Grant Agreement No. **ICT-2009-270082**
Project Acronym **PATHS**
Project full title **Personalised Access To cultural Heritage Spaces**

D5.2
Evaluation of the second PATHS prototype

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Project funded under FP7-ICT-2009-6 Challenge 4 – "Digital Libraries and Content"	
Status	Final
Distribution level	Public
Date of delivery	M32
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	09-08-2013	Jillian Griffiths	Document created with draft content
0.1.2	13-08-2013	Sheena Bassett	Edited and updated
0.1.3	15-08-2013	Jillian Griffiths	Edited and updated
0.2	16-08-2013	Jillian Griffiths	Edited and updated
0.3	20-08-2013	Paula Goodale	Edited and updated
0.4	22-08-2013	Jillian Griffiths	Edited and updated
0.5	24-08-2013	Paula Goodale	Edited and updated
0.6	26-08-2013	Jillian Griffiths	Edited and updated
0.7	27-08-2013	Paula Goodale	Edited and updated
0.8	27-08-2013	Jillian Griffiths	Edited and updated
0.9	28-08-2013	Sheena Bassett	Edited and updated
0.10	29-08-2013	Jillian Griffiths	Edited and updated
0.11	29-08-2013	Paula Goodale	Edited and updated
FINAL	30-08-2013	Jillian Griffiths	Edited and updated

Table of Contents

Appendices

List of figures

1. Executive Summary

The aim of this report is to present the results of evaluation of the second PATHS prototype. This work forms part of a programme that began with the evaluation of the first prototype, *D5.1 Evaluation of the first PATHS Prototype* (2012) and will be completed in the final round of field trials and technical testing to be reported in *D5.3 Report on results of field trials of the PATHS system*. The results of the evaluation activities reported here have enabled understanding of the second and final version of the prototype system, and will inform developments of future systems for personalised access to cultural heritage collections.

Groups of target users were invited to take part in field-based demonstration evaluation sessions, which were locally hosted sessions at cultural institutions and other venues. These sessions provided an opportunity for the collection of qualitative data from focus group discussions and quantitative feedback through questionnaires. Another group of target users were invited to take part in laboratory-based evaluation sessions, which allowed for testing of the efficiency and effectiveness of the PATHS software under controlled conditions, and in-depth feedback to be captured from participants on usability and satisfaction. Evaluation of the prototype system was also being conducted by the technical development partners; i-Sieve, Avinet, The University of the Basque Country and The University of Sheffield. These evaluations were concerned with the system architecture, content processing and enrichment and user interface design and focussed on systematic, objective evaluation of the building blocks of the system as standalone entities and will be reported in *D5.3 Report on results of field trials of the PATHS system*.

As with the first prototype (which was also well received by participants), it is evident that the majority of participants had an overall positive response to PATHS, finding it mostly *Interesting*, *Understandable*, *Easy*, *Useful* and *Fast*. The system was also seen as offering novel functionality that could be useful in a number of different user scenarios. Exploration and support for tasks were developed and extended considerably for the second prototype in light of findings and results from participants of the first prototype and now show high levels of positive responses for tasks related to *Serendipity and discovery*, *Finding items on a topic*, *Exploring a collection*, *Sharing content with others* and *Creating resources*. The path following task, *Using content created by others* received no negative responses, and responses have improved substantially across all tasks, including those which are core to PATHS, over responses given for the first prototype.

Additionally, the most popular tasks amongst participants of the second prototype were *Exploring the collection* and *Creating resources*, placed first by both Laboratory and Demonstration participants. *Serendipity and discovery*, *Sharing content with others* and *Finding items on a topic* all ranked amongst the top three uses for PATHS. The re-development of exploration modes and support for users of PATHS appears to have had a positive impact on participant responses to the second prototype.

Whilst there have been many positive responses to the second prototype there are areas where further investigation through extended field trials will bring useful insights, including *Preferred exploration mode*, *Path Creation*, *Participants experience of path creation task* and *Participants' own rating of path*. This work will continue in the final phase of evaluation where we will undertake field trials involving a group of invited participants who will be

encouraged to use PATHS in a naturalistic setting, undertaking their own work tasks, over a period of time.

Finally, the results of the demonstration and laboratory activities reported here have enabled us to confirm that the second PATHS prototype system does meet user requirements as identified in *D1.1 User Requirements Analysis* (2011) and is viewed as usable, useful and supportive of exploration of cultural heritage collections.

Acknowledgements
We wish extend our gratitude to the following organisations for their support in hosting demonstration sessions:

- Tekniker-IK4, Spain
- Euskomedia, Spain
- Elhuyar-Eleka, Spain
- CIC TourGune, Spain
- Ministry of Culture of Spain/Hispana
- Byzantine Museum, Athens, Greece
- Royal Institution, London, UK
- Manchester Institute for Research and Innovation in Art and Design (MIRIAD) , UK
- Department of Media, Manchester Metropolitan University, UK
- Department of History, Manchester Metropolitan University, UK
- North West Film Archive, UK
- Samuel Johnson Birthplace Museum, UK

We would also like to thank all those individuals who took part in both the laboratory and demonstration activities, your input has been invaluable.

2. Introduction

The evaluation work reported in this deliverable forms part of a programme that began with the evaluation of the first prototype, *D5.1 Evaluation of the first PATHS Prototype* (2012) and will be completed in the final round of field trials and technical testing to be reported in *D5.3 Report on results of field trials of the PATHS system*.

The focus of this work has been to assess whether the technical outputs of the second prototype of the PATHS system are usable, useful, meet user requirements and support exploration of cultural heritage collections. To achieve this we have:

- Engaged with users to verify user requirements are being met in field settings (demonstrations with users)
- Engaged with users to verify user requirements are being met in laboratory conditions (laboratory evaluations).

2.1 PATHS Evaluation Methodology

Overall, the PATHS evaluation effort needs to meet several requirements:

- to ensure that the system developed is fit for purpose;
- to evaluate PATHS against objective measures to assess accuracy, reliability and scalability;
- engage with users to verify user requirements are being met;
- provide feedback to partners after each Prototype has been released; and,
- demonstrate the feasibility and desirability of integrating PATHS into existing cultural heritage digital library services.

The project defined a broad approach to evaluation, which incorporates laboratory testing along with demonstrations and focus groups.

In this section, we define the specific methodology that has been employed.

2.1.1 Objectives of the evaluation

A number of objectives have been identified as the cornerstones of the PATHS system evaluation at its various stages, including:

1) To confirm that the user requirements expressed within the most recent functional specification have been met.
2) To ensure that system performance falls within acceptable limits.
3) To assess the design of the system and its interface against best practice guidelines.
4) To assess the design of the system against other systems supporting similar functionality.
5) To measure the usability of the system from the perspective of key user groups in support of simulated and natural (real-life, user-defined) tasks including domain-specific work tasks.
6) To assess the quality of the system and user experience from the perspective of key user groups.

7) To assess and further describe the validity and utility of the PATHS user interaction model in support of domain-specific work tasks.
8) To examine and further explore the information behaviour of different user groups with regard to exploratory search and path creation.
9) To test hypotheses relating to users' information behaviour in using the system, with regard to their cognitive styles.
10) To examine changes in information behaviour and use of the PATHS system over time.
11) To identify areas for improvement in future iterations of the system.

2.1.2 Development of the evaluation methodology

The evaluation methodology was developed in two phases, coinciding with the delivery of the two prototypes of the PATHS system.

- Phase One, months 10-16
  The initial methodology for the evaluation of the first PATHS prototype was defined by MDR and USFD based on the user requirements identified for the system in the initial research and includes validation criteria, objective measures and defined test tasks and queries for the database.
- Phase Two, months 25-27
  Further development and refinement of the Evaluation Methodology took place during months 16-25 and includes validation criteria, objective measures and defined test tasks and queries for use with PATHS during demonstration and laboratory activities and field trials.

2.1.3 Strategy

The purpose of this work is to evaluate the PATHS system as a whole and to provide overall evaluation of the success of the system against the defined objectives.

Evaluation of PATHS has largely followed a strategy derived from the interactive information retrieval paradigm, incorporating a mix of system and human-centred evaluations in both laboratory and field-based settings. These evaluations have varied somewhat between the stages of the project as different functionality was available in each prototype.

- The first Prototype (P1) included the core functionality to support the PATHS user interaction model. Evaluation related to objectives 5-8 and 11.
- The second Prototype (P2) includes updated core functionality based upon feedback from P1 plus additional personalisation and support for collaborative work. Evaluation has been extended to cover objectives 9 and 10 in addition to continued evaluation of objectives 5-8 and 11 (including comparison between P1 and P2 results).

2.2 Field-based evaluation, Demonstration sessions

Demonstration sessions were organised in cultural institution settings to enable quantitative and qualitative data to be collected from focus groups to assess the usability and usefulness of PATHS and it's use as a tool to explore cultural heritage collections.

Thirteen demonstration sessions took place across museums, archives, research organisations and educational settings in the UK, Spain and Greece and included a wide variety of participants (further detail in sections 3.1 and 3.4.1). Participants were encouraged to interact with PATHS through a Moderator and so, whilst each session followed a protocol and focus group script, each was tailored to the individual group.

Data collected comprised individual responses to the prototype via a questionnaire, including both quantitative (through the use of questions such as, semantic differentials, likert scales and closed questions) and qualitative data (from open comment boxes). Group data was collected from the discussions during each session. This has provided a wealth of data on participants' responses to PATHS and furthered understanding of information behaviour within a cultural heritage domain.

2.3 Laboratory-based evaluation

Evaluation of the second prototype in a laboratory setting allows for testing of the efficiency and effectiveness of the Paths software under controlled conditions, along with in-depth feedback from test participants on usability and satisfaction. A user-centred methodology has been employed, based upon the Interactive Information Retrieval (IR) paradigm, originally developed by Borlund (1997), and widely adopted in the IR community for more complex systems with functionality going beyond simple search.

Interactive IR evaluation utilises simulated and natural work tasks typical of user information needs, as an aid to system interaction in a controlled environment. In this way it has been possible to evaluate to what extent the system supports the user in their specific context. Extensive data capture via observations of user activity (e.g. screen capture, eye-tracking and transaction logs) is complemented by quantitative and qualitative data about the users, their information behaviour and their experience of completing the tasks and using the system in general, collected via questionnaires and interviews.

2.4 Project-wide evaluation

Specific and localised evaluation of the different elements of the PATHS system have also been conducted by the technical development partners, i-Sieve, Avinet, The University of the Basque Country and The University of Sheffield. These evaluations are concerned with the system architecture, content processing and enrichment and user interface design and are specifically focussed on systematic, objective evaluation of the building blocks of the system as standalone entities.

Results of a Cognitive Walkthrough, conducted as part of the evaluation of the interface and system functions of the prototype, is reported in section 4.10.1. It is included here in D5.2 as it evaluates the interface and functions as used by both the Demonstration and Laboratory participants.

Additional evaluation work regarding technical aspects of the system will be reported in *D5.3 Report on results of field trials of the PATHS system*. The feature 'Recommended Items' was not implemented in the second prototype used by the Demonstration and Laboratory

participants for their evaluation. Evaluation of this function of PATHS will be evaluated, along with other functionality, during this final round of evaluation activities.

3. Implementation

3.1 Participants

User profiles and a user interaction model were developed early in the project and have been reported in *D1.1 User Requirements Analysis* (2011). This work formed the basis of several example use cases detailing typical use of the PATHS system in context and has informed the identification of participants for both the field-based demonstration sessions and the laboratory-based evaluations. Evaluation of the second prototype was also informed by activities undertaken for evaluation of the first prototype, reported in *D5.1 Evaluation of the first PATHS prototype.* The PATHS system needs to support:

- Path creation - expert
- Path creation - non-expert
- Path facilitation (e.g. teacher/museum educator)
- Path consumption (e.g. Student/visitor)

And it is these categories of participants with whom we have engaged for the evaluation activities. These use cases were used to inform development of the tasks, queries, and demonstration activities for both the field-based demonstration sessions and the laboratory-based evaluations.

3.2 Evaluation protocol

An overarching evaluation protocol was employed to ensure consistency of approach across the laboratory-based and field-based demonstrations, modified slightly in accordance with the environment within which the evaluation was taking place:

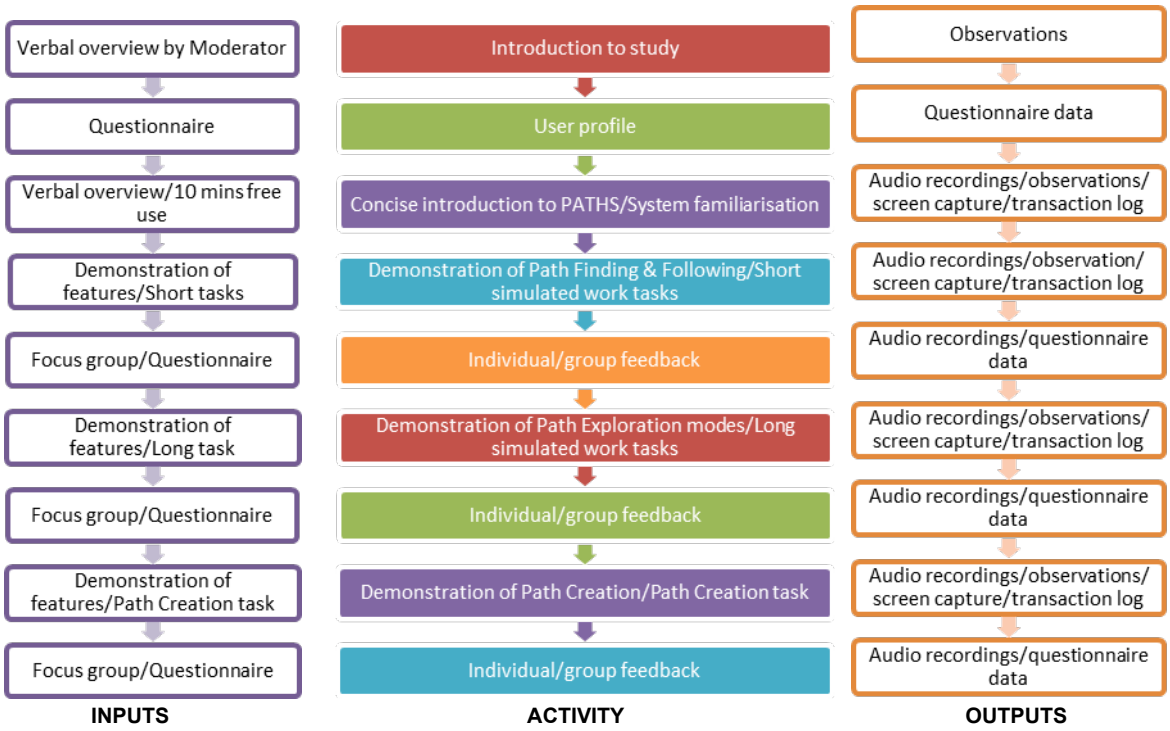

Figure 1 Overarching Evaluation Protocol

Additionally, questionnaires used by both the laboratory-based and field-based demonstrations were aligned, as were tasks used to demonstrate/interact with the system.

3.3 Piloting

A number of different data collection instruments and materials were developed in order to undertake the different evaluation activities:

- Overarching Evaluation Protocol (3.2), Demonstration Protocol (3.4.2) and Laboratory Protocol (3.5.2)
- Questionnaire for use in field-based demonstration sessions (Participant Pack, Appendix 1)
- Focus groups schedule for use in field-based demonstration sessions (Moderator Pack, Appendix 2)
- Questionnaires for use in laboratory-based evaluations (Appendices 3)
- Interview schedule for use in laboratory-based evaluations (Appendix 6)
- Tasks and demonstration activities for use in both field-based demonstration sessions and laboratory-based evaluations (Appendices 4-5)

These materials were extensively piloted by project partners, and with a selected number of external participants. These materials, tasks and demonstration activities were modified in accordance with this feedback.

3.4 Field-based evaluation, Demonstration sessions

MDR Partners, the University of the Basque Country and i-Sieve conducted a series of demonstration sessions with users to evaluate user responses to the prototype. A more qualitative approach was adopted to elicit user responses to the second Prototype. These comprised of a series of demonstrations of PATHS interspersed with focus group discussions and completion of individual questions to elicit individual responses to the system. Elements of the PATHS system were demonstrated in-line with the tasks employed within the laboratory-based evaluations.

3.4.1 Demonstration participants and sampling approach

User profiles and a user interaction model were developed in *D1.1 User Requirements Analysis* (2011), which then formed the basis of several example use cases detailing typical use of the system in context. The user interaction model supports the core tasks and roles that the PATHS system will need to support (3.1). Great care was taken to engage with a range of different cultural environments to ensure that user roles were well represented.

Initially it was anticipated that 8 demonstration sessions with between 3-7 participants in each group (circa 24-56 participants in total) would be run. In total 13 demonstrations were undertaken with 55 participants, thus:

- 5 groups of 26 participants in Spain (The University of the Basque Country)
    - Tekniker-IK4

  - Euskomedia
  - Elhuyar-Eleka
  - CIC TourGune
  - Ministry of Culture of Spain/Hispana

- 2 groups with a total of 5 participants in Greece (i-Seive)
  - Byzantine Museum, Athens
  - Group of museum experts, Athens

- 6 groups with a total of 24 participants in the UK (MDR)
  - Royal Institution, London
  - Manchester Institute for Research and Innovation in Art and Design (MIRIAD)
  - Department of Media, Manchester Metropolitan University
  - Department of History, Manchester Metropolitan University
  - North West Film Archive
  - Samuel Johnson Birthplace Museum

A non-probability convenience sample was used (Bryman, 2012:202), with host partners (The University of the Basque Country, i-Sieve and MDR) each identifying potential participants as matched against the four use cases above in 3.1. Invitations to participate in the project were sent out and local arrangements made to host each session.

3.4.2 Demonstration Protocol

An overview of the demonstration evaluation protocol was developed and modified from the overarching protocol (section 3.2) and is shown in Figure 2. This illustrates the main stages of the process, along with data instruments and other inputs, and an indication of the data collected as outputs of each of the demonstration activities.

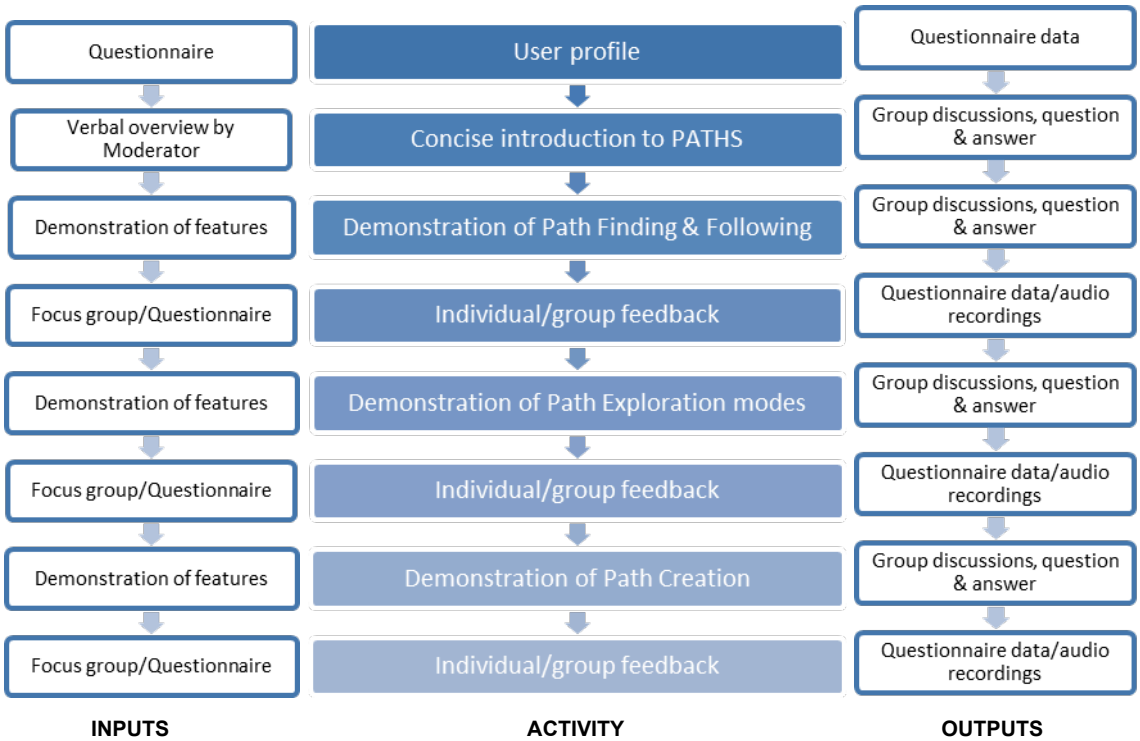

Figure 2 Demonstration Evaluation Protocol

Recording equipment was used to capture discussions and transcription of these undertaken locally by the host partner. Manual analysis of these discussions has been undertaken, whilst questionnaire data have been analysed using Excel and xlstat.

3.4.3 Measurement of Demonstration-based evaluation

A series of measures were developed for the demonstration based evaluation, these can be summarised as:

Instrument	Measures	Type
Demonstration: focus group schedule	Group discussion of PATHS concept and key elements of the PATHS system Finding a path Following a path Exploration modes Search Creating a path	Qualitative/subjective
Demonstration: questionnaire	Pre-defined questionnaires, collecting attitudinal (Likert Scale and Semantic Differential) data on: Usability/Ease of use/Usefulness/ Innovation and identification of improvements.	Quantitative/qualitative /subjective

Figure 3 Demonstration evaluation measures

The Participant Information Sheet, Consent Form and individual questionnaire were provided to participants in the form of a Participant Pack (which can be seen in Appendix 1).

The focus group schedule, tasks to be demonstrated and protocol were provided to host moderators in the form of a Moderator Pack (which can be seen in Appendix 2).

3.4.4 Data collection

The focus of the data collection for the Demonstration evaluation sessions followed a mixed methods approach, that is, “employing the data collection associated with both forms of data [quantitative and qualitative]” (Cresswell, 2008). Specifically, the Demonstration sessions sought to explore the cultural heritage information behaviour of participants, to identify responses to the concept and first impressions to the PATHS system and elicit their reaction to PATHS through the demonstration, by a Moderator, of tasks and activities using PATHS. Data was collected via recording of discussions and by individual completion of hardcopy questionnaires.

At the beginning of each Demonstration session participants were welcomed by the group Moderator and provided with a Participant Pack. This comprised:

- a Participant Information Sheet (which each participant took away with them)
- a Consent Form (which was given back to the Moderator on completion)

- Questionnaire (which was also handed back to the Moderator on completion). The questionnaire contained a mix of closed questions, open questions, and semantic differentials and was split into several sections:
    - demographic and profile data (with identical questions to that used in the Laboratory-based evaluation)
    - feedback on individual elements of PATHS, including Finding and Following a path, Search, Exploration modes and Creating a path
    - final view of PATHS

The questionnaire made use of a set of usability semantic differentials to elicit final reactions to PATHS. Semantic Differentials (SDs) originate from the work of Osgood (1957) as a technique for attitude measurement, scaling people on their responses to adjectives in respect to a concept. Typically individuals respond to several pairs of bipolar adjectives scored on a continuum + to – and in doing so differentiate their meaning of the concept in intensity and in direction (in a 'semantic space'). The adjectives used in evaluation of PATHS were informed by the work of Laugwitz et al (2008) who developed a set of 80 bipolar items used to measure the user experience of software products in several empirical studies. A sub-set of sixteen of these was chosen for the evaluation of PATHS.

Additionally, a focus group schedule was employed in order to: 1) maintain consistency across groups moderated by different project partners and 2) to collect qualitative data to complement the questionnaire data. This was provided to each Moderator in the form of a Moderator Pack. Discussions were recorded and manually transcribed (and translated into English where necessary) by the local host partner.

3.4.5 Ethics

The demonstration evaluation work was undertaken according to good ethical practices which was in-line with the ethical procedures and requirements of the University of Sheffield. To this end participants were provided with an information sheet about the study, were required to give informed consent relating to the use of the data collected before their session began and were provided with the opportunity to withdraw at any stage if they so wished. All data has been reported in aggregate form, with no individual user identifiable from the results provided.

3.5 Laboratory-based evaluation

The University of Sheffield carried out a base-line evaluation of the second PATHS prototype in the laboratory, under controlled conditions, and informed by the Interactive Information Retrieval approach to evaluation (Borlund 2009, Kelly 2009).

3.5.1 Goals

The laboratory-based evaluation of the second PATHS prototype aimed to:

- Evaluate the effectiveness of the system in supporting core information needs and work tasks.
- Assess the usability of the interface.
- Measure user satisfaction and engagement.

- Gauge user reactions to the system in the context of the Paths User Interaction model.
- Gain feedback on the updated functionality.
- Elicit additional recommendations and requirements for future development of the PATHS system.
- Review the degree of impact of users' cognitive style on their information behaviour as a potential basis for adaptability.
- Understand more about the nature of the types of paths that might be created, their characteristics and the contexts in which they might be employed.
- Compare and contrast findings from evaluation of the more complex second PATHS prototype, with the simpler first prototype.

This work is complementary to the demonstration and focus group evaluations, and is intended to provide a means of comparison between impressions of the system and actual use of the system.

3.5.2 Sample

A non-probability convenience sampling method (Bryman, 2012:202) was used to select participants in the laboratory evaluation study, who were recruited in the UK.

The main body of participants was recruited on a convenience basis via the University of Sheffield staff and student volunteer email lists, inviting potential users who identified with one of three scenarios:

- Regular visitor to museums and galleries (general/leisure domain – path consumer/end-user path-creator)
- Users of cultural heritage collections in a work context (research/education domains – expert path creator/path facilitator)
- Users of cultural heritage collections is a study context (student/education domain – end-user path creator/path consumer)

Additional expert participants were recruited on an ad hoc basis, through existing contacts known to the evaluation team. Due to the length and intensive nature of the study (c. 2 hours per participant), and the need to complete the evaluations within a tight timeframe, a gift voucher incentive was offered to aid recruitment.

In total, 34 participants completed the full evaluation protocol described below, using the iLab usability testing setup at USFD. Of these participants, 15 were classified as general users, 10 were classified as domain or subject expert users (4 researchers and 2 with professional cultural heritage experience, and most of whom also had some teaching experience), and 9 were classified as student users. The general and student users can then be classified as non-expert (novice) path creators, and/or path consumers, and the expert users can be classified as expert path creators and/or path facilitators. Seven participants had also taken part in the evaluation of the first prototype, and therefore had some limited prior knowledge of the system.

The laboratory evaluation protocol was developed and modified from the overarching protocol (section 3.2) and is shown in Figure 4. This illustrates the main stages of the

process, along with data instruments and other inputs, and an indication of the data collected as outputs of each of the test activities.

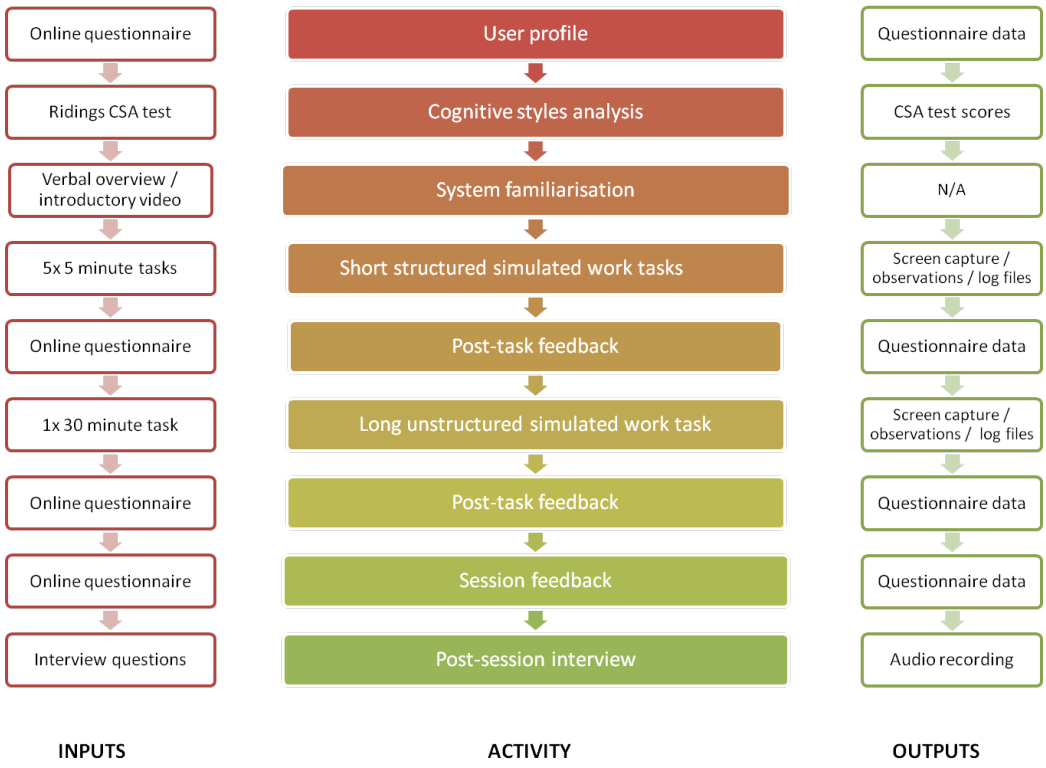

Figure 4 Laboratory-based Evaluation Protocol

A core element of the laboratory evaluation protocol is the simulated work tasks that enabled us to assess user experience and behaviour in a relatively realistic, but controlled way. Five short structured tasks were developed (see Appendix 4) to simulate two aspects of collection navigation, and three of the main information-seeking modes:

- **Task A: Finding and following a path –** using existing paths, simulating the path consumer navigation mode
- **Task B: Gaining an overview** – using the three main exploration tools offered in the interface to gain insight into the topics covered by the collection
- **Task C: Fact-finding** – two elements: locating a single specific piece of information, similar to known-item searching a library catalogue environment**;** and, an extended variation, locating several specific pieces of related information
- **Task D: Open-ended browsing** – locating several unspecified items on a topic or theme, allowing for some degree of user interpretation of what is needed, similar to subject searching a library catalogue
- **Task E: Exploration** – locating one or more items, where the goal is quite abstract or less-well defined, open to a high degree of user interpretation of what is needed

For each task, a time allocation of 5 minutes was allowed, after which they were prompted to finish, whether the task was completed or not. Each task also had multiple options, allowing the users choice to compensate for possible lack of subject knowledge.

Tasks 1-2 were completed first and in the same order by all participants, as an extension of the initial system familiarisation. In so doing, we aimed to ensure that users all had the same opportunity to understand the main elements of the PATHS system, and the content of the PATHS collection.

Tasks 3-5 were rotated in a Latin Square design as shown in Figure 5, with three variations of task order for each of the user groups in the sample. The purpose of this implementation is to eliminate learning and fatigue effects from the search results and to thereby ensure that tasks can be analysed on an equal footing. Tasks were identified in the instruction by letters C-E and users were not informed which of these tasks corresponded to which type.

	TASK C	TASK D	TASK E
Sheet 1	1	2	3
Sheet 2	2	3	1
Sheet 3	3	1	2

Figure 5 Task rotation order

Participants were also required to undertake a longer unstructured simulated work task, with a 30-minute time allocation. For this task, users were given one of three scenarios, corresponding to the three recruitment categories, and were asked to create a path on a subject of their choice. This task is clearly much more complex, and makes use of a wider range of the PATHS functionality, as well as providing outputs in the form of paths which can be further analysed in order to better understand the type of paths that people might create in different contexts. A high degree of interpretation was allowed in this task, and minimal guidance was given on how to approach the task and what to produce.

3.5.3 Data collection

The study incorporates a range of complementary elements of data collection to provide insights into the users, their prior experience, their actual behaviour in completing the tasks, their opinions about the tasks, their experience of using PATHS overall, and more in-depth discussion of the main path-creation task. Data was collected in a typical iLab setup, utilising a PC enabled with the Morae screen-recording and observation software, plus online questionnaires, PATHS transaction log files, and audio recording at appropriate points in the schedule, as indicated in the protocol above.

The profile and session feedback questions (see Appendix 3) are identical to those in the demonstration protocol, split into two parts to fit into appropriate points in the laboratory evaluation schedule.

Most of the task feedback questions we are also common with the demonstration protocol, with a small number of additional experiential questions unique to this part of the evaluation study. Task feedback questions were also completed online, with questions answered in line, on completion of each of the tasks. As detailed above, three of the short tasks were rotated in a Latin square sequence, requiring the data to be subsequently reorganised by task type for the purpose of analysis.

Comprehensive observation data was collected of participants engaged in the tasks, using the Morae usability software which is specifically designed for this purpose, enabling the capture of screen-recordings and observer notes, and the PATHS transaction logs for

analysis of actions carried out and content accessed. This data was analysed for key indicators of behaviour such as time taken on tasks, strategies and content used, and errors or difficulties encountered. In addition we have a record of the paths created by participants, enabling us to compare path length, features used, subject area, organisation and contextualisation, etc.

Reflections on the path-creation task formed the main element of a post-session interview, along with more general questions about the whole experience of using PATHS and potential real-life applications. This data provides a useful qualitative companion to the quantitative data compiled from the questionnaires and observations and gives the participants an opportunity to comment more freely on their experience of the evaluation session.

Finally, the Riding CSA test is an off-the-shelf product, delivered via PC software, with data outputs calculated automatically according to the software presets. An overall CSA 'type' is given, from a matrix of 9 possibilities derived from two scales; Wholist-Analytic and Verbaliser-Imager. Numeric scores are recorded for each of the scales, along with time taken for each part of the test.

The CSA test was developed by Riding in the early 1990s and has been in use since as a means of measuring differences in cognitive style with regard to the effect on an individual's approach to information processing and learning. Riding measures cognitive style on two dimensions, each one represented by a continuum, and an individual will be attributed a place on each of the two dimensions, according to their 'scores' calculated on completion of the CSA test.

