these results for this question will be affected by the high number of advanced internet users in the sample, who would likely have much better than average information skills and are therefore less likely to need support and guidance.

Almost 70% actively engage in saving or bookmarking items, and at least 50% like to share interesting items with others.

Q20) How often on average do you access cultural heritage material online?

Use of cultural heritage information for work is most frequent, with 44% of respondents using it at least 2-3 times per week, compared to only 23% for study purposes. Levels of use for hobbies, entertainment and general information are broadly similar. Work and study responses will in part reflect the higher levels of employment and lower levels of students amongst the respondents.

Fig. 31 Survey response: Frequency of use of cultural heritage information

Q21a) List any specific activities for which you might need to search for cultural heritage information.

A word cloud has been generated from the free text responses to this question. The dominance of search and information words is unsurprising as they are core elements of most descriptions of activity. At the next level, it is interesting to note terms such as:

- Family, history (equal weight, so possibly a pairing)
- Visit/visits/visiting, places/interest (another possible pairing), plan, tourist
- Museum/museums, cultural, historical, archaeological, heritage
- Collections, exhibitions, resources, iconographic

These results should be contrasted with the examples of more complex tasks given for question 21c, below.

Fig. 32 Survey response: Activities requiring cultural heritage information

Q21b) Do any of these activities entail looking for a variety of materials relating to a topic, theme or concept?

More than half of respondents definitely engage in activities where they need to locate several items on a theme or concept, whilst another 40% may do so. As this question relates to the previous examples given in question 21a, this degree of uncertainty may indicate that this type of task has not been listed, or perhaps that some tasks do not require this level of complexity every time they are carried out, or that there is a degree of ambiguity that requires further investigation.

Fig. 33 Survey response: Do these require looking for several items on a theme?

Q21c) Please give an examples(s):

A word cloud has been generated from the free text responses to this question.

Compared to the results for question 21a, it is notable that there is greater emphasis here on browsing, coupled with some degree of uncertainty, shown by words such as, e.g.

- Looking/look, topic, general
- Might, may, perhaps

Furthermore, subject matter is more specific, and there are also more references to media type:

- Local / history (have equal weighting, so possibly a pairing)
- Sheffield, industrial, plus a large number of individual instances of other topics
- Material, maps, books, image
- Music- could be a search topic or media type

Fig. 34 Survey response: Examples of tasks requiring looking for several items on a theme

Q22) When looking for a range of information on a cultural heritage subject or theme, how would you rate the difficulty of the following aspects of this activity?

Levels of very difficult and difficult responses are all below 30%, showing relative confidence in undertaking complex information tasks. Finding information is the least problematic aspect of the task, whilst a little more concern is shown for choosing what is relevant, knowing when you have enough and evaluating quality, all of these scoring a small amount of 'very difficult' responses. The highest level of confidence is shown for 'knowing how to get started (67% easy or very easy)', which would be expected for a majority of advanced internet users. For all other statements, levels for easy and very easy are around the 50% level.
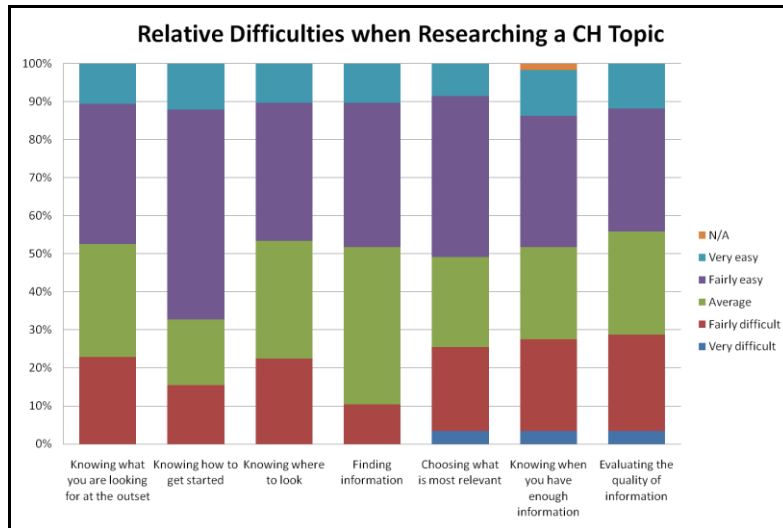
Fig. 35 Survey response: Relative difficulties when researching a cultural heritage topic

Q23) How long would you generally spend on this type of information task?

74.5% of respondents would spend less than one day on researching a topic in detail. All other categories score less than 8%. Responses for this question are very surprising, especially given the high level of education respondents. This may indicate time pressures, confidence in getting results, or different interpretations of what this type of task might involve. For those creating more complex learning resources, writing research publications, or curating displays and exhibitions, it would be expected that this type of task would take much longer.
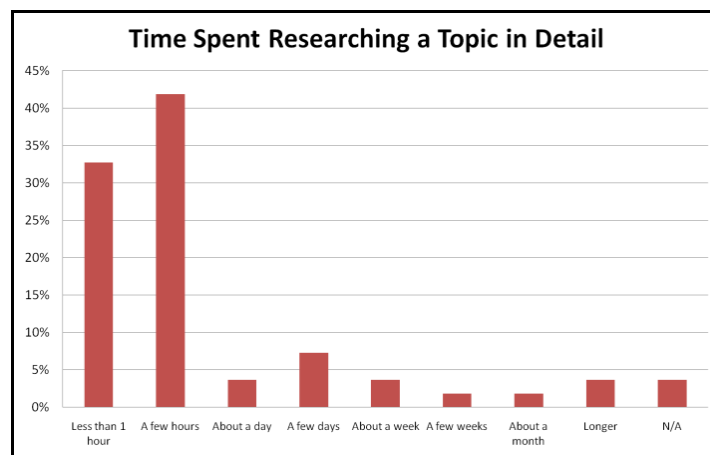
Fig. 36 Survey response: Time spent researching a topic in detail

64

Q24) How would you rate the overall complexity of this type of information task?

Perceptions of complexity follow a slightly skewed normal distribution. No responses are given for a rating of 1, and 59% of respondents score this type of task from 4-7, i.e. average to high complexity. Results for this question are likely to be affected by the high levels of advanced internet users, and differing interpretations of what this type of task might entail.
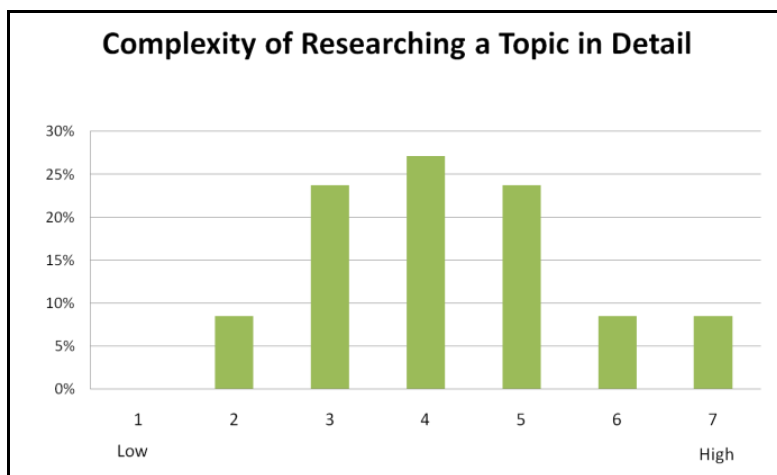
Fig. 37 Survey response: Complexity of researching a topic in detail

Q25) Have you ever visited any of the following types of cultural heritage institution in person?

All types of cultural heritage institution have high levels of personal visits from our respondents, with historic houses, art galleries and museums scoring 90-100%. Local history libraries are the least popular at 65%.
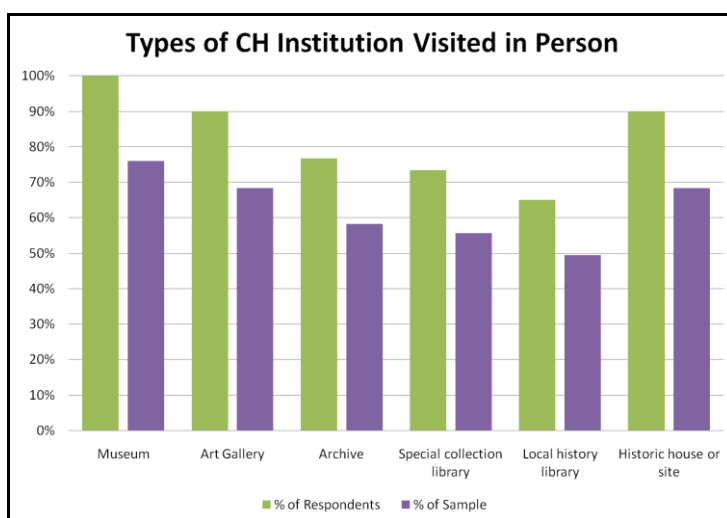
Fig. 38 Survey response: Types of cultural heritage institution visited in person

65

Q26) How many times have you visited cultural heritage institutions in person during the last 12 months?

47.5% of respondents have made more than 10 personal visits during the last 12 months. This is very much higher than national statistics, where the norm is closer to 1-2 visits. Only 5% of respondents have visited once or not at all during the last year. These figures suggest that our respondents are highly engaged with cultural heritage and may therefore have a relatively good grasp of the subject matter for information searching. This has significant implications for our experiment work; the type of tasks designed, and decisions on how much consideration we give to the needs of less highly engaged audiences.
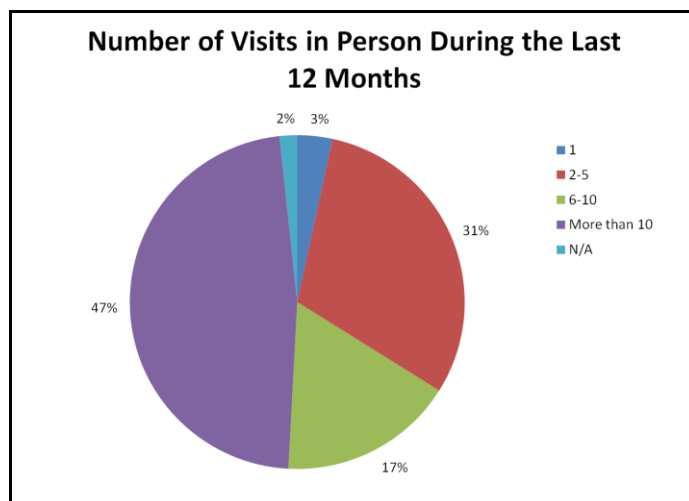
Fig. 39 Survey response: Number of visits in person during the last 12 months

Q27) How often do you use the following information resources when you visit in person?

General brochures, maps/floor plans and exhibit labels are all widely used, as might be expected, since these are the most consistently offered and most established forms of information in the physical cultural heritage environment. Audio tours and tour guides have similar levels of use at around one third of respondents. Themed trails (75% rarely or never) and activity sheets (79%) are relatively under-used. Smartphone apps have yet to become a mainstream technology, with 76% having never used them.

Trails and activity sheets are generally offered to family and school visitors, and as such may be a niche information resource for our respondents. We do not have information on who our respondents visit with, and whether they lead learning activities in this environment. This indicates a gap in our knowledge in this survey, but is addressed in some of the interviews.

This question may also be contrasted to some extent with perceived information usefulness of resources offered via cultural heritage web sites (question 17).
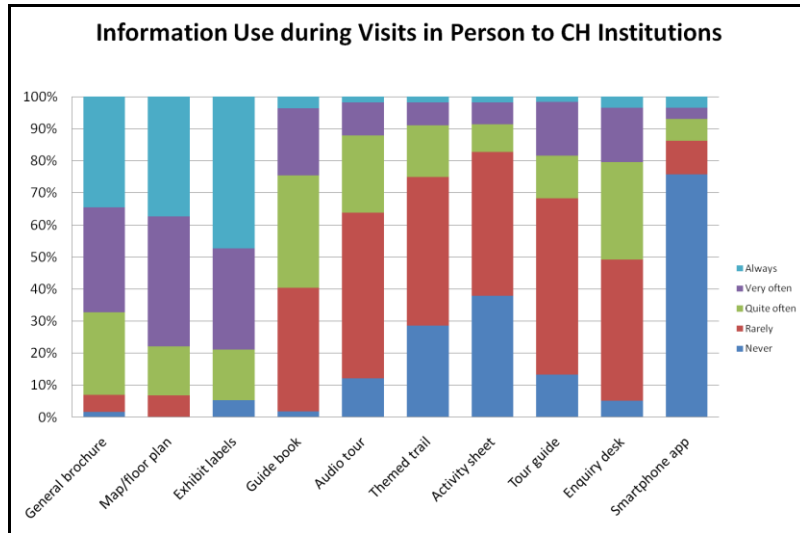
Fig. 40 Survey response: Information use during visits in person to cultural heritage institutions

Q28) How would you describe your knowledge of the following?

Respondents are most confident (rating excellent and good) in their knowledge of heritage and history, and least confident in their knowledge of arts and popular culture (i.e. both high- and low-brow subjects). 25% see their knowledge of popular culture as poor or below average, compared to only 7% for heritage. The low levels of confidence in pop culture may be in part affected by the low response from the 18-25 years age group.
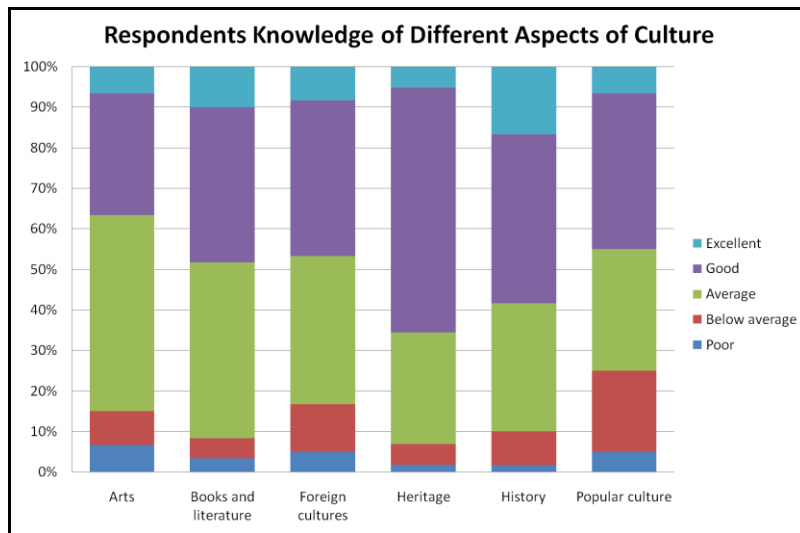
Fig. 41 Survey response: Knowledge of different aspects of culture

Q29) Do you participate in any of the following leisure interests or hobbies?

The most popular hobby is travel, followed by social networks, photography and learning languages. Scrapbooking, blogging and diary writing are the least popular and the level of enthusiasm for computer games is surprisingly low. The average number of selections for this multi-response question is 4 hobbies. The popularity of travel, learning languages and photography bode well for our inclusion of tourism and creative industry sectors in the professional domain, whilst the high score for photography may also suggest a strong visual preference of our users.
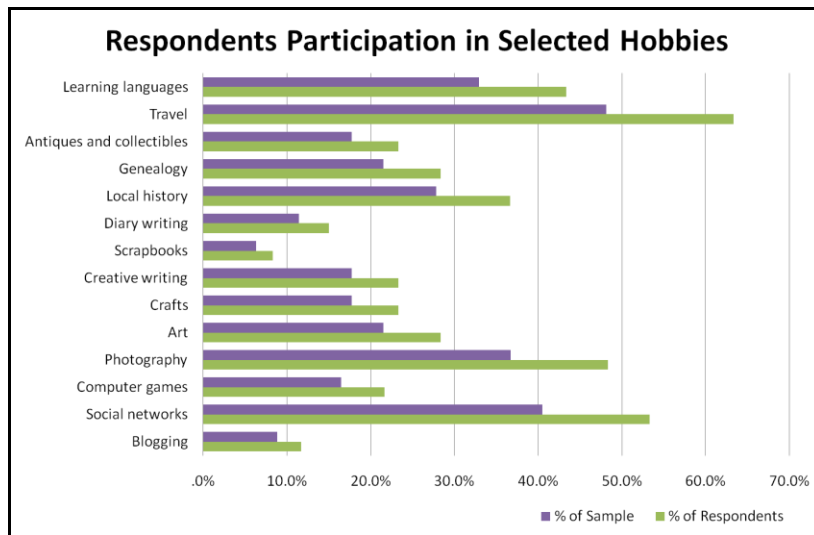
Fig. 42 Survey response: Participation in selected hobbies

Q30) Would you be interested in participating in further research relating to the PATHS project?

A majority of respondents indicated that were definitely (44%) or maybe (38%) interested in participating in futher stages of the PATHS project, with 30 providing email addresses.These contacts will be valuable for future user requirements analysis and also for usability testing and evaluation of prototypes.
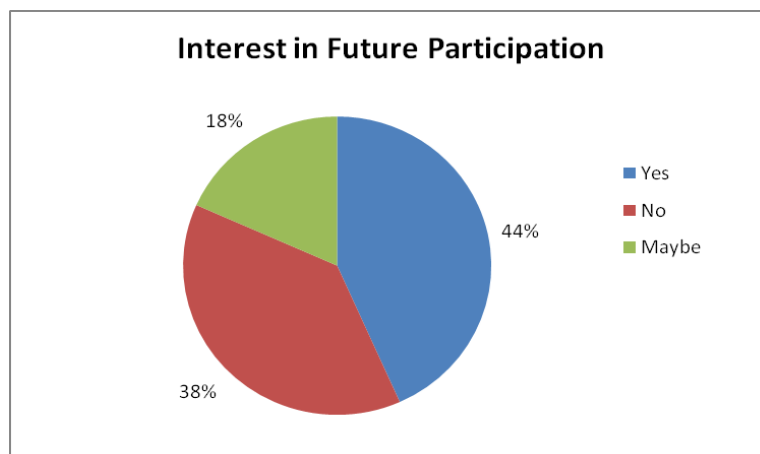
Fig. 43 Survey response: Interest in further participation

68

5. Primary Data: Interviews

5.1. Interview Design

A semi-structured interview was designed as a means of eliciting in-depth qualitative information about expert users' views on and current uses of the pathway metaphor. As the Interview Guide[5] explains:

"The purpose of this interview is to gather information about your own understanding and use of pathways in the context of your work and cultural heritage collections. There are four main Sections:

    A. exploring the concept of a path
    B. the process you use or might use for developing a path
    C. how other people might use your path
    D. your views on other people's paths"

The main questions in the PATHS expert user interview are intended as prompts to an open-ended discussion of elements of each of these four themes. Each question is also accompanied by a series of sub-questions that may be used as prompts by the interviewer to prompt further detail on aspects of the main question.

Each of the four interview Sections are presented below, along with explanation of their relevance in the context of PATHS user requirements research, and an overview of the main questions asked. For details of the sub-questions, see the full Interview Guide.

5.1.1. Exploring the concept of a path

Questions in Section A address the 'pathway' metaphor that is a central construct of the PATHS system. This metaphor has a degree of common usage in heritage and education environments in the context of guided tours around the physical museum, its exhibitions and its environs, and also in the form of 'trails' that are often used as educational device to support informal learning and exploration, particularly with younger educational and family visitors. It is therefore important for PATHS that we ascertain and fully understand any accepted common uses of the pathway metaphor, as well as uncovering alternative interpretations that may be applied in different user contexts.

---

1. What does the idea of a pathway through a digital collection mean to you?

2. How might the pathway concept be applied in the context of your work?

3. Do you see any connection between the concept of pathways, and guided tours or trails?

4. Do you see any connection between the concept of pathways, and storytelling or narrative?

Fig. 44 Interview Questions: Section A

---

[5] A pro-forma of the Interview Guide is presented in Annex 2, for reference.

5.1.2. Developing a path

These questions focus on the main task that the PATHS system will support; that of creating a path. In addition to the actual *process*, there are also questions inquiring on *perceptions* about the temporal aspects of the process, its complexity, and the degree of satisfaction achieved. The questions are an extension of Q21a-c in the survey, and the intention is to add depth to this critical area of user requirements.

---

5. Have you ever developed a guide, trail or pathway based upon items in a digital or physical cultural heritage collection? Please give an example...

6. How often do you need to create a path of this kind?

7. Overall, how complex was the task of creating the path?

8. How long did it take you to complete the process of creating the path?

9. How satisfied were you with the path?

Fig. 45 Interview Questions: Section B

5.1.3. How paths are used

Next we ask about issues relating to the *use* of these paths created by experts for non-experts. There is discussion of some of the practical considerations of making paths available, and more importantly, the types of users, their actual use and any feedback received. These questions are an important element of the user requirements gathering as they compensate for our limited access to non-expert users during the initial phase.

---

10. How was your path made available? [e.g. media / format]

11. How long was it available for?

12. Do you have a feel for how much it was used and by whom?

13. Explain how someone would use the path in practice…

14. Have you received any feedback from users?

15. Based upon this experience and feedback, what would you change the next time you develop a path?

Fig. 46 Interview Questions: Section C

5.1.5. Views on other people's paths

Finally, we attempt to gauge whether expert users have had interaction with other expert paths, and their reactions to them, along with perceptions on the overall path-making environment; other tasks that might be supported, other people who might create them, and so on. We intend, by asking questions in this Section, to cover wider views on paths and

path-creation than those relating the inherently limited number of case studies discussed in depth in Sections B and C of the interview,

16.

16.

> 16. Have you ever used or reviewed guides, trails or pathways from the digital collections of other cultural heritage institutions?
>
> 17. Are there any other activities you are engaged in professionally where you would find it useful to create, use and/or share a path using items from digital cultural heritage collections?
>
> 18. Are there any other people in your organisation who create or use paths in their work?
>
> 19. Is there anything you would to mention about the use of pathways in cultural heritage collections?

Fig. 47 Interview Questions: Section D

Analysis of the responses to the interview questions are presented as follows:

- Sections A and D are reviewed in Section 5 of the report

- Sections B and C, synthesised with key findings from the survey results in Section 4 of this report, can be found in Section 6

By splitting the presentation of interview results in this way, our aim is to focus first on the contextual information provided by the interviews, and second on the more practical aspects that have been discussed.

5.2.   Interview Data Collection

Prospective interviewees were contacted by email with an invitation to participate in the PATHS user requirements research. Interviews were then carried out either face-to-face, or via telephone, using Skype. Interviews conducted by UFSD and MDR were in English, whilst those conducted by Alinari were in Italian. For consistency, all interviewers used a common Interview Guide (described above). Detailed instructions were provided on how the guide should be used in practice, thus maintaining consistency of both the questions and the overall approach to carrying out the interviews.

Each of the interviews was audio-recorded, using a digital audio recorder for the face-to-face interviews and call-recording software for the telephone interviews. Audio files were then transcribed, and in the case of the Alinari interviews, translated into English. The resulting transcriptions were then used as the main data for analysis.

5.3.   Interview Sample

To date we have completed 22 interviews with expert users from the three expert domains (Heritage, Education and Professional) identified as most relevant for the PATHS project. Purposive sampling was used to target interviewees in relevant organisations and roles among partners' professional contacts. From a geographic perspective, 12 of the interviewees are located in the UK, 7 in Italy, 2 in the Netherlands and 1 in Spain. This reflects to some extent the allocation of workload of this task within WP1, with USFD and Alinari undertaking the majority of the data collection activities for user requirements.

Of the 22 interviewees, 13 work in the Heritage domain, 3 in the Education domain, and 6 in the Professional domain. Although representation of the Education domain appears to be relatively low, it should be noted that 4 of the Heritage interviewees are employed in educator roles, so the balance is redressed to some degree. In addition, from our survey it is evident that there a high degree of cross-over between the domains, and it is relatively common for experts to have experience in more than one sector. We are confident therefore that our sample provides a representative range of views across the three expert domains.

A decision was taken to focus on expert users at this stage of the user requirements analysis, as it is expected that these will be the main actors engaged in the core task of path creation. As we expect that non-expert users will be primarily concerned with following paths that have been created by experts, it is necessary to wait to involve these actors until we have a set of such paths available. This essentially means that pro-active inclusion of non-expert users must wait until post-implementation of the first prototype, when we have a system for expert users to purposefully undertake path creation tasks.

A list of the 22 expert users who were interviewed is given Table 7:

Table 7 List of Interviewees

Interviewer	Country	Organisation	Job Title	Generic Role	Domain	Sub-domain
USFD	UK	The National Archives	Media & Communications (Education)	Educator	Heritage	Archive
USFD	UK	The National Archives	Head of Cataloguing	Archivist	Heritage	Archive
USFD	UK	The National Archives	Head of Web Projects	Project	Heritage	Archive
USFD	UK	The National Archives	User Experience	Project	Heritage	Archive
USFD	UK	The National Archives	Head of Knowledge	Communications	Heritage	Archive
USFD	UK	The National Archives	Resource Discovery Project Manager	Project	Heritage	Archive
USFD	NL	Europeana	Project Manager	Project	Heritage	Digital Library
USFD	NL/UK	Europeana / British Library	Senior Communications Advisor	Communications	Heritage	Digital Library / National Library
USFD	UK	Archaeology Data Service	Project Development	Project	Education	Higher Education / Digital Library: Data
USFD	UK	University of Sheffield Information School	Head of Department /Inquiry Based Learning specialist	Educator	Education	Higher Education: Teaching
USFD	UK	University of Sheffield Humanities Research Institute	Director of HRI	Research	Education	Higher Education: Research
USFD	UK	Leeds Museums	Education Officer	Educator	Heritage	Museum
USFD	UK	Leeds Art Gallery	Curator	Curator	Heritage	Art Gallery
USFD	NL	Wikimedia	Project Manager	Project	Professional	Publishing / Digital Content

Interviewer	Country	Organisation	Job Title	Generic Role	Domain	Sub-domain
Alinari	IT	Alinari Museum	Archivist	Archivist	Heritage	Museum
Alinari	IT	Alinari Museum	Archivist / Education Assistant	Archivist/Educator	Heritage	Museum
Alinari	IT	Alinari Museum	Curator / Education Coordinator	Curator/Educator	Heritage	Museum
Alinari	IT	Alinari 24 ORE	Photographer	Creative	Professional	Photography / Publishing
Alinari	IT	Alinari 24 ORE	Marketing & Cultural Heritage Expert	Communications	Professional	Photography / Publishing
Alinari	IT	Municipality of Florence	Project Manager	Tourism	Professional	Tourism
Alinari	IT	Consultant	Consultant /Marketing & Cultural Heritage	Communications	Professional	Marketing
MDR	ES	Ministerio de Cultura, Hispana	Manager	Tourism	Professional	Tourism

5.4.   Preliminary Interview Results

Presentation of the qualitative interview data is organised around the four areas covered by the interview guide:

- The 'pathway' metaphor
- Creating paths
- Using paths
- Views on existing paths

As noted above, the data consists of transcriptions of in-depth semi-structured interviews, and presentation of results here is in a summarised form, focussing on recurring themes, as well as noting some exceptions. Comments are from multiple interviewees and will therefore sometimes be contradictory. In instances, where there is a clear preference across several interviews, a comment on prevalence is made.

In this Section we present the results on the first and last of these four categories, whilst results on creating and using paths are synthesised into the domain and role specific user profiles presented in Section 6 of this report.

5.4.1. The pathway metaphor

As is noted in the interview pre-amble, the term 'path' or 'pathway' is used as a generic term for all kinds of resources that could be perceived as or may be transformed into a digital path in the PATHS system, including guided tours, trails, exhibitions and displays, learning materials and other related resources. This generic usage is continued here.

A diverse range of ideas were revealed about what constitutes a pathway through a digital collection. This was the main focus of Questions 1-4 in the interview guide and the main themes extracted from the interview data are extrapolated from these questions and the related sub-questions in the interview guide, as follows:

- Interpretation of the pathway metaphor
- Specific characteristics of paths
    - e.g. whether they have a starting and/or end-point, and how

      the objects within the path are connected and organised.
- The nature and role of paths in specific contexts
    - e.g. learning, exploration...
- Advantages and disadvantages of offering a pathway through a collection
- Comparison of paths with the more well-known ideas of guided tours and trails
- Comparison of paths and interpretation within the context of story-telling and

  narrative

Summaries of the findings of this analysis are presented in the Table 8.

Table 8 Interview responses: The pathway metaphor

Category	Theme	Comments & examples
1) Pathway metaphor	a) Path as process	• E.g. registering on a web site, ordering a ticket, finding a document and ordering a copy
	b) Path as route through	• Can be 'well-trodden' – defined by popularity of the route • Can be laid down by experts – defined by steps, route markers and sign-posts • A way of presenting a set of source materials to an audience
	c) Path as a way in, overview or starting point	• Provide the popular, most accessible stuff • Capture imagination of a few and stimulate exploration
	d) Path as information literacy journey	• From rambler to trekker to explorer (TNA) • The route to becoming an experienced and effective researcher • By trial and error • By accessing research guides and sign-posts • Through an enquiry-based learning process – interacting with source materials to learn specific skills
	e) Path as information seeking journey	• Finding everything you need, following clues, berry-picking • Doing research – inevitably also involves going down some dead-ends • Exploring a collection, e.g. using timelines, maps, taxonomies
	f) Path as search history	• Search terms used • Trail of hyperlinks • May also include bookmarks and saved items • May be visualised
	g) Path as augmented reality	• Mimicking real-life journey, process of investigation, etc.
	h) Path as linked metadata	• Varied views on this, for and against

Category	Theme	Comments & examples
2) Characteristics of paths	a) Starting point	• May be obvious / fixed (but this is less desirable in most cases) • But works well for timeline structures • May be concealed (rabbit hole) • May be selected by the user (preferable) • May be established by the creator, but users may have different views on where to start
	b) End-point	• May be fixed (but less desirable in most cases) • May be open-ended and continually evolving • When search is on-going, e.g. genealogy • When path is a starting point for exploration • May not be pre-determined (preferable) • The user selects their end-point – where they leave the path and goes elsewhere • May evolve naturally as the path is explored • May be multiple end-points to choose from, dependent on route taken • Provides the opportunity to take new routes
	c) Structure / organisation	• Linearity is rarely the best choice, except perhaps for a process or timeline • Needs a conceptual framework (defined by the path creator) • By theme (most popular) • By date, location, author... • By different perspectives on the same story • By subjective, user-defined concepts • Pedagogy is more important than technical or conceptual frameworks, i.e. path supports leaning outcomes
	d) Connections	• Can be defined by the creator (expert-curated) • Can be defined by the user (user-curated) • Might be loosely-defined – e.g. random items connected by an over-arching idea • Are essential – provide interpretation • Are not essential at the outset, but may be added explicitly or implicitly as the path (or collection) is used • Can tell a story / develop a narrative / unfold a mystery • Curatorial input vs linked metadata. The former is a path, the latter is not.

Category	Theme	Comments & examples

2) Characteristics of paths	e) Content	• A set of links does not constitute a path
		   o Must have meaningful connections
		   o Must have context and interpretation
		   o Preferably should have human interest/story
		   o Previous three provided by curator and occasionally augmented by user-generated content
		• May all come from one collection, but
		   o Benefits from choosing the best available, independent of collection
		   o Benefits of linking to external content if it adds to the context
		• Should not try to keep people on site if you only have part of the story
		• Data enrichment, such as geo-tags and dates, can aid path visualisation
		• Data enrichment such as folksonomies can aid searching, browsing and finding
		• Issues of content accessibility
		   o Think about the audience, their skills, knowledge and context
		   o Problems, e.g. with earlier forms of language
		• Easier with images, news, and curated content
		• Might include only one type of content (images or docs), or a combination
		   o Integrating content of different kinds deepens understanding

	f) Way-finding	• May be explicit routes, but not a pre-requisite • A few help to get people curious • Usually better to let users find their own way • Visualisation can aid navigation • It can be useful to see an overview of the whole path so that you can decide what you want to see, where to start, how much you have viewed, what else you might want to view • Could view on a map or timeline to aid this • You need to be able to see the next node, but not necessarily the final destination • It needs to be obvious how you get back to where you were • Sometimes the route through can be hidden, requiring you to investigate which is the best node to take next (i.e. computer gaming process) • Exploring is more engaging than following • Branching allows the users to make decisions which way to go next • Users may need to interact with the objects to understand them and decide what to do or where to go next • A few dead-ends aid curiosity and learning • Paths can/should be connected to other related paths • These might be suggested by the system

Category	Theme	Comments & examples
3) Paths in context:	a) Path as learning device	• Steps towards a learning outcome • Mimicking (teaching) the research process • Helps if there is a 'scaffold' of questions
	b) Path as a process of investigation or exploration	• Similar to above, but can be entertainment-driven too • Each node presents new evidence / uncovers more of the story
	c) Path as a catalyst for exploration	• i.e. start on the path then venture off in new directions or personalise the path
	d) Path as a means of telling stories	• Extracting related items from the collection • Interpreting and giving meaning through the connections
	e) Path as an exercise in information literacy or site / collection familiarisation	• Supporting and encouraging users to become more independent in their information behaviour and interaction • Getting them started
	f) Path creation as a collaborative effort	• In family history – one person starts the path goes as far as they can, hands it on to someone else to continue • In a learning context
	g) Created on the fly from a collection of disparate / loosely connected items	• Path facilitator (teacher) offers collection • Users (learners) make sense / select / create path
	h) Supports browsing activities	• 50% of people want to search and go direct to info (generally supported quite well, but user may need good domain and subject knowledge) • 50% want to browse around until they find what they are looking for (Europeana does not support this at present)
	i) User experience is more important than quantitative web analytics	• Should support enjoyable experiences – e.g. exploration • Ensure users are satisfied – requirements are met • Should limit forcing people down lengthy routes to get too their destination
	j) Could be used to give multiple perspectives on the same collection	• e.g.in cultural heritage organisations, presenting the views of different curators, and of staff (and audiences) in different areas, such as educators, marketing and outreach
	k) Could be a combination of virtual and physical activities	• Combine content / process • Add links to ordering / physical location • Provide links to multiple physical locations/events that can be followed in person • Plan a visit
	l) Could be useful for personal research	• Keeping a record • Organising ideas
	m) Could connect multiple organisations / collections around a theme or event	• Connections by a curator / marketer • Suggested by the system

Category	Theme	Comments & examples
4) Advantages of paths	a) Useful in large collections where routes through may not be obvious	• Provides quick access to key resources • Aids access for non-experts
	b) Encourages exploration of collection (important)	• If path is not too linear
	c) May provide opportunities for wider exploration – if additional links are given	• Mimics the structure of the web
	d) Can support different types of users	• Different aspects of content • Different levels of detail • Different routes through site • Different levels of support
	e) Can add interpretation and contextualisation (important)	• In museum and learning contexts • Input from curator / teacher
	f) Tells stories	• captures interest (recurring theme)
	g) Encourages creativity	• Can learn what routes people take and improve site/collection
	h) Implicit trails, if saved, offer the opportunity to return	• reuse / organise / make sense • can be browsed
	i) Could be easily constructed if there are structured metadata	• E.g. subject, author, date, place
	j) Benefits for the organisation	• Seen in a positive light • Collection is more accessible • Relevant documents seen together, may reduce the need for physical access

Category	Theme	Comments & examples
5) Disadvantages of paths	a) May be too narrow and restrictive	• Relates to the volume and comprehensiveness of information presented to the user • This is a design issue for the path creator
	b) Can be misleading	• For instance, they might only tell one side of a story
	c) May be too laborious	• E.g. For people who know what they want and want to get there as quickly as possible, by the most direct route
	d) Can be restricted by available digitised content	• Affects the ability to create paths that demonstrate the most relevant objects on a particular subject • Digitisation of cultural heritage collections is rarely complete
6) Paths vs guided tours and trails	a) Some similarities	• All of these types of resources stem from the same metaphor
	b) Can (should) be different	• Rarely a good idea to repurpose existing tours and trails for the web • They are too-structured / linear / restrictive / static
	c) Paths might be shorter and snappier than a guided tour	• People have different perceptions of time in physical and digital environments
	d) Guided tours are a more passive user experience	• Guided tours are implicitly not user-led • They tell what to focus on, what you need to know about each item, and where you go next
	e) Paths are more exploratory than guided tours	• May entail you doing a lot of investigation yourself, and making your own choice • May also include context and interpretation, but the focus is more on supporting inquiry-based learning
	f) Online paths are unconstrained by place	• They are more flexible • Allow you to go more directly to a specific point • Allow for layers of context and other information
	g) Paths are personalised	• Whereas guided tours are pre-defined and homogenous
	h) They could be complementary	• Guided tour in person • Path for more information

7) Paths vs storytelling and narrative	a)	Many commonalities	• Stories are often the main concept or a core element of a path or guided tour
	b)	Can be largely irrelevant	• E.g. If the path is a process or information journey
	c)	Preferred by 'explorers'	• Those users who want to find out what there is to know about a domain or subject • Rather than those who want to get straight to the facts
	d)	Paths and stories have lots of the same elements	• Subject, author, time period, etc
8) An alternative metaphor	a)	Raw/Prepared/Cooked	• Used in educational settings
	b)	Raw	• just the content, unconnected, little metadata or context
	c)	Cooked	• fully curated by someone with expert subject knowledge
	d)	Prepared	• an intermediate case, where a teacher has the raw ingredients, including content, guidance on using it, and 'cooks' it in the context of their specific lesson and students

5.4.2. Views on existing paths

Responses to these questions were somewhat limited and less fully-elaborated than other Sections of the interview. This may represent their position at the end of the interview, or that the questions were not as easily answered when discussing the use of paths at such a conceptual level, before we have a system to demonstrate the exact meaning.