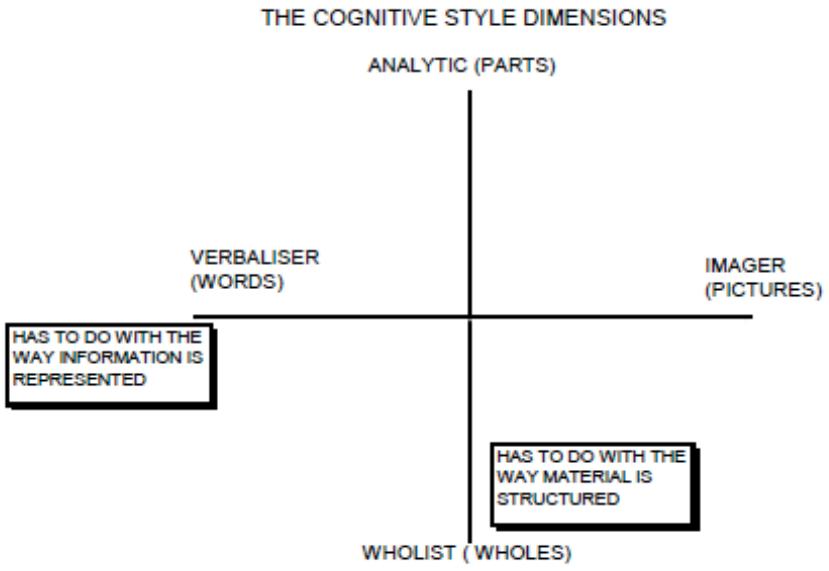

Figure 6 Cognitive Style Analysis matrix

(Source: Riding, 1991:5)

Each dimension is split into three zones, with the two opposing extremes and an intermediate or bimodal central position (Wholist-Intermediate-Analytic and Verbaliser-Bimodal-Imager). It follows, therefore, that there are 9 different discernible cognitive styles, as listed below:

- Analytic-Verbaliser
- Analytic-Bimodal
- Analytic-Imager
- Wholist-Verbaliser
- Wholist-Bimodal
- Wholist-Imager
- Intermediate-Verbaliser
- Intermediate-Bimodal
- Intermediate-Imager

Riding describes the CSA types as follows:

> **Wholist-Analytic Cognitive Style**
> "When they consider information, Wholists will have a balanced view of the whole, while Analytics will separate it out into its parts, or sections." (Riding, 1991:12)
>
> **Verbaliser-Imager Cognitive Style**
> "when people who are Imagers read, listen to, or consider information they experience fluent, spontaneous and frequent mental pictures. By contrast, individuals who are Verbalisers read, listen to, or consider, information in words... People in the middle tend to use either mode of representation." (Riding, 1991: 12)

3.5.4 Ethics

The laboratory evaluation work was approved by USFD's Information School Ethics Committee. In accordance with the University's requirements for research ethics, participants were provided in advance with an information sheet about the study, and were required to give informed consent relating to the use of the data collected before their session began. All data collected was anonymised using Participant ID numbers, and data is reported only in aggregate form, with no individual user identifiable from the results provided.

4. Results

A coherent and consistent approach to data collection was adopted across the field-based demonstration sessions and the laboratory-based evaluations in order to enable integration and comparison of results across these two settings. Thus, where appropriate, results from both demonstration sessions and the laboratory-based evaluations are presented together. Additional results from the laboratory-based evaluation are presented later in this section.

4.1 Participant profile

Results of the user profile questionnaire provide insight into the characteristics and information behaviour traits of the participants.

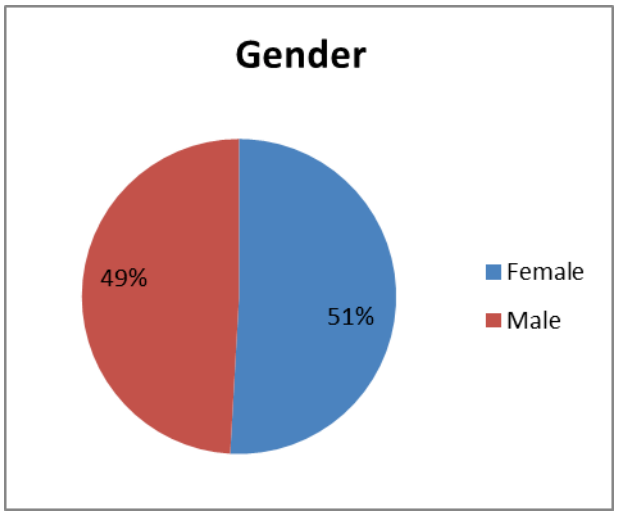

Figure 7 Gender: Demonstration responses

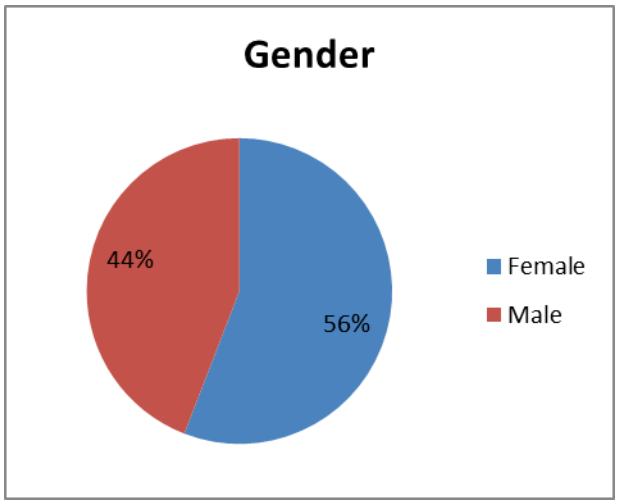

Figure 8 Gender: Laboratory responses

There were a slightly greater proportion of female participants in the Laboratory evaluation session but only a marginal difference between male and female participants in the Demonstration evaluation session. Demonstration participants were recruited individually by open invitation and by organisation, that is, staff of cultural heritage organisations.

Participants of the Laboratory-based evaluation were mainly recruited according to the three scenarios outlined in section 3.5.2. In both sample groups the proportions cannot be generalised to the overall cultural heritage user population as the sample was recruited on a convenience basis. However, from analysis run on the Laboratory participants, any concerns about bias from the predominance of female participants can be discounted as there were found to be no statistically significant correlations between gender and other evaluation data variables.

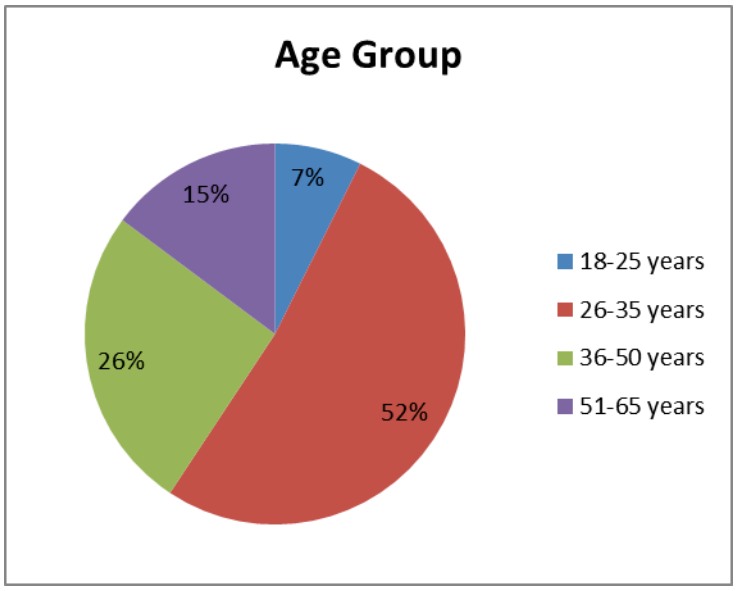

Figure 9 Age group: Demonstration responses

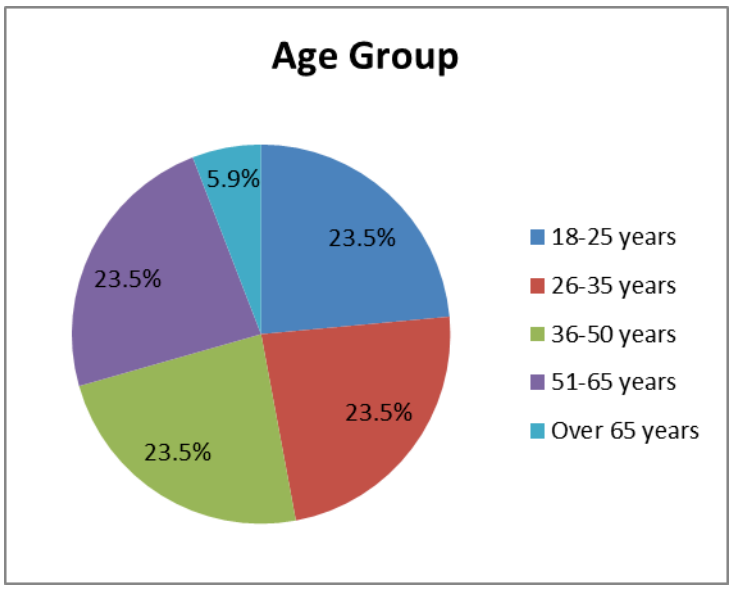

Figure 10 Age group: Laboratory responses

Differences in the age of participants across the two samples are evident. The majority, 52%, of participants of the Demonstration evaluations were aged between 25-35 years (the 56% majority was in the 36-50 age group for the first evaluation) whilst 24% of participants of the Laboratory evaluations were in this age range. The Laboratory participants were better

represented in both the youngest (18-25) and oldest (over 65) age groups than the demonstration group, where four of the five age groups are equally well represented in the sample. This is not surprising, since the participants were recruited through an open invitation to students, staff, and people generally interested in cultural heritage. Nearly 30% of the participants are aged 50 years or older, which is a key age group for cultural heritage, local history, and genealogy. Since students were a target recruitment group, it follows that nearly a quarter of the sample group is between 18 and 25 years old.

Overall, all age groups were represented evenly across the evaluation activities, with the exception of those over 65 years. The Demonstration participant profile has improved from the first evaluation as 26-35 years is one of the largest age groups of visitors of cultural heritage organisations indicated in national data. There are also a strong minority of older users represented, an important factor given the popularity of cultural heritage and related areas such as genealogy and local history within this target group.

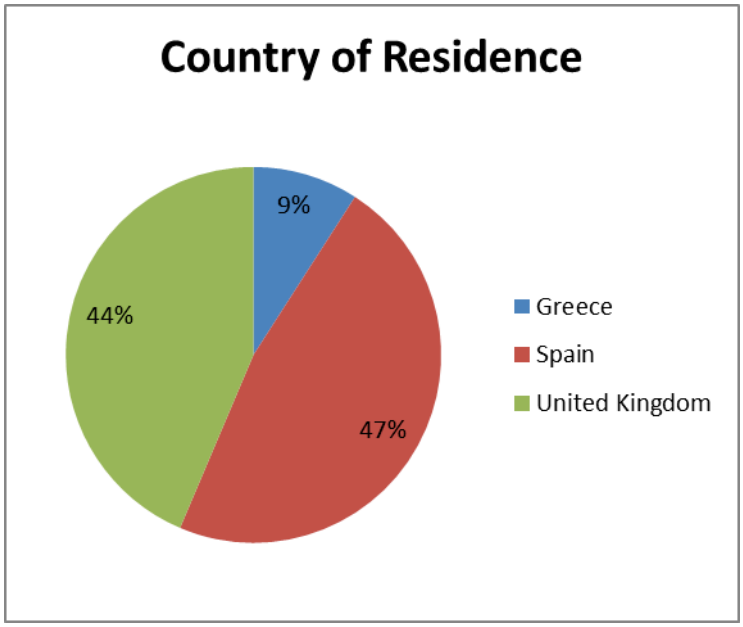

Figure 11 Country of residence: Demonstration responses

For evaluation of the second prototype demonstration sessions were held in Spain (47% of total participabts), the UK (44% of participants) and Greece (9% of participants.

The country of residence of all Laboratory participants was the UK.

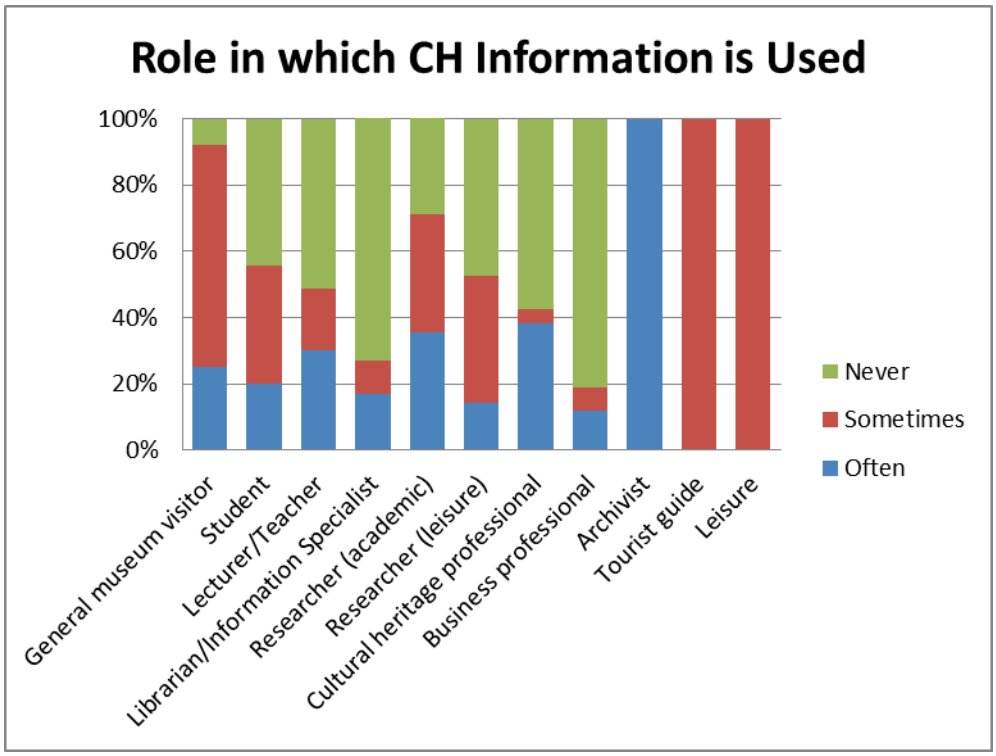

Figure 12 Role: Demonstration responses

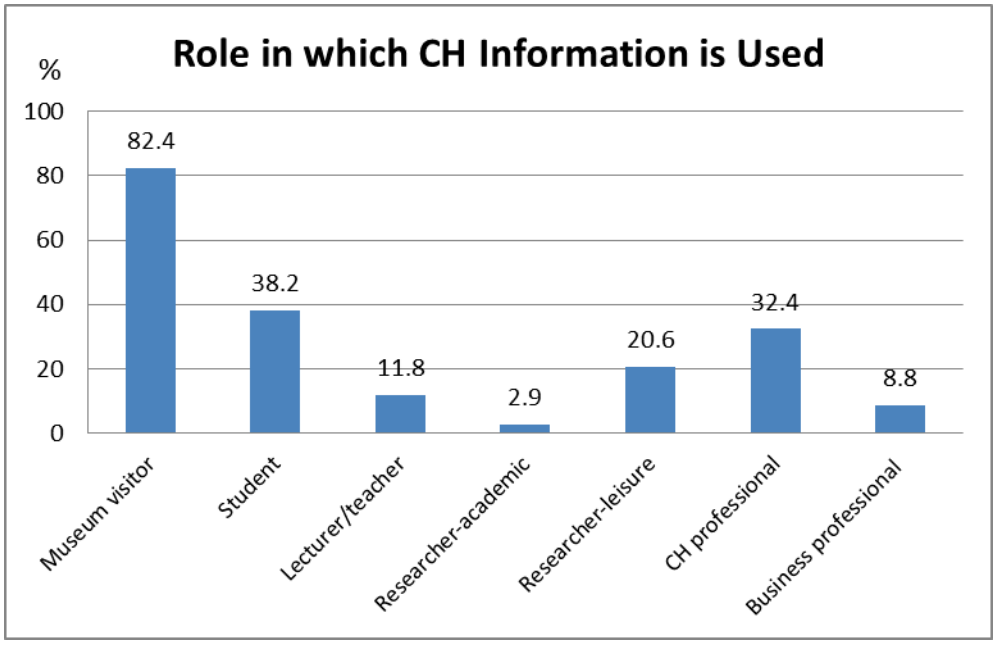

Figure 13 Role: Laboratory responses

Similar trends in the roles in which cultural heritage information was used can be observed between the Demonstration and Laboratory evaluation participants. Museum visitors were reported as high level users, whilst using cultural heritage collections in a business professional role was reported by participants to be one of the least likely. There was a difference in the academic/researcher role but this may be due to the actual field of this role and whether it is actually related to cultural heritage or not.

Participants for the Laboratory evaluations use cultural heritage information in a variety of roles, most frequently as museum visitors. The next most popular roles were as students and cultural heritage professionals, which corresponds with the sample, as those two groups of participants were specifically recruited. Note: Participants were encouraged to select all applicable options, so the overall percentage total is greater than 100%.

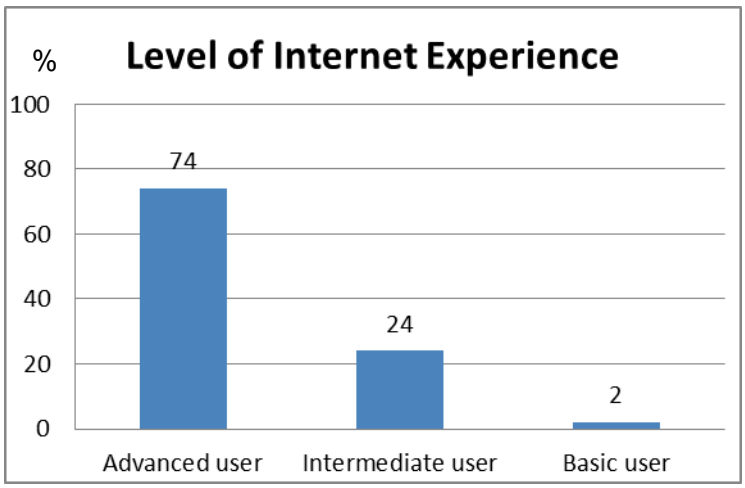

Figure 14 Internet experience: Demonstration responses

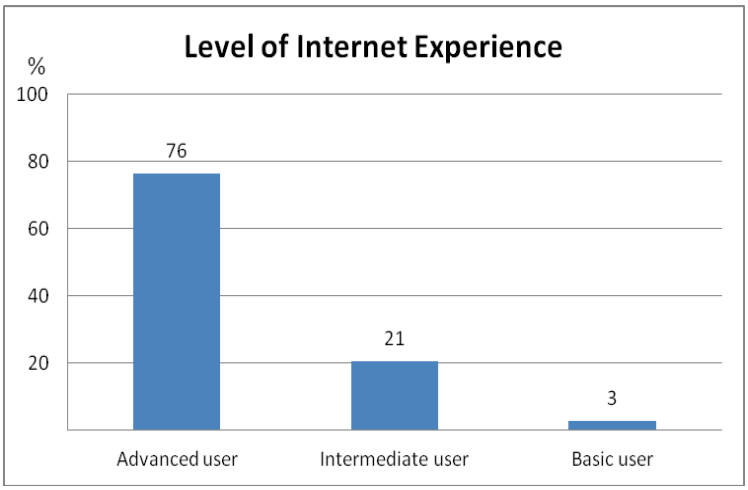

Figure 15 Internet experience: Laboratory responses

The level of Internet experience reported by participants is important as an indicator of confidence and ability in using online tools such as PATHS. In both samples, the majority of participants (over 70%) saw themselves as Advanced in their level of Internet experience, with only a very small minority of participants identifying themselves as Basic users.

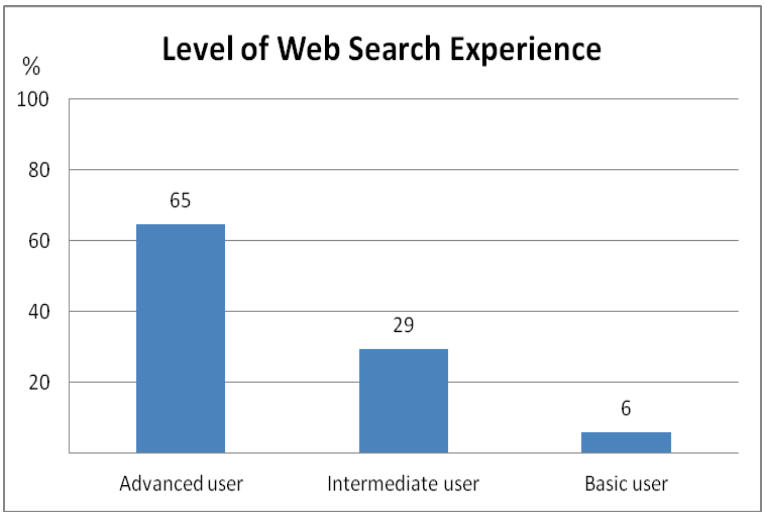

Figure 16 Level of web search experience: Laboratory responses

Since one of the main features of PATHS is its search interface, it was also important to be aware of participants' level of searching and information retrieval experience. Participants were similarly confident about their levels of web search experience. Again, the majority of participants reported that they were Advanced searchers, with only two participants identifying themselves as Basic users.

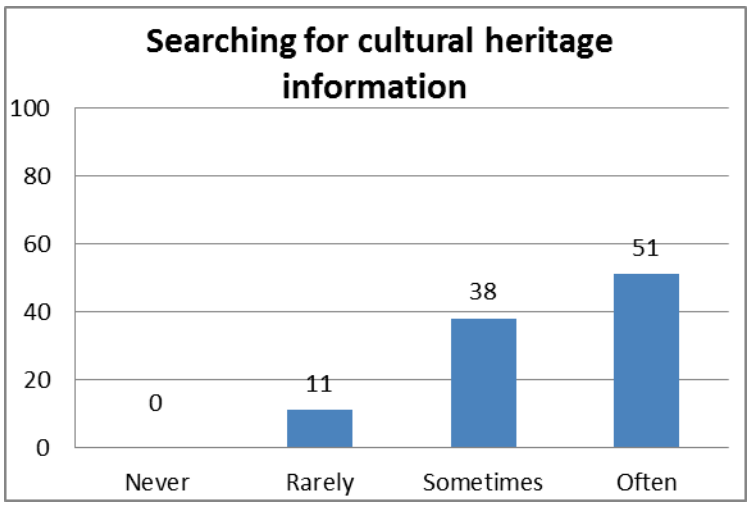

Figure 17 Searching for cultural heritage information online: Demonstration responses

Frequency of searching for information online was very high with 51% of participants of the Demonstration evaluation sessions reporting that they searched for information online Often (almost every day) and 38% Sometimes (89% combined). 11% said that they only searched online Rarely (and no-one, Never).

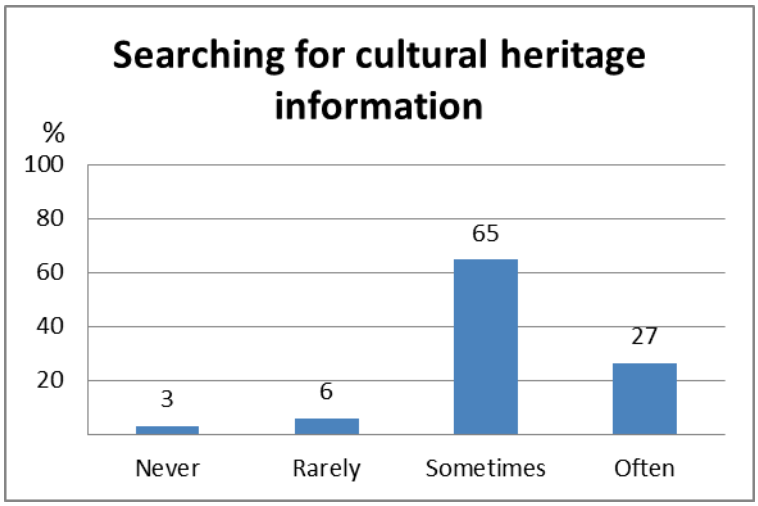

Figure 18 Searching for cultural heritage information online: Laboratory responses

The largest proportion of Laboratory participants use cultural heritage information Sometimes (65%) and 27% of participants use cultural heritage information Often, only 6% reported that they use it Rarely and 3% Never. This indicates that this is a group of relatively active cultural heritage information users, who should have some familiarity with the type of data available and may represent the type of users most likely to be more active users of PATHS, including perhaps the more advanced functionality.

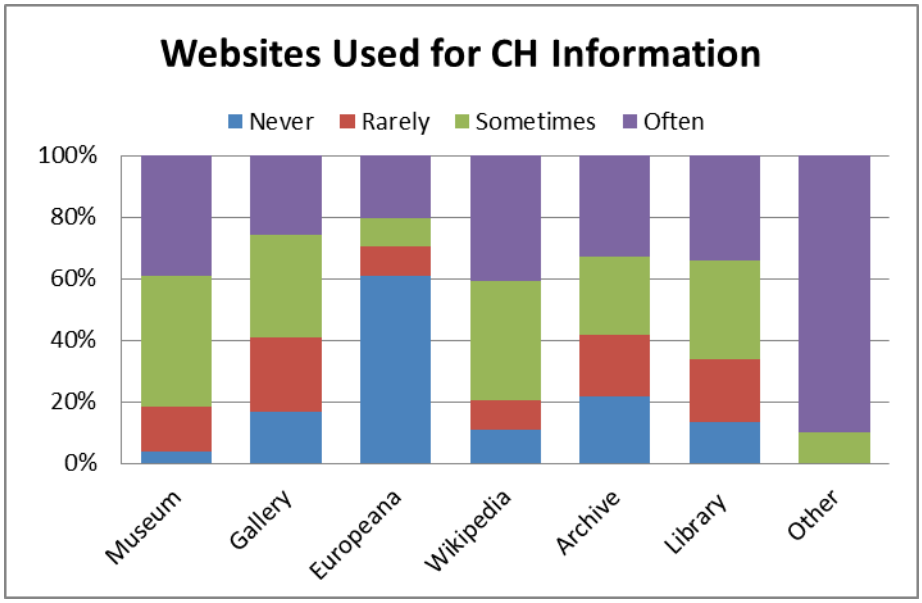

Figure 19 Websites used for information about cultural heritage: Demonstration responses

The Demonstration evaluations elicited a wide range of other websites used for information on cultural heritage which included:

- MICHAEL European Database.
- Oxford Dictionary of National Biography website.
- Virtual Library of Museums of the ICOM
- EEBO
- Google Books & JSTOR

- Library of Congress
- Genealogy sites. Heraldry sites.
- Facebook, Iffaca
- Google

To put this into context, websites such as Museums and Wikipedia were used extensively by nearly all the participants whilst a few participants frequently used individual named websites.

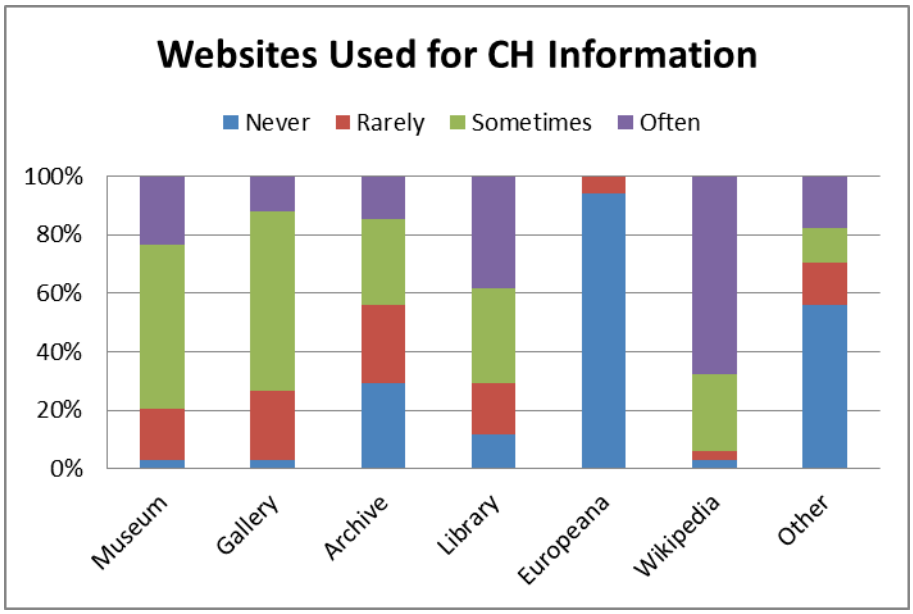

Figure 20 Websites used for information about cultural heritage: Laboratory responses

As for the Demonstration participants, Museums and Wikipedia are the most used websites by the Laboratory participants. The main difference here is the very low use of Europeana (more than 20% of the Demonstration evaluation participants used Europeana Sometimes or Often).

Across the range of websites listed as potential sources of cultural heritage information, Wikipedia is by far the most popular: 94% use it Often or sometimes. In contrast, Europeana is practically unknown, with only 6% of participants using it Rarely and the other 94% Never using it at all. In light of the overwhelming popularity of Wikipedia as a website for cultural heritage information, participants should find links to Wikipedia content a welcome augmentation of the PATHS source data from Europeana. Museum, library, and gallery websites are also important sources of cultural heritage information, while archive sites are visited less often. Only 18% of participants often use other websites to find cultural heritage information, so the sources listed here can be considered to cover most of the relevant websites. Other web sites mentioned by the laboratory participants included:

- Search engines – Google, Google Scholar, Bing
- English Heritage, Images of England, Flickr, Facebook
- OurSheffield, Sheffield Forum
- Local history sites and picture archives
- Portable antiquities scheme
- Online journals

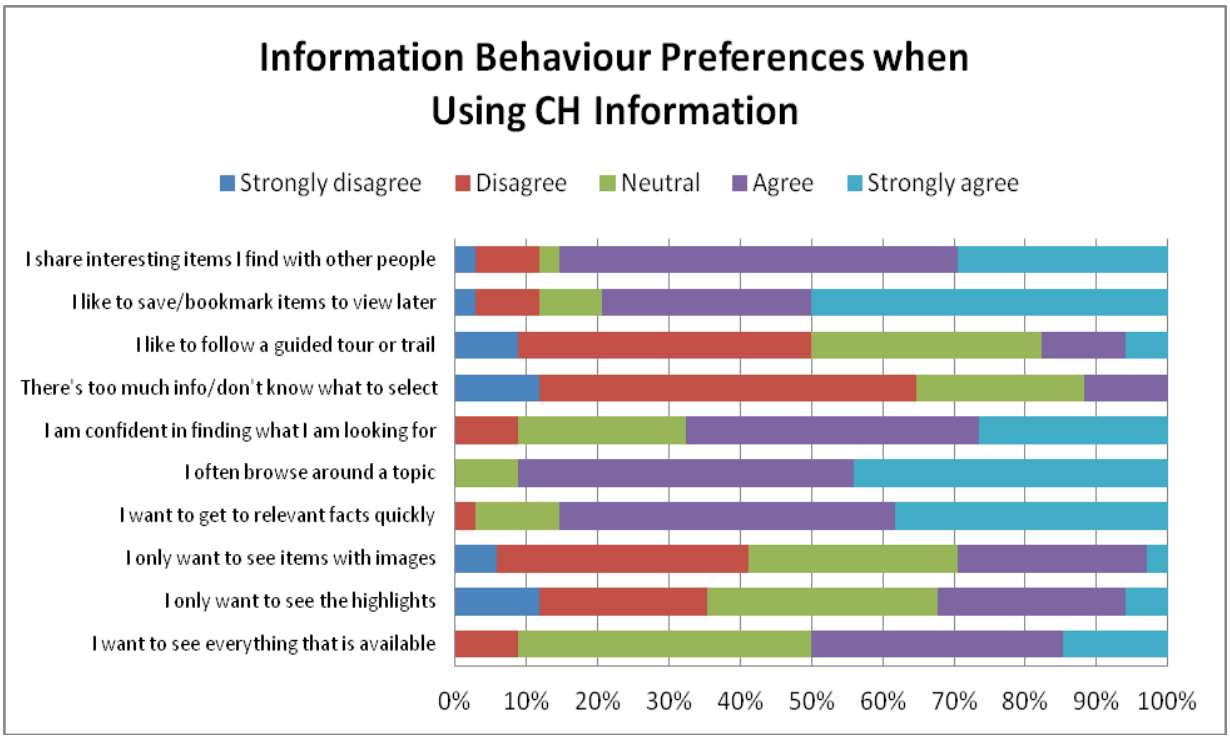

Figure 21 Information Behaviour preferences: Laboratory responses

Many of the participants have sophisticated information behaviour preferences, which may relate to their cognitive style to some degree, and which are demonstrated by their high level of agreement (strongly agree or agree) with the following statements:

- I often browse around a topic (91%).
- I want to get to relevant facts quickly (85%).
- I share interesting items I find with other people (85%).
- I like to save/bookmark items to view later (79%).
- I am confident in finding what I am looking for (68%).
- I want to see everything that is available (50%).

It is especially encouraging for PATHS that participants like to save or bookmark items to view later, and that they share their findings with other people, since those are two essential functions that the system is designed to deliver. A difficulty that must be overcome is the low percentage of participants who like to follow guided tours (18%). A possible explanation for this is the high level of confidence that participants report with regard to their ability to find what they are looking for on their own, and also in their advanced experience with web search engines and the Internet. Further evidence of participants' confidence in their capacity to navigate the cultural heritage information space is demonstrated by their disagreement with the idea that there is too much information or that they do not know what to select: 64% strongly disagreed or disagreed with the statement.

Participants' opinions are divided regarding collection highlights. Roughly one-third of participants (35.2%) strongly disagreed or disagreed with the statement "I only want to see the collection highlights", another one-third (32.4%) are neutral, and the final one-third (32.4%) strongly agreed or agreed.

On the whole, participants do not seem to be concerned whether items have images associated with them; only 29% of participants strongly agreed or agreed that they only want

to see items with images. While this finding goes against previous research, which emphasises the visual nature of cultural heritage information, participants could be indicating here that they are more open-minded to textual sources as well as images.

4.2 User type

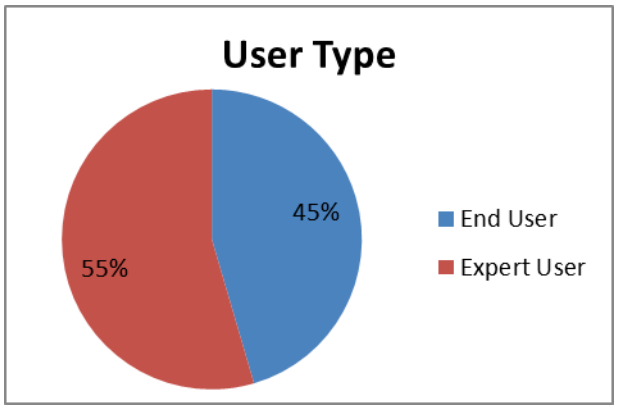

Figure 22 User type: Demonstration responses

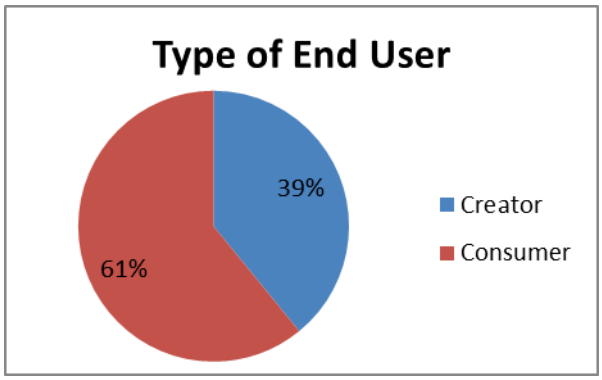

Figure 23 End User types: Demo responses

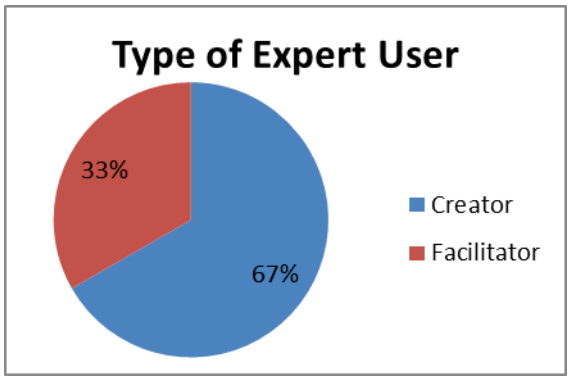

Figure 24 Expert User types: Demo responses

In accordance with the use cases and user types discussed in section 3.1 participants of the Demonstration evaluation sessions could be identified as being either End Users (45%) or Expert Users (55%).

Of the End Users:

- 61% were identified as being Consumers
- 39% as Creators.

Of the Expert Users:

- 33% were identified as Facilitators
- 67% as Creators

As discussed in section 3.5.2 participants of the Laboratory evaluations consisted of 71% Non-expert users (Creators and Consumers) and 29% Expert users (Path Creators and Facilitators). Of the non-expert users, approximately one third were students, mainly from

humanities disciplines, who may be classed as intermediate users in some instances, based upon their increased subject knowledge over general leisure users.

4.3 Finding and following a path

As described in the methodology section of this report, participants in the Laboratory evaluations were required to undertake five short structured tasks (including two introductory tasks and three information seeking tasks), and one longer, more open-ended, path creation task. In this section we first report on the findings of the task feedback questionnaire, and then look in more depth at the users' actual performance and information behaviour traits as evidenced from the observation data.

Two introductory tasks were completed by all users at the outset of the PATHS user session, giving them the opportunity to become acquainted with the main features of the interface for exploring content. Task A required the user to follow two existing paths, and Task B focused on gaining an overview of the PATHS content by exploring the Thesaurus, Tag Cloud and Map features. In this task, the laboratory participants were required to find and follow one common path, and one additional path of their own choice, thereby allowing for direct comparison, and individual interests.

Demonstration participant responses are based upon viewing and interacting, via the Moderator, functions and tasks demonstrated. Laboratory responses are based upon undertaking the task.

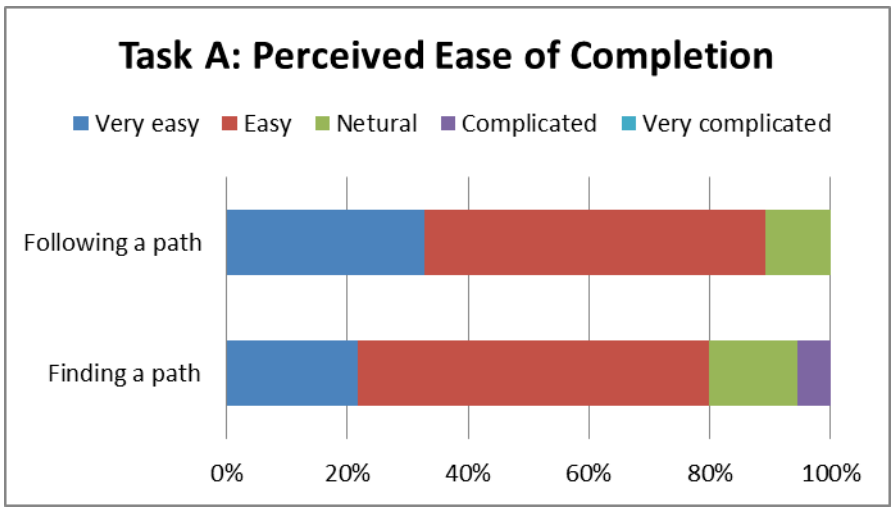

Figure 25 Finding and Following a path: Demonstration responses

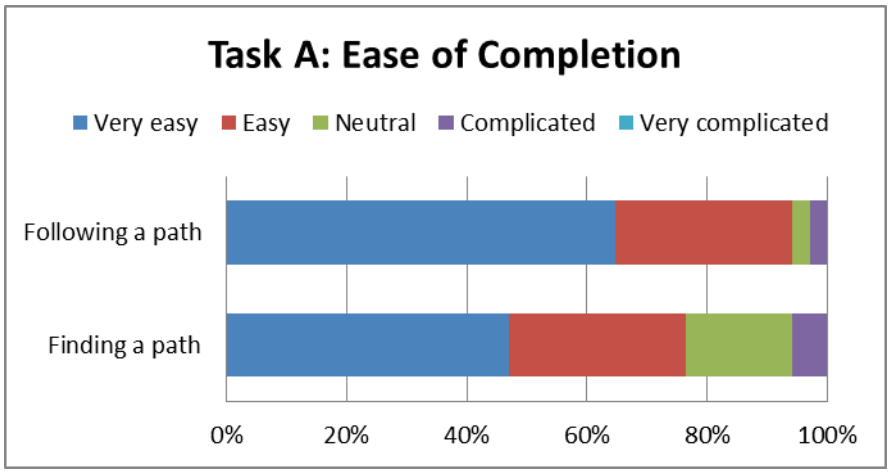

Figure 26 Finding and Following a path: Laboratory responses

Most participants found, or perceived, both finding and following paths either Very Easy or Easy.

The majority of Demonstration participants perceived finding and following a path easy. 80% thought Finding a path either Easy or Very Easy (22% Very Easy, 58% Easy). Once a path had been found 89% thought it either Easy or Very Easy to follow (33% Very Easy, 56% Easy). Following a path was demonstrated in depth, including looking at the large overview, looking at many of the nodes, following different branches, jumping across branches and clicking on and viewing external links.

The majority of Laboratory participants found the first familiarisation task easy: 77% of participants reported that it was Easy to find a path, and once they had found the path, 94% of participants reported that it is Very Easy or Easy to follow that path. Since this task involved a simple keyword search, which would be familiar to intermediate and advanced internet users, these ratings are unsurprising. From observation of Laboratory participants completing the task we noted, however, that participants' level of engagement and completion of the task varied enormously; some gave the path a brief scan using few of the navigation features, whilst others explored it in depth, viewing most or all nodes, and using multiple navigation features.

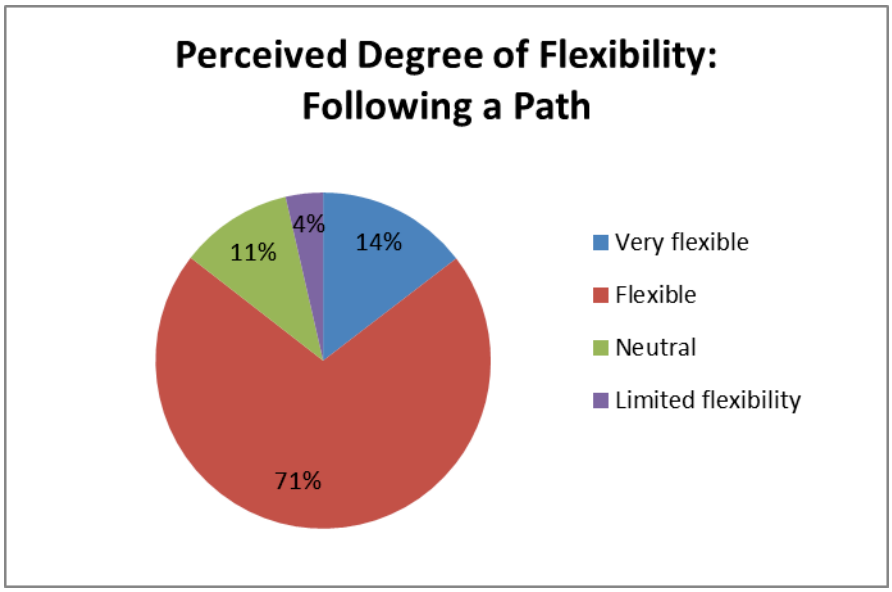

Figure 27 Degree of flexibility: Demonstration responses

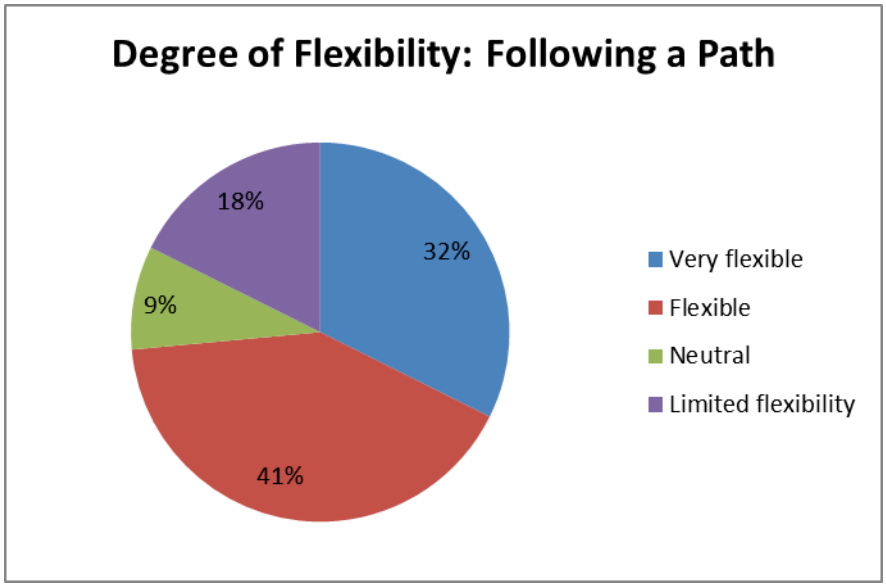

Figure 28 Degree of flexibility: Laboratory responses

The majority of the Demonstration evaluation participants (71%) found following a Path Flexible with a further 14% opting for Very Flexible (85% in all). Only 4% indicated Limited Flexibility. The majority of Laboratory participants (73%) also reported that following a path is Very Flexible or Flexible. Participants who experienced limited flexibility when following a path may have been influenced by the particular path chosen in the second part of the task. If a more linear path was chosen, then it would be difficult to follow it in a flexible way.

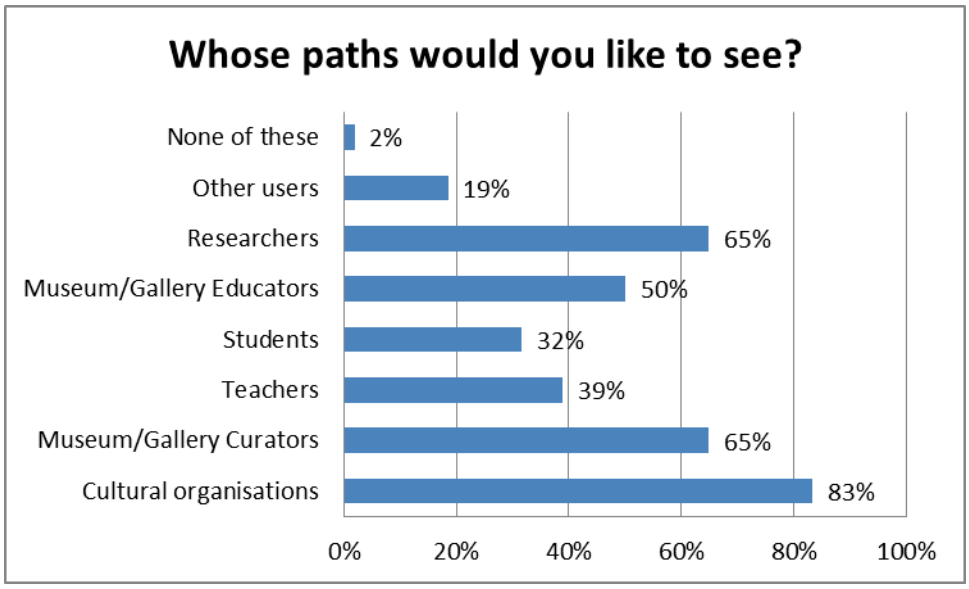

Figure 29 Whose path would you like to see: Demonstration responses

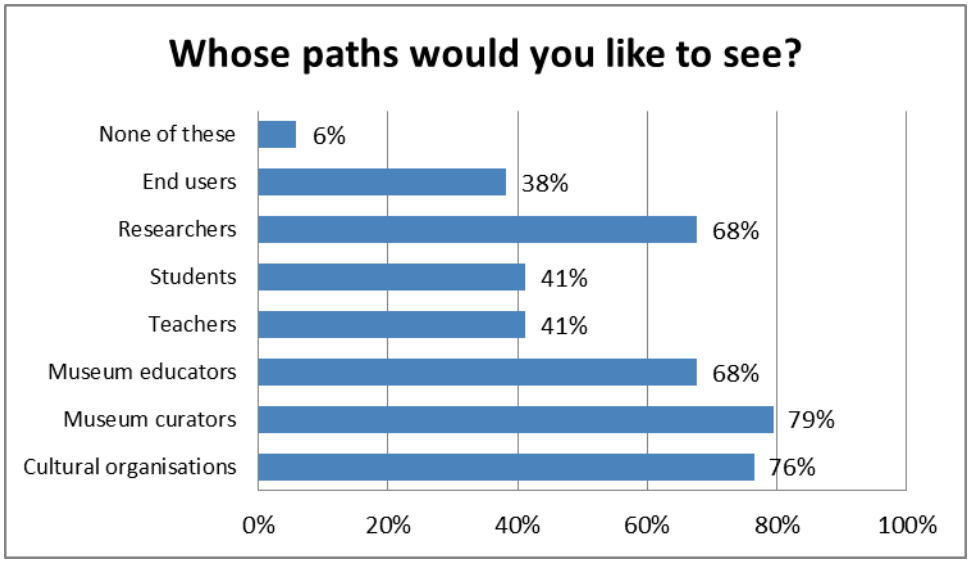

Figure 30 Whose path would you like to see: Laboratory responses

The response profile to the question 'Whose paths would you like to see?' is similar from both the evaluation groups with cultural heritage organisations, museum curators and researchers being favoured (all over 60%). The Demonstration evaluation participants were most interested in paths by Cultural Organisations (83%), followed by Researchers (65%) and Museum Curators (63%). They were least interested in Other Users paths (18.5%). Paths created by Students and Teachers were of some interest to between 31%-41% of all the evaluation participants.

When asked whose paths Laboratory participants would like to follow the most popular sources for paths were Museum Curators and Cultural Organisations, followed closely by Museum Educators and Researchers. Approximately 40% of participants would also like to follow paths created by Teachers, Students, and Other end users. There seems therefore, to be a preference for paths made by people with some degree of subject knowledge and

domain expertise, which was corroborated by several participants during their post-session interview.

Note: Participants were encouraged to select all applicable options, so the overall percentage total is greater than 100%.

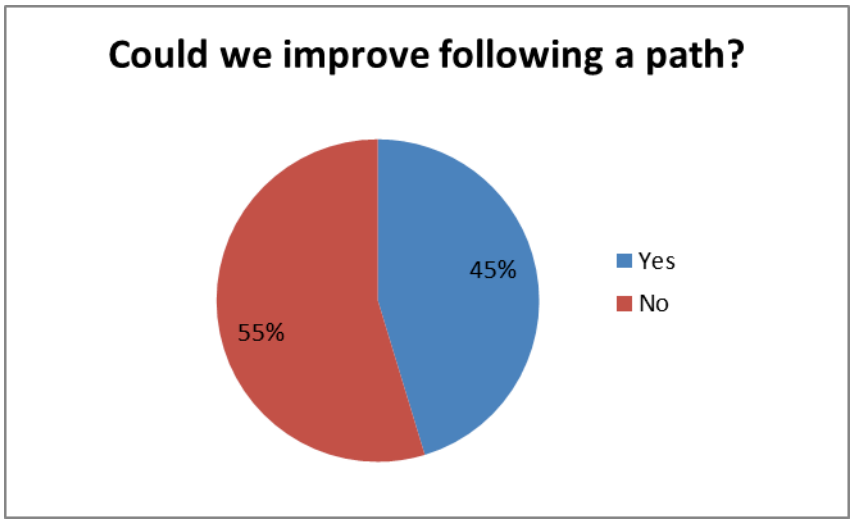

Figure 31 Could we improve following a path: Demonstration responses

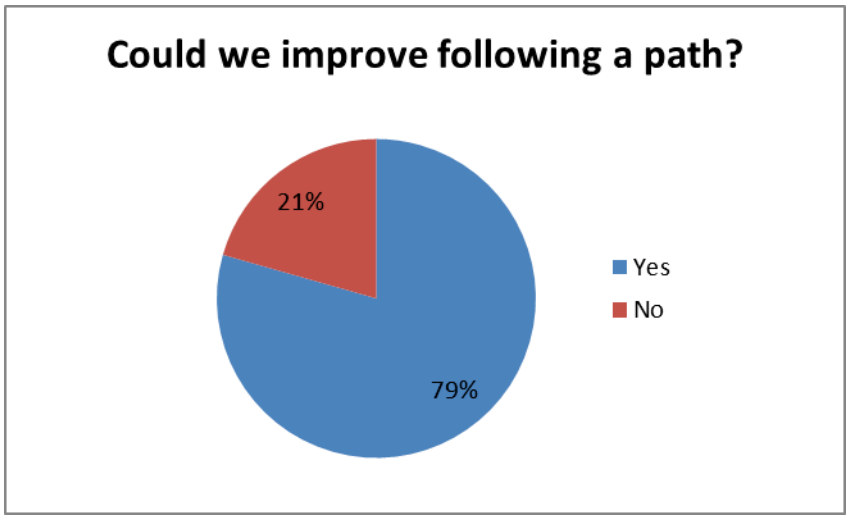

Figure 32 Could we improve following a path: Laboratory responses

There is a marked difference between the responses to 'Could we improve following a path?' between the two evaluation groups. Whilst 45% of the Demonstration evaluation participants said Yes, 79% of the Laboratory evaluation participants answered likewise.

Whilst one-fifth of the laboratory participants reported that following a path does not need improvement, the majority disagree, and many of the users wrote comments showing a high degree of engagement with the system. Several comments relate to navigation, with participants indicating that they would like a larger *"map of the path"* to help them *"jump between sections on the path"* or to *"stray from the path and easily return to it without using multiple browser tabs"*. One participant commented at length: *"I found I wanted breadcrumbs*

showing where I've been within the Paths system in order to return to those pages, and I wanted to keep the current path visible somewhere on screen even when I had strayed away from it (for example examining an image in more detail or following a tag)". Another common request is for larger and more numerous images. Due to constraints on the size of the source images, which is beyond the control of the PATHS project, this is not possible to remedy during the prototype phase.

Topic	Count
Larger images, ability to zoom in	4
Clearer graphics/representation of paths, better visualisation	3
Extend sources of information	3
Moderation/abuse reporting system required	2
Profiles of PATHs Creators required	2
Improvements to PATH functions (mouse-over text (2), allow branches, more info at branch start, print a path)	6
Other more general functions (rating, target audience etc.)	7
Miscellaneous comments	3

Figure 33 Improving following a path: Summary of Comments from the Demonstration responses

All the individual comments grouped by Topic are to be found in Appendix 9.

4.4 Exploration modes: Thesaurus, Tags and Map

In the content overview task, Laboratory participants were asked to try to get an overview of the PATHS system and its content using the three exploration modes offered by the Thesaurus, Tag cloud, and Map sections of the interface. This functionality and the associated evaluation task are a direct result of feedback gained from the first prototype, where it was found that users needed more assistance in discovering the breadth of content in the collection, in order to use the system more effectively in some of the more exploratory information seeking tasks.

Demonstration participants were shown each of the three exploration modes, moving through the content on a topic relevant to each group. Groups were able to make suggestions and interact with the system via the Moderator.

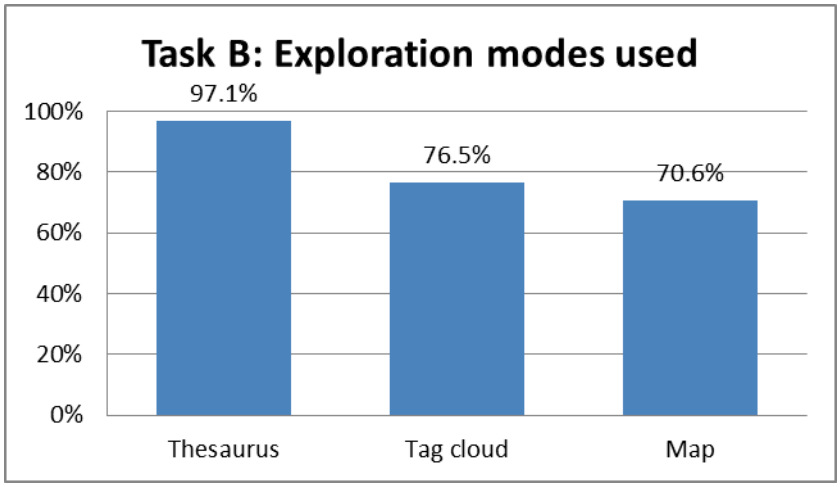

Figure 34 Exploration modes used: Laboratory responses

All but one participant of the Laboratory evaluation used the Thesaurus, 77% used the Tag cloud and 71% used the Map. It is unclear why participants did not try all options, as they were introduced to all three in the introductory video. It is possible that they chose those elements that they found most appealing in accordance with their cognitive style, or that they simply became engrossed in one mode and did not move on to the others.

Note: participants were asked to use “any one or more” of the three options, so the overall percentage total is greater than 100%.

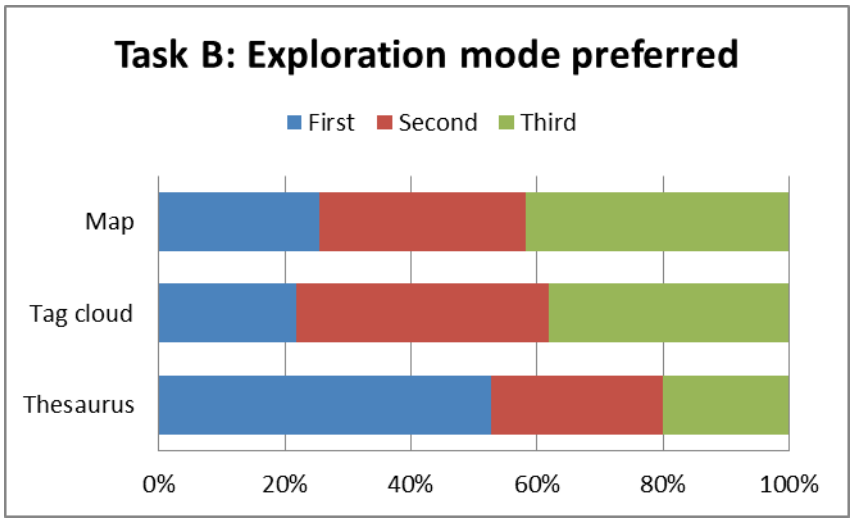

Figure 35 Exploration modes preferred: Demonstration responses

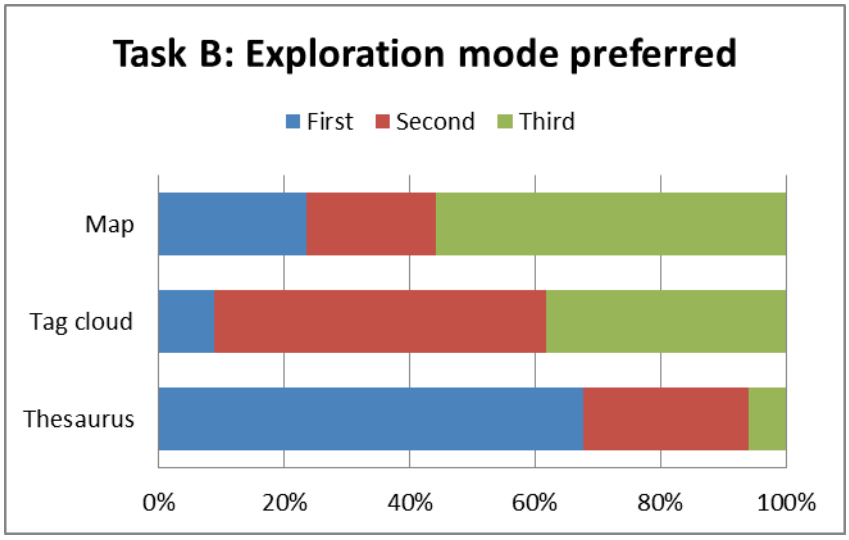

Figure 36 Exploration modes preferred: Laboratory responses

Both evaluation groups showed a distinct preference for the Thesaurus Exploration mode, with 53% of Demonstration participants choosing this as their first choice and 68% of Laboratory participants. Demonstration participants preferred the Tag Cloud as their second choice, with 40%, and the Map was the least preferred exploration mode with 42%.

For Laboratory participants, aside from the Thesaurus, 24% of people chose the Map as their first choice, whilst only 9% chose the Tag Cloud. However, the Tag Cloud was placed second by far more participants than the Map, leaving the Map in overall 3rd place. During the post-session interviews, some users remarked that they did not feel able to choose between the Tag cloud and Map for their second and third choices, since they had not used either of them during the evaluation. It is possible that their answers were influenced by the order in which the choices appeared in the questionnaire.

Laboratory participants were also asked to give a free-text response regarding the most interesting topics explored. The most common areas entered are as follows: art or artists (21%), language or literature (15%), science (12%), and history (9%). Archaeology and society or social change were mentioned by two people each, and other individual topics including accountancy, holidays, human names, photographs, and jewellery were mentioned. One participant specifically drew attention to the images associated with topics: *'historic themes with accompanying image thumbnails, also the topics with a large number of path categories to choose from'*. Another participant *'liked the look of the beliefs section, as this seemed the most detailed of the sections, so showed the full scope of the system'*.

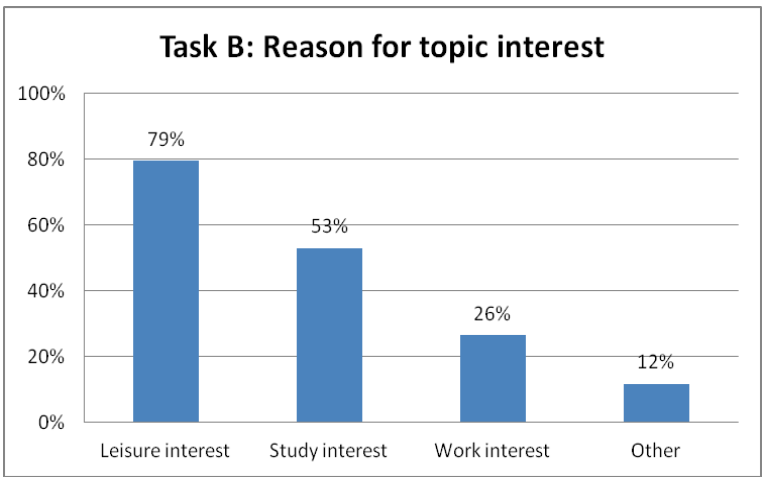

Figure 37 Reason for topic interest: Laboratory responses

Participants also identified their subject interest by type. Since the participants for this evaluation were recruited on the basis of three types of cultural heritage information users (general, student, and expert/professional), it is not surprising that leisure interest was the option chosen by the highest number of participants: students and professionals who work with such information often maintain a casual awareness of the area as well. It is also to be expected that the number of participants who are interested for work purposes (27%) is almost identical to the number of expert participants (29%). Note: Participants were encouraged to select all applicable options, so the overall percentage total is greater than 100%.

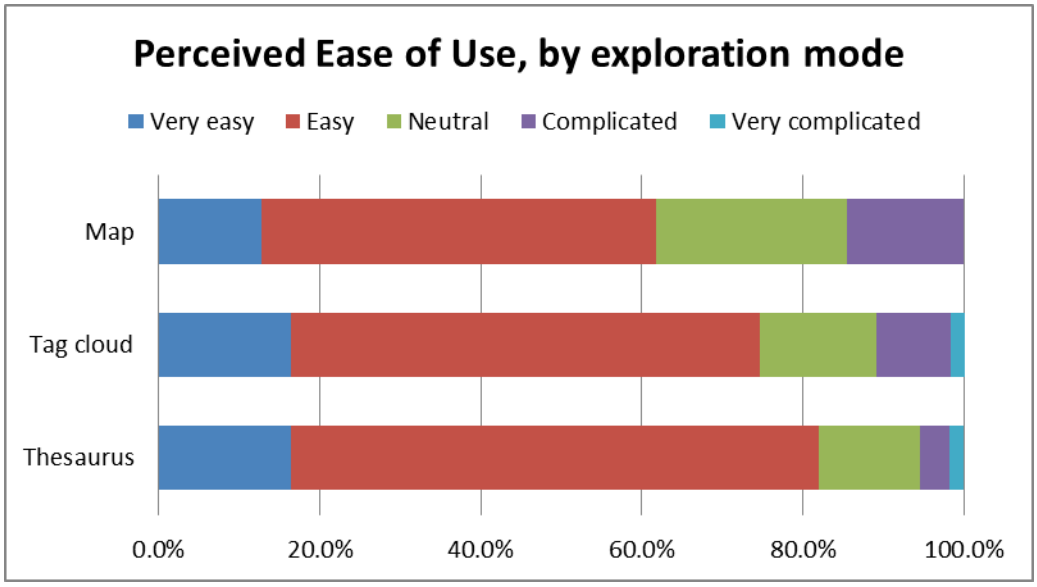

Figure 38 Ease of use by exploration mode: Demonstration responses

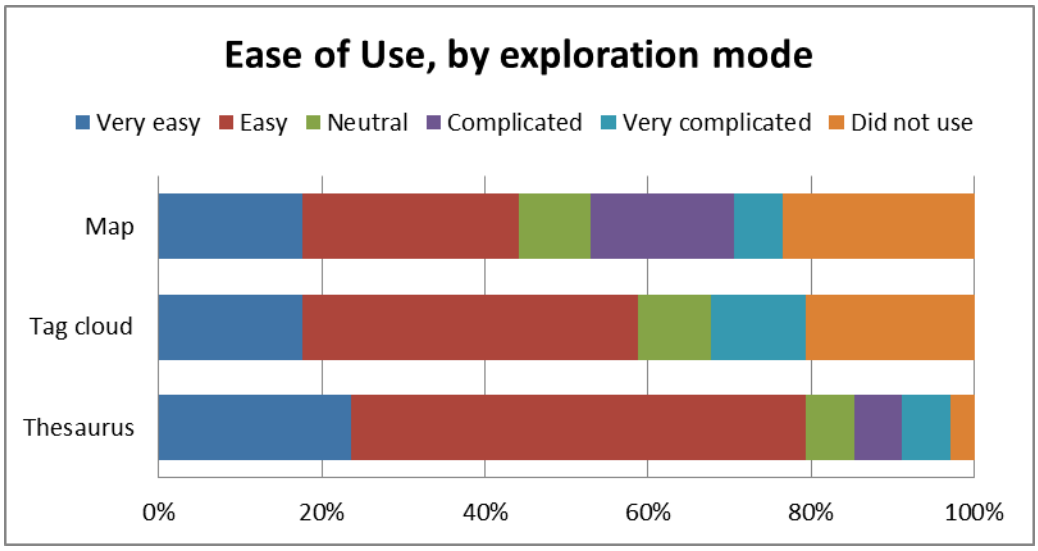

Figure 39 Ease of use by exploration mode: Laboratory responses

The majority of the Demonstration participants thought all the exploration modes Easy to Use (49%-66%), much smaller proportions being Very Easy (13%-16%) or Neutral (13%-24%). Over 10% rated the Map as Complicated and a small number (2%) thought the Tag Cloud and Thesaurus were Very Complicated.

The majority of the Laboratory participants were broadly positive about the ease of using the exploration modes of the PATHS system. Approximately 20% of participants found each of the three modes very easy to use. The difference in results arose amongst the Easy responses: 56% of participants believed that the Thesaurus was easy to use, while 41% felt the same about the Tag cloud, and only 27% considered the Map easy. It must be borne in mind that more than 20% of participants did not use the Tag cloud or Map mode, so the results are most accurate for the Thesaurus.

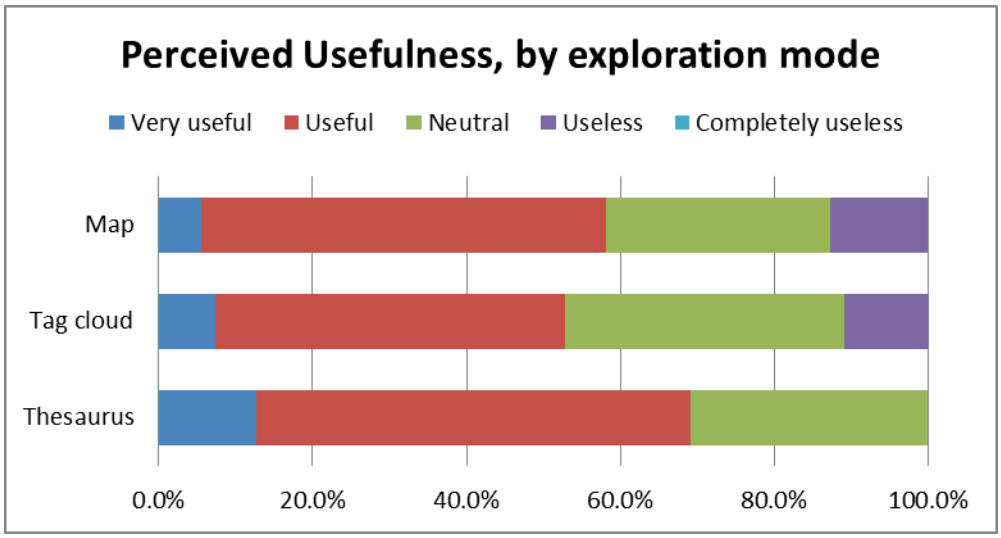

Figure 40 Usefulness by exploration mode: Demonstration responses

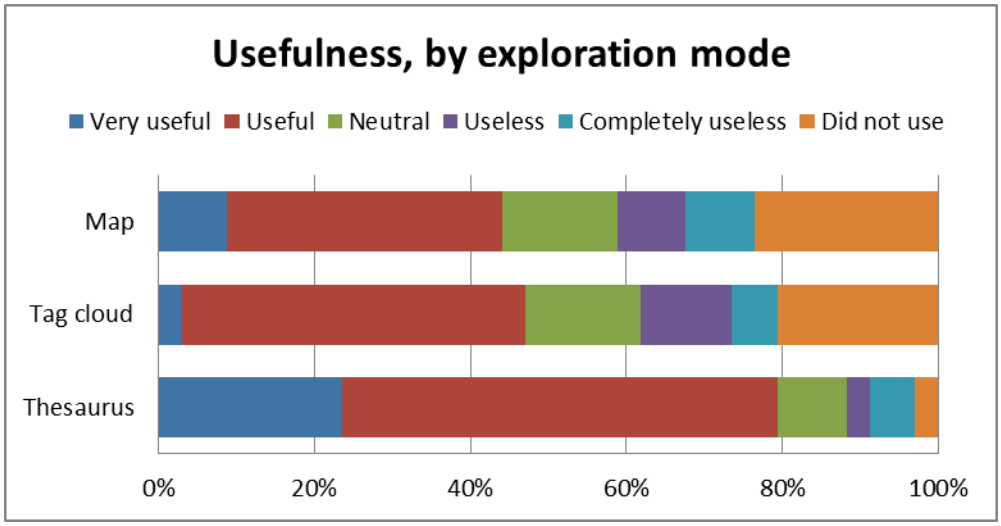

Figure 41 Usefulness by exploration mode: Laboratory responses

The majority of evaluation participants were positive about the usefulness of the different exploration modes of the system. The Thesaurus was found to be Very Useful/Useful by both evaluation groups (70%-80%), although a small number of Laboratory evaluation participants indicated Useless and Completely Useless. The Map and Tag cloud exploration modes were considered less useful with the Map (13%) and the Tag cloud (11%) being considered Useless by the Demonstration participants where between 29% - 36% were neutral about the usefulness of all three modes.