A summary of the most interesting observations is given in Table 9:

Table 9 Interview responses: Views on existing paths

Theme	Comments
Likes	• Being able to get to get to the content very quickly - not too many clicks • Good to have references to outside sources, even with own collection management system – but they need to appropriate • Being able to drill down through layers of content on the same object or subject – these could both be paths • Going from narrow to broad levels of infomation • The aesthetics of the interface are important in attracting use and exploration • Visual layout and hi-resolution images • Making links and associations between things, and adding anecdotes, for own future reference • Ability to develop a (multi-faceted) story • Interesting (for curators) to see what is popular with public and professional users, also how they describe objects • A sense of going a journey – things happen along the way, a need/desire to interact • Can be a good way of getting a quick overview of a topic
Dislikes	• Poorly assigned keywords that make search results meaningless or non-existent • Domain-specific terminology can inhibit the use of paths, and collections in general • Non-standard data can inhibit interaction with collections • Complex record structures can also inhibit access and use • Obvious elements of we're doing this because everyone else is doing it

Theme	Comments
Use of paths	• Items about a specific person, e.g. an author • Guided tours, in situ, via interactive screen • Interaction with news content – an opportunity • Several organisations working collaboratively – e.g. in a tourism project • Using paths as a marketing tool • Should be used by everyone with the museum / gallery staff who have any interaction with the public • Would be good to get children interacting with collections in this way, even very young ones • Providing multiple types of content (media) e.g. images with supporting audio • Using paths to organise events – linking together all of the relevant information • Would be very useful to have a map tool – a way of seeing nearness of records • Use paths as a means of organising search results – themes, categories, dates, etc • Not a great deal of use of the path metaphor online at present
Other issues	• Need people with curatorial skills to put together paths o Can be a problem in aggregated libraries such as Europeana • Need adequate metadata, and very important that copyright information about items which could be used in a path is clear at the creation and publishing stages • If a pathway is to be a guide to a collection, the objects must be very carefully selected (curated), to ensure they are representative • Important not to dumb down too much • Need to be careful of setting user expectations too high • Trust – allow people some leeway without logging in • Focus on the leaning outcomes, not the technology • Payment to use the system– would this be expected?

6. Synthesis of Survey and Interview Results

Based upon the primary data from the user survey and interviews presented in Sections 4 and 5 above, we have developed a model for the definition of domain and role specific user profiles, from which detailed use cases can be developed.
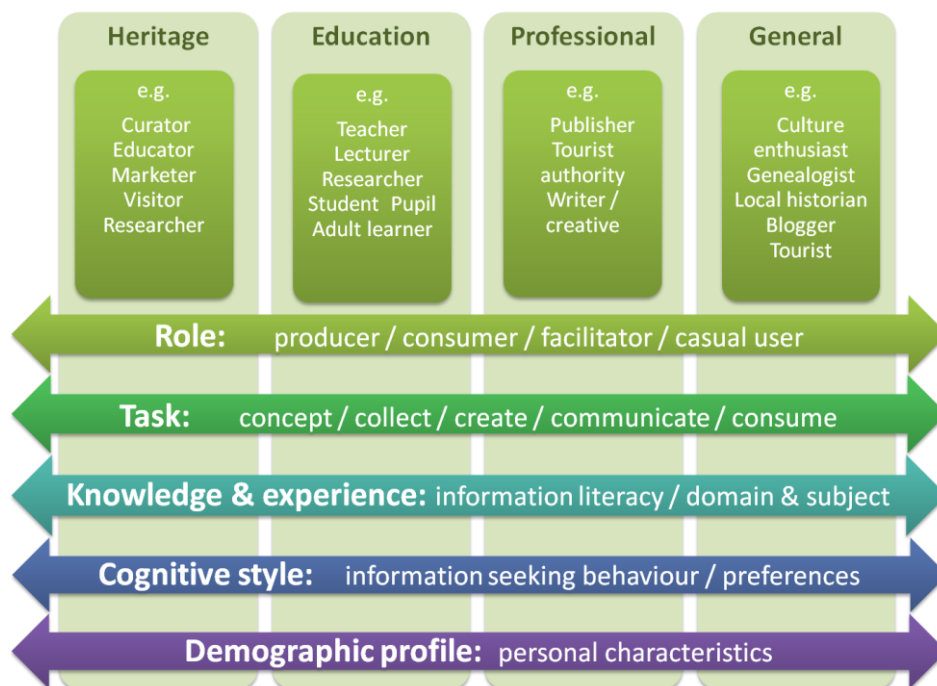
Fig. 48 Model of PATHS domain & role specific user profile

The profile template above shows that for any of the four domains and their associated expert or non-expert users, a profile for a PATHS user may be defined based upon five main characteristics:

- Role – in relation to the PATHS system
- Task – and its associated activities relating to using and creating paths (see the conceptual model in Section 8 of this report)
- Knowledge and experience – of both the domain and its subject areas, and related to the more domain-independent information skills
- Cognitive style – specifically its impact on information seeking behaviour and inherent preferences for levels of support and approaches to information tasks
- Demographic profile – incorporating a variety of generic personal characteristics

These characteristics incorporate the key elements seen in the variety of previous user studies reviewed earlier in this report, along with unique elements derived from the PATHS user requirements analysis. Specifically, they detail not only the generic high-level attributes commonly seen in user studies, but also the detailed behavioural and task-related attributes and processes that have a direct bearing on how the PATHS system will be used in practice.

6.1. Domain and Role Specific User Profiles

Using the data collected via our user survey and interviews, a number of more specific case studies of users have been developed, covering the primary roles in each domain to which we feel PATHS will have the greatest utility and interest. These case studies are presented in the following two tables[6]; the first defining user characteristics in the areas of knowledge and experience, information behaviour and personal and professional, and the second detailing typical tasks for each of these user types, detailing the user's objectives, processes followed, and, typical outputs and intended outcomes of the task.

These user profiles then a primary input, alongside the PATHS conceptual model and generic profiles presented in Section 8 of this report, for the development of use cases, and in turn the final list of user requirements for the PATHS system.

---

[6] The two tables cover the same case studies, but detail different information. They are complementary to one another, and should be used together.

6.1.1. User Profiles

Table 10 Domain & role specific profiles: user characterisitics

Domain	Role	Knowledge & Experience	Information Behaviour	Personal & Professional
Heritage	Curator	• Excellent domain and subject knowledge • Varying degrees of information literacy and search skills	• Uses generic and specific information sources • Uses own collection and others • Accesses the subject knowledge of peers • Wants to see artefacts in fullest detail (physical and/or very high-resolution) • Wants fine granularity of description and provenance • Assesses 'interestingness' / contribution to story • Provides interpretation	• PG education in subject and probably also in professional domain (museum/archive studies) • Strong visual and design aesthetic • Works primarily in the physical CH environment • Works with others to transfer/ adapt/support exhibitions to virtual • May actively choose to work on occasional virtual-only projects • May be studying part-time
Heritage	Educator	• Very good domain knowledge • Average to good subject knowledge • Very good/excellent education knowledge (inc. informal learning and education practice, plus external curricula) • Average to excellent technology and web knowledge/expertise	• Uses primarily internal sources • Accesses the expert subject knowledge of colleagues • Wants contextual information • Assesses accessibility of artefacts • Assesses 'interestingness' / contribution to story • Provides interpretation	• PG education in domain and/or education • May have transferred to profession from formal education teaching • Excellent communicators • Works primarily in physical CH environment, but increasingly (sometimes exclusively) in the virtual • May be studying part-time

Domain	Role	Knowledge & Experience	Information Behaviour	Personal & Professional
Heritage	Visitor	• Average to good subject knowledge • Varied information literacy skills • Becoming increasingly conversant with social networks for sharing and communicating	• Uses known and trusted sources (BBC/Wikipedia/museum/travel web sites) • Searches using Google • Full range of global – local style • Full range of independent – dependent style	• Cliche – well-educated, middle class, middle age (30-50) – has some truth • Visits alone, with friends, with family or as part of tour group • Visits for leisure (something o do/hobby), entertainment, learning, travel (must see institutions/works) • Visits from 1-2 times per annum (most prevalent) to very frequently • Strong response to visual
Education	Researcher	• Excellent subject knowledge • Excellent domain knowledge (research) • Varied domain knowledge (teaching and learning) • Good to excellent information literacy and web knowledge • Varied skills in using primary CH sources (dependent on subject area)	• Uses Google and Academic platforms for searching • Wants fullest information available • Active engages in keeping up-to-date • Highly focussed subject area • More likely to use archives and special collections • Assesses relevance and quality • Tends to be more independent in style	• PG education in subject • May be employed and/or PG research student • Visits CH for research and leisure • Good general knowledge of culture

Domain	Role	Knowledge & Experience	Information Behaviour	Personal & Professional
Education	Teacher /Lecturer	- Excellent domain knowledge (teaching and learning) - Varied subject knowledge (often specific to curriculum) - Good to excellent information literacy and web knowledge - Varied skills in using primary sources in teaching (may seek prof dev) - Increasingly skilled in inquiry-based learning techniques	- Accesses knowledge and resources provided by CH experts - Wants/provides contextual information - Wants/provides interpretation (possibly derived from CH expert resources) - Some focus on facts - Assesses accessibility of artefacts - Assesses 'interestingness' / contribution to story - Assesses relevance and quality	- PG education in subject and/or teaching - May be studying part-time - Visits CH for teaching and leisure - Arranges field visits for students (teacher-led or CH educator-led) - Good general knowledge of culture
Education	Student	- Domain knowledge dependent on experience as a 'consumer' of education - Subject knowledge largely curriculum-derived until advanced levels of education - Varied information literacy - Average to good web literacy	- Uses known and trusted sources (BBC/Wikipedia/museum/travel web sites) - Uses academic sources - Searches using Google - Full range of global – local style - Full range of independent – dependent style - Some focus on facts - Wants results quickly - Highly focussed on information needs of specific tasks	- Compulsory education (5-18yrs) - Post-compulsory UG and PG taught (mainly 18-25) - Visits CH for study – most often in a group - Younger students may also visit with family - Has grown-up with the web and mobile technologies - Regular user of social networks

Domain	Role	Knowledge & Experience	Information Behaviour	Personal & Professional
Professional	Tourism	• Domain knowledge (travel and tourism) is very good • Subject knowledge (CH) varies and may access expertise from CH providers • Good web literacy	• Uses internal and external sources • Wants facts and images of objects/places • Wants/provides context and interpretation • Wants to get to relevant information quickly • Assesses visual impact and interestingness of image • Assesses contribution to story	• Likely to be well-educated, at least UG degree level, plus additional professional qualifications • Has experience is related professions, possibly inc. CH • Visits CH for professional and leisure purposes • Strong interest in travel and foreign culture • Average to good general knowledge of culture
Professional	Creative industry	• Domain knowledge (publishing, etc) is very good, specific to area of expertise • Subject knowledge (CH) varies according to nature • May have specific subject knowledge e.g. marketing, design • May have specific technical skills – e.g. photography, graphic design, web design and development • Good web literacy	• Uses mainly external sources • Uses general and specialist sources (e.g. picture libraries/ CH collections) • May create own images, dependent on the project in hand • Wants facts & images of objects • Wants/provides context and interpretation • Wants to get to relevant information quickly • Assesses quality, impact and aesthetic value of image • Assesses contribution to story	• Likely to be well-educated, at least UG degree level, plus additional professional qualifications • Has experience is related professions • May be professional image maker, writer, editor, researcher or communication expert • May be project manager drawing on the skills above • Strong visual aesthetic • Visits CH for professional and leisure purposes • Average to good general knowledge of culture • Likely to have creative hobbies such as photography and art

90

Domain	Role	Knowledge & Experience	Information Behaviour	Personal & Professional
General	Culture enthusiast	• Subject knowledge derived from education and leisure interests • Information literacy varies, but average to good web literacy	• Uses known and trusted sources (BBC/Wikipedia/museum/travel web sites) • Searches using Google • Wants practical information • Wants context and guidance on interpretation • Wants images of objects • Full range of global – local style • Full range of independent – dependent style	• Typically aged 30-50 years, well-educated, employed, middle class • Visits CH frequently for leisure, learning and travel • May lead family visits • May be actively engaged in adult education course • Good general knowledge of culture • May use guided tours • Strong response to visual • Hobbies include photography and travel
General	Family /local historian	• Subject knowledge focuses on sources of information and facts • Information literacy varies from poor to good, improves with progress of project	• Uses known and trusted sources (BBC/Wikipedia/museum/travel web sites) • Uses archival and subject-specific resources • Accesses the expertise of other family historians • Searches using Google • Wants practical information • Wants specific facts and some context • Wants everything that is available • Open-ended project – continuous searching • Gets enjoyment from the search process	• Level of formal education varies • Typically aged over 50 years, possibly retired • Family/local history is one of their main hobbies • Visits CH for hobby (history project) and occasionally for leisure • Reasonable general knowledge of history and heritage, may be less in other aspects of culture

Table 11 Domain & role specific profiles: user tasks

Domain	Role	Task	Objectives	Process	Output & Outcomes
Heritage	Curator	• Create exhibition or display (physical and/or virtual)	• Create visually compelling display • Showcase collections • Provide context, interpretation and provenance • Engage visitors and encourage exploration / enable learning • Tell interesting stories	• Ideas formulated in advance or project • Develop detailed concept • Research artefacts (identify, view, evaluate) • Refine concept and artefacts • Develop exhibition display (visual, context, interpretation) • Produce exhibition (physical or virtual – with specialist suppliers) • Work with colleagues in education and communications to create materials to support the exhibition • Gather and review feedback from visitors	• Cohesive display of artefacts, supported by compelling and accurate information • Visitors view the resource, interact with it, and go on to explore further • Enjoyment/ appreciation and informal learning takes place

Domain	Role	Task	Objectives	Process	Output & Outcomes
Heritage	Educator	• Create learning resource e.g. trail / lesson or topic package	• Support teaching and learning offered by formal providers • Provide materials for school, family and adult learner visits • Provide an informal learning experience • Engage students, encourage exploration, enable learning • Ask questions and promote inquiry • Tell interesting stories	• Research audience needs (e.g. curriculum) • Select subjects/topics re curriculum and/or specific exhibition • Work with colleagues to select relevant objects • Develop learning resource (context, interpretation, questions/activities) • Produce learning resource (physical or virtual – latter may include specialist supplier or colleagues) • Work with colleagues in communication to promote the resource • Use resource in learning environment with students /teachers and/or make available for independent use • Gather and review feedback from learners and teachers	• Learning resource suited to audience needs • Resource may be adapted by teachers • Resource is used on-site, in classroom and/or online • Informal learning and enjoyment takes place
Heritage	Visitor	• Explore exhibits (physical or online)	• Enjoyment • See exhibition / collections • Increase understanding / learning	• See or find information about exhibition • Visit exhibition (in person or online), follow and/or explore exhibits • Interact with exhibits (optional dependent on preferences and availability) • Communicate experience to others and/or provide feedback (optional) • Find out more about the exhibits (rare in physical environment, more common online)	• Audience are attracted to and engaged with exhibition • Enjoyment and/or informal learning takes place

Domain	Role	Task	Objectives	Process	Output & Outcomes
Education	Researcher	• Write publication	• Advance knowledge / research in subject area • Produce compelling/unique thesis • Support with evidence and/or examples	• Develops ideas and overall concept for publication based upon knowledge of subject area and ongoing research • Gathers evidence from own research, primary sources and academic literature • Writes publication • Refines and iterates previous 3 stages • Publishes findings / communicates to academic audiences in print or at research conference • Communicates to public audiences (optional) • Publication accessed by audiences in digital and physical environments • Academic audiences critique and reference the publication in their own work	• Paper or report is written and published • Publication is accessed by relevant audiences • Publication becomes part of the knowledge in its specific subject area

Domain	Role	Task	Objectives	Process	Output & Outcomes
Education	Teacher / Lecturer	• Create learning resource	• Deliver a formal learning session specific to curriculum and cohort needs • Support specific learning outcomes (knowledge and skills) • Engage students in the subject and learning process • Support the learning process	• Develop learning objectives with reference to curriculum / overall programme of study • Consider how learning outcomes might be achieved using primary source material • Look for available material (pre-packaged or via own research) • Repurpose material and/or develop resource from scratch, e.g. unstructured collection of material to selected items to be used in a specific sequence • Provide (limited) contextual information and instructions/questions for students • Students interact with resourc and produce answers/create required output • Teacher reviews students' work	• Learning resource is produced • Learning resource is consumed by students • Learning takes place and specific leaning outcomes are met
Education	Student	• Use learning resource	• Meet the requirements of the learning session and overall programme • Meet learning outcomes successfully / achieve desired grades • Advance own learning	• Attend / participate in learning session • Engage with resource, following instructions given by teacher, working either individually or in a small group • Make sense of task, organise/filter/augment materials as directed • Produce desired output (e.g. question answers, essay, artefact, learning diary) • Receive feedback from teacher • Engage in reflection on experience/results achieved (optional)	• Student engages with learning task • Student produces desired output • Learning takes place and success is achieved

Domain	Role	Task	Objectives	Process	Output & Outcomes
Professional	Tourism	• Promote a place or event	• Produce materials or event • Raise awareness/attract visitors • Generate income for own and partner organisations	• Develops ideas by researching domain and/or discussion with partner organisations • Commissions or gathers materials • Develops story and assimilates materials to create resource/publication/event • Produces event or publishes material • Communicates via marketing and PR • Public accesses information and goes on to book a trip/make a visit • Public shares information with others (desirable)	• Attractive and interesting resource /campaign • Target audiences are reached • Audiences respond positively and act upon information
Professional	Creative industry	• Produce a publication or web site	• Develop content for professional or public audiences • Generate sales / readers / visitors	• Idea comes from author, journalist, creative and/or editorial team • Materials are researched and gathered, or commissioned from specialists • Story is developed and materials are assimilated into a finished work • Refinement and iteration of above 3 stages • Produces/publishes – probably through internal experts • Communicates via marketing and PR • Public accesses communications and consumes/buys publication • Public shares information with others (desirable)	• Publication • Sales/users as desired • Favourable reviews

Domain	Role	Task	Objectives	Process	Output & Outcomes
General	Culture enthusiast	• Engage in a cultural experience	• (See heritage /visitor)	• (See heritage /visitor)	• (See heritage / visitor task)
General	Family / local historian	• Produce a family tree	• Research historical facts • Complete all branches of the tree • Find out contextual information and stories	• Starts with own and family information / known facts • Plots onto a tree and highlights gaps in knowledge • Uses existing information for clues on locating missing information • Accesses relevant primary sources • Accesses the work of other family historians / looks for connections and overlap • Assimilates new findings into the tree • Refines and iterates search • Finds new branches or interesting story • Extends search • Periodically shares results with personal contacts and other family historians • Communicates with other family historians about research process and useful sources • May self-publish findings for very niche local audience	• Ongoing process of research and fact-finding • Increasing collection of inter-related facts and stories • Family trees / scrapbooks / small publications

7. Experiments

At this stage of the PATHS user research we have used task-based experiments to generate some additional understanding of the nature of a path, and of the path creation process. As we do yet have a working prototype, the experiments have been designed around existing facilities, from the very low-fidelity paper and pencil approach, to medium-fidelity approaches utilising systems identified as part of the State of the Art deliverable as having partial path-creation functionality.