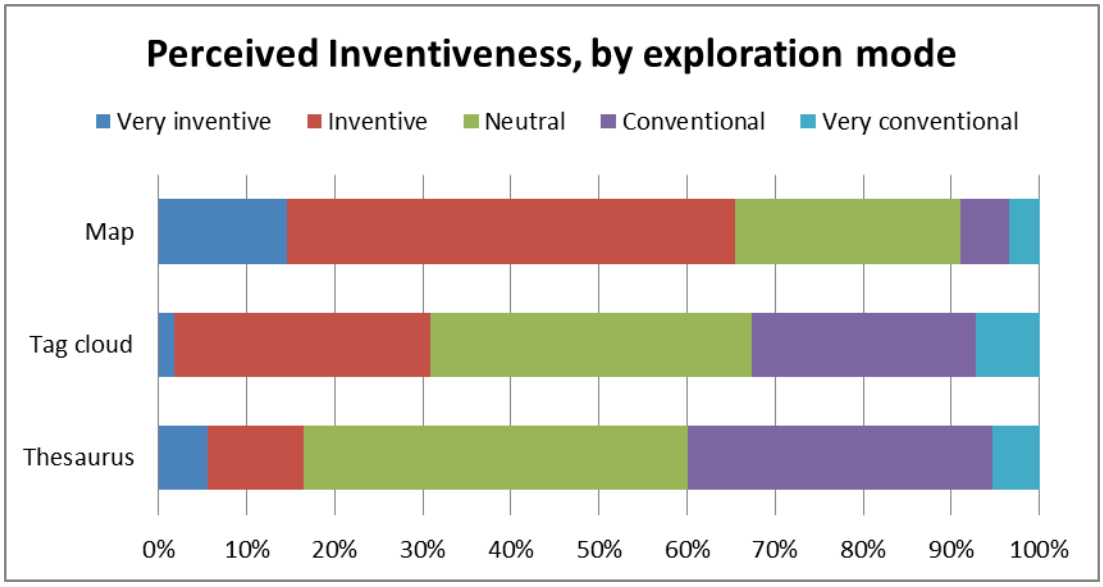

Figure 42 Inventiveness by exploration mode: Demonstration responses

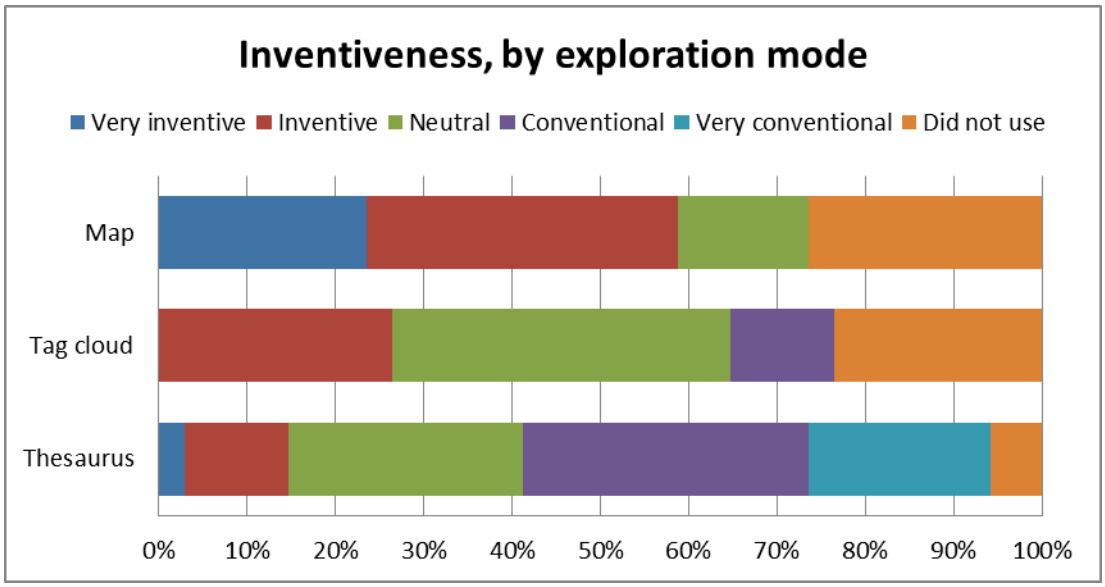

Figure 43 Inventiveness by exploration mode: Laboratory responses

The majority of Demonstration participants (66%) rated the Map as either Very Inventive (15%) or Inventive (51%). The Thesaurus was rated as the most Conventional/Very Conventional (41%), although 11% thought it Inventive. The Tag cloud was rated in-between the Thesaurus and the Map, 29% thought it Inventive, 36% were Neutral and 26% Conventional.

Of the 25 laboratory participants who used the Map mode, the majority found it Inventive or Very Inventive (80%). The originality of this PATHS design feature is clear from the fact that no one marked it Conventional or Very Conventional. In contrast, participants did not have strong feelings about the Tag cloud: 38% of users were Neutral, and no one deemed it very Inventive or Very Conventional.

Overall, the Thesaurus was rated the least inventive of the three modes, with 80% of participants labelling it very Conventional, Conventional, or Neutral. Given that 68% of participants preferred it as their first choice of the three exploration modes, 79% found it Very Useful or Useful and 79% Very Easy or Easy to use. It is, therefore, not surprising that the majority of participants are comfortable with the mode of exploration with which they are most familiar.

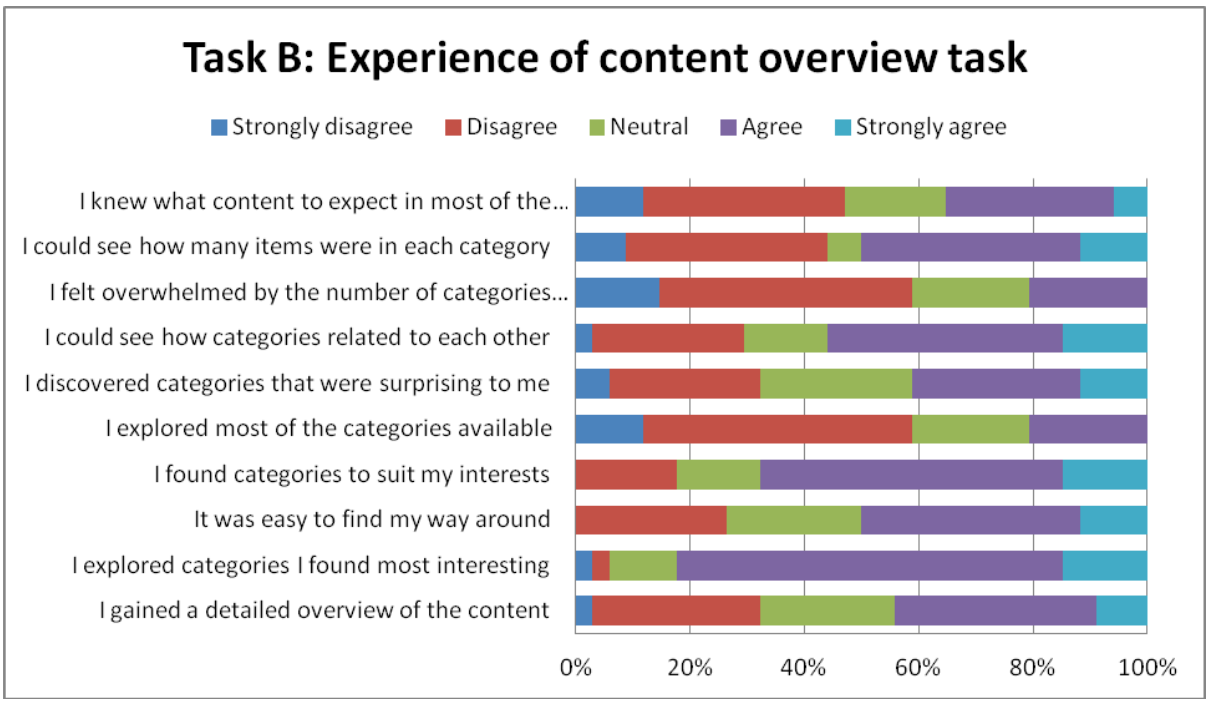

Figure 44 Experience of content: Laboratory responses

Laboratory participants were also asked about their level of agreement with a range of statements relating to their experience of this task. Previously in the profile questionnaire, participants overwhelmingly (91%) indicated that they browse around topics. In line with this, the majority of participants Strongly Agreed or Agreed that they explored categories they found most interesting (82%), found categories to suit their interests (68%), and could see how categories related to each other (56%). Half of participants Strongly Agreed or Agreed that it was easy to find their way around and that they could see how many items were in each category.

A small majority of participants did not feel overwhelmed by the number of topic categories available (59%). However, 59% also replied that they did not explore most of the categories available. It may be that they did not explore most of the categories because they focused on those they found most interesting to them. The percentage of participants who did not feel overwhelmed is also similar to the percentage of people who disagreed with the statement that there is too much information or that they do not know what to select (64%) in the profile questionnaire.

Participants were fairly evenly split as to whether they felt they discovered categories that were surprising (32% Strongly Disagree or Disagree, 42% Strongly Agreed or Agreed).

Reflecting this, only 35% Strongly Agreed or Agreed that they knew what content to expect in most categories, while 47% Strongly Disagreed or Disagreed with the statement.

4.4.1 Information seeking tasks

As described in the methodology section of this report, participants in the Laboratory evaluations were required to undertake five short structured tasks. Three information seeking tasks were provided (tasks C-E), comprising a combined simple and extended fact-find, open-ended browsing, and exploration. These tasks were rotated between users using a Latin square design, and Table X below indicates the number of users undertaking each of the task types in positions C-E in the task schedule. These tasks have been analysed in two ways. First, in order to compare the tasks by type, data collected as tasks C-E has been resolved to the task type. Second, the tasks have been analysed by the sequence they were undertaken, in order to investigate any issues of timing.

		Sequence in which tasks were completed			
		C	D	E	N
Task type	Fact-finding	12	11	11	34
	Open-ended browsing	11	12	11	34
	Exploration	11	11	12	34
Total		34	34	34	102

Figure 45 Sequence in which tasks were completed: Laboratory responses

Following each task C-E, participants were required to complete a brief form comprising three 7-point semantic differential scales and an answer box. The three scales allow the user to rate the task according to their familiarity with the subject matter (Familiar---Unfamiliar), ease of completing the task (Easy---Complicated), and how enjoyable it was to engage with the task (Enjoyable---Annoying).

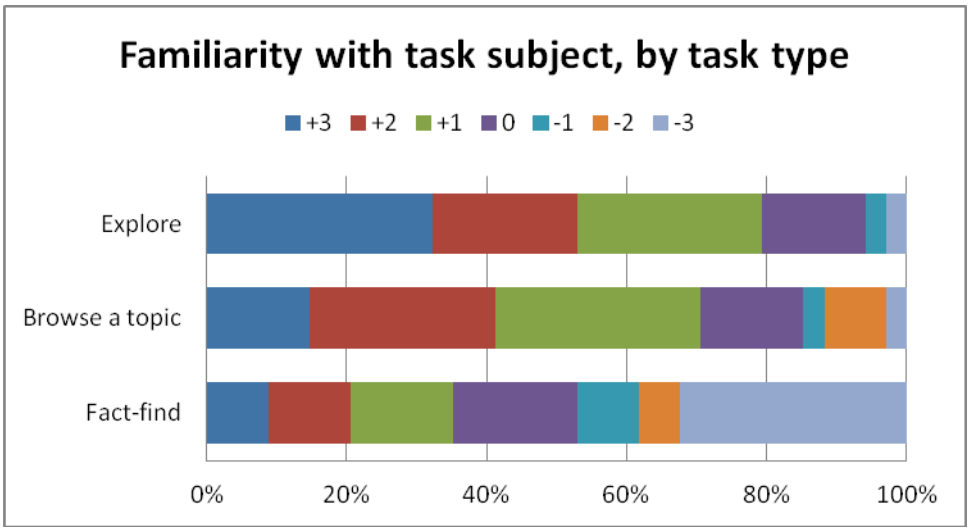

Figure 46 Familiarity with task subject

As might be expected, participants had the highest level of subject familiarity with the browsing a topic task (71% rating this +1 to +3) and the exploration task (79%). These tasks allowed for some degree of user interpretation and flexibility on subject matter, whilst the fact-finding task was much more prescriptive in its requirements. It is no surprise therefore, that the subject matter of the fact-finding task had a high degree of unfamiliarity amongst participants (47% rating this -1 to -3).

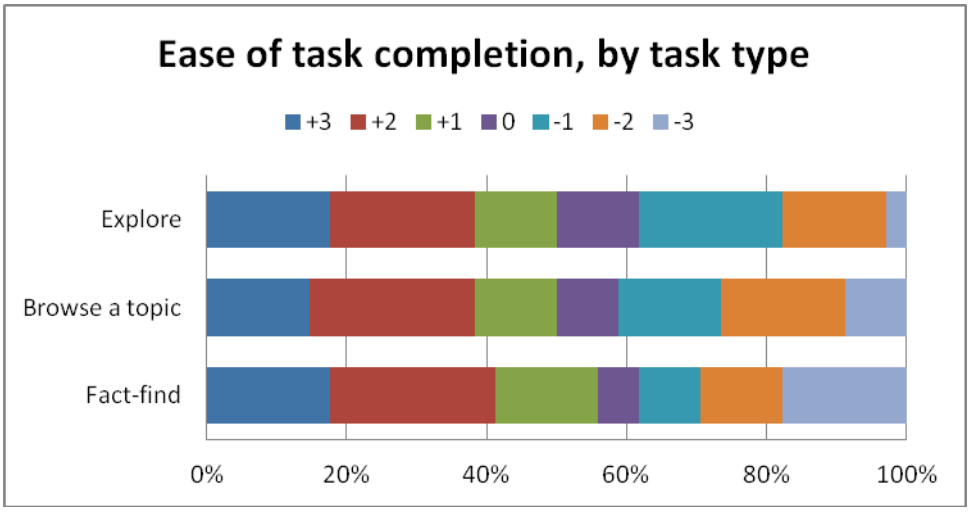

Figure 47 Ease of task completion by task type

The ratings for ease of completion are relatively similar across all three task types, with an overall positive response of (+1 to +3) from a majority of participants (ranging from 50% for browsing and exploration to 55% for simple fact-finding). Negative responses are also relatively even, ranging from 38% (-1 to -3) for fact-finding and exploration, and 41% for browsing a topic. However, fact-finding received considerably more -3 responses than the other two tasks, suggesting that a significant minority of users experienced major problems in completing this task. Further analysis revealed that novice users gave more negative responses for the fact-finding task, which could be a reflection on their lack of domain knowledge and/or technical searching and navigation skills.

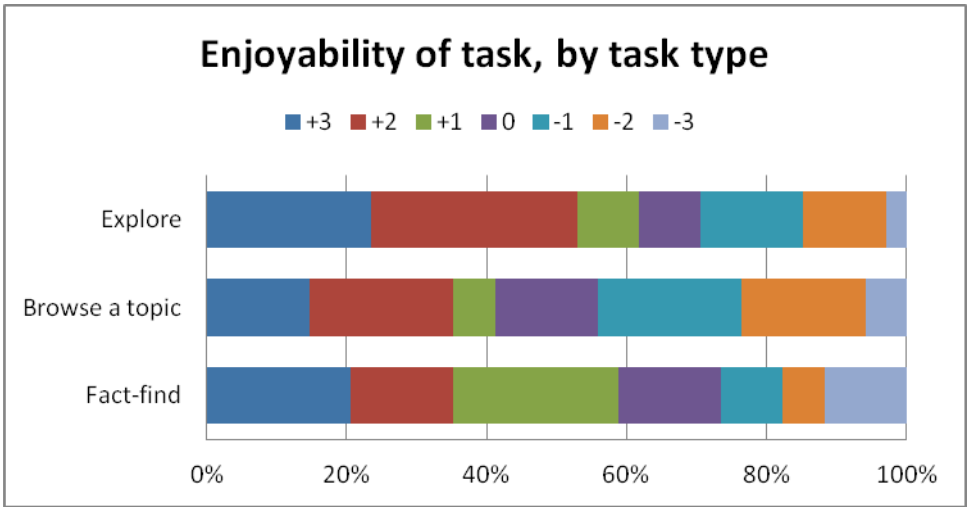

Figure 48 Enjoyability of the task by task type

There was greater variation in the ratings for enjoyability. The highest level of positive ratings (+3 to +1) rating was awarded to the exploration task (62%), closely followed by the fact-find task (59%), although the exploration task has a much greater proportion of higher +2 and +3 ratings. The least popular task was browsing a topic (41%), with correspondingly higher negative responses, however, the fact-find task has the most -3 negative responses overall (12%).

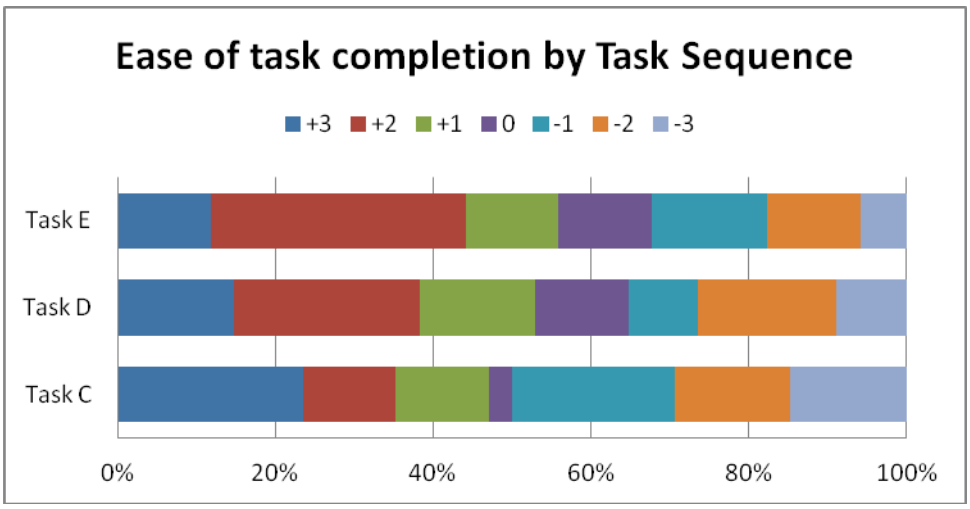

Figure 49 Ease of task completion by task sequence

When considering tasks by sequence of completion rather than by type, the amount of positive responses (+3 to +1) increased from the first (C) to the last (E), indicating a small learning effect from increased familiarity with the system. However, the level of +3 responses was highest for the first task (C). Surprisingly then, the first task also has by far the most negative responses (-1 to -3), and fewest neutral responses. Overall though, positive responses are shown for 50% or more of participants for all tasks.

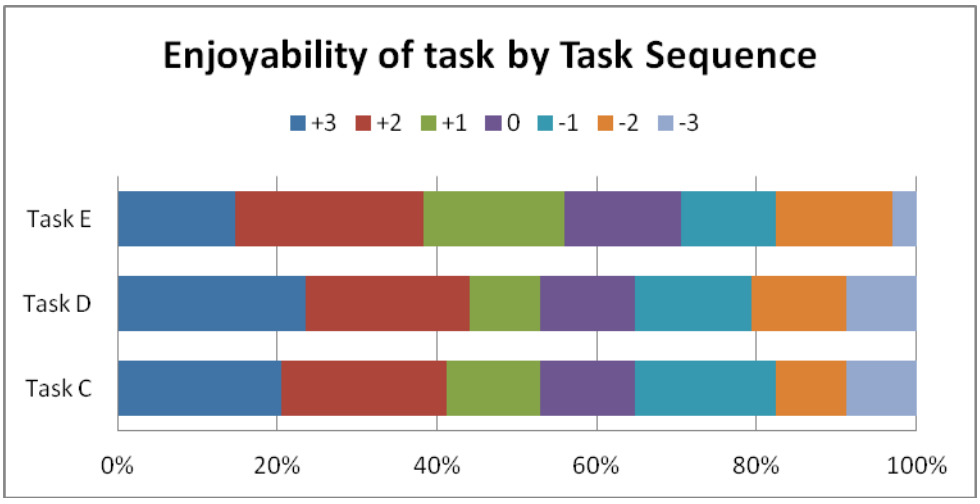

Figure 50 Enjoyability of the task by task sequence

Whilst positive ratings for ease of completion increase and negative ratings decrease over the course of the three tasks, both positive and negative ratings for enjoyability are broadly similar for all three tasks. This indicates that enjoyability is therefore more a factor of task type than of task sequence.

On analysing these data from the semantic differential scales in further detail, it is found that there is a statistically significant strong positive correlation of 0.754 (Spearman's Rank, 2-tailed, 0.01 level) between ease of task completion and enjoyability. This results seems relatively intuitive in that it would be reasonable to expect that easier tasks are more enjoyable, especially given that the opposite semantic for enjoyable was 'annoying'. In addition, a weaker positive correlation of 0.204 (Spearman, 2-tailed, 0.05 level) was found between familiarity with the subject and enjoyability of the task.

4.5 Contextual and additional content preferences

Participants were asked about additional exploration features that are currently offered in PATHS, or are being investigated for future implementation, including related items, recommended items, and links to external related content. There were no tasks specifically requiring the use of these features, but the Demonstration sessions did discuss these with participants. The main purpose of these questions is to further investigate and understand the potential usefulness and more specific user requirements for these features.

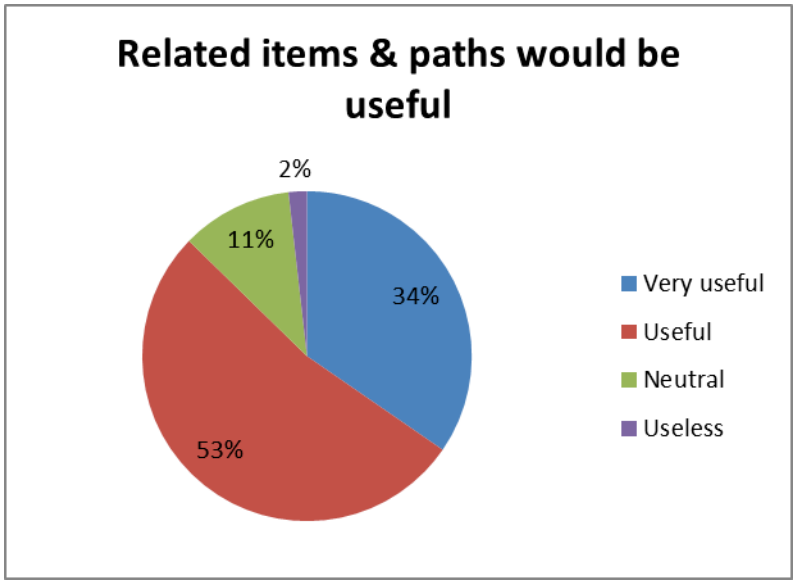

Figure 51 Related items & paths would be useful: Demonstration responses

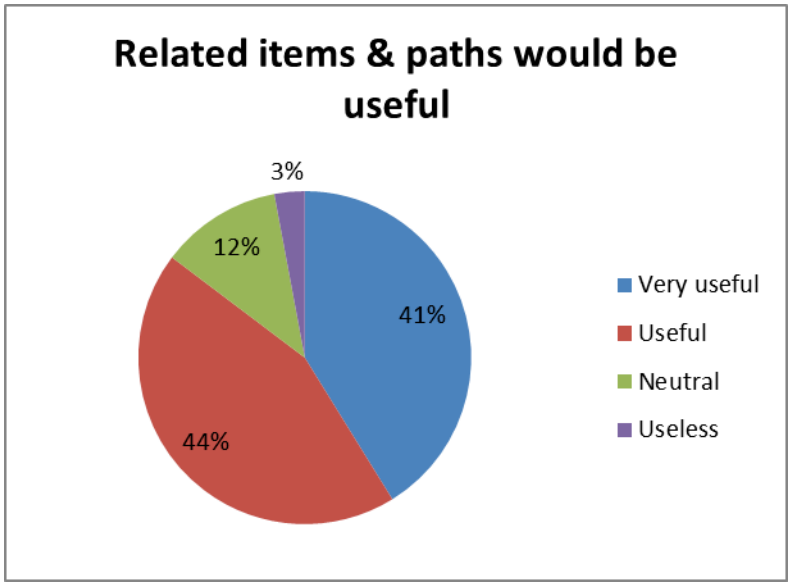

Figure 52 Related items & paths would be useful: Laboratory responses

Both evaluation groups indicated that Related Items and Paths would be either Very Useful (34% and 41% respectively) or Useful (53% and 44%) with a small percentage Neutral (11% and 12%) and just 3% Useless. A total of 88% of Demonstration participants responded that Related Items and Paths would either be Useful or Very Useful (35% Very Useful 53%, 53% Useful). A total of 85% of Laboratory participants indicated that they would find related items or paths either Very Useful or Useful.

It is interesting that relatively few Laboratory participants were observed making use of this feature in the course of completing the previous tasks, and seemingly less so than for the first prototype. This may be due to several factors: the related content was not available for all items and paths at the present time; there may possibly be an interface design issue in displaying this content; or, there were sufficient other tools available to complete the tasks without needing to use related items.

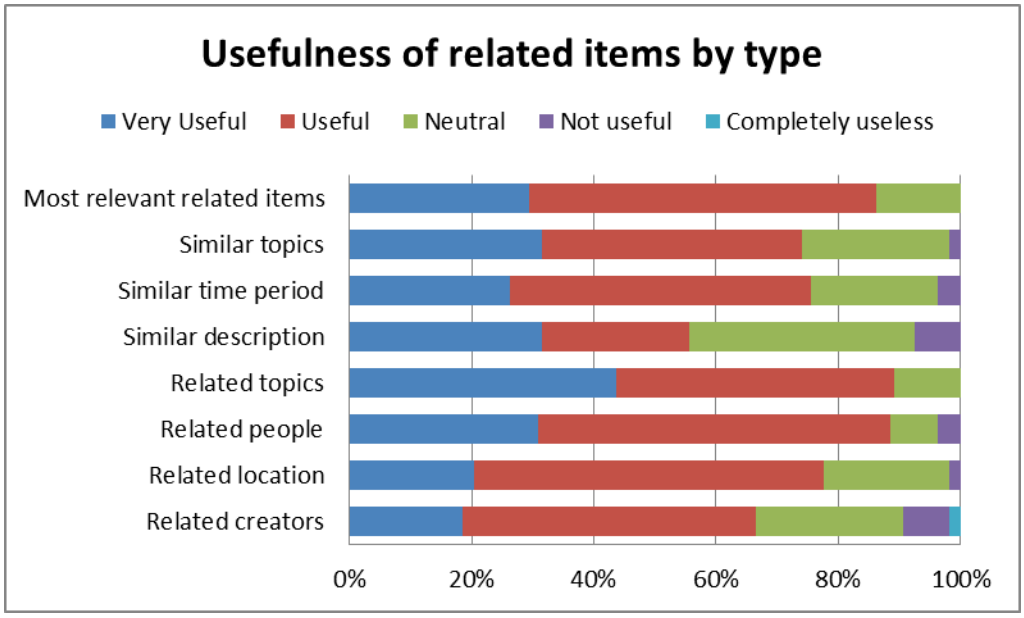

Figure 53 Usefulness of related items by type: Demonstration responses

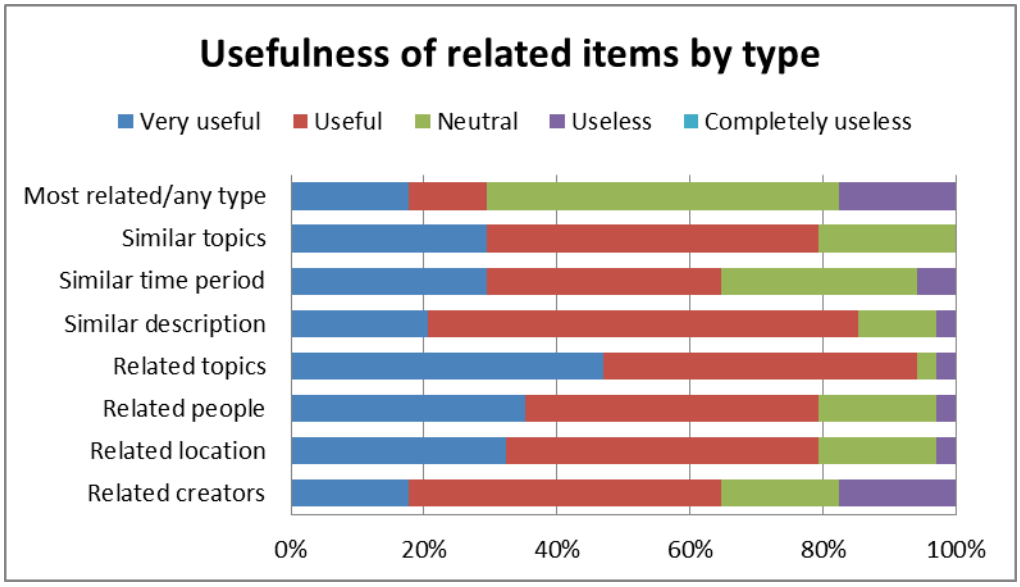

Figure 54 Usefulness of related items by type: Laboratory responses

At present, where possible, we display related items in the PATHS system by their relationship type. Over 40% of both the evaluation groups responded that Related Topics would be Very Useful with the same proportion again responding Useful. After Related Topics, the next most popular choices of related items are Related People and Related Locations, Similar Topics. Similar Descriptions had a mixed response and Related Creators was less popular although over 60% in both groups rated this as Very Useful/Useful. The biggest difference was for Most Relevant Related Topics which was the third most popular type of related item in the Demonstration participants (87% Very Useful/Useful) but by the far least popular type with the Laboratory group, many of whom were Neutral.

90% of Demonstration participants rated Related Topics most useful (44% Very Useful, 46% Useful), with Related People closely behind with 89% (31% Very Useful, 58% Useful). These were followed by Most Relevant Related Items with 86% (29% Very Useful, 57% Useful).

At least 65% of Laboratory participants rated all options Very Useful or Useful, with the exception of Most related items, regardless of type (29%). It may be that this last option was not fully understood, or is genuinely not of interest. The highest positive response was given for Related Topics, followed by Similar Descriptions, with the nuances of Time Period and Related Creators, scoring less well.

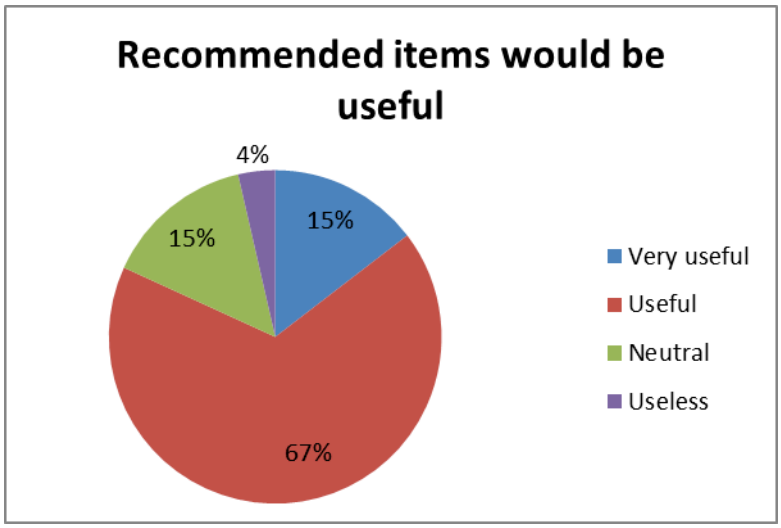

Figure 55 Recommended items would be useful: Demonstration responses

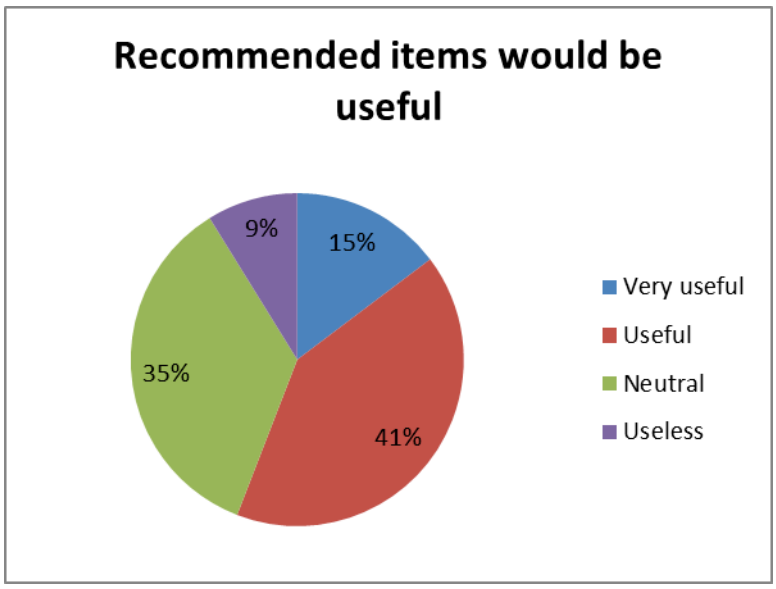

Figure 56 Recommended items would be useful: Laboratory responses

Recommended Items were not yet implemented in the prototype used by the laboratory participants for their evaluations. Responses to this question are therefore hypothetical.

The Demonstration participants mainly thought that Recommended Items would either be Very Useful (15%) or Useful (67%), 82% overall. Only 9% said Useless. A total of 56% of Laboratory participants indicated that they would find Recommended Items either Very Useful or Useful, with a much higher level of neutral (35%) and negative responses (9%), than for Related Items.

Despite the difference in responses between the groups, overall Recommended Items are seen as a good feature to have.

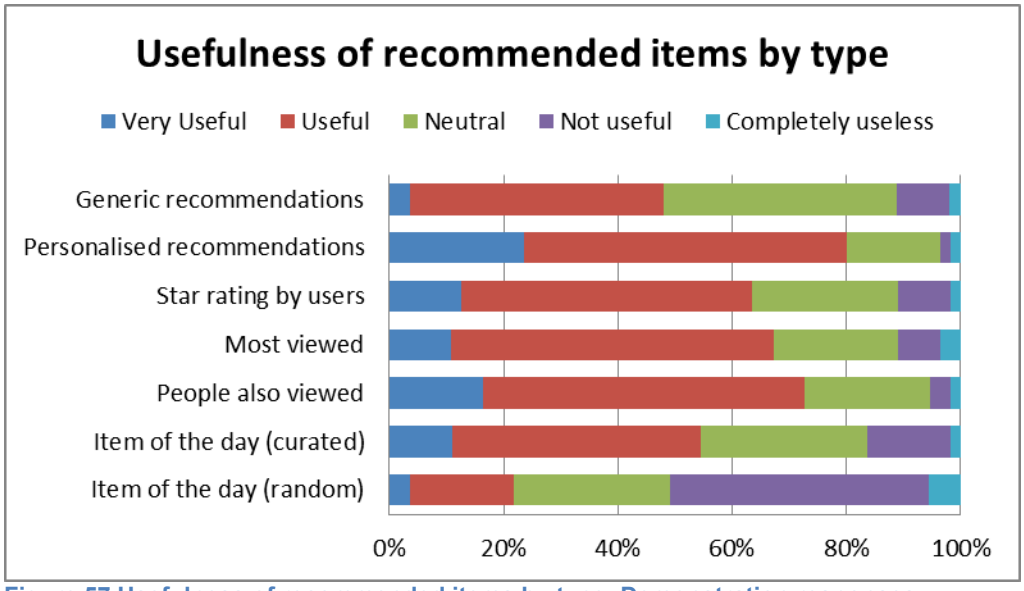

Figure 57 Usefulness of recommended items by type: Demonstration responses

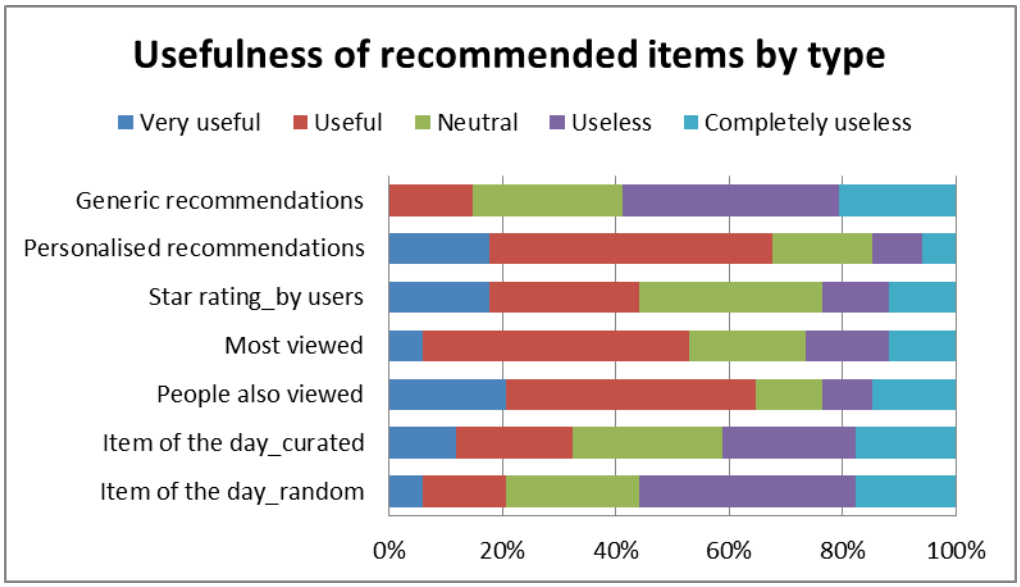

Figure 58 Usefulness of recommended items by type: Laboratory responses

When asked about the Usefulness of recommended items by type, the Demonstration evaluation participants favoured *Personalised* recommendations the most (24%) while the Laboratory evaluation participants showed a slight preference for *People also viewed* (20%) as Very Useful. *Personalised Recommendations* was the most popular choice for both groups when the Useful responses are added to Very Useful. *Star rating by users* and *Most viewed* were the next most popular recommended item, *Random item of the day* being rated the least useful overall. The main difference between the groups was *Generic recommendations* where 11% of Demonstration evaluation participants rated this as Useless/Completely Useless compared to nearly 60% of the Laboratory evaluation participants, the latter group also being less enthusiastic about *Curated Items of the day* (over 40% to 17% as Useless/Completely useless).

Three options were rated Very Useful or Useful by a majority of Laboratory participants: *Personalised Recommendations* (67%); *People who viewed this also viewed these* (64%);

and, the *Most viewed items* (53%). Slightly less popular (44%), but with a high neutral response was the option to *star ratings* awarded by other users. *Generic recommendations* received the highest negative response with 59% rating this option Useless or Completely Useless, closely followed by the more specific, but still generic, *Random item of the day* option (56%). Surprisingly, the option for *Curated item of the day* also received a relatively high negative response (41%), as previously participants expressed a strong preference for paths generated by curators. There was a clear preference for personalised over generic recommendations, and for those crowd-based recommendations that users are familiar with in other web-based environments, including shopping and social media.

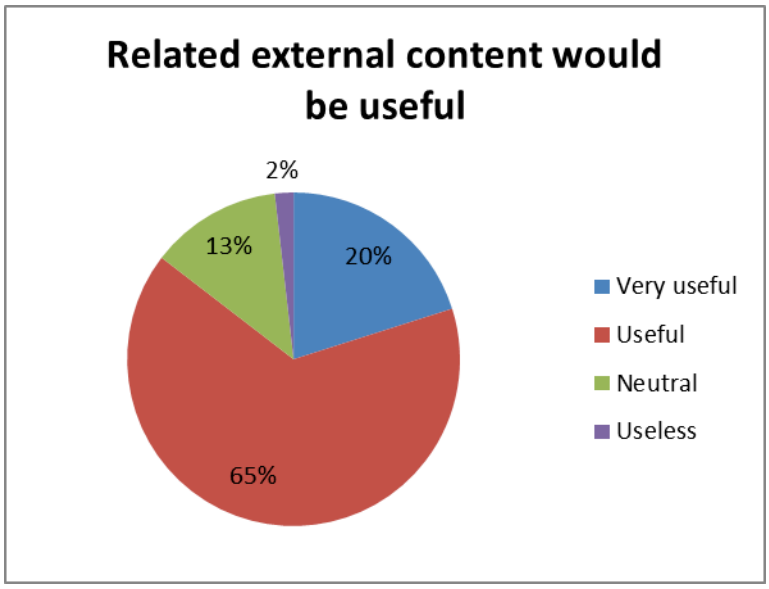

Figure 59 Related external content: Demonstration responses

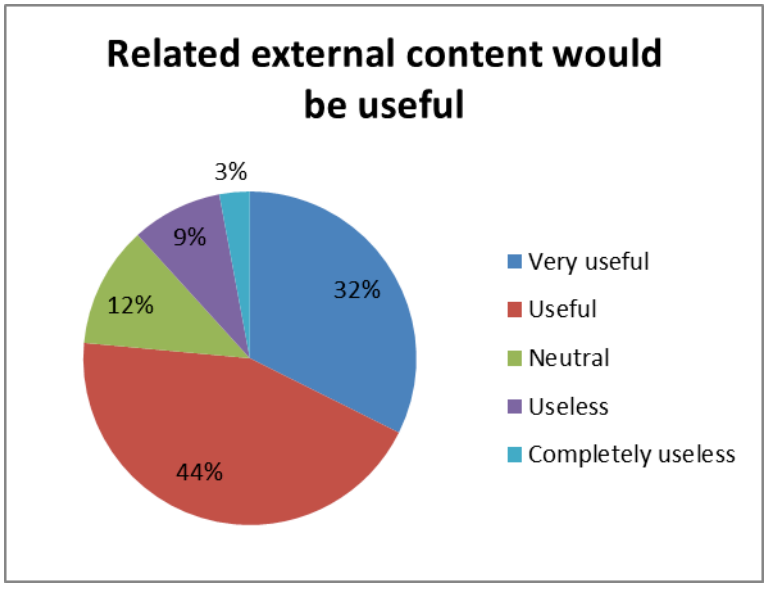

Figure 60 Related external content: Laboratory responses

In the second prototype links to external content in Wikipedia are provided as an additional source of contextual information and as a means of exploration. These links are presented as topic hyperlinks in the item record, although there is no immediate indication of where

they lead to if followed. Whilst Related External Content was seen as useful by both sets of participants (85% of Demonstration participants and 76% of Laboratory participants), reservations were expressed by Demonstration participants of the appropriateness of links to Wikipedia, for example *'Academic rather than Wikipedia'* and *'Reliable sources - preferably academic/heritage, i.e. not Wikipedia'*. This is contrary to an earlier question where we found that Wikipedia was one of the most frequently used sources of cultural heritage information, and is also cited frequently here a preferred source for background links.

In the Laboratory evaluation, relatively few participants were observed using these background links, yet, once again, there was strong support for inclusion of links to external related content, with 76% rating this feature as Very Useful or Useful.

Other sources mentioned by several participants include museum, gallery, archive and library web sites, other general content such as the Encyclopaedia Britannica and the Oxford Dictionary, specialist subject collections, scholarly sources such as journal articles, and multimedia content including images, videos and maps.

Summary of Suggested External Content	**Count**
Academic/scholarly sources	5
Related organisations	4
Specialised sources (range)	11
A range of sources, all sorts	4
Wikipedia	4
Dbpedia	2
Blogs, social networks	1
Other specific (named) websites	2
Europeana	1

Figure 61 Suggested external content: Demonstration responses

4.6 Path creation

A longer more involved and interpretive path creation task was undertaken by Laboratory participants, with an allowance of 30 minutes in which to complete the task. This was also followed by a brief feedback form, using the same three semantic differentials as for the earlier tasks, plus a range of other feedback about perceived task performance and decisions made during its completion.

As before, Demonstration participant responses are based upon viewing and interacting, via the Moderator, functions and tasks demonstrated. Laboratory responses are based upon undertaking the task. A new and unique path was created with each Demonstration group, dependent on their interests, for example, John Priestley with Expert Creators from a Science Museum. Participants could suggest items for inclusion in the path, the order of items, descriptions, links, metadata etc.

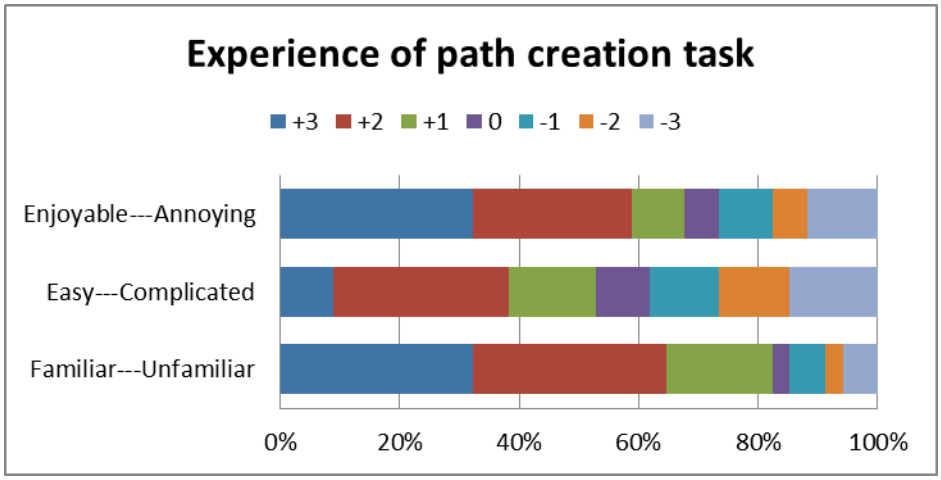

Figure 62 Experience of path creation task: Laboratory responses

As with the information seeking tasks above, participants rated their experience of completing the path creation task against three 7-point semantic differential scales. A high majority of users chose a subject with which they are familiar, and it may be assumed that the remainder may have been constrained by the range of topics that were available with sufficient content from which to make a satisfactory path. Observations and interviews support this finding, and some participants were even able to find topics in which they have a more detailed research or study interest. All three scales have a majority positive response (+3 to +1) above 50%. It is interesting to note the discrepancy between the task being easy to complete and being an enjoyable experience; whilst a significant minority of users found the task to be complicated to some degree, they may still have found it to be enjoyable rather than annoying.

As with the shorter information seeking tasks (C-E) there is a statistically significant strong positive correlation of 0.778 (Spearman's Rank, 2-tailed, 0.01 level) between ease of task completion and enjoyability, and a weaker positive correlation of 0.394 (Spearman, 2-tailed, 0.05 level) was found between familiarity with the subject and enjoyability of the task. These correlations are both higher than for the shorter information seeking tasks, emphasising the importance of ease of completion (and an inferred high degree of usability) and familiarity with the subject, for enjoyment of more complex and extended information tasks.

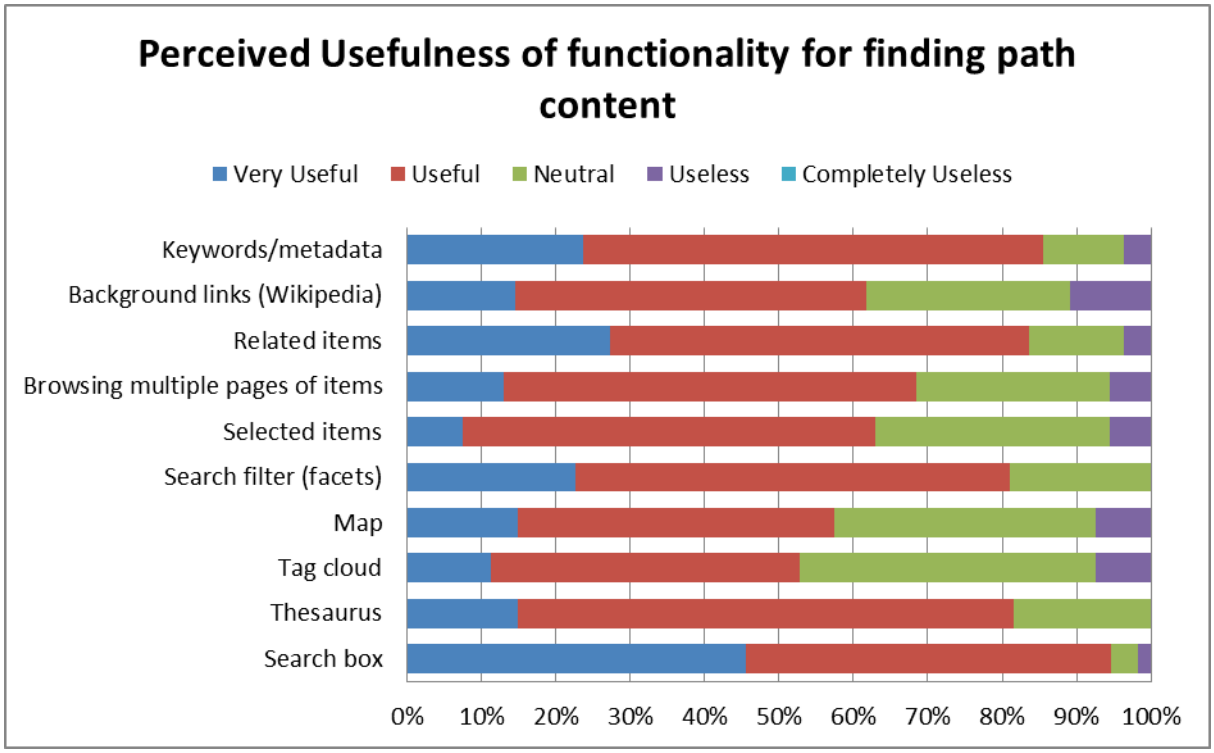

Figure 63 Usefulness of functionality for finding path content: Demonstration responses

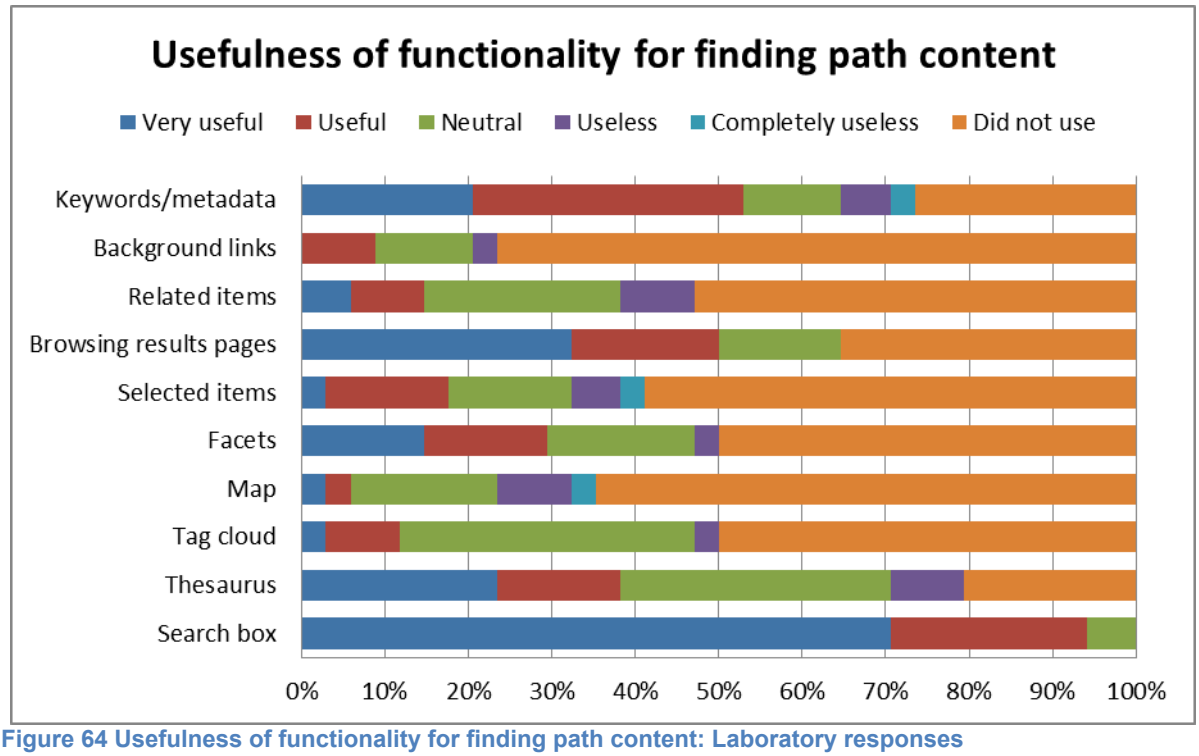

Figure 64 Usefulness of functionality for finding path content: Laboratory responses

Demonstration participants were asked which of the PATHS functionality they would prefer to use as a means of finding content for their path, and how useful they perceived each of these elements in undertaking this task. The majority of Demonstration participants were very positive about the different functionality for finding content for a path. 95% thought the

Search box useful, 86% for Keywords/Metadata, 83% for Related items, 82% Search Filter/Facets and 82% Thesaurus (all Very Useful and Useful).

Laboratory participants were asked to recall which of the PATHS functionality they used as a means of finding content for their path, and how useful each of these elements were in undertaking this task. Every participant used the Search box, with 94% finding it Very Useful or Useful. Other features with a high positive rating are the hyper-linked keywords and other metadata (53%) and browsing multiple results pages (50%). The thesaurus (38%) and facets (29%), also scored relatively well. These results indicate that participants have favoured the strategies and functionality that they use regularly in other systems, although there is also evidence of many people trying the new exploratory features to some degree.

If we consider responses from only those participants who used these respective features, results show that all features had a median response that was at least neutral, and that there are therefore no features (once used) that have a majority of negative responses. Positive responses (Very Useful and Useful) are also higher when considering responses from those who actually used the features in question: Search 94%; Keywords 72%; Results pages 77%; Thesaurus 48% and, Facets 59%.

When considering responses according to expertise, Novice users (55%) rated the Thesaurus much more highly in terms of being Very Useful or Useful than Expert users (29%). Higher preference was also shown for the Tag Cloud and Map by Novice over Expert users. In contrast, Expert users indicated a higher preference than Novices for Search, Facets and Keywords. It appears that Novice users may prefer the more novel exploration modes, whereas Expert users opt for the more traditional search and library-type functionality. This may reflect the fact that domain and subject knowledge is an important factor in using search and library tools effectively, whereas the exploration modes allow for browsing and exploration strategies to compensate where subject knowledge is not as well developed.

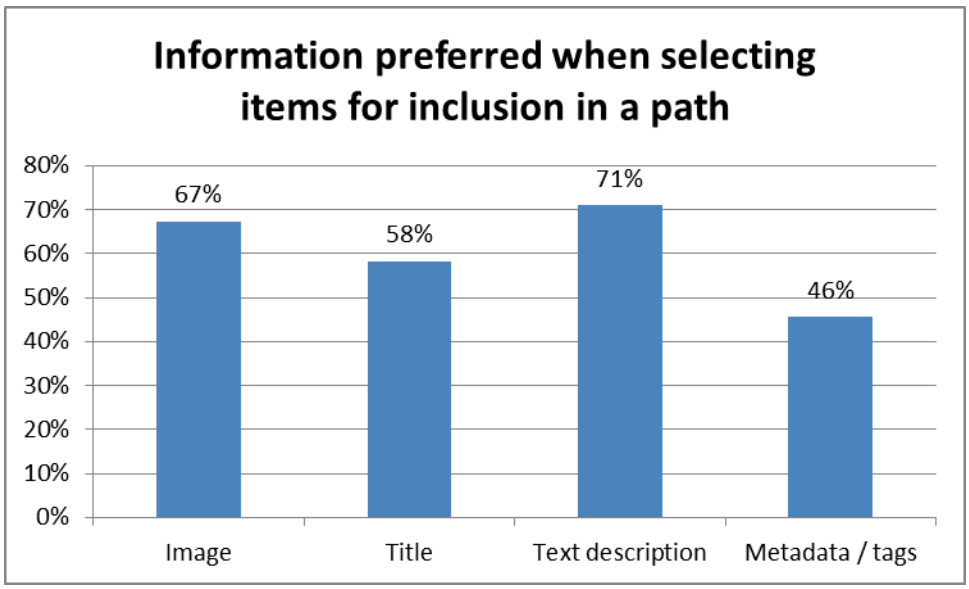

Figure 65 Information preferred when selecting items for inclusion in a path: Demonstration responses

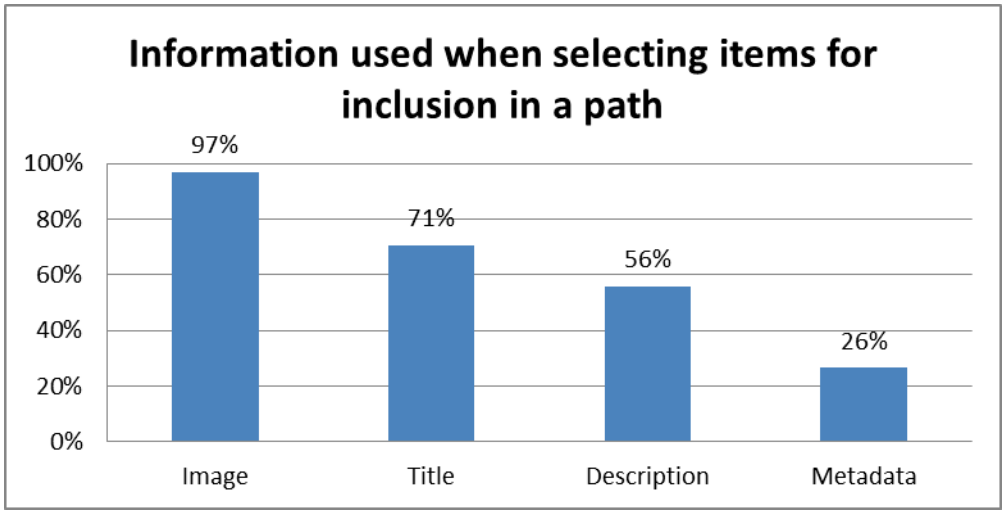

Figure 66 Information used when selecting items for inclusion in a path: Laboratory responses

Participants were also asked a series of questions about their strategies for selecting and organising content within the paths they created. First we asked which information in the item records they used as a basis for choosing items to include. As with our findings for the first prototype, and in the cultural heritage information seeking literature (Skov & Ingwersen, 2008), Laboratory participants reported that the image is used most frequently (97%). Of the textual data, Title was used by the most users (71%), followed by the Item Description (56%), and the Metadata (27%).

Demonstration participants were asked what information they would be most likely to use when choosing items for a path, 71% responded that they would use Text information, closely followed by Image (67%), Title (58%) and Metadata (46%).

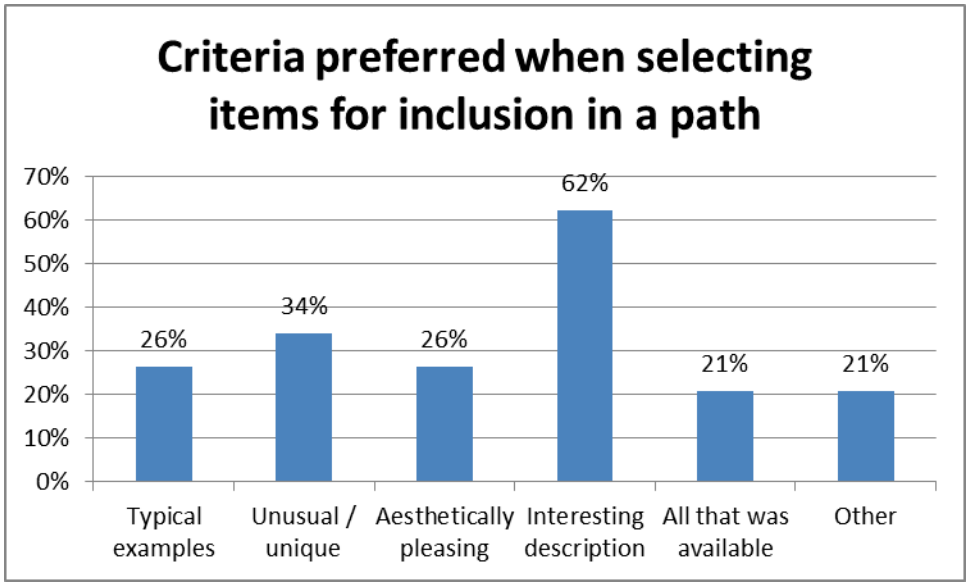

Figure 67 Criteria preferred when selecting items for inclusion in a path: Demonstration responses

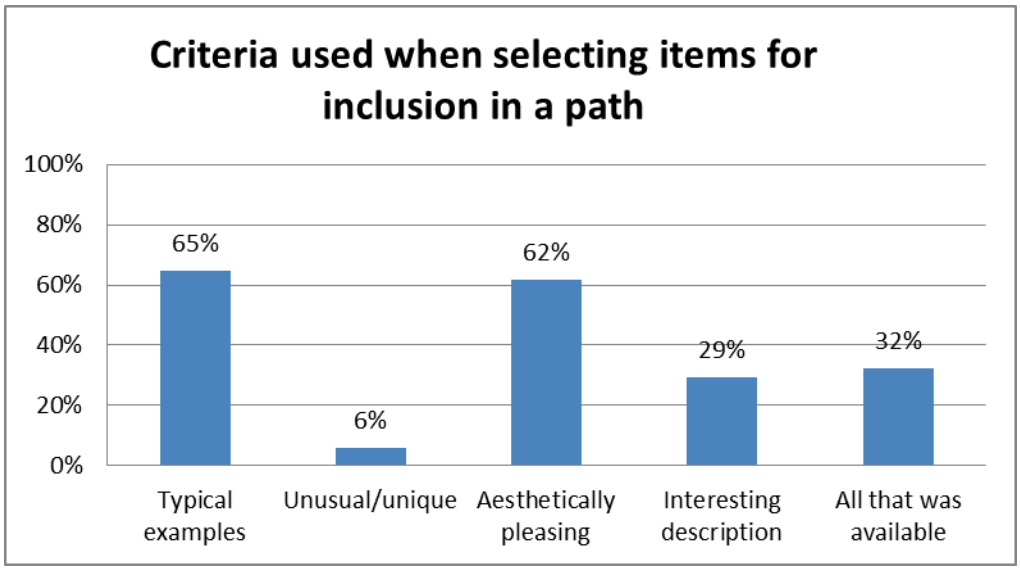

Figure 68 Criteria used when selecting items for inclusion in a path: Laboratory responses

Demonstration participants were asked what criteria they would be most likely to use when choosing items for a path, by far the most preferred criteria for selecting items was Interesting Descriptions with 62%. Other criteria for including items were much less popular, with Unusual/Unique items with 34%, Typical Examples and Aesthetically Pleasing both with 26%.

Laboratory participants were most likely to look for Typical Examples to illustrate their topic (65%), or those which they found Aesthetically Pleasing (61%). The least popular criteria was for items which are Unique or Unusual (only 6%), suggesting that novelty is not important.

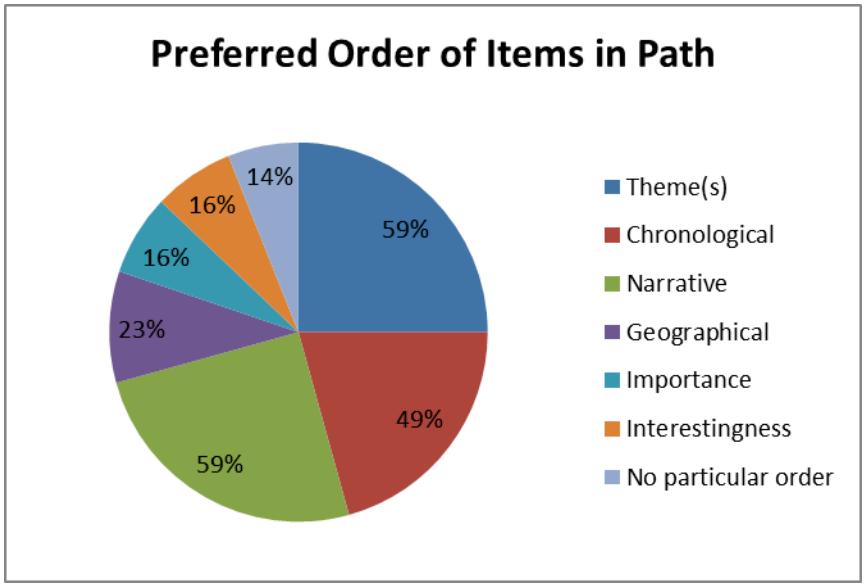

Figure 69 Preferred Order of items in a path: Demonstration responses

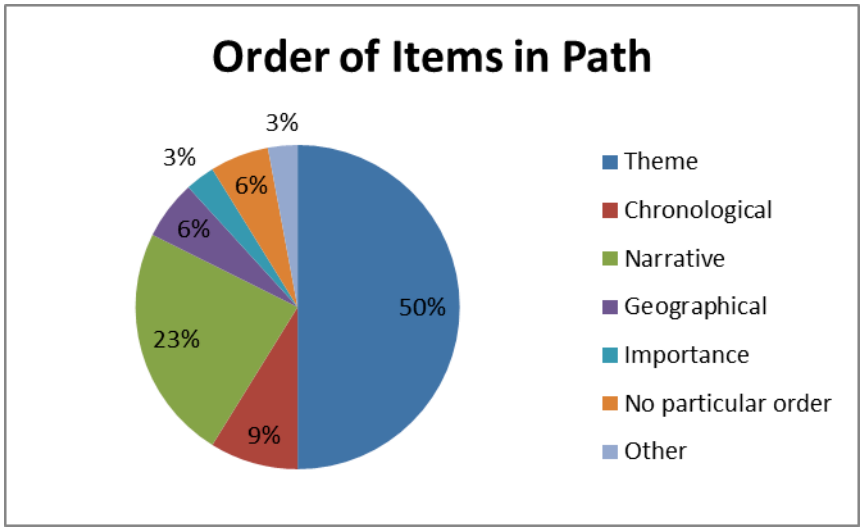

Figure 70 Order of items in a path: Laboratory responses

In the first PATHS prototype, the path was initially created with items listed according to the order in which they were collected, and users could then rearrange them to suit their needs, in a linear format only. In the second prototype, users are required to actively move items into the path one by one, and they can be placed in more complex formats, using varying degrees of branching (hierarchies). Demonstration participants were asked how they would prefer to order their own path. 59% selected Theme and Narrative, next most popular was in a Chronological Order (49%).

With the new path creation mode of the second prototype, we find that half of all paths created by Laboratory participants were ordered by one or more Themes, with Narrative the next most popular format (23%) and Chronological Order (only 9%). In contrast, in the previous linear mode, Chronological Order was the most popular (32%), Narrative was the same at 23%, ordering by Theme was attempted by only 9%, and 23% did not attempt to impose an order at all. It appears that functionality has a strong impact on the type and format of paths created, and in the latest prototype, we are able to support the thematic and narrative-based structures that are often favoured in cultural heritage contexts.

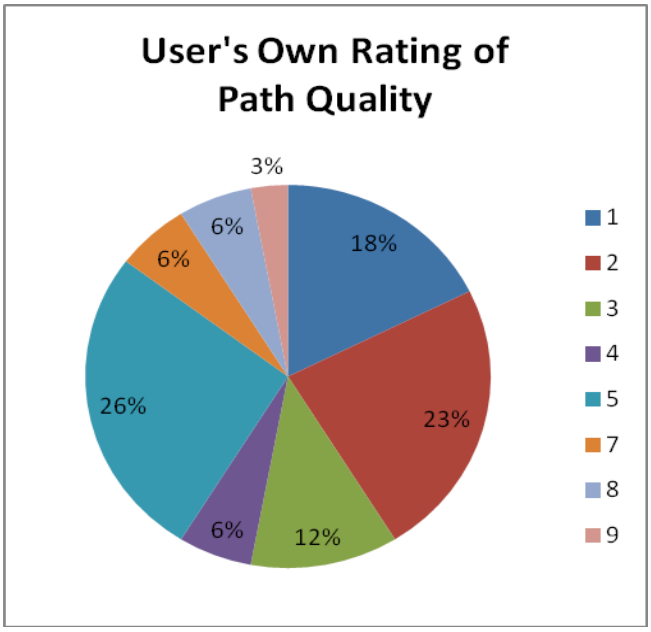

Figure 71 User's own rating of path: Laboratory responses

Laboratory participants were asked to rate the path they created on a scale of 1-10 (low-high). Ratings for paths on the second prototype ranged from 1-9 (for the first prototype, the highest rating was 7), with 85% of users rating their path as 5 or less. The relatively low ratings are to be expected given that this was the first time they had used the system and created a path, and that they were working within time constraints, but it is encouraging to see a small number of higher ratings than previously. A small majority (53%) gave a rating of 1-3 for their efforts, compared with 45% for the first prototypes. 32% gave a rating of 4-5 (compared with 30%), and 15% gave a rating of 7-9.

In direct contrast to the first prototype, when analysed by CSA types, it is found that Wholists were much more critical of their efforts than Intermediates or Analytics. However, Imagers were still somewhat more critical of their own efforts than Verbalisers of Bimodals. Higher ratings (7-9) were spread relatively evenly across all types on both CSA scales, suggesting that the CSA type may have more impact in assessing poor than high quality, where other factors may be important.