As part of this initial work on observing and reviewing user activities in path creation, we have to date collected the following data:

- undirected individual-created paths
    - 3 from PATHS project staff, online content, non-specific software
    - 4 from PATHS project staff, online content, 'path-creation' software
- directed group-created paths
    - 5 from UFSD students (education non-experts), scenario-based tasks, low-fi methods
    - 1 from Alinari staff (cultural heritage experts), archival task, low-fi methods

The first set of undirected tasks form an exploratory element of the research, and were used as a means of gaining a degree of understanding about the nature of the path creation task prior to undertaking our data collection with users. The second set of directed tasks were undertaken during the course of the main phase of interview data collection, and build upon the original experiments by exploring some specific user scenarios, but also facilitate the validation of initial findings on the nature of and processes involved in creating paths.

As the project progresses these data will provide a foundation for developing more extensive and specific experiments involving tasks for both non-expert and expert users, across all four domains, addressing elements of system and interface design, prototype testing and evaluation.

7.1. Undirected Individual Path-creation Tasks

7.1.1. PATHS Project staff: online content, non-specific software

A small number of PATHS project staff were given an open brief to construct and visualise an example of a path using any tools they preferred. The results from this experiment are the three paths that are illustrated and discussed below.

Path 1 – Artefacts from Europeana

A selection of eight records on the theme of scuba diving in the UK were located in the Europeana collection and presented in a simple linear path of hyper-text links. In practice, these might be presented in a web page as simple nodes that can be followed in a sequential manner, each one developing the narrative associated with the theme.

UK Scuba diving path

http://www.europeana.eu/portal/record/00401/3CA69330A05249879E5DAFBAC2AAF994544EF5E5.html?query=diving&start=12&startPage=1&view=table&pageId=brd

http://www.europeana.eu/portal/record/00401/92E856AA82C53E7288480FC76F495680FDFD85F5.html?query=shipwreck&start=18&startPage=13&view=table&pageId=brd

http://www.europeana.eu/portal/record/00401/63470555AF02BF1A06D9B4642D858147909495B0.html?query=st+abbs&start=44&startPage=37&view=table&pageId=brd

http://www.europeana.eu/portal/record/09405/C251918E96B723E4EEA8234E3714E1C114D5642A.html?query=farne+islands&start=18&startPage=13&view=table&pageId=brd

http://www.europeana.eu/portal/record/09405/50F7CC6021B305CB37BC0C4A5328246A69F6EB3F.html?query=seal&start=11&startPage=1&view=table&pageId=brd

http://www.europeana.eu/portal/record/00401/92DDE2150E228DE0A15E30FEEC5B2575F58CDB91.html?query=dogfish&start=4&startPage=1&view=table&pageId=brd

http://www.europeana.eu/portal/record/00401/379EAA3548620EEB731A5C65D87709D1D40A5E36.html?query=cuttlefish&start=9&startPage=1&view=table&pageId=brd

http://www.europeana.eu/portal/record/00401/50BCD7F3AAD08992A61A914E7B010D48E589279F.html?query=moray+eel&start=1&startPage=1&view=table&pageId=brd#

Fig. 49 User created path: UK scuba diving

Path 2 – a representation of a digital learning resource

This path has a somewhat hierarchical form, staring with linear contextual information items and then offering branches off on specific aspects of the topic. Each route leads the users through a series of nodes that develop a narrative about a theme, and are illustrated by links to a variety of digital objects.
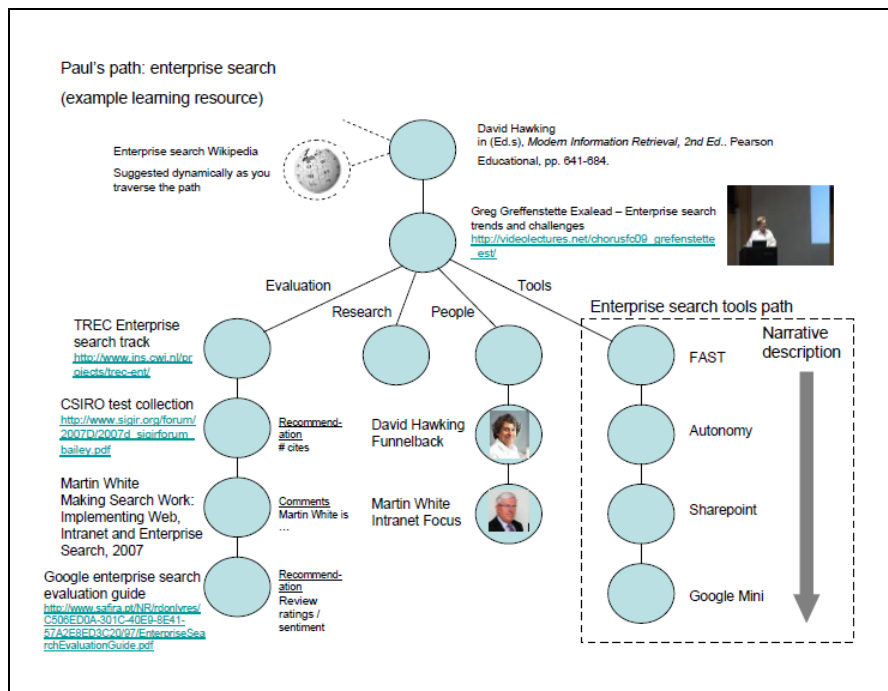

Fig. 50 User-created path: Enterprise search

Path 3 – exploring the context of a piece of music

From a central theme of the opera of Dido and Aeneas, this path offers a variety of routes to explore the story and characters of the opera, and also the musical genre, and the various iconic performances and recordings of the piece. Each route from the central theme is linear, developing a narrative as it progresses, and offering branching where there are alternative readings or multiple nodes on the same subject.
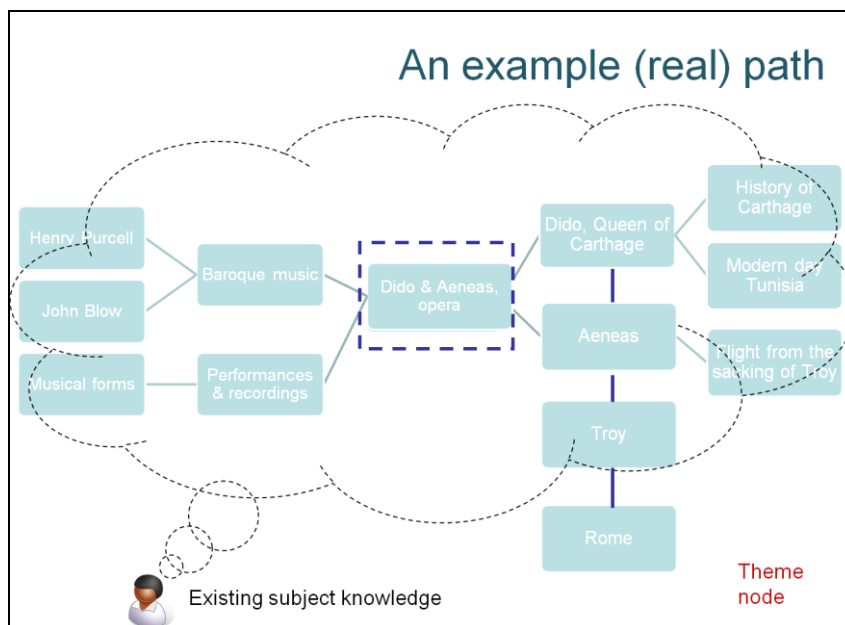

Fig. 51 User-created path: Dido & Aeneas opera (overview)

At the node level, the record may include content from inside a digital collection, links to external sources, and a narrative input by the path creator to explain the node and/or how it fits into the overall path.

Fig. 52 User-created path: Dido & Aeneas opera (node detail)

101

7.1.2. PATHS project staff: online content, existing path creation software

The paths created for this exercise were designed to explore how path-creation might be undertaken in the online environment using systems that already exist. Four different systems were used:

- Storify – an online 'content curation' tool, with a focus on linear structures

- Pearltrees – an online 'content curation' tool, with a focus on mind map structures

- Flickr Galleries – a tool for generating a user-curated 'exhibition' in the popular photo-sharing web site

- Trailmeme – a tool for creating 'trails' to support learning activities

The goal of this experiment was to better understand the nuances path-creation process identified from data collected via interviews, and to assess the impact of software functionality on this process and on the nature and structure of the paths created in this way. Of the four platforms, three are collection independent, with only Flickr Galleries limiting content selection to its own site.

Path 1 – created using Storify

Storify enables the user to clip items of interest that have been discovered via web searching and browsing, and then to order and annotate these items to create a linear story (path). In this example the path creator has selected a variety of web links to develop a narrative about the PATHS concept. An overview or introduction has been added, and then the selected links were ordered using a drag-and-drop facility, and enhanced with user input text descriptions of the items and the connections between them.

The completed path is in a strictly linear form in a single web page and requires scrolling to see all of the links. It is published as a 'story' which is effectively a blog post of user-curated content, which is publicised via social networks and can also be found by searching Storify.

Fig. 53 User created path: PATHS and content curation (2 pages), using Storify

Path 2 – created using Pearltrees

In this example, the user has searched for items in Europeana (although this could have been any online collection or search engine) on the theme of art and performance, and saved them to the Pearltrees software for the purpose of creating a path. Clipped items have been assembled into a tree or mind-map structure, using simple one-way branching connections, using theme nodes (informational, no content attached) for structure, and object nodes for content relating to the themes contained in the path.

When an object node is selected it provides a view of the link destination page, and allows for comments and tags to be added by any users of the Pearltrees system, as well as sharing via social networks.

A large amount of branching is possible, depending on how the user creates their overall path, and users viewing the path can therefore follow multiple routes, with nodes being revealed as the route is selected. Only the active route is visible at the point of use, and an overview of the entire path is not possible. Users find the path through social networks or by browsing the Pearltrees site.
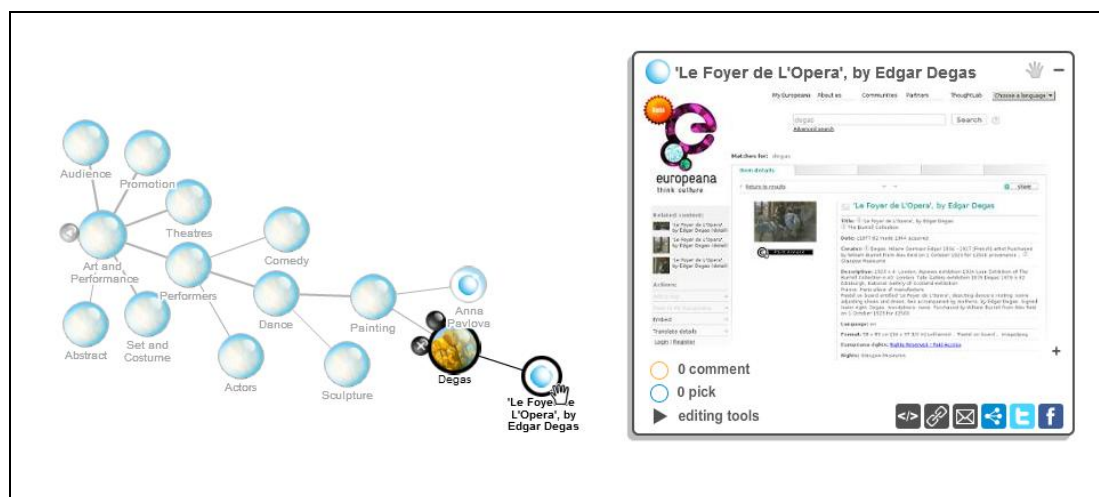
Fig. 54 User-created path: Art & performance in Europeana, using Pearltrees

Path 3 – created using Flickr Galleries

In this path, a theme of the relationship between human and animals has been developed, using images found in the Flickr Commons collections of cultural heritage artefacts, using keyword searching and browsing. Selected images were collected using the 'add to Gallery' facility and once a set of relevant items had been assembled, the image thumbnails were ordered using a drag and drop function to create the sequence of the path. The path is then completed by adding an introduction and descriptions or narrative to the individual images in the user-curated gallery.

On viewing the gallery, the user can navigate using the thumbnail overview, or scroll through the page to view the detail of the complete path in a linear form. The main ways that users find the gallery is through searching in Flickr for galleries on a topic, or by following a link from the original image page. It is also possible to promote the path (gallery) via social networks and it may become visible in search engine results.
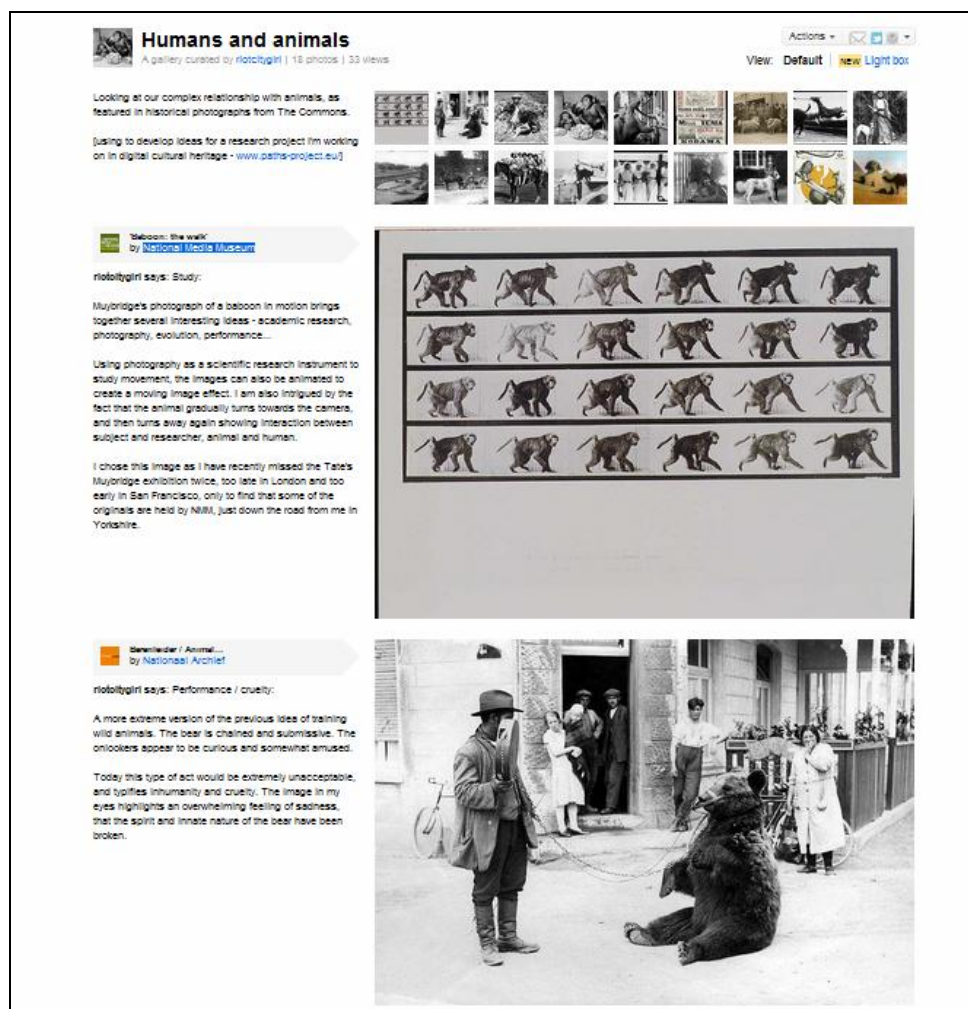
Fig. 55 User-created path: Humans & Animals in Flickr Commons, using Flickr Galleries

Path 4 – created using Trailmeme

This path re-purposes content from the Flickr Gallery above, in an attempt to make the path less linear and to allow organisation of objects via themes in order to provide the path follower with options to take multiple routes through the path. In the Trailmeme software nodes are created by the path creator, which may then be annotated to provide various levels of text description.