Figure 72 Path improvement suggestions Laboratory responses

After rating their path, participants were asked what they might do to improve it, given more time and resources. A summary of these detailed free-text responses is shown in the Wordle graphic in Figure 72. Ignoring the word ‘path’ with the largest word count, it is clear from this graphic that the most prominent issue for participants relates to the images in the collection, although this is much less prominent than it was for the first prototype, suggesting that improved links to the original source material may have overcome some these issues. There are also a significant proportion of comments about the content of the path, including ‘topic(s)’, ‘items’, and ‘examples’, perhaps suggesting that these would be developed further.

An additional area of concern is the contextual content with emphasis on terms such as ‘text’, ‘description(s)’, ‘content’ and ‘detail’. As with the first prototype, we find much less emphasis on words relating to information behaviour and the mechanics of path creation (e.g. ‘research’, ‘find’, ‘create’, ‘make’, ‘include’), and ‘search’ has disappeared, perhaps indicating less reliance on this mode of operation. Again, there is some evidence of quality issues (e.g. ‘relevant’, ‘limited’, ‘better’, ‘quality’) that could relate to any aspect of the system and content, although these have reduced in emphasis. Issues relating to ‘time’ constraints are also strongly represented, indicating that effective and satisfactory path creation is likely to need more than the 30 minutes allowed in the evaluation setting.

On analysing the full text in more detail, it appears that the major issues with wanting to see and include larger images has declined, although there is still a desire to find ‘better’ images’. Other common concerns relate to; finding relevant content; including more detailed contextual information, in particular adding in external content; having time to add descriptions and narratives; and, working more on the structure and ordering of the path content. This latter concern is much prevalent than with the first prototype, probably due to the more sophisticated functionality available and the associated opportunity to create more complex paths.

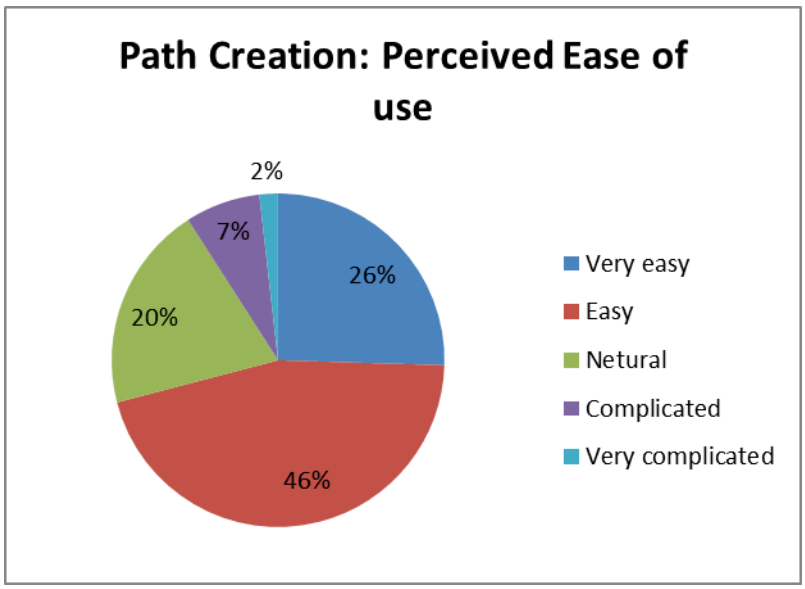

Figure 73 Perceived Ease of use: Demonstration responses

A large majority (72%) of Demonstration participants thought path creation seemed easy to use (26% Very Easy, 46% Easy). Only 9% thought it seemed Complicated/Very Complicated.

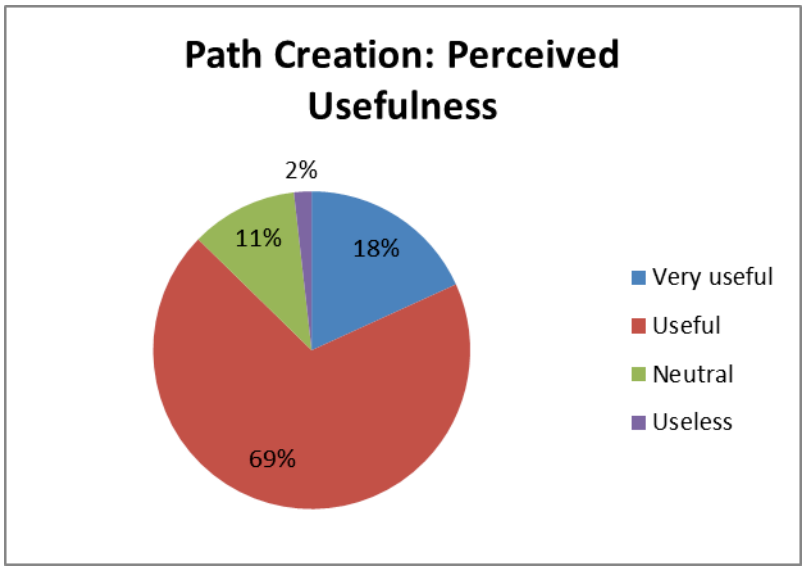

Figure 74 Perceived Usefulness: Demonstration responses

Almost all Demonstration participants, 87%, thought path creation was useful (18% Very Useful, 69% Useful). Only 2% thought it Useless.

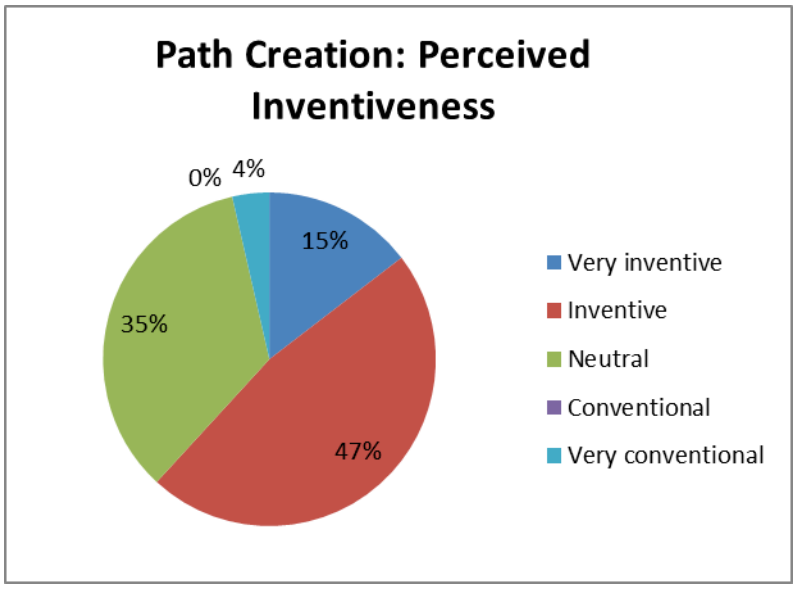

Figure 75 Perceived Inventiveness: Demonstration responses

The majority (62%) of Demonstration participants thought path creation was inventive (15% Very Inventive, 47% Inventive). 35% were Neutral about the inventiveness of path creation, whilst only 4% thought it seemed Very Conventional.

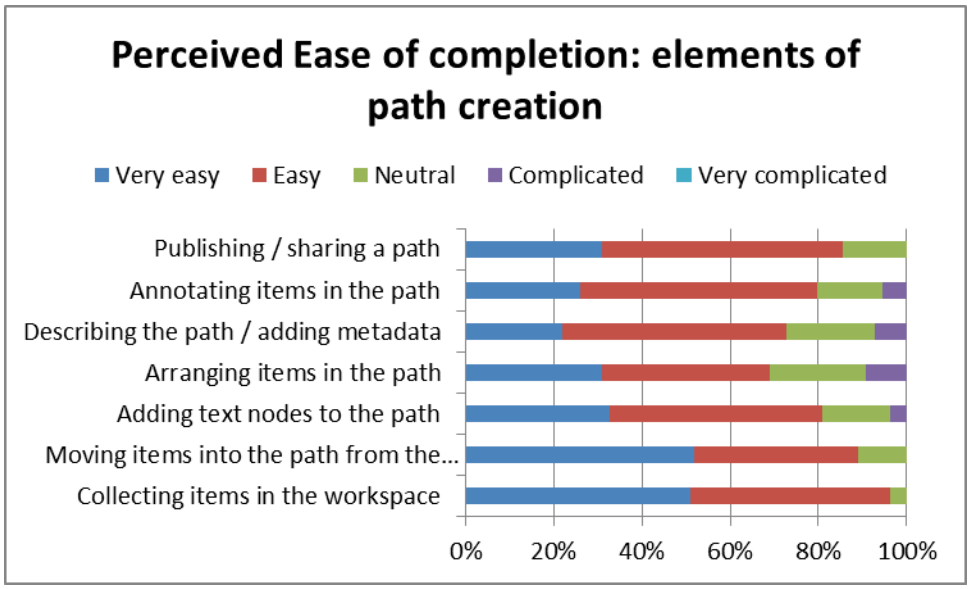

Figure 76 Perceived Ease of completion: Demonstration responses

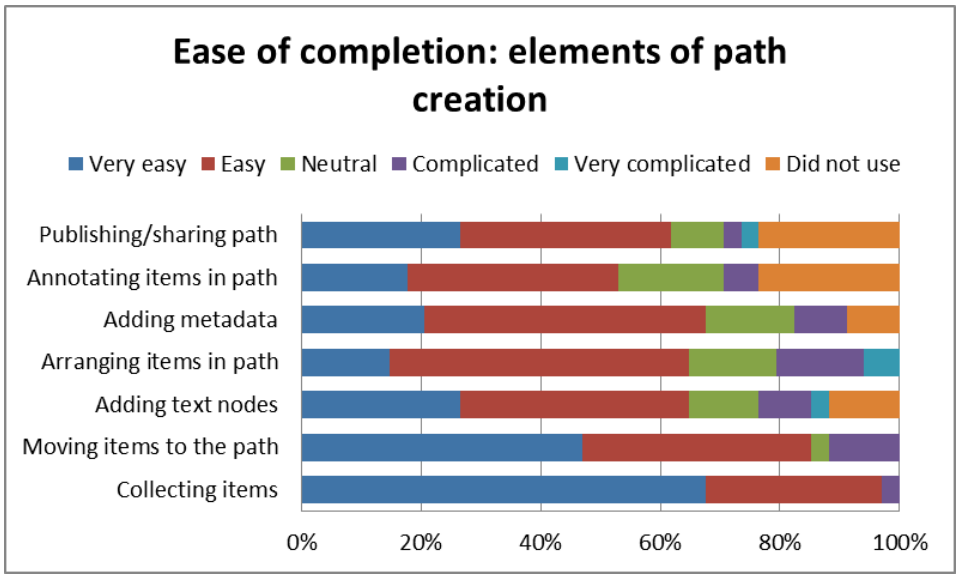

Figure 77 Ease of completion: Laboratory responses

Demonstration participants were asked to rate each of the main elements of functionality in creating a path. The majority of participants thought all elements Very Easy or Easy, with the highest ratings for Collecting Items (97%), Moving Items into the path (89%) and Publishing and Sharing a path (86%).

Laboratory participants rated each of the main elements of work involved in creating their paths. An additional option allowed them to indicate that they did not use a specific element of the system in this task. All users engaged to some degree in the core elements of collecting items for their path, moving collected items from the workspace into the path, and arranging items within the path. As will be seen in Section 4.8.3 which presents an analysis of the paths created, the level of activity across the 34 users varies considerably. All elements of the path creation task were judged to be Very Easy or Easy by a majority of participants, with the highest ratings for Collecting Items (97%) and Moving Items into the path (85%).

Annotating items in the path received the lowest positive score at 52%, and it was observed that this element of the task was engaged in less than for the path creation task in the first prototype evaluation. This is likely to be due to the more complex nature of the path creation task in the second prototype, with a wider range of possibilities, but also probably due in part to the updated design which uses a popup dialog box for each node, rather than an open form for all nodes. It should also be noted however, that adding text notations was one of the most frequently cited improvements that users would have made to their path given more time. This time constraint almost certainly accounts for many of the users who did manage to publish their path, again with the added complication of a dialog box for this action, requiring scrolling to see the list of publishing options.

When considering responses only from those who engaged in each element of the path creation task, ratings for Very Easy and Easy are somewhat higher, with the highest ratings given to collecting items (97%), moving items into the path (85%), and publishing the path (81%), and the lowest scores for arranging items in a path (65%), and annotating items in a path (69%). Overall these results are very encouraging, given the complexity of the path

creation functionality and of the task itself, and that more than two thirds of participants can be regarded as Novice users.

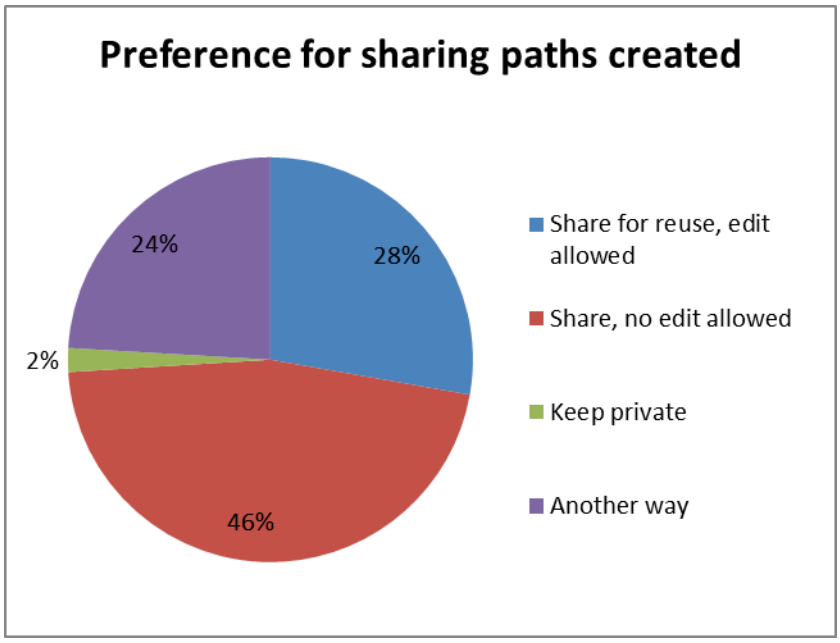

Figure 78 Preference for sharing paths: Demonstration responses

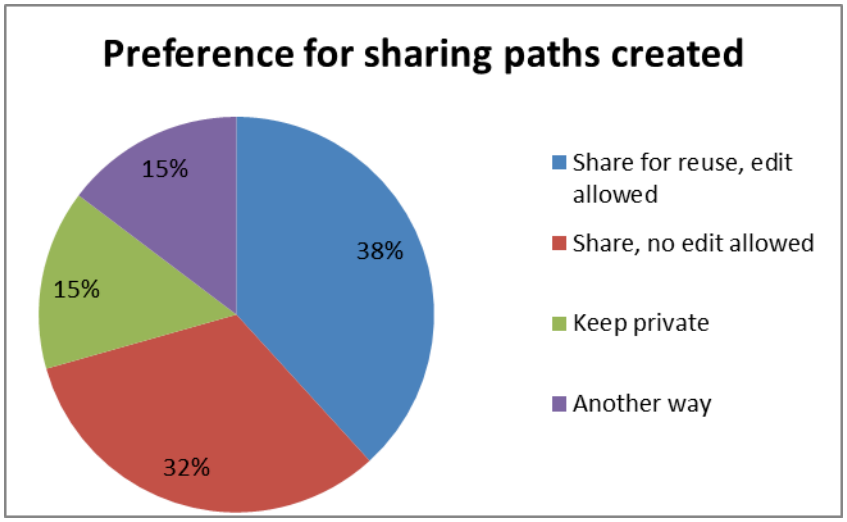

Figure 79 Preference for sharing paths: Laboratory responses

Differences in Sharing preferences were evident between the Demonstration and Laboratory participants. The majority of Demonstration participants would want to share their path, but not allow editing (46%), with 28% Sharing and allowing Edit and 24% choosing to Share in another way. Only 2% would want to keep their path Private.

A total of 70% of Laboratory participants would want to share the paths they create, with 38% allowing their paths to be edited and reused by other users. Interestingly, Expert users were twice as likely to allow reuse of their paths as Novice users, perhaps indicating the increasingly common trend for open access to research data and learning resources. However, some 20% of Expert users would prefer to keep their paths private, and further investigation during the post-session interviews suggests that this is likely when paths are

used as a means of recording or auditing a piece of research or for paths that might be work or research in progress.

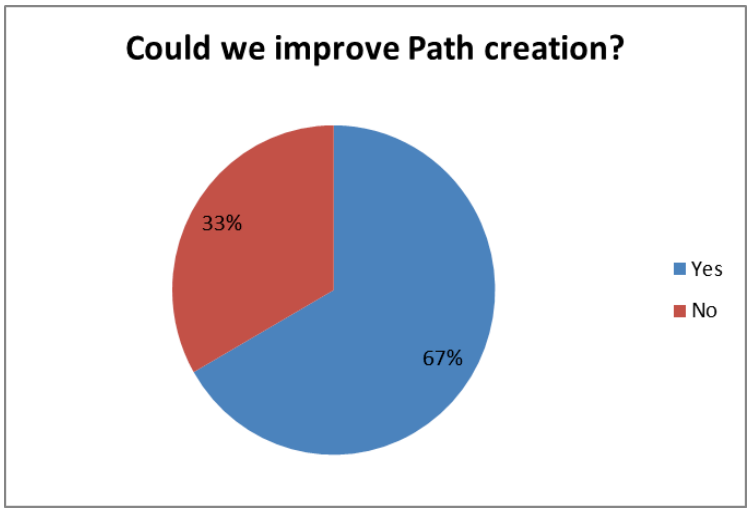

Figure 80 Could we improve Path creation: Demonstration responses

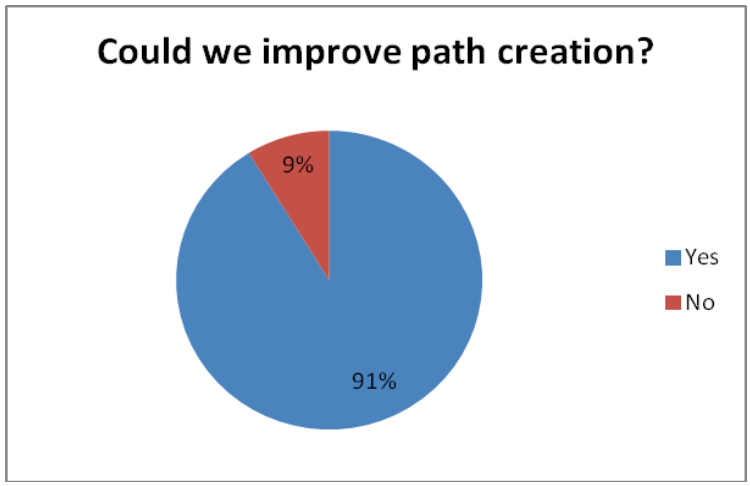

Figure 81 Could we improve Path creation: Laboratory responses

Despite the positive feedback of the various elements of the path creation task, an overwhelming majority of 67% of Demonstration participants and 91% of Laboratory participants felt that overall the path creation function could be improved further. Free text responses eliciting how path creation could be improved place emphasis on the following aspects:

Topic	Count
Using the workspace	14
Editing and adding text	6
Path creation and layout	11
Other path functions	10
More general navigation and layout design	9
Other miscellaneous comments	8

Figure 82 Suggestions for improving Path Creation

All the comments are listed in Appendix 10 by the Topics in the Table 82.

The main areas of feedback can be summarised into three main categories: navigating and arranging the path in progress; adding contextual content to the path; and, issues with visibility of some elements of the interface. In addition there were a number of comments relating to small bugs within the PATHS system, mainly relating to the display of nodes within the path workspace. Observations show that a high proportion of users experienced these bugs, which along with the increased complexity of this functionality, may account for the very high number of users saying that path creation could be improved.

4.7 PATHS as a tool to facilitate use of cultural heritage collections

One of the objectives of PATHS is to demonstrate the desirability of integrating PATHS into existing cultural heritage digital library services. Participants of both evaluation activities were asked questions about use of PATHS as a tool to facilitate use of digital cultural heritage collections.

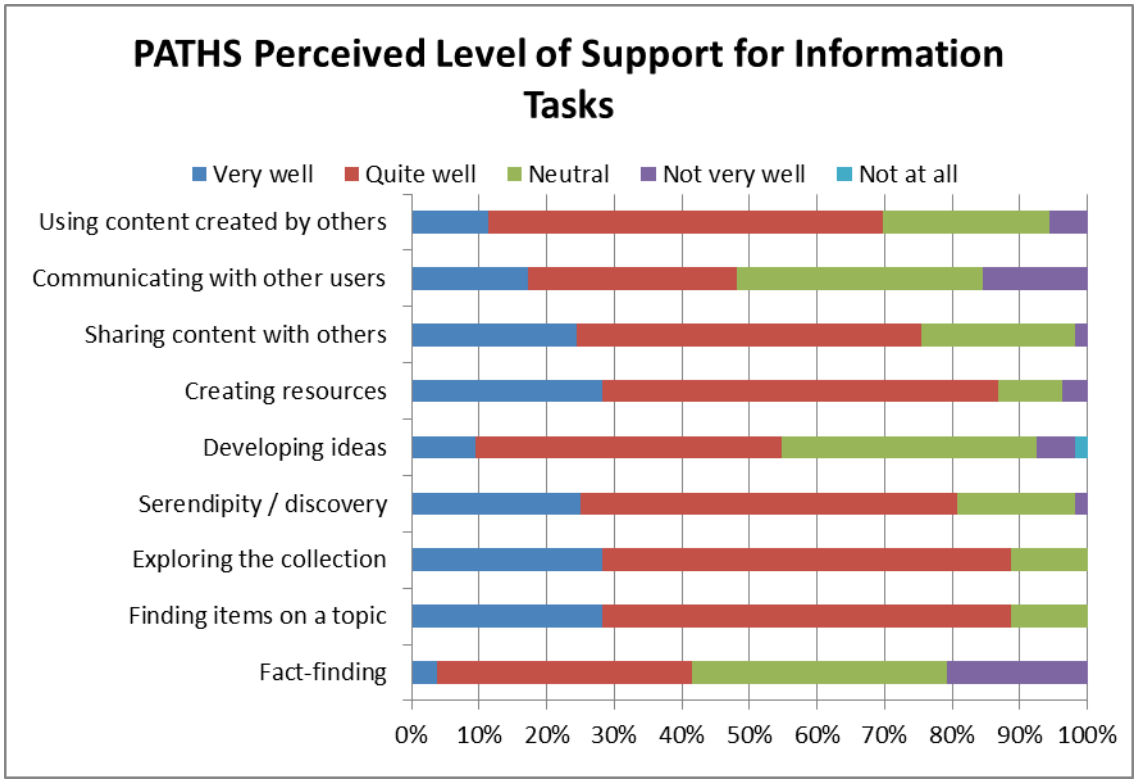

Figure 83 PATHS Perceived support for information tasks within cultural heritage collections: Demonstration responses

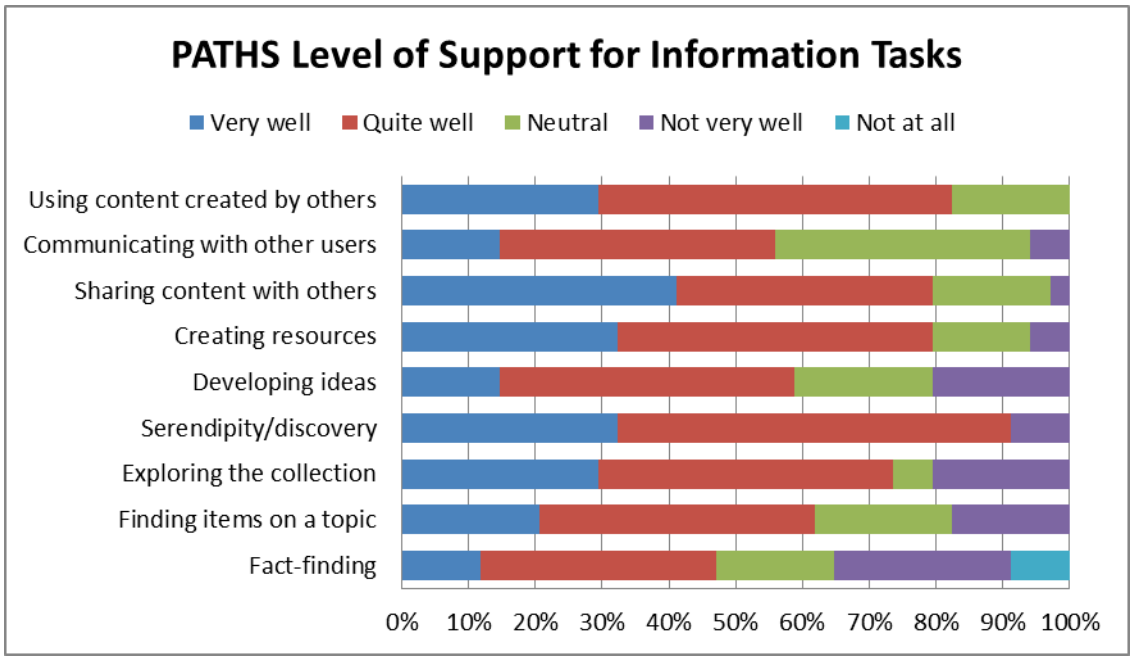

Figure 84 PATHS support for information tasks within cultural heritage collections: Laboratory responses

When asked to consider how well PATHS supports different types of information tasks, the majority of Demonstration participants responded Very Well or Quite Well to all but two task types, these being Fact-finding (42%) and Communicating with other users (48%). There were high levels of positive responses for Finding items on a Topic *and* Exploring a Collection (both 88%). These task types received no negative responses at all. Creating Resources (87%) and Serendipity and Discovery (81%) also scored highly.

A majority of Laboratory participants responded Very Well or Quite Well to all task types except fact-finding, which still scored relatively well at 47%. The highest negative response was also for fact-finding (35%), which is the only task rated at the lowest level Not at All (9%) by a small number of users, but even so the level of these negative responses is a little lower than for the first prototype.

Encouragingly, given the emphasis on exploration and path creation and use within the PATHS system, there are very high levels of positive responses for tasks related to serendipity and discovery (91%), using content created by others (82%), creating resources (79%) and haring content with others (79%). The path following task (using content created by others) received no negative responses, and responses to this question have improved substantially across all tasks, over responses given for the first prototype.

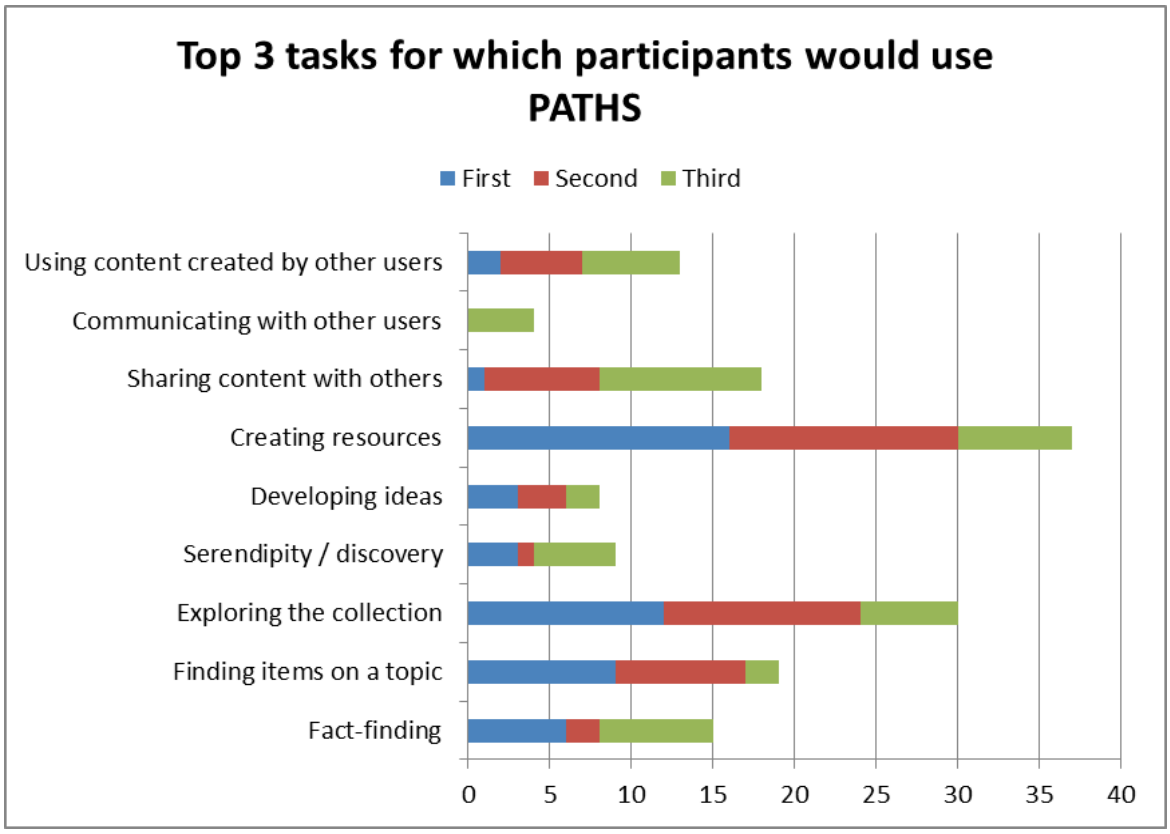

Figure 85 Tasks for which participants would use PATHS: Demonstration responses

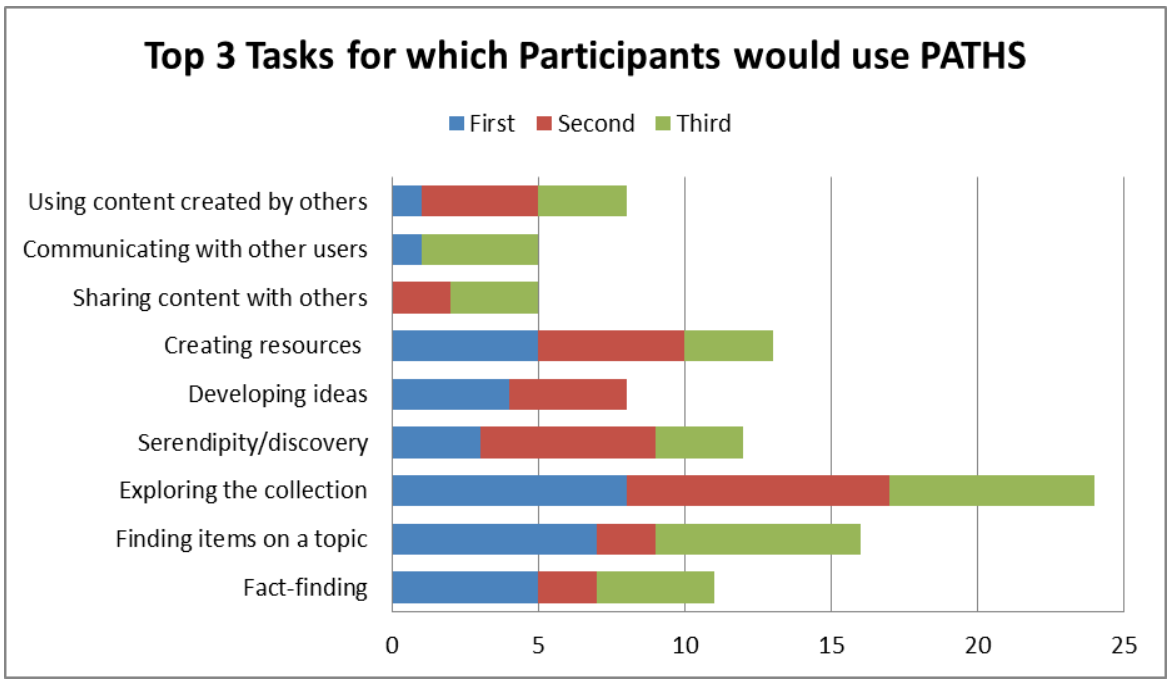

Figure 86 Tasks for which participants would use PATHS: Laboratory responses

In accordance with the findings for the previous question, participants were also asked to select the three tasks that they would be most likely to use PATHS for.

The most popular task amongst the Demonstration participants was *Creating Resources*, with 70% placing this first, second or third, with *Exploring the collection* a little way behind (57%). After these, *Finding items* (36%) was next most popular, followed by *Sharing Content* (34%). In terms of most popular by placement the order is *Creating resources* 1st by 31%, *Exploring the collection* 2nd by 30% and *Sharing content with others* 3rd by 20%.

Of the Laboratory participants the most popular task by far was *Exploring the collection*, with 71% of Laboratory participants placing this task first, second or third, with *Finding items on a topic* some way behind, voted for by 47% of participants, *Creating resources* (40%), and *Serendipity and discovery* (35%).

The popularity of the *Exploring the collection* task is a little surprising, given that this task was judged to be in fourth place terms of how well it is supported. This task also scored the highest number of first choices, followed closely by finding items on a topic, a change from the first prototype, where *Creating resources* was given the most first choice votes.
When further analysing these results by novice and expert users, it is interesting to note that experts show a much stronger first choice preference for *Exploring the collection*, *Serendipity and discovery*, and *Creating resources*, whereas novices are more likely to place these tasks in second place, and to select fact-finding and developing ideas tasks in first place. These results may indicate a difference in needs for the two groups of users, but may also correspond to the types of work and leisure tasks that each user type is likely to engage in on a regular basis. In terms of most popular by placement the order is *Exploring the collection* 1st by 24%, *Serendipity/discovery* 2nd by 18% and *Finding items on a topic* 3rd by 21%.

When looking at how these are placed, the most popular tasks amongst participants of the second prototype were *Exploring the collection* and *Creating resources*, placed first by both Laboratory and Demonstration participants. *Serendipity and discovery*, *Sharing content with others* and *Finding items on a topic* all ranked amongst the top three uses for PATHS.

4.8 Additional laboratory-based evaluation activities

4.8.1 Cognitive Style Analysis test

The Riding Cognitive Style Analysis, CSA, test was undertaken as an addition the user profile questionnaire as a means of analysing potential cognitive behavioural and preferential differences between users in their interactions with the PATHS software.