Some nodes in the example path are purely thematic and enable structuring of the path, whilst others represent specific objects and links to the associated content from various web sources. Connections are added by the path creator and the path can therefore take almost any structure envisaged from linear, to mind map, or network forms. The path creator also decides the direction of the connections and can make multiple connections to and from each node, if desired. Completed paths are published in the overview form seen below, and again, can be found by searching the Trailmeme site or through sharing in social networks.
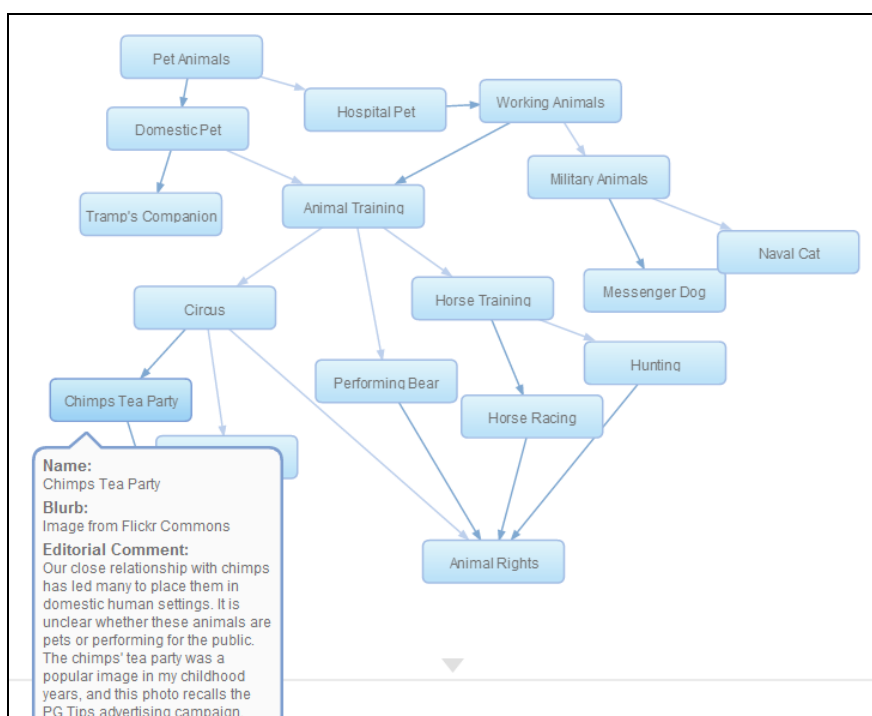
Fig. 56 User-created path: Humans & Animals (overview), using Trailmeme

When a user decides to follow a path, they select a starting node from the overview, and are presented with the page of content pulled in from the source web page, along with navigational indicators to previous and next nodes available in the path. In this way there are potentially any number of routes that can be followed and these are in part defined by the path creator via the connections they create between items, and also by the path follower through the decisions they take on where to go next.
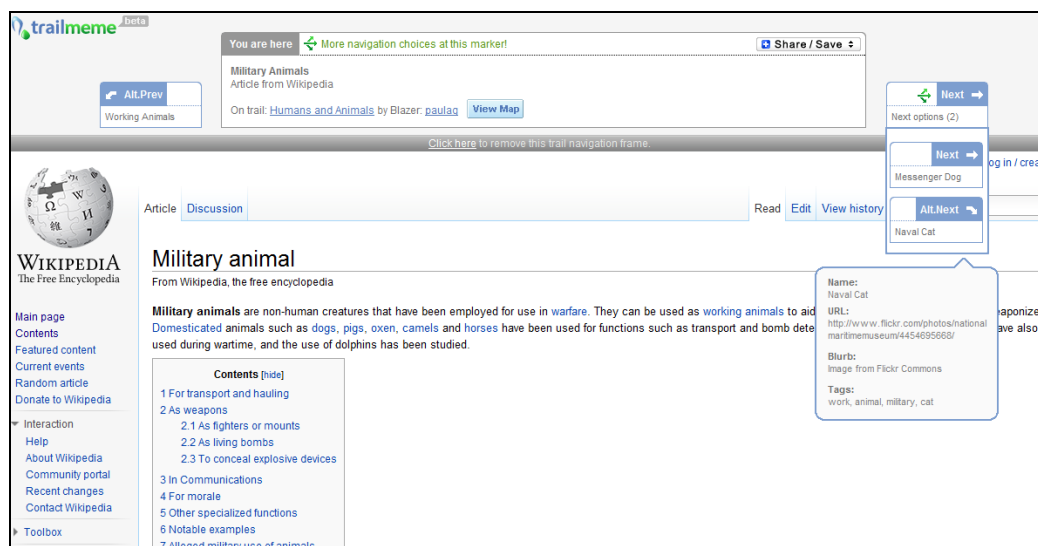
Fig. 57 User-created path: Humans & animals (node level), using Trailmeme

A number of conclusions became apparent in the course of using these various software tools to create paths:

- The process of creating a path involves elements of finding items to include, deciding how to organise the found items, adding information to help the user interpret the path and the items it contains, and sharing the path with potential users

- Paths can take any structure

- Individual paths can support multiple routes through the content

- The structure of the path depends to a large degree on the facilities available in the software

- The structure of the path may also be defined by the path creator if the software allows for flexibility in this respect

- The addition of contextual information in the form of various types of annotations by the path creator make the path more accessible as a stand-alone resource

These results support the findings of the interview data in that the pathway metaphor offers a variety of possibilities for creating expert or non-expert curated resources, and that it is often desirable for paths to support exploration of a topic, giving the path follower a degree of freedom in which route they choose to take. They also validate the key activities involved in creating a path, which can be seen recurring in the user profiles and case studies provided in Section 6 of this report.

7.2.   Directed Group Path-creation Tasks

7.2.1. USFD students: scenario-based tasks, low-fidelity methods

This experiment was conducted during a two hour teaching session at the University of Sheffield. One of the primary reasons for undertaking this experiment was to gather a small amount of input from non-expert users on ideas relating to path creation, compensating to some degree the lack of non-expert users in our interview data collection.

Participants were 19 postgraduate students who were taking the Archives and Records Management module. Students were arbitrarily assigned to five groups and provided with a scenario from which they were required to create a path using only low-fi methods. The format of the workshop was as follows:

- A short presentation of the proposed PATHS system

- Task part 1 – produce a path based upon the scenario provided, working as a group and using low-fidelity methods

- Task part 2 – prepare a short presentation to describe your path

- Task part 3 – present your path to the rest of the class

- An individual questionnaire reflecting on the experience of creating the path

A full description of the task, along with the five scenarios and closing questionnaire are available in Annex 3 of this report. Summarised scenarios and images of the paths created in the workshop are presented below.

Scenario 1 – a public librarian creating a talk for a local history society

This pathway depicts a topic of interest to local historians in the Sheffield area. It is organised in a star structure with multiple routes emanating from a central starting point. There is also a suggestion that some of the routes might lead to data in the form of a timeline or a map. Sticky notes represent information objects and links to additional sources.
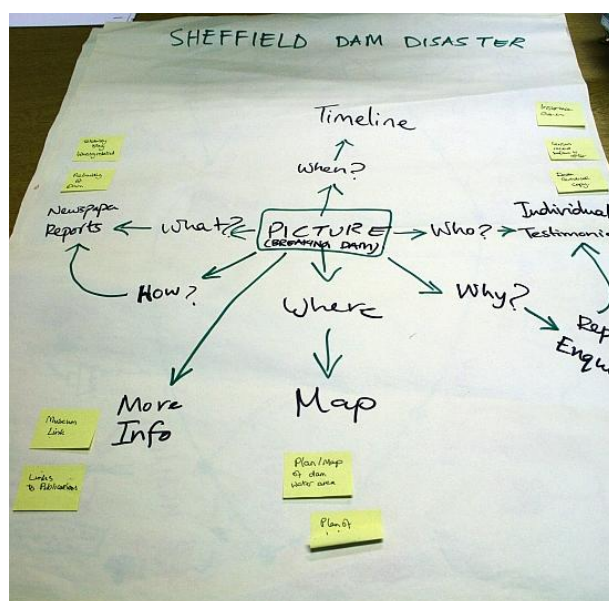
Fig. 58 Group-created path: Scenario 1

108

Scenario 2 – a primary school teacher preparing a class for a trip to a museum to explore the theme of 'life in war-time Britain'

This path focuses on the child's experience of being evacuated from home during World War 2 and is organised around the 3 main themes that will be explored at the museum. Each theme is developed as a route through the path, and is comprised of a set of artefacts that build a narrative about that theme, and which can also be used as stimuli for activities that pupils will undertake to aid this informal learning experience. Paths are relatively linear, but are also inter-connected with some artefacts appearing in more than one route.
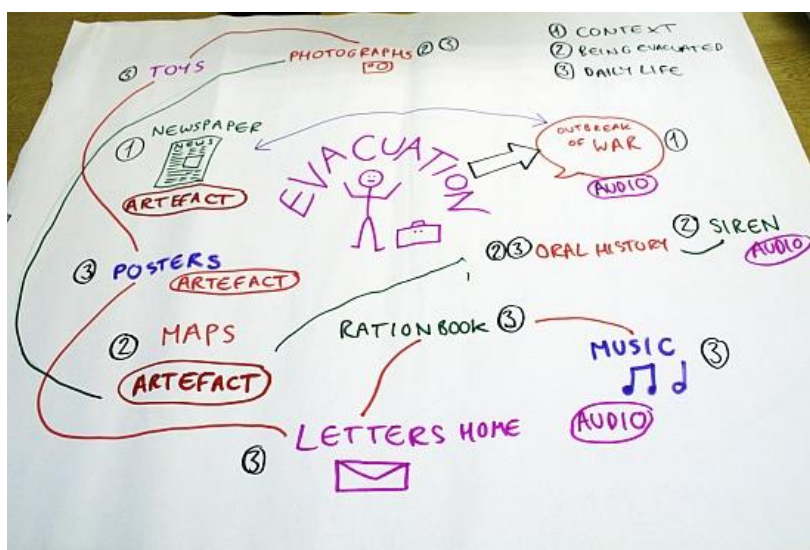
Fig. 59 Group-created path: Scenario 2

Scenario 3 – a culture enthusiast writing a blog about their favourite artist

This group chose to create their path about the life and work of the contemporary British artist known as Banksy. The path begins as a mind-map and eventually takes a hyper-text network form, with each node (representing a theme or artefact) having multiple connections with other nodes. It is envisaged that the starting point might be a Wikipedia article and that links would be created to other web-based resources such as an annotated Google map, or other relevant web pages. Connections shown in red are the primary elements of the path, and are developed as a mind-map, whilst those shown in blue are secondary, providing links to contextual information; together these two sets of connections start to form a hyper-text structure.
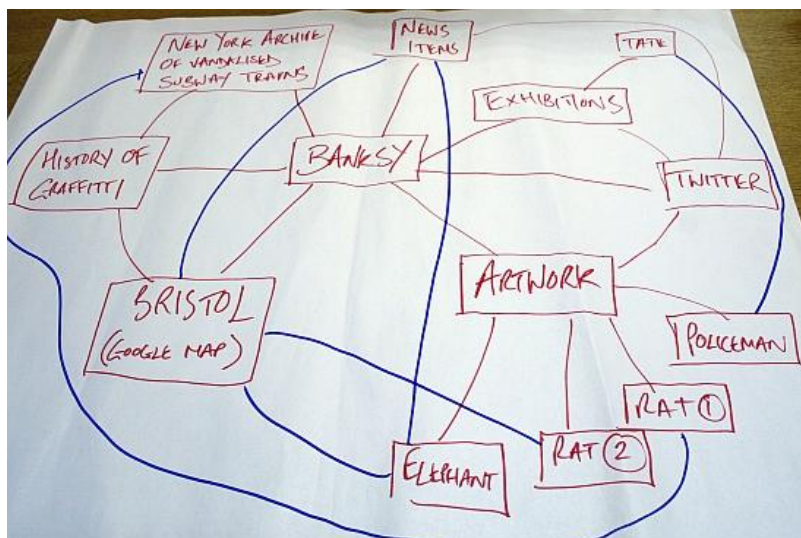
Fig. 60 Group-created path: Scenario 3

Scenario 4 – a university student creating a guide to the local area

This path is a variation of a mind-map, overlaid with an element of geographic mapping. The university campus is used as a starting point for exploring the city, with each route exploring a specific aspect of life in Sheffield for students attending the university. Nodes are connected to web pages about each location and may be represented in the path by thumbnail images. The group stressed that the path is non-linear and provides a platform for exploration with routes offering multiple branches and intersecting with other routes.
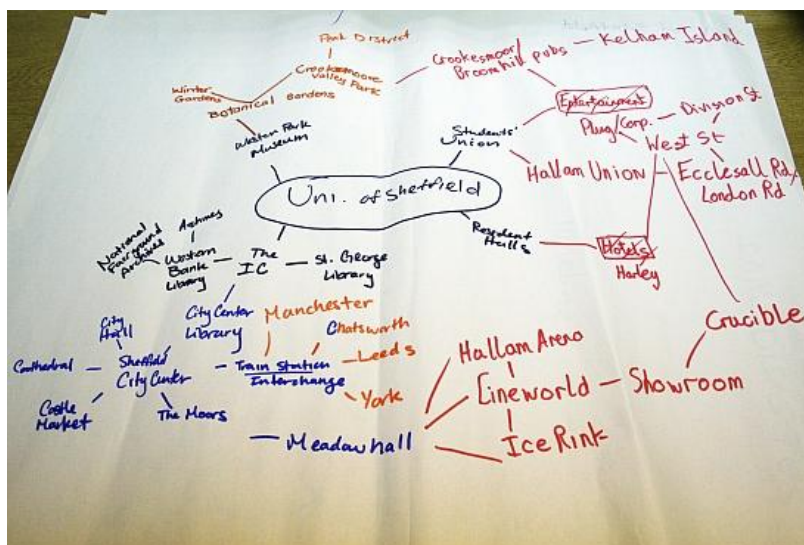
Fig. 61 Group-created path: Scenario 4

Scenario 5 – a traveller on a round-the-world trip creating a diary of their experiences to share with friends and family

This path takes the form a variation on a circular tour, and is followed in a relatively linear way, emulating the route of the round-the-world trip. It is envisaged that the path might be presented as pins on a geographic map or globe, with a degree of animation for zooming in on locations of interest. The pins connect to information about the locations from relevant web sites, and also to blog entries and photos made along the way. Objects are a mix of cultural heritage and leisure experiences. There are also a small number of points off the route (e.g. Berlin and Hong Kong) relating to places that were second choices and were not visited on this occasion, giving the path an opportunity for updating as these places are explored at some time in the future.

Fig. 62 Group-created path: Scenario 5

What is evident from the combined output of this workshop is that our interview findings on the multiple interpretations of what constitutes a path are again validated when people are given the task of creating a path of their own. However, contrast this with the findings from the task of creating paths using existing systems and it appears that this may be something of a 'red herring' as users invariably fall into creating paths that are structured and populated with content according to the functionality available to them.

Observation of the process of path creation and feedback from workshop participants also lends support to the recurring activities indentified from the interview data relating to the process of path creation. It would seem therefore that these activities are somewhat system independent and can be applied in both offline and online path creation environments.

7.2.2. Alinari cultural heritage experts: online archival tasks, low-fidelity methods

This experiment entailed a focus group facilitated by Alinari project staff and involving participants comprising experts from the main professional roles in the organisation:

- 9 people from Alinari staff

- Alinari sectors involved: cataloguing, IPR licensing, publishing, digitising, exhibitions

The format of the workshop was simple; first a presentation of the key elements of the vision for the PATHS system, and second, open-ended group discussion exploring how the concept of pathways could be applied to the Alinari Archive System. Based upon their discussions, workshop participants generated an example of a creating a pathway using the Alinari archives website http://www.alinariarchives.it. The website currently provides the user with the possibility to conduct searches (simple and advanced) through the use of keywords. The images found are displayed in hierarchical order according to the following fields:

- Artist
  - Title
  - Date of the artwork
  - Location
  - Keywords
- Photographer
  - Date of the capture of the photograph
  - Photographic references
  - Warning
- Size
- Colour

Some of these fields are clickable (highlighted in yellow). Participants suggested that in addition, the fields Title and Place (highlighted in pink) should also be clickable, to enhance the options available for creating pathways.
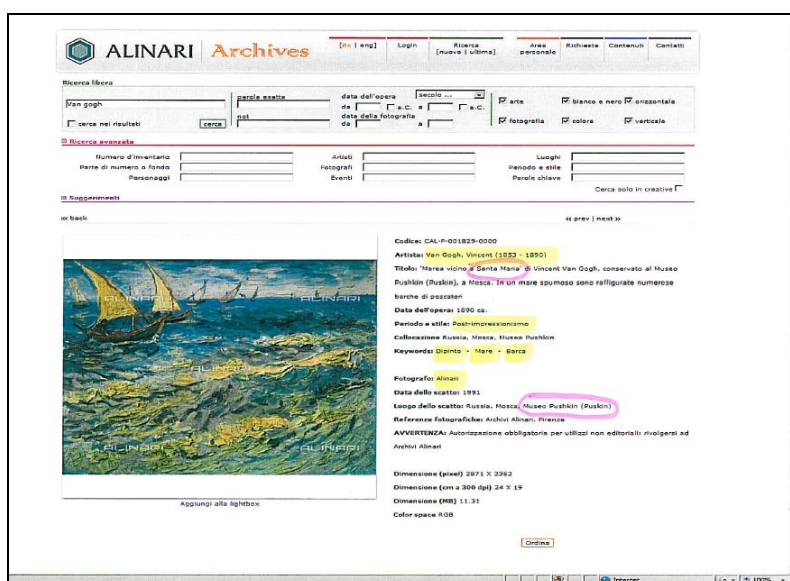
Fig. 63 Alinari Workshop: Adapting the Alinari web site to support paths (1)

The group also envisaged opportunities for improving the Alinari workflow through application of the PATHS concept; in particular the possibility of connecting fields in a more dynamic way, for example:

- Artist links to Place : so we can get other artworks of the artist whose subject is related to this place
- Artist links to Period: so we can get other artworks of the artist related to this period
- Period links Place: so we can get other artworks of the same period whose subject is related to this place

A representation of how paths could be constructed via this amended version of the Alinari website is shown below. Starting with an image, the user could explore other content in the system, initially through the keyword metadata for the image, but also through inter-connections between themes and items discovered.
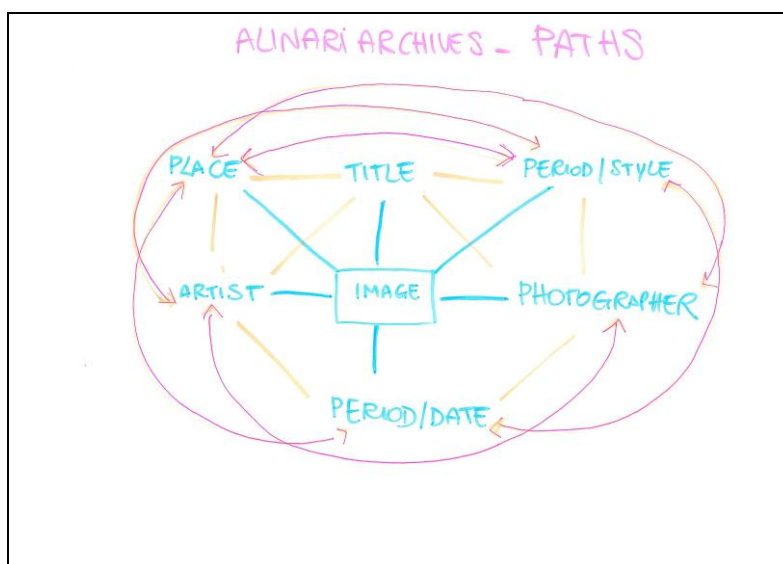
Fig. 64 : Adapting the Alinari web site to support paths (2)

8. User Requirements

In this section we develop the findings from Sections 4-7, firstly into a conceptual model of user interactions with paths, supporting all of the main activities and behaviours of users, both expert and non-expert, across all four domains. From there we extrapolate four generic user profiles based upon typical path-creation and consumption activities, which are all supported by the over-arching conceptual model.