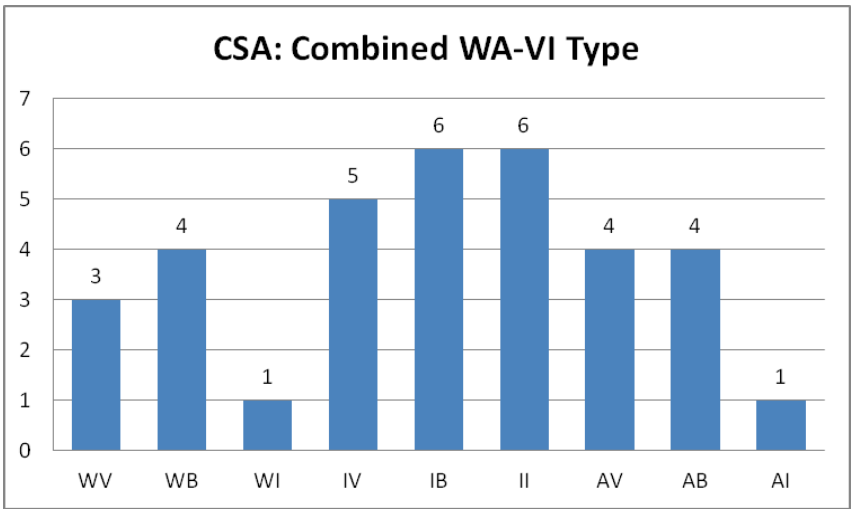

Figure 87 CSA: Combined WA-VI type: Laboratory responses

The nine categories of Riding's CSA are all represented within the sample. The two largest categories of participants are Intermediate Bimodals and Intermediate Imagers, and Intermediate Verbalisers are the next largest category. Together, the three Intermediate categories make up 50% of the sample. The distribution of the other half of the sample is also strongly Bimodal, with Wholist Bimodal and Analytic Bimodal making up 24%. Out at the extreme ends of the spectra, the Wholist and Imager types are the least well represented, with Wholist Imager, Analyst Imager, and Wholist Verbaliser being the smallest proportion of the sample. It is unclear why the sample is so heavily oriented toward the Intermediate and Bimodal, but it is interesting to note that the pull is toward the centre on both scales. It would have been ideal if the participants were more evenly distributed among the nine CSA categories; nevertheless, since the correlational analyses are performed on the numerical scores rather than the categorical distinctions, the labels will not have a large impact on the results.

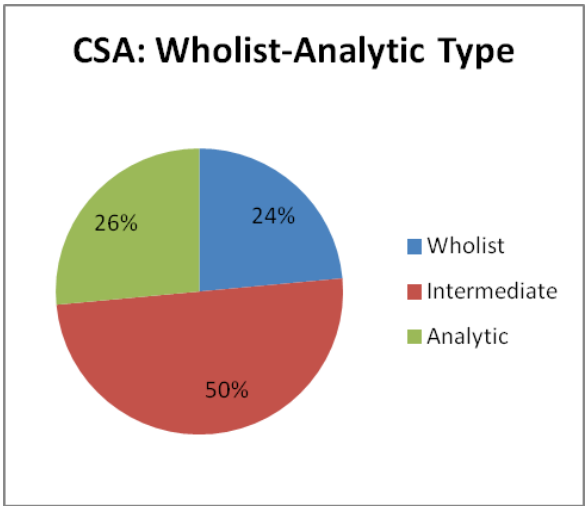

Figure 88 CSA: WA type: Laboratory responses

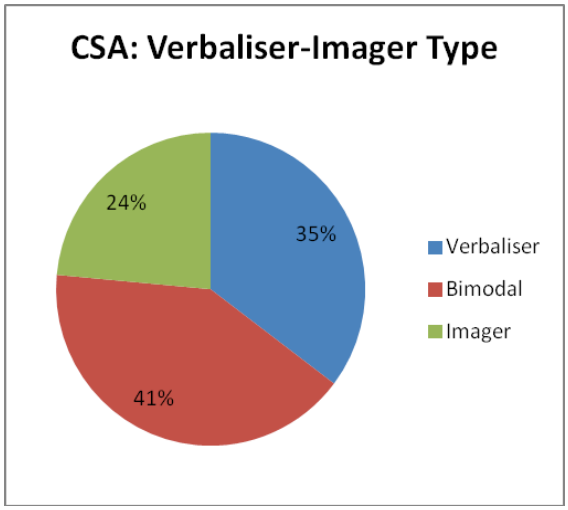

Figure 89 CSA: VI type: Laboratory responses

Dividing the CSA scales along the two axes reveals the predominance of participants in the middle zone of Intermediate and Bimodal. There are marginally fewer Bimodal participants than Intermediate. It may be the case that PATHS, with its text-based Thesaurus, image-based Map, and bimodal Tag Cloud, will appeal to users who are equally comfortable with

images and text, and who are interested in both the overall collection and the individual items within it.

4.8.2 Task observation data

In this section additional findings about the users' tasks, derived from observed task completion data gathered via the Morae software, including quantitative elements of time and activity levels are presented.

Time Taken	Minimum	Maximum	Mean	Standard Deviation
Follow a path	.84	5.00	3.30	1.35
Content overview	.94	5.00	3.56	1.41
Fact-find	.72	5.00	4.26	1.10
Browse a topic	2.07	5.00	4.76	.66
Exploration	.85	5.00	3.95	1.21
Tasks C-E	.72	5.00	4.32	1.06

Figure 90 Time taken for short structured tasks: Laboratory participants

For the short structured tasks, a time limit of 5 minutes was set, and from the data in Table 90 above, it can be seen that the mean average for each task type varied from 3.3 minutes for the introductory 'follow a path' task, to 4.76 minutes for the more open-ended 'browse a topic' task. A maximum time of 5 minutes was recorded for all 5 of these tasks (indicating that they used the maximum time available), and in fact, for 77 out of a total of 170 tasks undertaken (5 each by 34 users), a prompt was given to the user after 5 minutes had elapsed. For all tasks, however, there were a proportion of users who used much less than the 5 minutes allocated, with a minimum time of only 0.72 minutes for the fact-find task, to 2.07 minutes for the browse a topic task.

Of the three rotated information seeking tasks (C-E: fact-find, browse a topic, exploration), the 'browse a topic' task had both the highest minimum time taken, and mean average time taken, as well as the smallest standard deviation score at only 0.66. Fact-find had the lowest minimum time taken (0.72 minutes), but exploration had the lowest mean average time taken (3.95 minutes) of these three tasks.

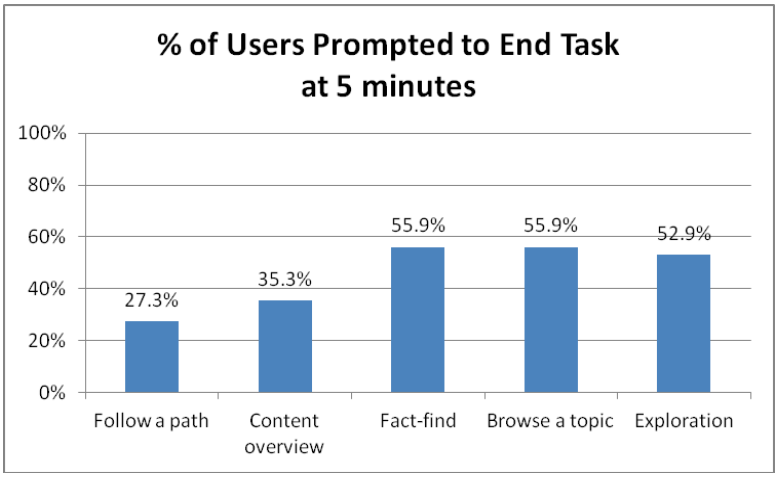

Figure 91 % of Users prompted to end short tasks at 5 minutes: Laboratory participants

Participants were prompted less often about ending the two introductory tasks (follow a path, content overview), than they were for the information seeking tasks (fact-find, browse a topic, exploration). Prompts for all of the information seeking tasks were relatively even, at a little over 50%. A high proportion of participants needing prompting could mean one of two things, either they were finding the task difficult, or they were engrossed and engaged in it, and in both cases they may possibly have not been sure when they had finished it satisfactorily. Spending longer on a task can therefore be a positive or negative outcome.

Mouse clicks	Minimum	Maximum	Mean	Standard Deviation
Follow a path	8	95	28.36	18.20
Content overview	8	90	42.26	21.56
Fact-find	6	67	34.74	14.41
Browse a topic	20	115	59.15	24.43
Exploration	6	132	44.32	27.41
Tasks C-E	6	132	46.07	24.70

Figure 92 Number of mouse clicks used for short structured tasks: Laboratory participants

Observation data for the number of mouse clicks per task reveals that not only did users take more time on average over the browse a topic task, but that they were busier during that time, making more mouse clicks than for all other tasks, with the exception of the exploration task. In fact, the minimum time taken in Figure 90 above, and the minimum number of mouse clicks used shown here in Figure 92 are fairly consistent for all other tasks except the browse a topic task, suggesting that this task was significantly more challenging, or more engaging than any of the others. As might be expected, the lowest mean average number of mouse clicks is for the follow a path task, where there is an in-built delay between clicks, as users absorb information contained within each path node. Of the three information seeking tasks, the highest mean average mouse clicks is found for the browse a topic task, and the lowest for the fact-find task.

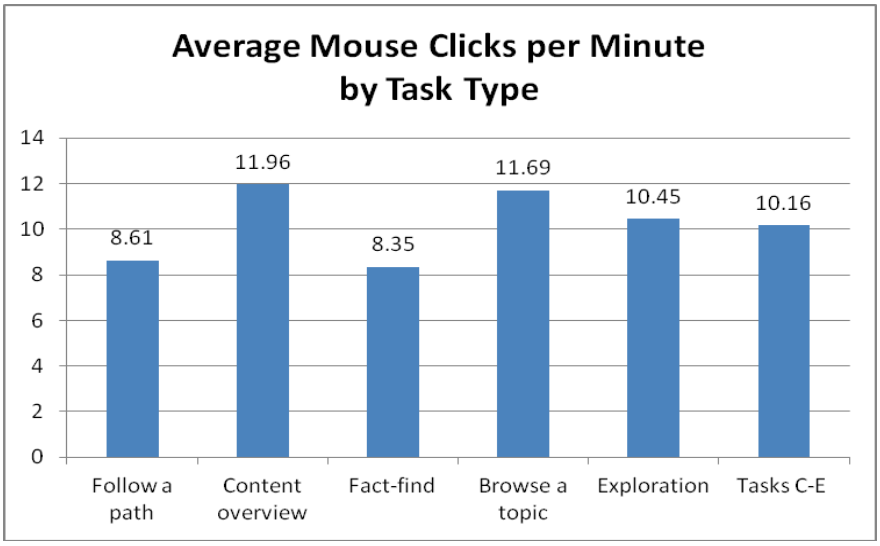

Figure 93 Average mouse clicks per minute for short structured tasks: Laboratory participants

A comparison for the number of mouse clicks per minute on average for each task type, further emphasises the higher levels of activity for the browse a topic task, compared with the other two information seeking tasks (fact-find and exploration). It is also interesting to note that the content overview task, which also had a browsing element to it, has a similar activity level to 'browse a topic'. Both the 'follow a path' and 'fact-find' tasks have relatively low activity levels compared the other tasks, perhaps indicating a greater degree of thinking and/or reading as the user navigates the interface and the content that is found.

Path Creation Task	**Minimum**	**Maximum**	**Mean**	**Standard Deviation**
Time taken	10.56	30.00	24.51	5.93
Mouse clicks	86	689	267.24	106.18
Mouse clicks per minute	4.16	22.94	10.88	3.19

Figure 94 Time and mouse for path creation task: Laboratory participants

Similar data was also collected for the 30-minute path creation task. A minimum time taken of 10.56 minutes was recorded, compared to a maximum of 30 minutes (capped), a difference of some 19 minutes. The mean average for time taken is however towards the higher end of the range at 24.51 minutes, and overall, only 35% of participants required a prompt to finish the task in the time allocated. The range of activity for mouse clicks is even wider, with a minimum recorded of just 86 clicks, and a maximum of 689 clicks, with a mean average closer to the centre of the spread, indicating a wider range of activity levels for mouse clicks.

Compared with the shorter tasks, it is interesting to note that the average number of mouse clicks per minute for the path creation task is relatively consistent with the exploration task, and a little below that for the browsing-based content overview and browse a topic tasks. However the range is much wider, with a minimum of only 4.16 (one every 15 seconds) clicks per minute and a maximum of 22.95 clicks per minute (one every 2-3 seconds), although the standard deviation of 3.19 reveals that a majority of users were closer to the average number of mouse clicks per minute.

4.8.3 Analysis of paths created by users

Using the paths created by participants during the evaluation, key properties of paths were analysed, including the extent to which certain tools in the path creation workspace have been used in formatting and enhancing the path.

	# of items in path	**# of text items**	**# of image items**
Mean	10.59	1.38	8.88
Median	10.00	.00	9.00
Mode	5	0	5
Std. Deviation	5.182	1.923	4.312
Minimum	3	0	2
Maximum	21	6	17

Figure 95 Summary statistics for number of items added to paths: Laboratory participants

The overall number of items in a path varied considerably across the sample, from a minimum of 3 to a maximum of 21. There was also variety in the number of text items and the number of image items in a path, ranging from zero to a maximum of 6 text items and from 2 to 17 image items. The means for both the total number of items in a path (10.59) and the number of image items (8.88) are near the centre of the spread, but the mean for the number of text items (1.38) was toward the lower end.

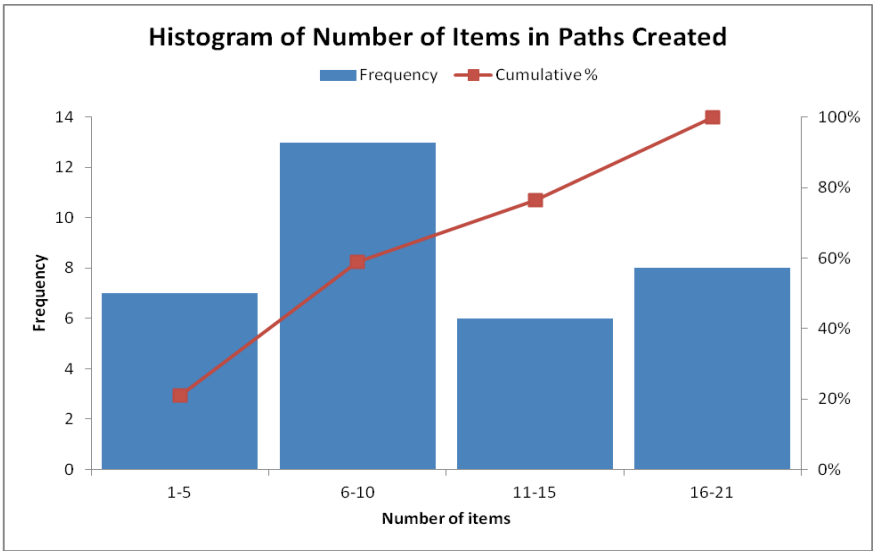

Figure 96 Distribution of # of Items in Paths Created by Users: Laboratory participants

The most common path length was 6-10 items total, with fairly equal distribution in the other three ranges. Given that all participants had 30 minutes to complete this task, it is interesting to note the high proportion of paths with more than 10 items, a significant increase on the paths created with the first prototype.

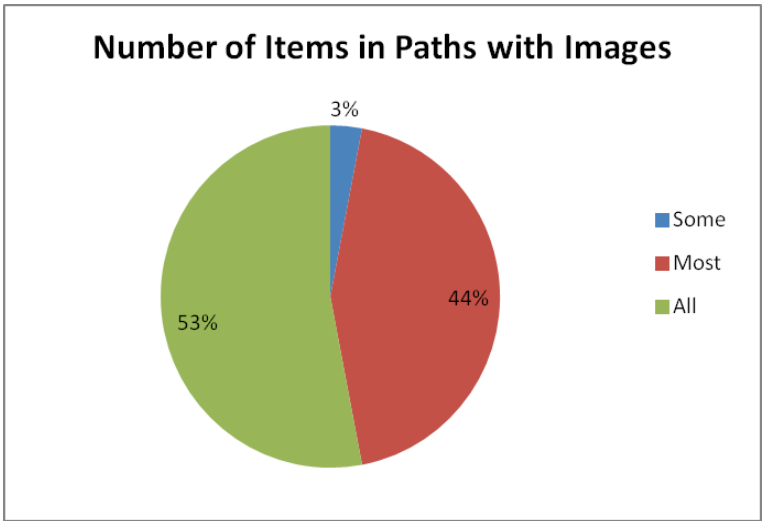

Figure 97 Number of Items in Paths with Images: Laboratory participants

All of the paths contain image items, which reinforces the importance of images in cultural heritage interfaces. There was only one path in which fewer than 56% of the items has images, and this was due to broken links outside the system. The participant explained during the interview that all of the items in the path should have images, but they are from a particular database known to the participant that was not synced properly with the PATHS

prototype at the time. The participant was confident that the links would be fixed in the future and that the path would be restored. Relying on prior knowledge can be a utilitarian way for experts to create paths without images for their own future use, but it might make them more difficult for general consumers to follow.

It is interesting to note that a few paths contain items that are entire thesaurus topics, tag clouds, or search results (15%). In all of the cases, more than one item in the path is a results cluster, so it is clear that those participants found the advanced functionality of adding an entire page of results to their workspaces to be useful.

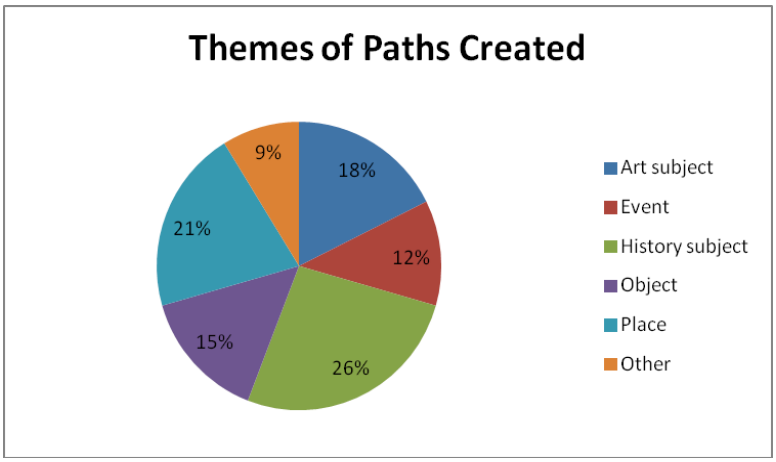

Figure 98 Themes of Paths Created: Laboratory participants

Participants created paths with a wide range of themes. Each path was manually assigned a single theme based on the title and subject matter. The most popular categories were history subjects (26%), places (21%), and art subjects (18%). This is to be expected given the nature of the items available within PATHS; based on the interviews a number of participants chose their themes based on items they had come across during the short tasks. A number of the object-themed paths were based on buildings, which reflects the research interests of participants from the Department of Architecture. This demonstrates the system's flexibility to support users exploring both academic and leisure topics.

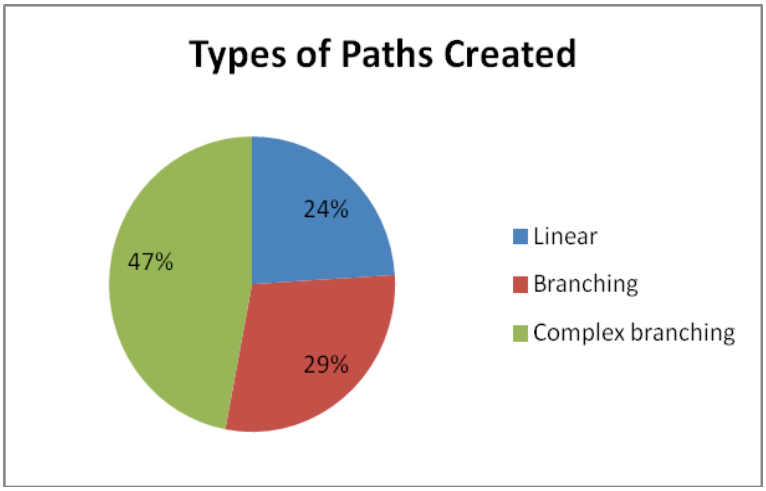

Figure 99 Types of Paths Created: Laboratory participants

All of the paths were also manually classified into three types, depending on the nature of their structure. Linear paths have at most one branching node, which is defined as a place where a user could follow two items from a single item. Examples of all of the types of paths created by participants are shown below. Branching paths have two or more instances of branching nodes. Complex branching paths have at least one instance of a branching node off of a branching node.

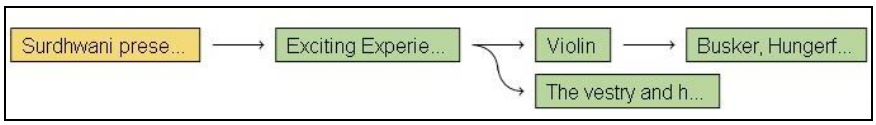

Figure 100: Example of a Linear path: Horizontal

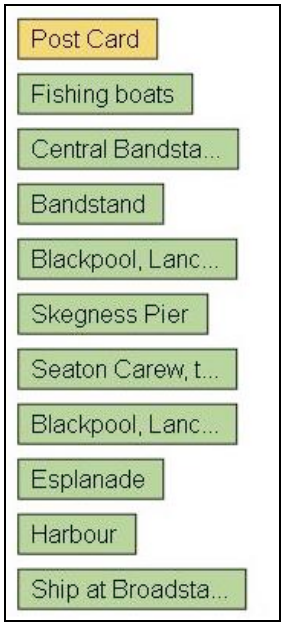

Figure 101: Example of a Linear path: Vertical

Figure 102: Example of a Branching path

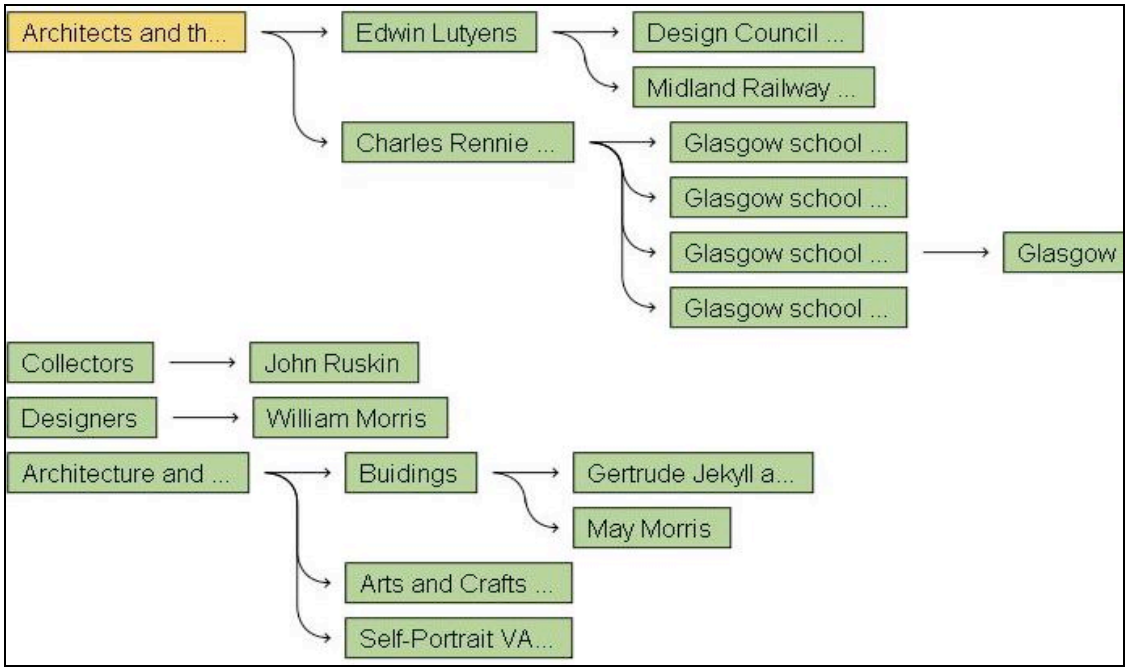

Figure 103: Example of a Complex Branching path

It is interesting that complex branching paths were the most popular (47%). It might be expected that the easiest path to create would be the type that the largest number of participants created, but this is not the case, suggesting that participants made full use of the system's advanced features. During the interviews, some participants reported feeling frustrated at their inability to manipulate the items in the paths exactly as they wanted them in the limited time, but were confident that they would be able to master the system with more practice.

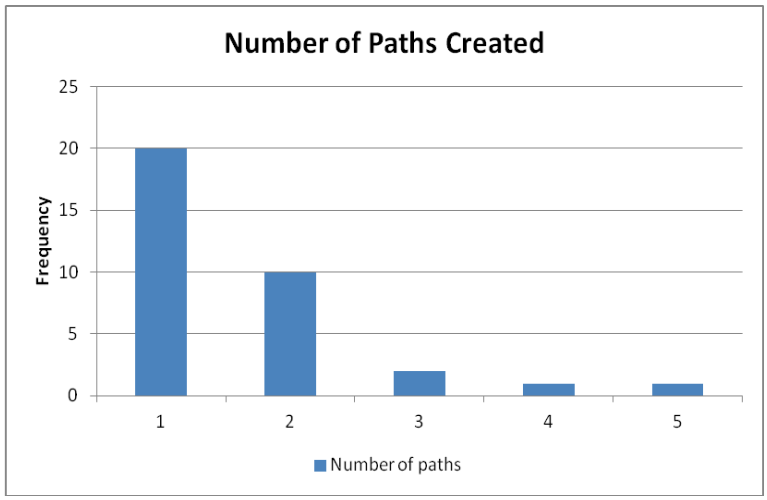

Figure 104 Number of paths created: Laboratory participants

While the majority of participants created and published only one path (59%), a sizeable minority began multiple paths. Discussion in the interviews revealed that some participants found it difficult to return to and edit a path if they went searching for more material after having created one; clearer signposting may be required. Although it should be noted that instructions for how to return to the path are included in the instructional video shown to all participants before beginning the path creation task.

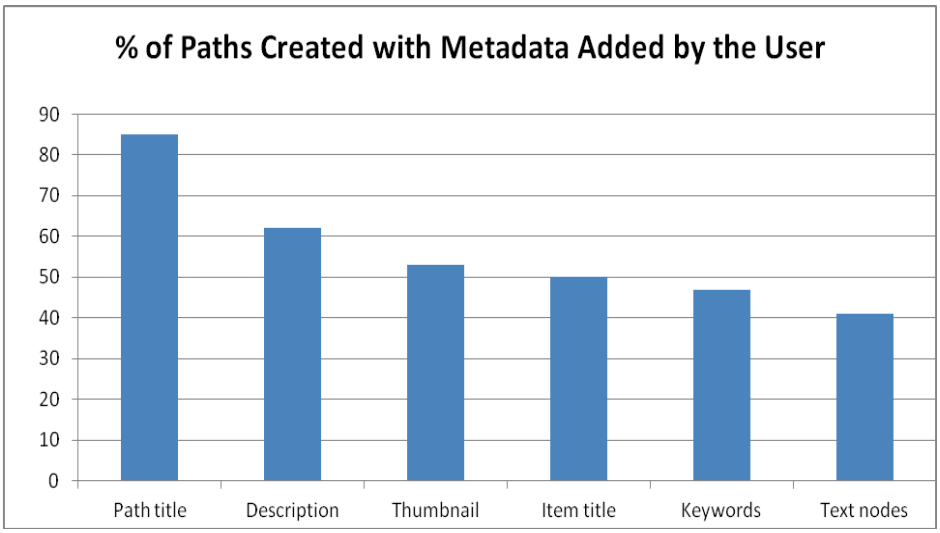

Figure 105 Metadata added to paths created by users: Laboratory participants

In addition to arranging the image items from the system in their paths, users also have a number of options to enhance their work, including titling their paths, adding a description and thumbnail, changing the titles of individual items, adding keywords, and adding text nodes. The vast majority of participants named their paths (85%), and many also added a description of their own (62%).

Several participants worked for the full 30 minutes on the task, and many of them felt they ran out of time. The relatively low number of paths with added keywords and thumbnails may be due to the location of those options in the path publishing pop-up window. The title is the first item in the display, and the description area takes up a great deal of room, possibly obscuring the single line for keyword entry. In order to see the thumbnail selection area, users must scroll down within the pop-up window.

The least popular additional function was adding text nodes (41%). As has been mentioned previously, if participants felt pressured for time in arranging the image items they had already found through their searches, they were not likely to insert additional items that required both titles and descriptions.

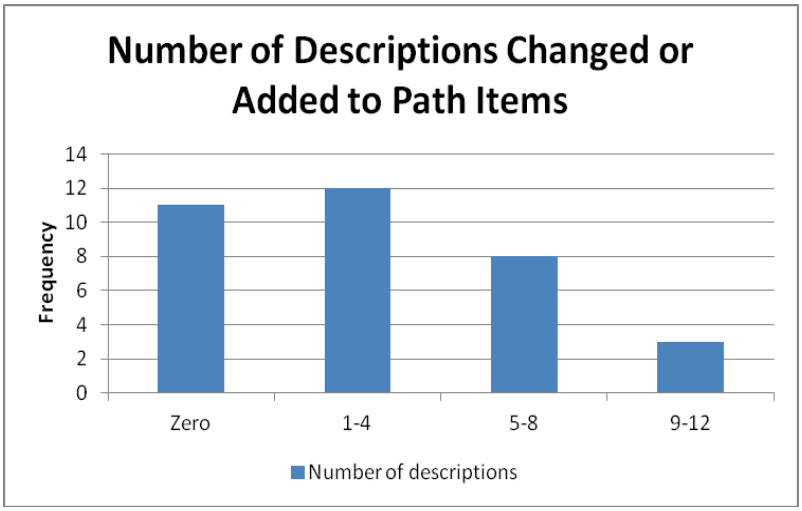

Figure 106 Number of descriptions changed or added to path items: Laboratory participants

While some participants did not change the descriptions of any items in their paths, the majority changed at least one description (68%). A number of participants copied the original titles of the items as given in the system and pasted them into the description, adding new titles of their own (24%). A few participants added rich, extended descriptions that progress as a narrative and demonstrate expert knowledge about the topic (15%).

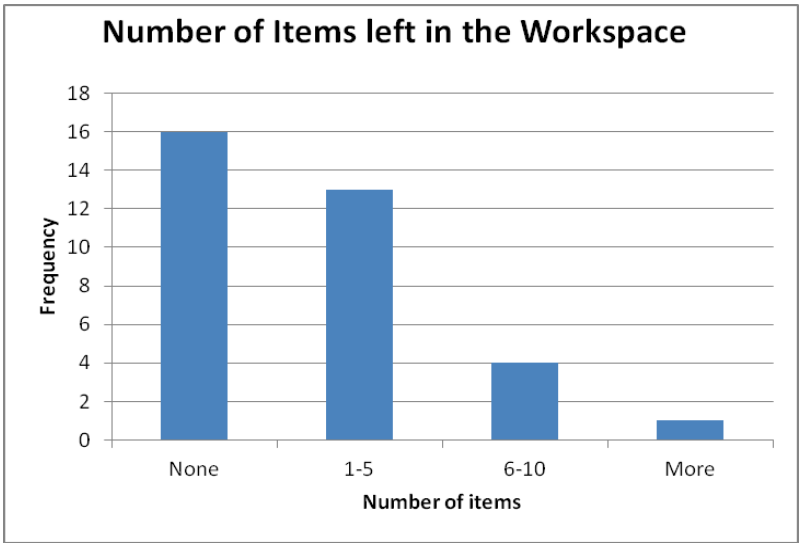

Figure 107 Number of items left in the workspace: Laboratory participants

While many participants transferred all of the image items from their workspaces down to their path workspaces (47%), the majority did not. In some cases, items left in the workspace were duplicates of those in the paths, suggesting that perhaps they had inadvertently added two copies of the same item into the workspace. One user left 28 items in the workspace. During the interview, the participant reported that "what went into the workspace was a random selection of things to do with [the topic]", and it was at the path-building stage that the participant narrowed down the selection. A few participants expressed interest in accessing the interface at the end of the evaluation session, so it is possible that they were planning ahead.

4.8.4 Observations – difficulties and errors

In addition to user-reported difficulties, it is perhaps useful to note those elements of the PATHS software that caused the greatest amount of difficulty among laboratory participants. These often required help to be requested. In addition we list user errors in the use of the prototype observed during the evaluations, including incorrect usage and misunderstanding of on-screen information. Participants' use of PATHS during the laboratory evaluations was observed and recorded using the Morae software. In this section we report on a small number of common errors made and difficulties encountered by users during these sessions, in two main areas; navigating the PATHS collection, and creating a path.

In navigating the collection, the first difficulty observed for several participants was locating the 'Railway Journeys' path for Task A. This became more apparent as more paths were created, as the path was often not listed on the first page of results in the Paths tab. Some participants attempted to overcome this by using the search box. This action led to set of global search results, including paths and items, and although a facet is then available to filter the results to see only paths, few users recognised this and used it immediately.

Participants also commented later that they had expected search to deliver a list of paths only. Two issues arise here then: first, there is no obvious way how to find a specific named path except for browsing through all the available paths; second, users try to resolve this by using the search box which searches everything rather than the current tab. A topic list or tag cloud in the left hand navigation area may solve this issue to some degree, or the use of a sort function (e.g. alphabetical, user).

When moving on to later tasks where more exploration was required the issue of participants attempting to search within a tab was also evident in other parts of the system. Several participants tried using search to get to a specific topic area in the thesaurus and map tabs, and again they were led to a set of global search results, rather than zooming to the topics of interest, as expected. Due to the nature of the natural language topic hierarchy underpinning these exploration tools, using search to locate topics within them is not straightforward, as there may be several entries in different topic areas that use similar terminology. The exact resolution to this problem area therefore requires further investigation.

An additional error in the thesaurus and tag cloud tabs arose when some participants did not realise they needed to click on the ‘English’ hyperlink to navigate into the collection in order to see the full list of topics. Instead, some proceeded to use the facets instead, whilst others simply abandoned the page and looked elsewhere. With a single collection, this link is not needed, but where there are multiple collections in the system that are each navigated individually, some element of selection must be made, and in these cases, some instructions on what to do may be required.

The main difficulty observed during the path creation task was that participants found it difficult to navigate back to their path workspace after leaving it to find more items. Some participants resorted to extensive use of the Back button in the browser, which is not very efficient, whilst others tried searching for their path or looking in the Paths tab. None of these approaches were very effective, and the correct action was to click on the username (in the evaluations this was an ID number, so possibly not immediately obvious to users), and to view the list of paths. Even when this action was completed, an additional difficulty arose, as the participants was often presented with more than one path that had not yet been named, all using the default ‘New Path’ title. It would seem that the most obvious solutions to these problems would be a prominent ‘My Paths’ or ‘Path Workspace’ button, along with an option to name the path at the point at which it is initially created.

One final error that was mainly observed during path creation, but was also seen at later stages of adding items to the workspace, was users trying to drag and drop from the path creation area or the search results back into the collecting workspace. It seems that the drag and drop into the path creation area is so intuitive and comfortable that participants automatically expected to use the same type of navigation in other areas of the system.