These four generic profiles are used, along with the domain and role-specific profiles in Section 6, to generate a series of example use cases, and from there we are able to determine first, the user requirements implied by the use cases, and finally a set of generalised requirements in accordance with the five elements of the conceptual model.

8.1. Conceptual Model

Based on the preliminary analysis of the user interviews, the surveys, and observation in the path-creation experiments we have defined a conceptual model of the user-interactions with paths. The model consists of five activities (*Concept*, *Collect*, *Create*, *Communicate*, *Consume*) and the transitions between these activities.
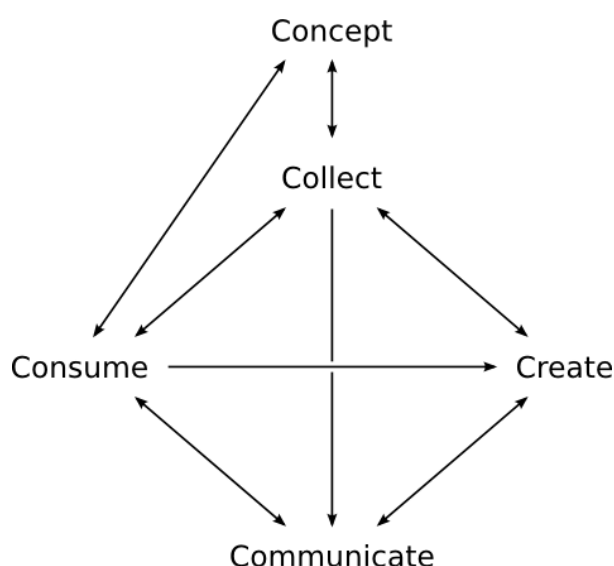
Fig. 65 Generalised Conceptual Model of User Interactions with Paths

The strength of the model is that it has no pre-defined start- or end-points and instead allows the user complete freedom as to how they wish to interact with the system. At the same time the activities are clearly delineated and the semantics of the transitions are powerful enough to enable the system to support the user in their current activity, but also in the process of making the transition between activities as seamless as possible. The following Sections describe each of the activities in the conceptual model.

8.1.1. Concept

This activity is focused on the user determining the concept that they either wish to learn about or that they wish to create a path about. This is mostly an activity that happens outside

of the PATHS system, however, as the bi-directional arrows between it and the *Collect* and *Consume* activities indicate, interaction with the PATHS system can lead to a modification of the concept and this in turn means that the system has to be aware of this possibility and adapt any recommendations or suggestions it makes to these changes in concept focus.

8.1.2. Collect

The *Collect* activity is structured around the process of collecting the nodes that will form the path. Users want to search for known items, but they also want to be provided with some kind of overview over what data is available in the collection (cmp. [Hornbaek and Hertzum 2011]) in order to either focus their search activities or simply to be able to browse through the collection. In both activities the user collects items both explicitly and implicitly, which are then used in the *Create* activity. The primary transition from *Collect* is to *Create* a path, however in some cases users might want to directly *Communicate* the collection of nodes to other users. For example, initial user studies have indicated that educators using inquiry-based teaching methods want to share collections of items with their students and make the students create the paths to facilitate their learning.

8.1.3. Create

The *Create* activity takes the collected nodes and forms them into a path: a series of interconnected nodes that convey a story or inform about a subject. Although nodes can be collected explicitly through the *Collect* activity the model also supports the implicit collection of nodes through the process of *Consum*ing existing paths (i.e. through the mining of user-system interaction logs). In both cases the *Create* activity forms a path from the nodes and also enables the addition of *theme* nodes that provide contextual information, such as links to background information. In addition a path may be accompanied by a narrative that describes the nodes in the path. As the model illustrates, it is likely that the user will repeatedly switch between the *Create* and *Collect* activities, as the process of arranging the nodes might highlight areas in the path that require further examples to be retrieved from the collection.

8.1.4. Communicate

This activity is centred around sharing individual nodes, collections of nodes, and paths between users. Sharing might be restricted to simply informing other users to "take a look at this'", but might go as far as enabling collaborative consumption or creation of paths. Research has shown that interacting with cultural heritage information has a strong social dimension [Sumi and Mase 2001], [Szymanski et al. 2007], [Bernstein 2008] and this needs to be supported by the model. Sharing will not be restricted to sharing within the PATHS system, but will reach out to existing social media such as Twitter or Facebook.

8.1.5. Consume

For many users *Consume* will be the first activity they participate in. The paths they consume will take them into areas of the collections that they have not previously explored, expanding their knowledge. Alternatively following paths will give the user an idea of what type of information is available in the collection and how is it structured, informing their own searching and browsing behaviour. Users want to adapt the path-following interface to suit their own needs. In some situations they want to be shown a large amount of distracting information, while in other contexts they are only interested in the core information. This will also vary with their cognitive style.

Consume is meant to be the primary entry-point for the casual user, but, as the model illustrates, the tight linkage with the *Collect* and *Create* activities indicates that the goal is to transition the user from purely consumption to more interactive and self-mediated forms of exploration; ultimately to the point of path creation.

8.1.6. Example model interactions

The power of the proposed conceptual model derives from the fact that it can be traversed in many different ways (see, e.g. fig. 66) examples of which have been derived from an initial user study: interviews conducted with experts (e.g. curators and educators) and users (e.g. students) at museums, archives, and libraries. The analysis revealed that curators tend to start with the *Concept* they wish to illustrate in their collection, before moving on to *Collect* the items, *Create* the path and then *Communicate* it to their consumers, e.g. museum visitors. On the other hand, educators are less concerned with the *Create* activity as this something they want their students to perform. Finally the casual user may take a very meandering route through the model, as they first *Consume*, then think of what other *Concept* they might be interested in; *Consume* some more, before finally moving to *Create* their own path, which might simply be a record of their interactions with the system (e.g. queries issued or items viewed).
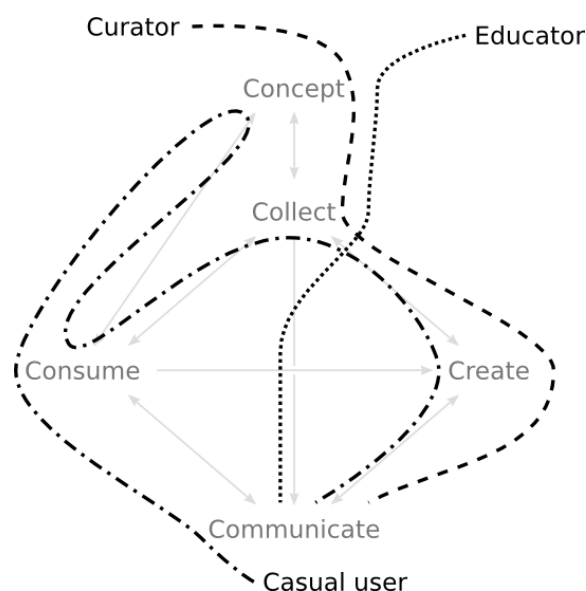
Fig. 66 : Conceptual Model of User Interactions with Paths: three possible interaction patterns

Figure 66 illustrates three potential interaction patterns, showing demonstrating how a curator, an educator and a causal user might interact with the PATHS system. Our proposed conceptual model is able to support all these interaction patterns, which means that a unified system can be presented to the user. Depending on the user's current activity and a record of transitions between activities the system can adapt itself and provide suggestions and/or assistance tailored to what the user might want to do next.

8.2.   Generic User Profiles

Four generic user profiles have been identified from the interview data collected to date:

- Path creator (expert)

- Path creator (non-expert)

- Path facilitator

- Path consumer

These profiles are largely domain independent, although some will have greater prevalence in certain domains. We have extrapolated the conceptual model in Section 8.1 to illustrate the activities of each of type of user.

There follows a summary of each of the four generic profiles, with illustration of how these types of users might interact with the conceptual model.

8.2.1. Path Creator (expert)

e.g. curator, researcher

Process

- ➢ Starts at Concept (theme/story)
- ➢ Moves on to Collecting artefacts
- ➢ Creates path
- ➢ Communicates path
- ➢ Path is consumed by others

Comments

- ❖ Concept may be informed by Consuming other paths and/or by Communication with previous path Consumers
- ❖ Concept and Collecting stages may be iterative
- ❖ Communication may include a dialogue with Consumers, and may be re-Communicated (shared) by Consumers with other consumers
- ❖ Consumption may be passive or active
- ❖ Active Consumers may stray off the path to explore further and/or add their own contributions, such as comments or additional personal artefacts (i.e. augment the path – supplement the Creation process)
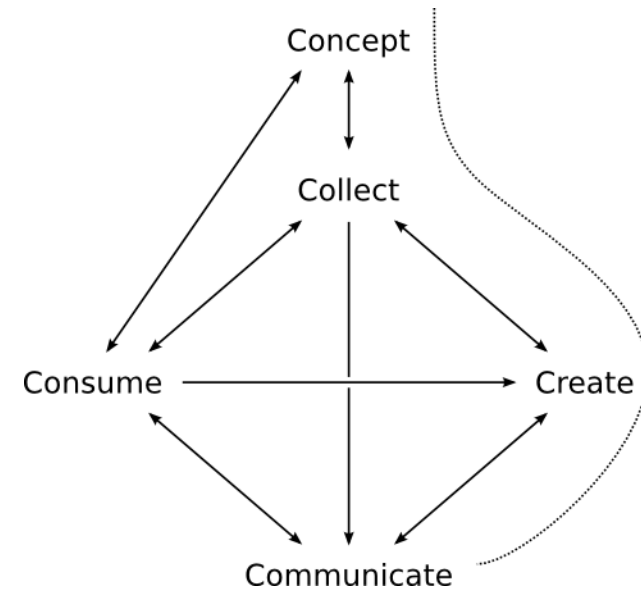
Fig. 67 Model of User Interactions with Paths: path creator (expert)

118

8.2.2. Path Creator (non-expert)

E.g. enthusiast / family historian / student

Process

➢ Starts at Consumption, Collecting or, less often, at Concept stage
➢ Collects artefacts in a more purposeful manner or reviews unintentionally Created implicit path (e.g. search history)
➢ Starts to create a more purposeful path
➢ Refines path
➢ Communicates path (optional)
➢ Paths are Consumed by others or kept private for personal Consumption only

Comments

❖ Process may initially be intentional or unintentional – explicit/implicit
❖ Process may be self-directed (rare) or under the direction of an expert (e.g. teacher)
❖ Path creation may be a collaborative activity, with each person contributing to one, more, or all of the stages, depending on group dynamics/personal interests & expertise
❖ Communication may be with other Consumers or with experts directing the task
❖ Consumption likely to me more personal and interactive
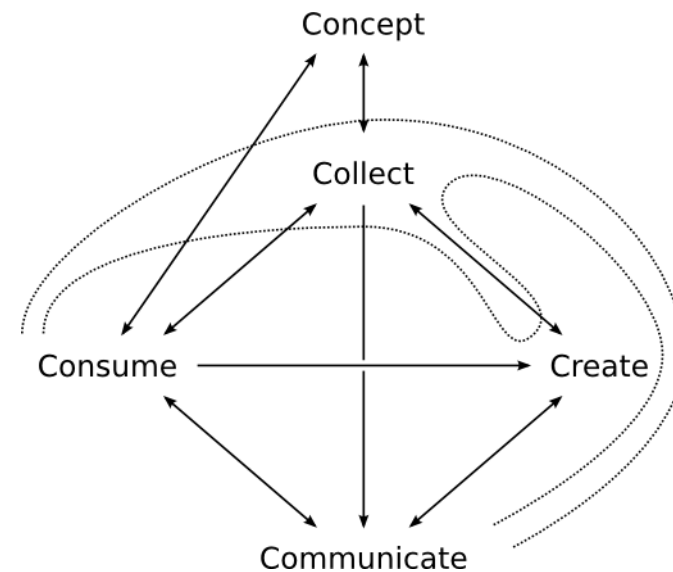
Fig. 68 Model of User Interactions with Paths: path creator (non-expert)

119

8.2.3. Path Facilitator

E.g. teacher / museum educator

Process

➢ Starts at Concept (learning outcomes)
➢ Goes to Consumption of expert paths or begins own Collecting
➢ (Re)Creates Path or Collection for use in specific learning activity
➢ Provides Collection/Path to non-expert path Creators with instructions for inquiry-based learning activity
➢ Non-experts Consume and interact with paths and/or Create own paths from the Collection given to them
➢ May Collect additional items to add to their personal path (optional)
➢ Paths are Communicated back to the facilitator for review/evaluation and/or to general Consumers

Comments

❖ Consumption results from Communication of paths or collections created by experts
❖ Paths and collections from experts are repurposed to suit the specific learning context
❖ New collections may also be developed by the facilitator
❖ Collections and Paths are often intentionally unstructured or semi-structured, to encourage problem definition or questioning
❖ Communication may include reflection on the path-creation process (self-evaluation)
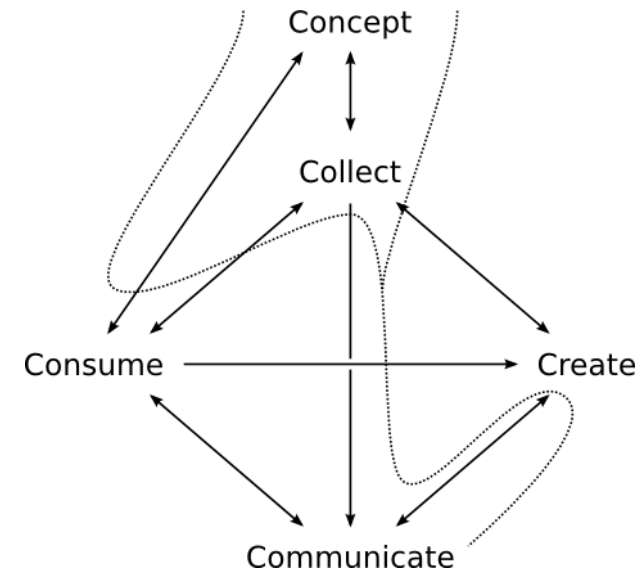
Fig. 69 Model of User Interactions with Paths: path facilitator

120

8.2.4. Path Consumer

E.g. visitor / student / enthusiast / general user

Process

➢ Starts at Consumption
➢ Follows the path
➢ May deviate off the path to explore/Consume adjoining paths or other items of interest
➢ May interact with the path, adding Communications, or augmenting with additional items (supplementary Creation)
➢ May Communicate the path to other users

Comments

❖ Consumption may be reached via specific Communication from another expert or non-expert user or via general search/browse of available paths
❖ Following the path may be in a linear or non-linear way – the Consumer can enter and exit at any point, completing as many entries as they wish, and in any order they prefer
❖ All stages apart from Consuming the path are optional and may occur in any order and/or with degrees of iteration
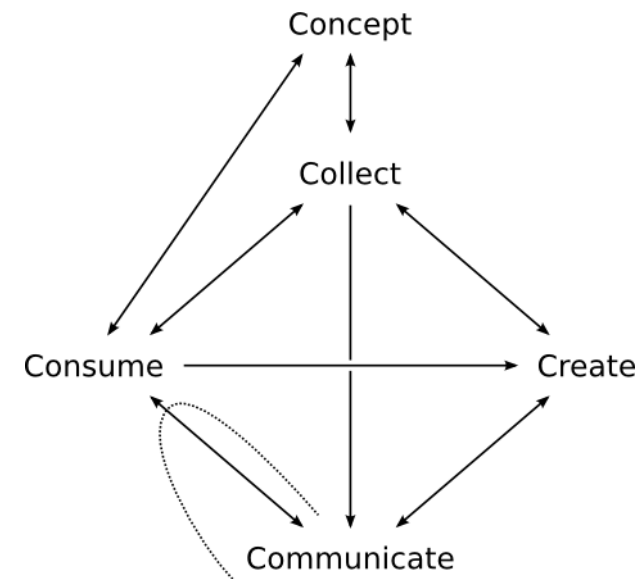
Fig. 70 Model of User Interactions with Paths: path consumer

121

8.3.   Use Cases

In the following Sections we present a number of use case scenarios that reflect the some of the main types of user identified in the study. In each case we derive a number of implied requirements that arise from the activities described. These requirements are allocated one of three priorities:

- Must have - these are seen as essential requirements of the PATHS system without which the user cannot complete their primary activities

- Should have - there is a clear need for these requirements, but they are not essential to support the core functionality of the PATHS system, but they would improve and/or extend users' ability to engage in primary and secondary activities

- Could have – these are non-critical requirements, which may add to the user experience of the PATHS system, but do not impede users' ability to engage in primary and secondary activities

Several requirements arise from multiple scenarios but these are not repeated except where there is a change in priority.

8.3.1. Path Creator (expert)

Use Case: Path Creator (expert)		
Scenario		An expert from the cultural heritage sector with excellent domain and subject knowledge and varying degrees of information literacy.
Actor	1	A curator from the Bletchley Park museum in the UK with excellent knowledge of the history of Bletchley Park during the second world war, competence in searching the internet and archives, and knowledge of specialist information sources.
Task activities	2	Starts with a concept or theme, in this case an idea for a new exhibition about an aspect of the Bletchley Park story
	3	Carries out background research on the theme, consulting for example published articles, collection catalogues and other reference materials.
	4	Identifies sub-themes (related concepts), for example code-breaking, wartime life, early computing etc.
	5	Collects items from the organisation's collections to illustrate these concepts, including for example photographs, documents, recordings, videos, maps etc.
	6	Identifies relevant items from external collections
	7	Prepare materials, for example: a. writes introductions to the sub-themes b. writes or edits descriptions of items in the collection
	8	Create pathways and design end-user interaction, for example designing ways to encourage end-users to: a. explore the concepts further (to stray off the path and search the digital library for additional materials). b. add comments c. upload personal content, e.g. photographs or stories about themselves when they worked at Bletchley Park
	9	Communicate the path to end-users for example, by a. publishing a starting point on the organisation's website, b. adding a choice to a menu of pathways c. Publishing a news story and sharing the news through social networking sites
	10	End-users consume the pathway, for example by reading stories, following the links, sharing comments, exchanging news etc.

	Implied Requirements	
Use Case Reference	**Requirement**	**Priority**
1-4	Conducted outside of PATHS	N/A
5	Search the collection	Must
5	Collect items, i.e. make them available directly from some sort of holding space	Must
5	Annotate, edit and arrange objects within the holding space	Should
6	Links from identified objects to related content	Must
7a	Add content that describes the theme and sub themes. Such content is not directly tied to specific objects.	Must
7b	Add content that is tied to specific objects	Must
	Note on Point 7: there is no implication concerning the *type* of content that can be added. However, the minimum requirement would be to support plain text. There are other potential media that could be used, notably hypertext, images (such as diagrams) and audio.	
8	The ability to create pathways, that is, an annotated series of objects.	Must
8	A flexible design for paths, allowing the same basic tools to be used in different ways.	Should
8a	The ability to leave *and return to* the path.	Should
8a	The ability for users to post comments on the path as a whole.	Should
8b	The ability for users to post comments on individual items on the path.	Could
8b	The ability for users to augment existing paths with their own content.	Should
9	Paths have a unique identity that can be referenced on the Web.	Must
10	Individual nodes along the Path, and user comments/contributions should also have referenceable identities.	Must

8.3.2. Path Creator (non-expert)

8.3.3. Use Case: Path Creator (non-expert)		
Scenario	Adults with an enthusiasm for local history and wishing to share their interest with friends and other members of their history society	
Actor	1	Mary Smith is a mature student taking a short course in the local history, she has been given an assignment to prepare a pathway.
Task activities	2	She starts by searching for content about her village and the local area by searching on the place name
	3	Finds some interesting results and saves them to review later (e.g. by saving the search or by bookmarking items)
	4	Reads some of the content and discovers some interesting connections (e.g. between the village and other places) and themes (e.g. working life)
	5	Organises the items to create a pathway or pathways

	6	Shares the pathway with classmates and receives comments:
		
		    a. Comments on the path
		    b. Ratings

	7	Refines the pathway and submits her assignment to her tutor.
	8	Share the finished pathway with friends and others if she chooses

	Implied Requirements	
Use Case Reference	**Requirement**	**Priority**
3	Presence of links from each object to related objects and themes into which the object fits.	Must
3	Ability to add to items to the holding space even when browsing outside the collection/Paths.	Could
5	Access to a given Path can be restricted to specified individuals	Must
5	Access to a Path can be restricted to a specified group of individuals, such as a peer group. Membership of that group may be outside the direct control of the Path creator.	Should
5	Ability for users to comment on the Path	Must
5a	Ability to communicate with the Path creator directly or alert the creator that a specific comment has been left.	Should
5c	Ability for users to be able to rate Paths	Should
6	A Path creator can return to edit a Path on a later occasion	Must
6 & 8	Access rights to a Path given to individuals or a group can be rescinded or extended.	Must
7	A creator can receive private comments on their Path	Could

8.3.4. Path Facilitator: Teacher

Use Case: Path Facilitator - Teacher		
Scenario	Teacher or lecturer in a formal teaching and learning context. Goal is to enable students to engage with primary sources to meet specific learning outcomes.	
Actor	1	Jack Snow is a university-based teacher who is designing a pathway to enable students to learn about the types of online resources which are available in the humanities in preparation for their dissertations.
Task activities	2	Jack starts by defining the learning outcomes, which include introducing the students to the range of sources available from cultural institutions.
	3	He prepares a lecture on the topic
	4	He searches for content and existing pathways to illustrate key points (to provide evidence)
	5	He designs the scaffolding (e.g. prepares a set of questions and activities for the students)
	6	He creates the pathway
	7	Prepares the help (e.g. info pages, time to be online, group/individual activity)
	8	He communicates the pathway to a group of students.

Implied Requirements		
Use Case Reference	**Requirement**	**Priority**
2, 3	Outside of the PATHS system	N/A
1	Paths are search-engine friendly, i.e. they expose key information about the Path's subject matter etc.	Must
6	Path creators can describe their Path both in terms of the subject matter and the type of activities included, the likely time required to follow the Path etc. (fits in with previous item)	Should

8.3.5. Path Facilitator: Museum Educator

Use Case: Path Facilitator: Museum Educator		
Scenario	An idea is developed for using games-based learning activities to encourage visitors to discover the hidden history of children in the 19th century.	
Actor	1	A museum educator, developing resources which can be used onsite or online, with good knowledge of the national curriculum and trained in facilitating learning in informal contexts.
Task activities	2	She begins collecting content from her own institution's collection (e.g. images of toys, clothes, woollen mills, orphanages, extracts from novels, films, etc.)
	3	She then reviews some existing pathways which are relevant to the topic
	4	She identifies relevant themes and creates a series of short pathways
	5	She designs a series of learning activities, for example: a. users could follow the pathway and be invited to tag the content they could be rewarded for using keywords b. users could be invited to find the connection between XX and YY c. simultaneous users could be invited to explore the pathway together and augment it by adding nodes or their own items
	6	She publicises the pathway to teachers and family visitors to the museum

	Implied Requirements	
Use Case Reference	**Requirement**	**Priority**
5	Users who are not Path creators also have an identity on the system.	Must
5a	Users can tag individual items in the collection (as distinct from commenting on an item)	Should
5a	User-defined tags for a particular item can be aggregated	Should
5a	A user adding a 'correct' tag results in some sort of reward being added to their profile	Could
5b	The ability for Path creators to show or hide their annotations.	Should
5b	The ability for users to add their own annotations to a given Path (i.e. without cloning or affecting the 'master').	Could
5c	Paths can be cloned by users.	Should
5c	Once cloned by a user, a Path maybe edited.	Should

8.3.6. Path Consumer

Use Case: Path Consumer - Tourist		
Scenario	Using paths as part of a physical cultural heritage experience, perhaps intgrating online and offline use of information.	
Actor	1	A tourist visiting London with an interest in the Romans.
Task activities	2	Chooses the 'Roman London' pathway prepared by the Museum of London on his iPhone
	3	Views a map showing the pathway and chooses to start at London wall
	4	He travels to the location and then views the first node on his iPhone
	5	He chooses to watch a video showing a reconstruction of the wall, and looks at some additional materials
	6	He takes some photographs of the wall and saves them to his workspace
	7	He checks the map and the pathway and sees that the temple ofMithras is nearby
	8	He visits the temple and listens to an audio recording
	9	After exploring the area he walks to St Paul's Cathedral and goes inside
	10	He uses the app to check the map, and is offered some materials about Christopher Wren and St Paul's
	11	He stops for a cup of tea, and after making some notes about his visits, he shares his pathway with family and friends.

Implied Requirements		
Use Case Reference	**Requirement**	**Priority**
1	Paths should be available on multiple platforms	Must
3	Where possible, objects should include geolocation data	Could
2	Individual nodes have their own identity and can be referenced separately so that Paths may be joined (and left) at any point.	Must
4, 7	Objects in Paths can include text, images, video or audio	Should
5	The ability for users to upload their own content, such as images and video and save it to an area associated with their profile.	Could
6	Path is viewable in different resolutions, allowing user to get an overview of the whole Path or zoom in to a specific Section	Must
9	The ability for Paths to offer information about objects associated with a specified location (see above)	Could
10	Ability to clone Paths	Should
11	Ability to edit a cloned Path to include new items including own original content.	Should

8.4. Initial User Requirements for the PATHS System

The implied requirements cited in the previous Sections derive directly from the research. However, there are further requirements that need to be met in order to realise the platform as a whole. Furthermore, Paths encompasses a number of innovations that users won't necessarily ask for. As Henry Ford famously said, "If I'd asked customers what they wanted, they would have said 'a faster horse.'" We need to offer them the motor car.

We have grouped the requirements according to theme and, again, assigned a priority to each one. The word PATHS, when capitalised, refers to the system as a whole that supports the creation and sharing of individual Paths (capital P).

8.4.1. Basics

Req	Requirement	Priority
A1	PATHS users need to be able to register on a website and receive privileges needed to create and use Paths.	Must
A2	PATHS users should be able to build up a profile as a creator, user and/or facilitator, and as a member of one or more groups. This implies that their visible profile includes a number of Paths-specific fields.	Must
A3	The PATHS system should build up a profile of the user's cognitive style e.g. rambler, trekker, explorer. (a key feature of PATHS)	Must
A4	PATHS users need to be able to access and edit their profiles (although things like number of Paths created will be generated by the system).	Must
A5	A familiar environment/user experience is preferred to a wholly novel design.	Should

8.4.2. Collecting items for a Path

Req	Requirement	Priority
B1	Path creators need to be able to search for relevant items: • inside their own collections; • in other collections which are also in the digital library; • via related pathways	Must
B2	It should be possible to search for content via associated geo-location, ideally via a map.	Could
B3	Objects in the collection should show links to other related items	Must
B4	PATHS users need to be able to find paths that already exist.	Must
B5	Path creators need to be able to collect relevant items, make a selection, annotate objects and add them to a pathway in an ordered way.	Must
B6	It should be possible to search using keywords matched against user-generated tags for objects	Should

8.4.3. Path Creation

Req	Requirement	Priority
C1	Path creators need to 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; • 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)	Must
C2	Path creators should be able to add 'objects' from outside the collection(s) to their workspace (ideally while browsing the Web, i.e. not only from within PATHS).	Could
C3	Nodes in a Path link to objects that can be drawn from the collection(s) or related Web content. The objects can be images, text, audio or video.	Could
C4	Path creators need to be able to add annotation to individual nodes along their Path.	Must
C5	Path creators need to be able to create content that introduces the Path as a whole and that links nodes without being directly associated with a particular node.	Must
C6	Support for annotations, linking content etc. to be provided as plain text is a minimum requirement. Support for such content as hypertext, images (such as diagrams) and audio is also possible.	Should
C7	Creators need to be able to save Paths, and retrieve them for future editing/updating/amending.	Must
C8	Path creators need to be able to find, use and edit pathways by selecting part of the path and adding or deleting items(nodes).	Must
C9	To support the best and most flexible user experience, the structure of Paths should be as flexible as possible, i.e. should not necessarily be a series of nodes joined by the same kind of linking material. Flexibility implies sophistication of design.	Should

Req	Requirement	Priority
C10	PATHS creators need to be able to set the sharing options: • a Path should be private until it is shared; • a Path can be shared with selected individual users; • a Path can be shared with members of a group of which the creator is also a member; • a path can be shared with all users; • a path can be shared publicly.	Must
C11	Path creators should be able to share the nodes but hide the annotations (connections) or vice-versa.	Should
C12	Path creators should be able to receive comments on their Paths privately.	Could
C13	Path creators should be able to choose to receive an alert when someone comments on their Paths.	Should
C14	Users should be able to clone an existing Path, edit and publish it as their own.	Should
C15	Path creators should be able to declare whether they are willing to share their path for reuse (i.e. to allow editing) or not (i.e. prohibit editing). In either case, they should be sent an alert whenever a Path of theirs is cloned.	Must
C16	Path creators should be able to share their Paths through a unique identifier thqt can be referenced	Must
C17	Individual nodes should also have their own unique, identifier that can be referenced	Must

8.4.4. Consuming Paths

Req	Requirement	Priority
D1	PATHS users need to be able to change the zoom level, i.e. • zoom out to see an overview of a Path; • zoom in to see some steps and a piece of narrative.	Must
D2	Users should have a sense of discovery, namely: • to have choices between steps on the way, recommendations of additional items, suggested branches to new paths; • to change direction; hop onto another Path that intersects at a given node etc. • investigate related materials not on the Path.	Must
D3	Users need to be able to stop and start at any point on the Path	Must
D4	Users want to be able to go backwards, i.e. • to go back along the steps they have actually taken; • to follow a path backwards (which might not be the same thing).	Must
D5	Users may want to define how long they will be online when choosing a Path so that they can choose between short paths and lengthier explorations.	Should
D6	Path consumers should be able to comment on Paths	Must
D7	Path consumers should be able to comment on individual nodes within a Path	Should
D8	Path consumers should be able to rate Paths.	Could
D9	Path consumers should be able to tag objects in the Path	Should
D10	Paths should be search engine-friendly and discoverable in their own right.	Must
D11	Path consumers would like to be able to upload their own content (including images). This implies that: • the author of user generated content needs to be identifiable • user generated content needs to have structured metadata • system managers need to be able to take down uploaded content (for breaches of privacy, copyright, other legislation, local policies etc.)	Could

Req	Requirement	Priority
D12	Path consumers must be able to identify who created an item of content (object, pathway, annotation)	Must
D13	PATHS users need access to the original object as well as to metadata pointers	Must
D14	PATHS users need to be able to use a Path and find related items, i.e. • follow a pathway (route, timeline, taxonomy) with defined nodes and to branch off • serendipity – the pathway offers related content • related views on the same topic (related pathways)	Must
D15	Path creators and PATHS users need to be able to maintain their history: • to go back to previous steps on the path • to bookmark their steps • to save searches	Must

8.4.5. Communicating Paths

Req	Requirement	Priority
E1	Path creators need to be able to share a Path and a description of it (i.e. provide some descriptive metadata)	Must
E2	Paths must be explicitly attributed to their creator (linked to the creator's profile).	Must
E2	Cloned Paths become attributed to the new owner	Should
E3	A system for rewarding users who tag objects in a certain way	Could
E4	PATHS should be designed to be accessed through multiple platforms	Must

9. Conclusions

The PATHS user requirements analysis in the light of the project vision, and has been completed via the collection of extensive data, utilising several complementary methods, and focussing mainly on the needs of expert users in the heritage, education and professional domains. The methodology is underpinned by theory and empirical evidence from the research literature and is designed to ensure that different aspects of users' profiles that may affect the acceptance and effective use of the PATHS system are addressed using the most appropriate techniques, whilst also triangulating results in key areas, notably the process of path creation.

Our results include a series of domain and role-specific user profiles, along with a template for generating further variations, as needed. An especially important output is the 'conceptual model of user interactions with paths' presented in Section 8, along with four generic behavioural profiles for interactions by both expert and non-expert path creators, plus path facilitators, and path consumers. Together, these generic and specific profiles and conceptual model have enabled us to extrapolate a detailed set of use cases based upon clear empirical evidence, from which we have derived a comprehensive list of user requirements, which not only form a sound basis for developing the PATHS functional specification, but also realise the PATHS vision of a system that enables enhanced information access to cultural heritage collections, through novel forms of user interaction, supported by appropriate and personalised adaptivity.

An important area of future work in developing these user requirements will be to extend the research further into the non-expert user groups; in particular, to fully validate the generic profiles for non-expert path creators and for path consumers, both of which require a working system for meaningful analysis to take place. In this context we will also be able to investigate the nature of implicit paths, created through interaction with the system, but without an articulated purpose. We will of course also continue to work with expert users, and will further test our model interactions through observation of task-based experiments on the prototype system.

10. References

Adomavicius, G. & Tuzhilin, A. (2005) Toward the Next Generation of Recommender Systems: A Survey of the state-of-the-Art and Possible Extensions, *IEEE Transactions on Knowledge and Data Engineering*, Vo. 17(6):734-749

Ahn, H.J.(2008). A new similarity measure for collaborative filtering to alleviate the new user cold-starting problem, *Information Sciences*, Vol 187:37-51

Alinari. (2011). *Alinari 24 ORE web site* [Online]. http://www.alinariarchives.it

Allen, B.A. (1996). *Information Tasks: towards a user-centred approach to information systems.* San Diego: Academic Press.

Amin, A. et al. (2008). Understanding Cultural Heritage Experts' Information Seeking Needs. *Proceedings of JCDL'08* June 16-20, 2008, Pittsburgh, USA. ACM, 39-47.

Audenaert, N. & Furuta, R. (2010). What Humanists Want: how scholars use source materials. *Proceedings of JCDL'10*, June 21-25, 2010, Gold Coast, Australia, 283-292.

Benardou, A. et al. (2010). Understanding the Information Requirements of Arts and Humanities Scholarship. *International Journal of Digital Curation*, 1(5), 18-33.

Bernstein, S. (2008) *Where Do We Go From Here? Continuing with Web 2.0 at the Brooklyn Museum.* Museums and the Web 2008 [Online]

Bryan-Kinns, N. & Blandford, A. (2000). *A Survey of User Studies in Digital Libraries*. RIDL Working Paper, July 2000.

Dempsey, L. (2006).The (Digital) Library Environment: ten years after [Online]. *Ariadne*, 46(Feb). Available: http://www.ariadne.ac.uk/issue46/dempsey/ [Accessed: 02/04/2011].

ECLAP / Baltussen et al. (2010). *ECLAP DE2.1.1 User Requirements and Use Cases*. ICT-PSP-250481

Eliëns, A. & Wang, Y.(2001) *Rate, Recommend, Regret -- an Expert-based Approach to the Personalization of Guided Tours* Workshop on Personalised Access to Cultural Heritage (PATCH07), 51-58

EuropeanaConnect / Hesselmann, T. & Heine, D. (2009). *EuropeanaConnect D3.4.1 Catalogue of User Requirements*. ECP-2008-DILI-528001.

Filippini-Fantoni, S. (2002) *Visiting with a "personal" touch: A guide to personalization in museums.* Maastricht McLuhan Institute

Filippini-Fantoni, S. (2003) *Personalization through IT in Museums. Does it really work? The case of the Marble Museum.* ICHIM'03

Fisher, M. & Twiss-Garrity, B. A. (2007) *Remixing Exhibits: Constructing Participatory Narratives With On-Line Tools To Augment Museum Experiences.* Museums and the Web 2007

Flickr. (2011) *Flickr Galleries* [Online]. http://www.flickr.com/galleries/

Hornbæk, K. & Hertzum, M. (2011) The notion of overview in information visualization*. International Journal of Human-Computer Studies*, 69, 509 – 525

Inskip, C. et al (2006). A study of the information needs of the users of a folk music library and the implications for the design of a digital library system. *Information Processing and Management*, 44, 647-662.

Joachims, T, et al. (2007). Evaluating the accuracy of Implicit Feedback from Clicks and Query Reformulations in Web Search. *ACM Transactions on Information Systems*, Vol 25(2):7

Marty, P.F. (2008). Museum Websites and Museum Visitors: digital museum resources and their use. *Museum Management and Curatorship*, 23(1), 81-99

Matusiak, K.K. (2006). Information Seeking Behaviour in Digital Image Collections: a cognitive approach. *The Journal of Academic Librarianship*, 32(5), 479-488.

Minelli, S.H. et al. (2007). Gathering Requirements for Multilingual Search of Audiovisual Material in Cultural Heritage. *Proceedings of Workshop on User Centricity - state of the art* (16th IST Mobile and Wireless Communications Summit), Budapest, Hungary, 1-5 July, 2007.

Multimatch / Minelli, S.H. et al. (2006). *Multimatch D1.2 User Requirements Analysis*. FP6-2005-IST-5

Pask, G. (1976) Styles and Strategies of Learning. *British Journal of Educational Psychology* 46:II, 128–148.

Pearltrees. (2011). *Pearltrees web site* [Online]. http://www.pearltrees.com/

Purday, J. (2005). Think Culture: Europeana.eu from concept to construction [Online]. Progetti, 105-126. Available: http://digitalia.sbn.it/upload/documenti/DIGIT_1-2009_PURDAY.pdf [Accessed: 27/04/2011].

RIN & Bulger, M. et al. (2011). Reinventing Research: information practices in the humanities. Oxford: Research Information Network.

Ross, C. & Terras, M. (2011). *Scholarly Information-Seeking Behaviour in the British Museum Online Collection*. Museums and the Web 2011.

Rutledge, L.; et al (2007) *Recommendation with Semantics for Cultural Heritage.* Workshop on Personalised Access to Cultural Heritage (PATCH07), 59-70

Schaller, D. T.; et al (2007) *One Size Does Not Fit All: Learning Style, Play, and On-line Interactives.* Museums and the Web 2007

Skov, M. & Ingwersen, P. (2008). Exploring Information Seeking Behaviour in a Digital Museum Context. *Proceedings of IIiX'08 Information Interaction in Context*. ACM, 110-115.

Storify. (2011). *Storify web site* [Online]. http://storify.com/

Stuer, P.; Meersman, R. & Bruyne, S. D. (2001) *The HyperMuseum Theme Generator System: Ontology-based Internet support for the active use of digital museum data for teaching and presentation.* Museums and the Web 2001

Sumi, Y. & Mase, K. (2001) Agent Salon: Supporting New Encounters and Knowledge Exchanges by Chats of Personal Agents. *CHI'01 extended abstracts on Human Factors in Computing Systems*, ACM, 191-192

Szymanski, M. H.; et al (2008) Sotto Voce: Facilitating Social Learning in a Historic House. *Computer Supported Cooperative Work*, 17, 5-34

TelPlus / Agosti et al. (2008). *TelPlus D5.1 Report on User Requirements of the Target Library Services*. ECP-2006-DILI-510003

The National Archives (2008). *The National Archives – User Research for the Online Strategy* [Unpublished report]. London: Amber-Light Partners Ltd for The National Archives, UK.

Trailememe. (2011). *Trailmeme web site* [Online]. https://trailmeme.com/home

Witkin, H.A., Moore, C.A., Goodenough, D.R., and Cox, P.W. (1977) Field Dependent and Field-Independent Cognitive Styles and Their Education Implications, *Review of Educational Research*, 47:1, 1- 64.

Annex 1 – PATHS User Requirements Online Survey Pro-forma

Introduction

You are invited to participate in the PATHS User Requirements survey. PATHS is a 3-year research project funded by the EU involving 6 academic, technical and industry specialist organisations, including the University of Sheffield who are running the current survey.

About PATHS

PATHS aims to build a system for exploring online collections from cultural heritage institutions such as museums, art galleries, archives, specialist libraries and historic sites. Exploration will enable users to discover items within collections related to a concept, theme, person, place or idea in which they are interested. Items of interest can also be saved as a pathway for future reference, for sharing with other users, or even for telling a story.

About the survey

In this survey, we are investigating what users currently do when they use cultural heritage collections online. Your input is incredibly valuable to us and will be used to help us design the first prototype of the PATHS system. It will take approximately 15 minutes to complete the questionnaire. Your participation in this study is completely voluntary. you can withdraw from the survey at any point by clicking on the Exit Survey button. By starting the survey, you agree to the data you supply being used for research purposes. Your survey responses will be strictly confidential and results from this research will be reported only in an aggregated or anonymous form, unless your prior consent has been given. Your data will not be shared with third parties unassociated with the PATHS project. This research has received full ethical approval from the Information School at the University of Sheffield.

Contact

If you have questions at any time about the survey or want further information about the PATHS project, please email either Dr Paul Clough (p.d.clough@sheffield.ac.uk) or Ms Paula Goodale (p.goodale@sheffield.ac.uk). Thank you very much for your time and support.

---

1) Gender

- Female
- Male
- Prefer not to say

2) Age group

- Under 18 years
- 18-25 years
- 26-35 years
- 36-50 years
- 51-65 years
- Over 65 years
- Prefer not to say

3) Which country do you live in currently?

- Austria
- Belgium
- Bulgaria
- Cyprus
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- Ireland
- Italy
- Latvia
- Lithuania
- Luxembourg
- Malta
- Netherlands
- Norway
- Poland
- Portugal
- Romania
- Slovakia
- Slovenia
- Spain
- Sweden
- Switzerland
- United Kingdom
- Other _____

4) What is your current student status?

- Full-time student
- Part-time student
- Not studying
- Prefer not to say
- Other _____

5) Which of the following types of education have you completed?

- School (compulsory education)
- Further education
- Undergraduate degree
- Postgraduate taught degree
- Postgraduate research degree
- Professional qualification
- Adult education course
- Other_____

6) If you have studied at higher or further education level, what is the subject of your current or last course?

7) What is your current employment status?

- Full-time employment
- Part-time employment
- Full-time carer / parent
- Retired
- Unemployed
- Other_____

8) What is your current or last job title?

9) Have you ever worked in any of the following industry sectors? (Select all that apply)
- Cultural heritage - museum
- Cultural heritage - art gallery
- Cultural heritage - archive
- Cultural heritage - library
- Cultural heritage - historic site
- Cultural heritage - other
- Education - higher
- Education - further
- Education - secondary
- Education - primary
- Education - other
- Creative industries
- Publishing
- News media
- Tourism
- Digital services

10) If you have worked in an education role, please list your area(s) of subject expertise.

11) How experienced are you in using the internet?

- No experience
- Basic user
- Intermediate user
- Advanced user

12) Have you ever used the web sites of any of the following types of cultural heritage institution?

	For work	*For study*	*For leisure*	*Never used*
Museum				
Art Gallery				
Archive				
Special collection library				
Local history library				
Historic house or site				

13) Have you used any of the following websites for information about cultural heritage? (Select all that apply)

- Wikipedia
- Europeana
- Facebook
- Twitter
- YouTube
- Flickr
- LinkedIn

- Blogs
- Local authority sites
- Tourism and travel sites
- Whats on guides
- Online news and magazines
- None of the above
- Other _____

14) List any other cultural heritage websites that you can remember using in the last year.

15) What are your main reasons for using cultural heritage web sites? (Select all that apply)

- General interest
- Entertainment / enjoyment
- Preparing for a visit in person
- Following up from a visit in person
- Purchasing tickets, gifts or publications
- Research for work
- Research for study
- Research for leisure

- Communicating with enthusiasts
- Communicating with experts
- Other_____

144

16) What types of cultural heritage information do you look for online?

	For work	*For study*	*For leisure*	*N/A*
News				
Reports and data				
Magazine style features				
Audio / podcasts				
Video				
Catalogue of items in a collection				
Detailed description of items in a collection				
Images of items in a collection				
Academic literature				
Expert comments				
General user comments				
Reviews				

17) How useful do you find the following information resources when you use cultural heritage web sites?

	Not needed	*Rarely useful*	*Somewhat useful*	*Useful*	*Essential*	*Don't know*
Map / floor plan						
Electronic guided tour						
Electronic brochure (e.g. PDF)						
What's on diary						
Catalogue of items in the collections						
Descriptions of individual items						
Themed trail						
FAQs						
Enquiry form						
Podcasts / audio						
Videos						
3D representation						

18) I use digital cultural heritage collections for:

	For work	*For study*	*For leisure*	*N/A*
Finding out specific facts				
Keeping up-to-date				
Researching a topic in detail				
Producing materials for others to use				
Exploring ideas and opportunities				
Professional development				
Networking				

19) When looking for cultural heritage information online:

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
I want to see everything that is available					
I only want to see the highlights of the collection					
I only want to see items with images					
I want to get to the relevant facts as quickly as possible					
I often browse around a topic to build up a more detailed picture					
I am confident in finding what I am looking for					
There is too much information and I dont know what to select					
I like to follow a guided tour or trail on a specific theme					
I like to save or bookmark items to view again later					
I like to share interesting things I find with other people					

20) How often on average do you access cultural heritage material online?

	Every day	2-3 times per week	Once a week	Every 2-3 weeks	Once a month	Less often	Never
For work							
For study							
For a hobby							
For entertainment							
For general information							

21a) List any specific activities for which you might need to search for cultural heritage information.

21b) Do any of these activities entail looking for a variety of materials relating to a topic, theme or concept?

- Yes
- No
- Maybe

21c) Please give an examples(s):

146

22) When looking for a range of information on a cultural heritage subject or theme, how would you rate the difficulty of the following aspects of this activity?

	Very difficult	Fairly difficult	Average	Fairly easy	Very easy	N/A
Knowing what you are looking for at the outset						
Knowing how to get started						
Knowing where to look for information						
Finding information						
Choosing which information is most relevant						
Knowing when you have enough information						
Evaluating the quality of the information						

23) How long would you generally spend on this type of information task?

- Less than 1 hour
- A few hours
- About a day
- A few days
- About a week
- A few weeks
- About a month
- Longer
- N/A

24) How would you rate the overall complexity of this type of information task?

Low 1   2   3   4   5   6   7 High

25) Have you ever visited any of the following types of cultural heritage institution in person?

- Museum
- Art Gallery
- Archive
- Special collection library (e.g. rare books)
- Local history library
- Historic house or site
- Other _____

26) How many times have you visited cultural heritage institutions in person during the last 12 months?

- 1
- 2-5
- 6-10
- More than 10
- N/A

27) How often do you use the following information resources when you visit in person?

	Always	*Very often*	*Quite often*	*Rarely*	*Never*
General brochure					
Map / floor plan					
Exhibit labels					
Guide book					
Audio tour					
Themed trail					
Activity sheet					
Tour guide					
Enquiry desk					
Smartphone app					

28) How would you describe your knowledge of the following?

	Poor	*Below Average*	*Average*	*Good*	*Excellent*
Arts					
Books and literature					
Foreign cultures					
Heritage					
History					
Popular culture					

29) Do you participate in any of the following leisure interests or hobbies? (Select all that apply)

- Blogging
- Social networks
- Computer games
- Photography
- Art
- Crafts
- Creative writing
- Scrapbooks

- Diary writing
- Local history
- Genealogy
- Antiques & collectibles
- Travel
- Learning languages
- Other_____

30) Would you be interested in participating in further research relating to the PATHS project?
- Yes
- No
- Maybe

If you have ticked yes or maybe, please give your email address so that we can contact you about future PATHS research. (Note: your email address will not be used for any other purpose and will not be shared with any other organisations.)

THANK YOU for your participation in the PATHS User Survey!

Annex 2 – PATHS User Requirements Interview Guide

Instructions for the Interviewer

1. ***Before the interview***
   a. Provide the interviewee with a PATHS leaflet, an Interview Information Sheet and a Consent Form. (Send in advance, if possible, or provide at the beginning of the interview).
   b. Explain the purpose of the interview and how it will be conducted.
   c. Explain that the interview will be audio-recorded and that all information provided will be managed appropriately.
   d. Emphasise that their answers are confidential and that they are free to decline any question that they do not wish to answer.
   e. Ask if the interviewee has any questions about the interview and respond.
   f. Ask for a signed Consent Form.

2. ***During the interview***
   a. Use the interview guide to elicit information. This can be followed in a conversational manner, and whilst the main questions should all be asked, the sub-questions are there for prompting to ensure that full information is gathered. If the interviewee has given this information already in response to the main question, these sub-questions can be omitted, or you can simply ask for further clarification.
   b. Maintain a neutral position. Aside from the questions in the interview guide, be very careful not to influence the interviewee by offering your own experience or opinions. Allow the interviewee to talk freely and uninterrupted.
   c. If their answers are a little brief, ask them to explain to tell you more, or explain further, and use the sub-questions as prompts.
   d. It is sometimes useful to reiterate what they have said or confirm your understanding.
   e. Notes for the interviewer are in square brackets *[like this]*.

3. ***After the interview***
   a. Ask if the interviewee has anything else they would like to add.
   b. Thank them for their participation.
   c. Ask them to complete the supplementary survey – either on paper or online. If necessary, provide a copy or link for return later.
   d. Explain what will happen next. i.e. what will happen to the interview data, possible follow-up communication to clarify issues discussed, preferred method of communication and contact details.
   e. Ask if they would be interested in participating further in the PATHS project, and if they know of any colleagues or end user groups who might also agree to contribute.

About the Interview

The PATHS project aims to develop a system that will enable expert and non-expert users to explore digital cultural heritage collections, and to engage in the process of knowledge discovery, meaning-making and learning. The metaphor of a pathway will be used to support the process of exploration and as a means of organising and sharing items from a digital collection. The pathway metaphor is already familiar in cultural heritage and can be seen in different guises such as trails and guided tours.

The purpose of this interview is to gather information about your own understanding and use of pathways in the context of your work and cultural heritage collections. There are four main sections:

E. exploring the concept of a path
F. the process you use or might use for developing a path
G. how other people might use your path
H. your views on other people's paths

Note: for simplicity we will use the term 'path' in asking the interview questions, but the examples you provide may take any related form (e.g. guided tour, trail, learning object), and you are free to use your own preferred terminology.

A. *Exploring the Concept*

1. **What does the idea of a pathway through a digital collection mean to you?**
    a. What form does it take?
    b. Does it have a specific start point, and what might that be?
    c. Does it have a specific end point, and what might that be?
    d. How might a user get from A to B?
    e. Must they follow an exact route?
    f. What opportunities might there be for wider exploration? *[e.g. deviating from the path, connecting to other related paths]*
    g. Can you see any advantages or disadvantages of offering paths through digital collections?

2. How might the pathway concept be applied in the context of your work?

3. Do you see any connection between the concept of pathways, and guided tours or trails?

4. Do you see any connection between the concept of pathways, and storytelling or narrative?

B: *Developing Paths*

5. **Have you ever developed a guide, trail, pathway or other resource based upon items in a digital cultural heritage collection?**

   ○ Yes   ○ No

   If no, have you developed anything like this for use in a physical environment?

   ○ Yes   ○ No

   If yes for either digital or physical collection, please describe in detail a typical recent example...

   a. Is the path still available? Please provide a copy or web address.
   b. Why did you decide to develop this path?
   c. What was the purpose of the path?
   d. Who were the intended audience(s)?
   e. Describe the content…
   f. How did you source the content? *[e.g. was it all from your own collections?]*
   g. Did apply any specific criteria for selecting or validating the content?
   h. How many items did you include?
   i. How did you organise the items in the path? *[e.g. chronological, theme, hierarchy, story...]*
   j. Did you include any interactive elements?
   k. Did you use any specific tools to assemble or publish the path?
      ○ What functionality did these tools provide that was useful?
      ○ Were there any limitations with them?
   l. Did you develop any supporting materials? *[e.g. narrative, exercises/ worksheets, teachers pack, how to use…]*
   m. Was the path adapted for use by different audiences? *[how / why not?]*

6. How often do you need to create a path of this kind?

7. Overall, how complex was the task of creating the path?

8. How long did it take you to complete the process of creating the path?

9. How satisfied were you with the path?
   a. Was there anything you would have liked to do to improve it?

C.   ***Users of Paths***

10. How was your path made available? *[e.g. media / format]*

```



```

11. How long was it available for?

```



```

12. Do you have any information about how much it was used and by whom?

```



```

13. **Explain how someone would use the path in practice**…

```



```

14. Have you received any feedback from users?

    a.   What did they like or dislike about it?

15. Based upon this experience and feedback, what would you change the next time you develop a path?

D.   Other Paths

16. Have you ever used or reviewed guides, trails or pathways from the digital collections of other cultural heritage institutions?

   a.   What was your experience of using them?
   b.   Are there any that you liked or enjoyed using? Explain…
   c.   Are there any that you disliked or found difficult to use? Explain…

17. Are there any other activities you are engaged in professionally where you would find it useful to create, use and/or share a path using items from digital cultural heritage collections?

18. Are there any other people in your organisation who create or use paths in their work?

   d.   Do you know anything about how they use them?
   e.   Does their usage differ from your own in any way?

19. Is there anything you would to mention about the use of pathways in cultural heritage collections?

Thank you for your participation!

Annex 3 – PATHS User requirements Workshop Guide

Agenda

Time	Activity	Comments	Duration	Staff	Resource
11:00	Introduction	About the session & the user requirements work, arrange groups	15 mins	PG	- PPT - Group lists
11.15	Group task – part 1	Produce a path using low-fi methods, 5 different tasks, 5 people per group,	30 mins	All	- Flip chart paper, pens, etc - PCs - Audio, video, camera
11:50	Group task – part 2	Prepare presentation about the path created	15 mins	All	- PCs - Paths
12:10	Group task – part 3	Presentations + questions	5 x 5mins + 10 mins	All	- Video, audio, camera - Paths
12:45	Questionnaire / Wrap-up	Complete questionnaire on how the path was created	10 mins	PG	- Questionnaire

Task Instructions

Working as a group, create a path as a means of presenting historical and cultural information within the context of the scenario allocated to your group. Your path should be produced in a poster format, using flip chart paper and any of the other materials provided. You may use the PCs in room 206 to look-up relevant items if necessary, but do not spend too long on this! It is perfectly acceptable to use somewhat fictitious references and to draw the items on your poster. Your path may be annotated in any way you choose, so that it can be used on a standalone basis without a presenter.

You have 30 minutes to complete your poster!

Each group of students is also provided with one of the following tasks upon which to base the path that they create:

Scenario 1

You are a public librarian and have been asked to speak to the local history group about a famous historical person, event or location from the Sheffield area. The group mainly consists of retired people who are enthusiasts about the history of Sheffield. Many are actively engaged in historical research as a hobby and some produce publications or websites on their finding. They also regularly arrange trips to local historic sites, invite 'expert' guest speakers, and several are also researching their own families and houses.

Scenario 2

You are a primary school teacher taking your class to the local museum to find out about life in Wartime Britain. Before you go, you will do an introductory class to get the pupils thinking about important themes. Your path should focus on one or two of these themes.

Scenario 3

You are a culture enthusiast who blogs about your favourite artists and writers who have captured your imagination. Your path will support a piece for your blog on a single artist or writer of your choice, which will then be circulated to your friends and followers via social media.

Scenario 4

You are a student at the University of Sheffield and you have been asked to create a local area guide for students thinking about applying for a course. You should highlight aspects of the city, Yorkshire / the Peak District, local life and student venues.

Scenario 5

You are travelling around the worls and want to share your experiences with friends and family whilst you are away. Your path will show highlights of your trip, including places of interest, people and experiences.