4.8.5 Interview data

After completing the tasks and the session feedback questionnaire, participants were interviewed about their experience of the path task, to gain further insight into this activity, along with more general feedback about the positive and negative aspects of using PATHS. Findings and recurring themes from these interviews are summarised in Figure 108:

Questions	Feedback
Deciding on a topic	• Prior knowledge of professional or personal research interests • Remembered seeing items or topics during short tasks • Working within available content
Information-seeking strategies and tactics	• Searching: to get a general overview with broad topics • Searching: to find general keywords because the Thesaurus had “gone awry early on” • Searching: with increasingly narrower keywords to find specific items • Exploring Maps: to clarify the content about a topic in the collection • Exploring the Thesaurus: to decide on an overall topic • Exploring the Tag cloud: to make sure there are enough items in the category • Using the facets: to find related items • Using the facets: to identify the number of subtopics • Using the facets: to see overarching categories into which a particular item fits
Criteria for selecting items for the path	• Availability and relevance to other items in the collection • Interesting items that the participant would like to see in a path • Items that fit into the participant’s categories to demonstrate their understanding of the task • Visual impact, supported by strength of metadata • Images based on prior knowledge of the source database outside PATHS • Individual title and depth of metadata • Any image with a representation of the theme • Description, which indicated geographic location relevant to the theme
Organisation of items within path	• Logically in order to tell a story • General/broad to specific: “macro to micro” • Thematically/categorically around any number of main topics • Wanted hierarchy to be vertical rather than horizontal, felt they had to restructure path to be more linear to fit into the system • The operational sequence in which the items would have been used to produce an object • Narrative following a subject through different locations • Sub-classification of a topic • No organisation applied
To what extent does your path develop a story or narrative?	• Strong narrative goes through the production process • Some narrative, but there are dead ends • More of a dictionary or reference than story • Information rather than a story
What would improve the	• More time and access to external resources for images and

path?	information • More descriptive text (both quantity and quality) • More items overall grouped more coherently • Better structure, clearer plan before trying to build a structure • Wider array of different kinds of media
What was the simplest aspect of the task?	• Adding items to the workspace • Dragging and dropping the images from the workspace into the path • Dragging items to organise them within the path • Everything seems pretty simple • Adding the text
What was the most difficult aspect of the task?	• Publishing the path • Lack of order inside the workspace • Initially creating the path • Visualising the whole path at once • Trying to get rid of one image and accidentally deleting the entire path • Frustrating that standard keyboard shortcuts (Ctrl+A) are not set up • Going back to search for an item after having started to create a path • Figuring out how to add text items • Structuring the path in a meaningful way
What was most enjoyable about the task?	• Trying to tell the story • Using the map to explore • Looking through the items (search) • Going through to the source data of individual items • Putting the items in order • Following the path after it was completed
What was least enjoyable about the task?	• Scrolling through the thesaurus • Squinting to see the photos • Thumbnails in path workspace disappeared intermittently, along with the “Edit/ Preview/ Delete” options • Thinking of what to write in descriptions • Frustrated because the path structures are limited—no decision points that lead back to previous branches, can’t circle backwards • Workspace was too small—impossible to see all images at a glance
Overall impression of PATHS	• Well designed visually, but difficult to learn for older users • Nice because it is interactive, provides freedom in arranging items • Has potential as a way to organise one’s resources • Frustrating both technically and conceptually • Serves a complementary function to Google—has many features that Google lacks, but not as good for detailed research

	• Fun to play with the different ways to take research in new directions • Great resource that will improve with more paths • Useful because it is a bigger grid that provides more of an overview than any individual institutional collection • Appreciates the interactive element attached to the digital object, which encourages users to relate to the system individually
Who would use PATHS, and for what purpose?	• Younger people as an early-stage research tool • Secondary-school students and teachers interested in culture • School children who have been to a museum and then complete a narrative project by making a path • Undergraduates, art appreciation students • Curators at galleries • Local studies professionals and enthusiasts who have expert knowledge about their collections and want to share them • Fiction writers who need information on a particular topic • Museum-goers preparing to visit an exhibition (consumer) • Genealogists and family historians gathering data on people • Students could collaborate with each other to build a path
Additional feedback	• Search function is so efficient that the other exploration modes are unnecessary • Easier to use than the previous prototype • PATHS would be great if it could include items from the entirety of the internet • It would be useful if users could upload their own material to add to their paths • Could not tell if lack of metadata, images, and descriptions was due to the system or source data • Zooming in on the map and switching to other modes is exciting • Map is a nice idea, but only half of the topic titles display consistently • Friendly interface that would be fun to wander around at a more relaxed pace • Most interesting aspect is personalisation and ownership—users can create their own online museums • Serendipity of seeing what items appear under which categories is interesting • Personal satisfaction in being able to create a narrative sequence in the way that one would like others to see it • Tag cloud mode is most useful

Figure 108 Summary of post-session interviews: Laboratory responses

4.9 Final view of PATHS: responses to usability Semantic Differentials

The final section of the questionnaire presented a series of semantic differential scales, rating polar opposite experiences on a 7-point scale of +3 to -3, with a neutral 0 (zero) position at the centre.

4.9.1 Semantic Differentials from the Demonstrations

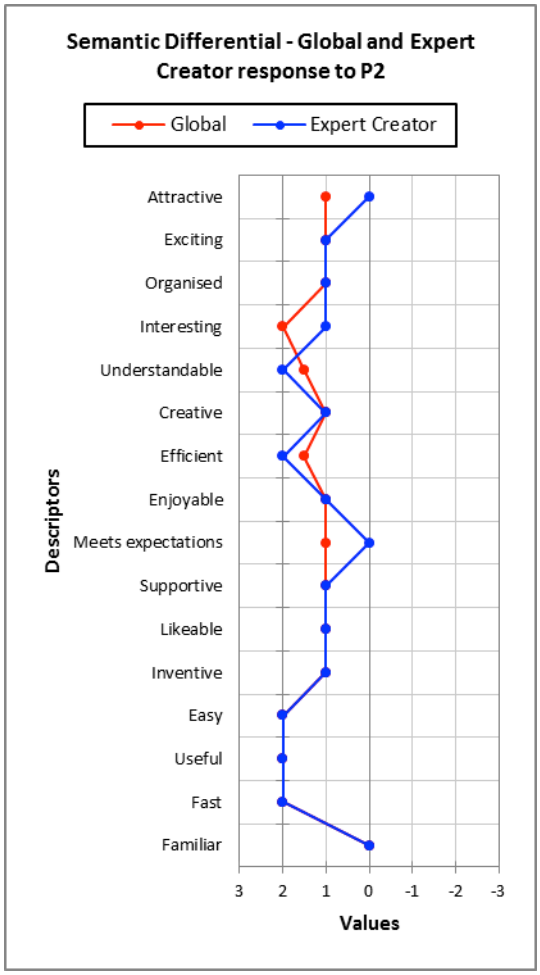

Figure 109 Expert Creator overall view

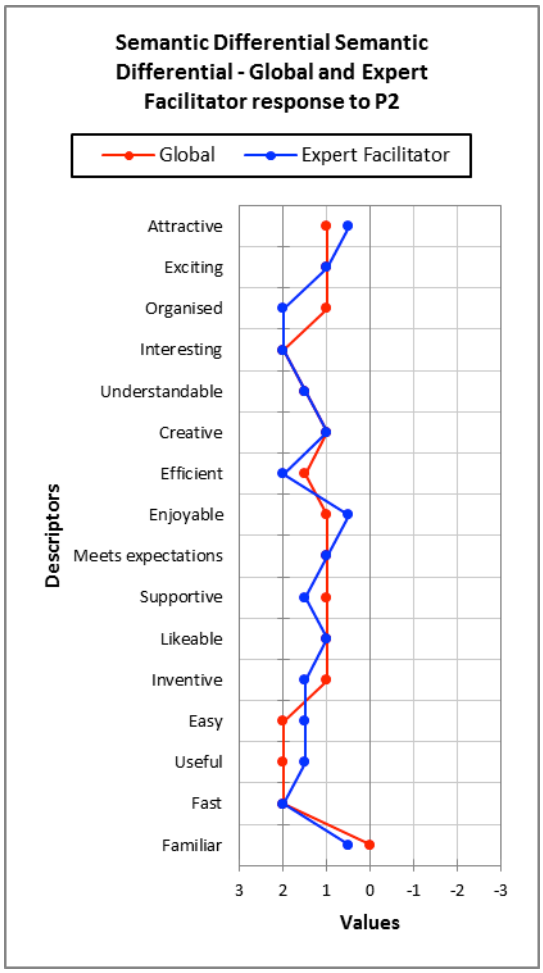

Figure 110 Expert Facilitator overall view

Results to the sixteen semantic pairings by the Demonstration participants show a very positive response to *all* aspects of usability evaluated, ranging from 0 to +2. Using Global response as a benchmark (responses from all Demonstration participants), it is possible to identify where each of the user groups differed slightly in opinion. Most user groups rated Familiarity as one of their lowest points; this is to be expected in a prototype system. Interestingly End User creators scored this lowest (-3), perhaps reflecting their inexperience with new ways of interacting with digital cultural heritage collections.

Expert Creators' responses ranged from 0 to +2 and rated Attractiveness and Meets Expectations as their lowest point. Highest rated were:

- Understandable
- Efficient
- Easy
- Useful
- Fast

Expert Facilitators' responses ranged from +0.5 to +2, and rated Attractiveness and Enjoyable lowest. Highest rated were:

- Organised
- Interesting
- Efficient
- Fast

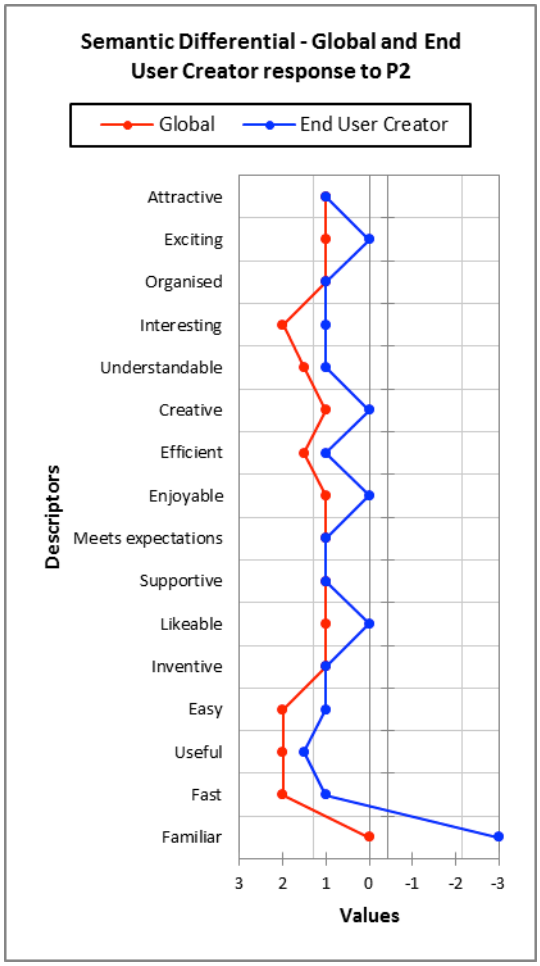

Figure 111 End User Creator overall view

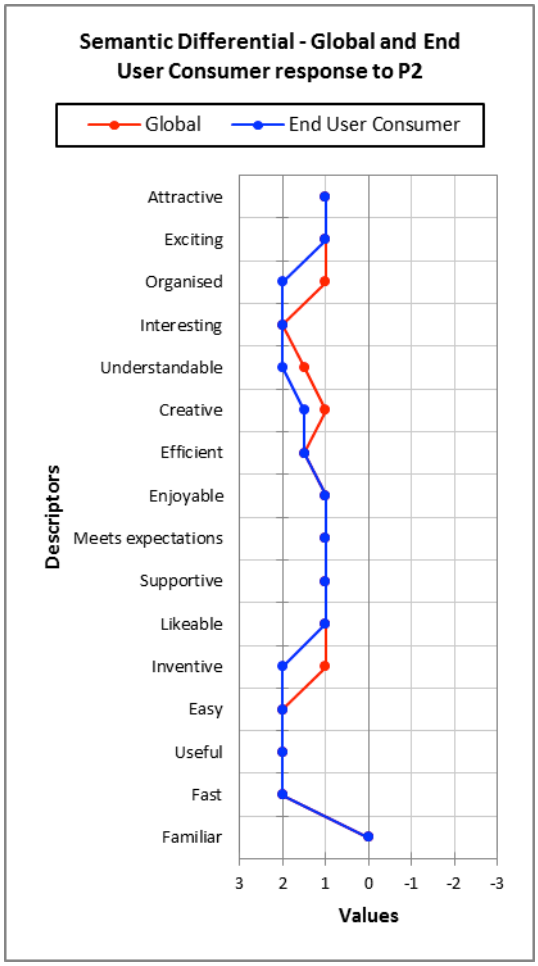

Figure 112 End User Consumer overall view

End User Creators' responses ranged from +1.5 to 0 (-3 for Familiarity), and rated Exciting, Creative, Enjoyable and Likeable lowest. Highest rated were:

- Useful, followed by
- Attractive
- Organised
- Interesting
- Understandable
- Efficient
- Meets expectations
- Supportive
- Inventive
- Easy
- Fast

End User Facilitators' responses ranged from 0 to +2, and rated Attractive, Exciting, Enjoyable Meets expectations, Supportive, and Likeable lowest. Highest rated were:

- Organised
- Interesting
- Understandable
- Inventive
- Easy
- Useful
- Fast

As a follow on to the familiarity scale, participants were also asked that if PATHS seemed familiar, what it reminded them of. Demonstration participants responded:

- Amazon
- Creating Narrative within Schools
- Europeana
- Google books
- HistoryPin tours and collections
- Microsoft Office
- Moodle (VLE)
- Google Maps
- National Maritime Museum
- Keep Thinking - Collection CMS
- Online shopping/eBay
- Search engines of UK museums (I think it is Victoria & Albert or Tate)
- Use of the thesaurus is familiar
- Wikipedia (two responses suggesting Wikipedia)
- Mind Maps
- iMovie

Visually this can be seen as:

Figure 113 Visual representation of things similar to PATHS: Demonstration responses

4.9.2 Semantic Differentials from the Laboratory responses

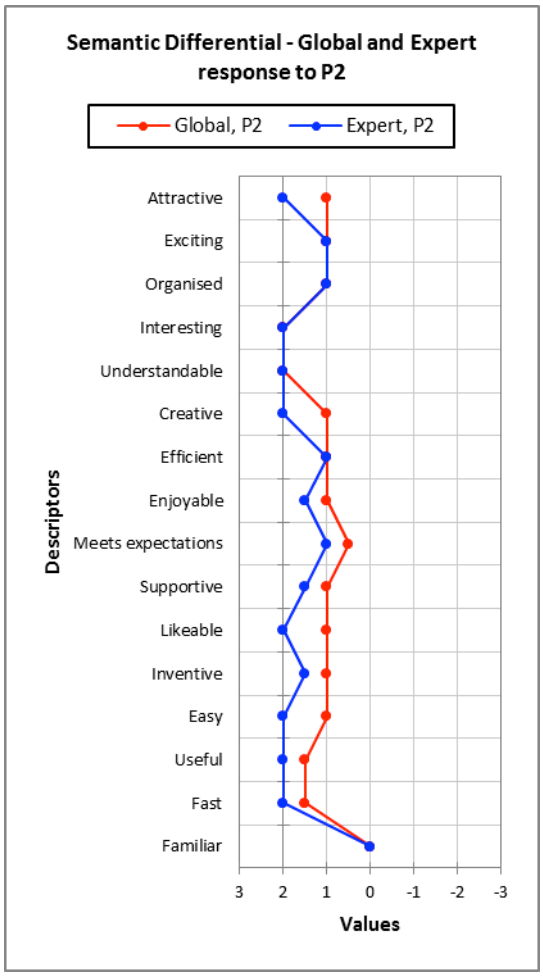

Figure 114 Global & Expert overall view: Lab

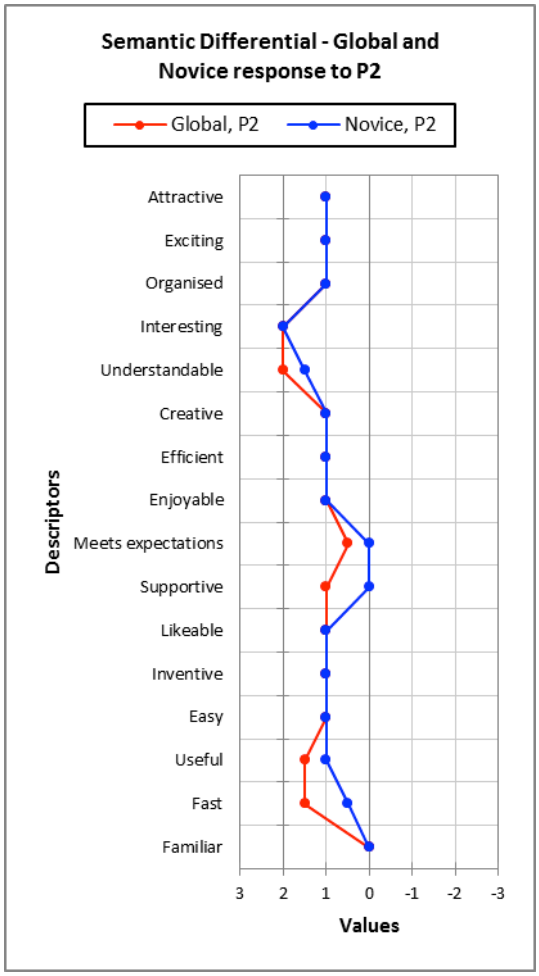

Figure 115 Global & Novice overall view: Lab

Findings from the Laboratory participants show that 14 of the 16 scales received an overall positive response of +1 to +3, and for all scales, the median response was at least neutral. Expert users rated PATHS higher than novice users on all but five of the scales – Exciting, Organised, Interesting, Efficient, and Familiar – on which they were in agreement. Novice participants gave neutral 0 median response for three scales – Meets expectations, Supportive, and Familiar. This is perhaps to be expected, given the complex nature of the PATHS system, and that many of the Novice participants would be most likely to be path followers in their primary interaction mode, and yet during the evaluations, they were required to use all parts of the system. It does, however, indicate that there is still more that can be done in supporting users with less technical skills and domain knowledge, especially if we are to convert them into more active path creator user types.

As a follow on to the familiarity scale, participants were also asked that if PATHS seemed familiar, what it reminded them of. Five Laboratory participants responded to this with comments indicating familiarity in the following ways:

"Not really anything in particular. Just the way the system is designed make it very easy and straight-forward to use."
"Bookmarking pages into folders and subfolders in a browser from various online collections"
"obvious similarities to a wiki"
"the pinterest.com social visual image sharing website, where object are 'pinned' to a board, much like adding a topic of interest to a workspace"
"I felt that the site took common tools from the web search sites and social sites and put them together to do a job, so I already knew how to operate them".

4.10 Results of the project-wide activities

Whilst activities undertaken via demonstration sessions and laboratory testing constitutes the main work of PATHS user evaluation, assessment of the different elements of the PATHS system are also being conducted by the technical development partners, i-Sieve, Avinet, The University of the Basque Country and The University of Sheffield. These evaluations are concerned with the system architecture, content processing and enrichment and user interface design. These activities are specifically focussed on systematic, objective evaluation of the building blocks of the system as standalone entities. Additional evaluation work regarding these activities will be reported in *D5.3 Report on results of field trials of the PATHS system*. Results of a Cognitive Walkthrough, conducted as part of the evaluation of the interface and system functions of the prototype, is reported here as it evaluates the interface and functions as seen and used by both the Demonstration and Laboratory participants.

4.10.1 User Interaction and Interface Design – Cognitive Walkthrough

As a follow-up to the interface design and as a precursor to the laboratory evaluations an expert evaluation was carried out using the Cognitive Walkthrough technique (Sharp et al, 2007). This process aims to uncover any likely usability issues that will arise for users carrying out key tasks, and to indicate areas that may need attention in further developing the system and user interface.
This evaluation was carried by USFD, and analyses tasks relating to the primary elements of the PATHS User Interaction model, as follows:

- Task 1 – Finding and following a path (Consume)
- Task 2 – Collecting items for a path (Collect)
- Task 3 – Creating a path from collected items (Create / Communicate)

In the Communicate element we have covered the aspects of annotating and editing path content, but have not included aspects of sharing via email and social media. The latter are somewhat more secondary activities, and are relatively common in social web environments. Rather, our goal is to evaluate in detail the core and more novel aspects of the second PATHS prototype.

Results for the three tasks are shown in Figures 116, 117 and 118, below.

Task 1 – Find/follow a path

Actions	Evaluation criteria – will users...	Evaluation
2 main options: **1a) In the Paths section, browse the available paths** **1b) Use the Search box to find a path topic or title; filter results using the Path facet**	know what to do?	1a) Maybe – new users may not realise that paths have their own section, and may be more likely to search as this is a more common behaviour in web systems. Yes – once in the Paths section, the paths are presented in a standard results layout. 1b) Yes – searching by keyword and title are common tools for locating content in web-based systems. Maybe – facets may be unfamiliar to some users
	see how to do it?	1a) Yes – the Paths section is clearly visible at all times, and users are familiar with navigating one or more results pages. 1b) Yes – the Search box is clearly visible at all times. Maybe – users may not immediately notice the Path facet, instead focusing on the main results area.
	understand whether their action was correct or not?	1a) Yes if they select the Paths section, a list of paths is displayed. 1b) Maybe – a set of search results appears, but the path(s) may not be evident until the Path facet is selected. No – if no paths are found, the user has to recognise that the path facet is not listed. It could be useful show a results summary at the top of the page, with number of items and number of paths.
2) Select path from the results list	know what to do?	Yes – it is common to select an item of interest from a results list.
	see how to do it?	2a) Yes - each path in the results can be accessed by clicking the title or thumbnail image (common in web systems) 2b) Maybe – paths can also be accessed by a ‘Follow this path’ button, but this is only revealed when the mouse hovers over the path.
	understand whether their action was correct or not?	2a) Yes – an overview page is reached with the same title shown in the search results and a summary of the path content. Maybe – they may be confused if the full overview cannot be seen (e.g. on a laptop screen).

		2b) No – this action takes the user to the first node in the path, skipping the path overview page, so they may not immediately realise where they are, as the node title usually differs from the path title. There is also no obvious way to access the path introduction using this route to remedy this and to know more about the content to be followed. There is a help text on the right hand side that explains that a path is being followed, but this could be more prominent.
3) Follow the path using navigational tools – view the first node	know what to do?	2a) Yes – if starting from the left-hand side of the path No – if starting from other nodes in the path 2b) No – no action required as the first node is in view and it is not clear that this is the case, without referencing the small 'path overview' graphic on the right hand side.
	see how to do it?	2a) Yes – there is a prominent 'Follow this path' button No – it is not clear that they use the Path Overview graphic to start from any node in the path. 2b) No - see above 'know what to do'. Also, by clicking the navigational buttons the user actually reaches a second node.
	understand whether their action was correct or not?	2a) Yes – the first page of the path is presented 2b) No – see above.
4) Follow the path using navigational tools – view additional items	know what to do?	Maybe – if they have experience of multi-page content, then they should know how to use navigational forward and back buttons. No – the path overview on the right-hand side is likely to be a relatively novel navigational feature for most users.
	see how to do it?	Yes – there are prominent Previous and Next buttons. Maybe – users may be confused when there are several Next buttons for branching paths No – it is not clear that you can jump ahead to later items using the path overview, unless the user takes the time to read the help text, and this is obscured (scrolling required) when Related Item content is

		present.
	understand whether their action was correct or not?	Yes – the next selected path page is presented.

Figure 116 Cognitive Walkthrough Task 1: Find/follow a path

Task 2 – Collect items for a path

Actions	Evaluation criteria – will users...	Evaluation
1) Use the Search and/or Explore functions to locate relevant items	know what to do?	1a) Yes – search is a familiar functionality 1b) Maybe – thesaurus is a less common functionality in web environments, but may be familiar for regular digital library users 1c) Yes – tag clouds are familiar functionality in web environments 1d) No – map is a novel functionality for the majority of users, and they are more likely to associate this term with geographic content
	see how to do it?	1a) Yes – the search box is prominently featured on all pages 1b) Maybe – the full thesaurus is not immediately presented and it is first necessary to navigate to the English collection. Once there is a nested list of hyperlinked topics, which should be familiar to most web users. However, users may be unfamiliar with the meaning and use of the 'topics', 'items' and 'paths' links on the right hand side of the main thesaurus list. 1c) Maybe – the full tag cloud is not immediately presented and it is first necessary to navigate to the English collection. Once there, the tag cloud is a common layout, which will be familiar to many web users. No – users may be unfamiliar with the meaning and use of the 'topics', 'items' and 'paths' links, which require two levels of hovering to be fully revealed. This may therefore inhibit intermediate topic selection, as users click to the lowest level before results are finally revealed. 1d) Yes – the map uses standard navigational functionality, in common with geographic maps. No – It can take many clicks to get to the pins for individual and clusters of items. At

		this point, pins are spread wide apart, making it difficult to see at a glance the full set of results, without navigating to the Items section. It is also not at all evident how to navigate to set of results at an intermediate topic level.
	understand whether their action was correct or not?	1a) Yes – Search - a list of search results is delivered, or an indication that no results were found 1b) Yes – more detailed topics are revealed, with the hierarchy in view, although some users may expect to go straight to the results for the selected topic. Yes - When a lowest level topic is selected, or the items or paths links followed, a set of standard search results is presented. 1c) Yes – more specific levels of the tag cloud are delivered, although it may not be immediately clear how to view results for higher level topics. Yes - When a lowest level topic is selected, or the items or paths links followed, a set of standard search results is presented. 1d) Yes – as the user clicks or zooms, the map reacts in the same way as a geographic map. Yes, pins are presented at the lowest topic level, which should be familiar from standard geographical maps. No – it is not obvious how to get to a set of results for a topic.
2) Review the relevance of items of interest	know what to do?	Yes – users are familiar with search results lists and with checking the main item records for additional information
	see how to do it?	Maybe - there is a lack of snippet information in the results list, and titles are not fully displayed in the default grid view. Some items also lack images and/or titles. These type of results will be relatively familiar for users of image collections, but less so for others. Yes – it is clear that you can click hyperlinks to see more information. Most users will also recognise that thumbnail images can be clicked.

	understand whether their action was correct or not?	Yes/Maybe – this is a subjective judgment by the user. However, there may not be enough content available for many items to accurately judge relevance. No – users might expect that clicking an image will present a larger version, or in the case where no image is available, that it will reveal an image.
3) Add items to the workspace	know what to do?	Yes – saving items for later use is a common function in web and library environments, although the exact terminology may be new.
	see how to do it?	Maybe – there is an 'Add to Workspace' button on every item in the search results, but it is only revealed by hovering over with the mouse. Yes – there is a prominent 'Add to Workspace' button on the item record page. No – it is not clear what the 'Add to Workspace' button on the Thesaurus, Tag cloud, Map and Items sections achieves, and in fact the content added to the workspace varies by page.
	understand whether their action was correct or not?	Yes – the workspace slides down from the top and the item images are listed there. No – when the first few items have been added to the workspace, additional items are not seen at first glance as they are added to the bottom of the list and the user must scroll to see them. There is no indication of the number of items in the workspace or that this has increased.

Figure 117 Cognitive Walkthrough Task 2 – Collect items for a path

Task 3 – Create a path from collected items

Actions	Evaluation criteria – will users...	Evaluation
1) Use 'Create Path' button in the workspace to transfer	know what to do?	Maybe – this is a new functionality for most initial users and they may not realise they need to take specific action.
	see how to do it?	Yes – if they are logged in and have added items to their workspace, the 'Create Path'

items to the Path workspace	see how to do it?	button is clearly visible.
	understand whether their action was correct or not?	Yes – the Path workspace appears, with their content and options for editing.
2) Add nodes to the path	know what to do?	Maybe – drag and drop is a relatively familiar way of moving content within an edit space.
	see how to do it?	Maybe – the user needs to drop down the collecting workspace and drag and drop items. This will be intuitive for many (especially Mac users), and for others, there is a Help text on the right hand side.
	understand whether their action was correct or not?	Yes – the thumbnail will move from the collecting workspace into the path edit space.
3) Add a title, description, metadata and thumbnail	know what to do?	Maybe – if they have created web content (e.g. blogs, Flickr, YouTube) previously they will be familiar with these actions.
	see how to do it?	No –the 'Create path metadata' button uses technical language that may not be familiar to many users. The use of a button/dialog box also means that the user needs to seek out this form and it is therefore not immediately evident that this content can be added. No – once in the dialog box it is not clear in what format the keywords should be added, nor what should be included in the duration field. No - The 'access rights' options also use some technical language and additional help text may be required to differentiate between the choices.
	understand whether their action was correct or not?	Yes – content appears in the metadata field as typed, and standard radio buttons are used for multi-select options Maybe – once the dialog box has been closed, the user may choose to Preview the path and any metadata added will be revealed, although scrolling is required, as most of this content is located at the bottom of the page.

4) Add/edit item titles and contextual information	know what to do?	Maybe – editing content is implicit in creating web content, but creating a path is a new activity. No – users might expect the original item descriptions to be included in their path.
	see how to do it?	Maybe – the edit button is only revealed when the mouse hovers over the path node Yes – once the edit button is clicked an edit form is revealed, although it may not be immediately apparent that the title (automatically added from the original content) can also be changed.
	understand whether their action was correct or not?	Maybe – if they manage to edit the fields, the new text is shown when they preview the path, or preview the node. However both of these actions require additional effort from the user, and the preview node button is only revealed by hovering with the mouse.
5) Move the items into the preferred order	know what to do?	Maybe – drag and drop is a fairly common feature of editing content, but many users may not have done this before. There is also the added complexity of being able to organise nodes in a branching pattern.
	see how to do it?	Maybe - directional highlighting is used to indicate where a node will be placed, but this may take some level of practice before comprehension and accuracy are achieved. Help text is available.
	understand whether their action was correct or not?	Yes – the item moves to a new position.
6) Delete irrelevant items	know what to do?	Yes – this is a common function in web editing environments.
	see how to do it?	Maybe – the delete node button is only revealed when hovering over it with the mouse.
	understand whether their action was correct or not?	Yes – the node disappears from the path. However, they may not realise that the item is then returned to the collecting workspace for future use. This may inhibit use of the delete node function as users may be concerned that the content will be lost.
7) Edit the path and/or	know what to do?	Yes – it is common to be able to edit content created in this type of web publishing

add additional items at a later stage	know what to do?	environment. Yes – the process for adding more items is the same as for creating the original path.
	see how to do it?	No – once the user has left the path workspace and returned to the main search and explore pages, there is no indication of how to find previously created paths. Yes – if the user find their list of paths, there is a prominent 'Edit' button on the path overview page.
	understand whether their action was correct or not?	Yes – if they are successful, in re-locating the path and continue to the edit workspace, adding new content or editing existing content is the same as for the initial path creation.
8) Publish the path	know what to do?	Maybe – if they have worked with web content in the past. No – they may think that having created the path, it is automatically available to other users.
	see how to do it?	No – there is no prominent 'publish' button in the edit workspace. Users must find this function in the 'Edit path metadata' dialog box, and even then it is listed as 'Access rights', which may be unfamiliar terminology for many users.
	understand whether their action was correct or not?	No– there is no dialog to confirm that the path is published. The user must find it in the Paths section or search results to know that it is definitely now publicly available.

Figure 118 Cognitive Walkthrough Task 3 – Create a path from collected items

5. Discussion and Conclusions

Digitisation of cultural heritage assets held by museums and institutions enables access to a much greater variety and quantity of material than can achieved through physical displays. Tools such as PATHS bring additional added value when utilised by experienced staff and/or knowledgeable end users to bring together related items and to present new themes, enriched by additional information. The evaluation groups demonstrated a clear preference for pre-defined paths created by curators and research staff. Cultural collections should be able to exploit their collections better by presenting information to end users in the form of exciting new paths. As PATHS is an interactive tool, educators can take predefined paths and adapt them for their students and all end users can contribute and add the existing PATHS as well as create their own paths from the materials available. In addition, when using material from a variety of sources, digital assets can be combined into a PATH in a way that is difficult to achieve with physical objects.

The following section presents comparisons of the evaluation results from the first and second prototype.

5.1 Comparison of responses to PATHS 1 and PATHS 2

Evaluation activities have, as far as possible, adopted a consistent approach across the first and second prototype. Some differences in questions, task and data collected have been inevitable due to the differing functionalities available at each prototype stage.

None of the Demonstration participants took part in both evaluations. Seven of the Laboratory participants took part in both.

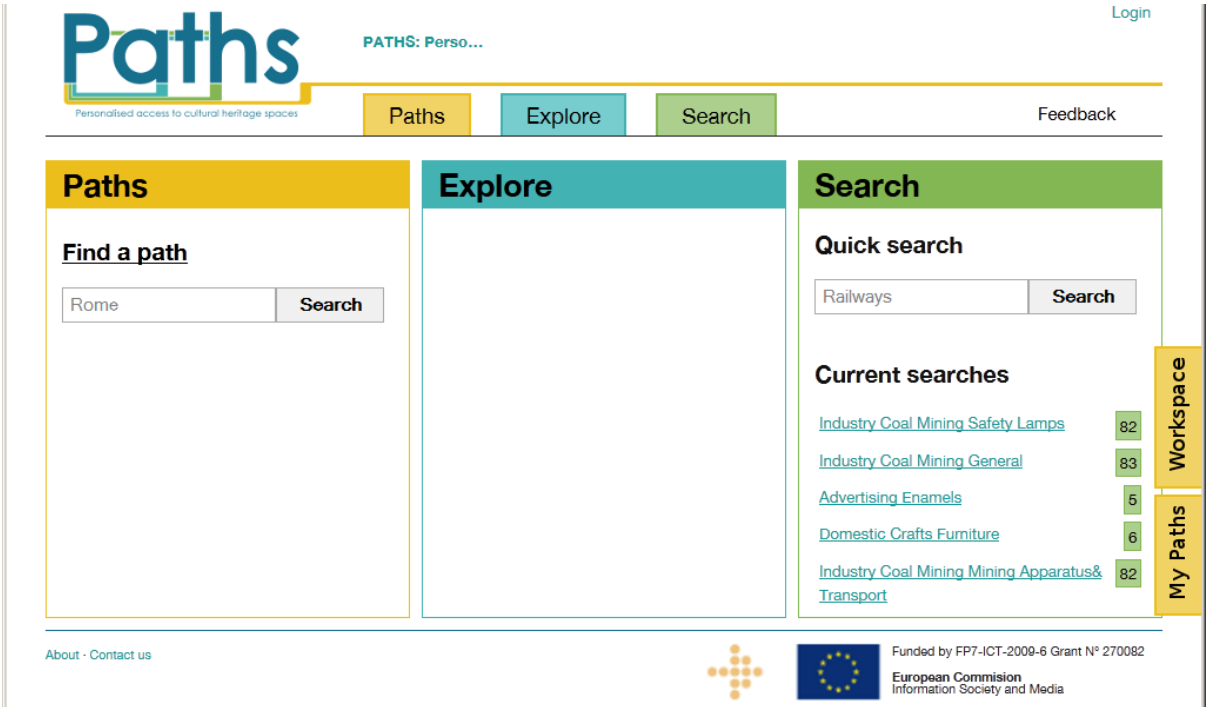

Figure 119 P1 interface and main functionality

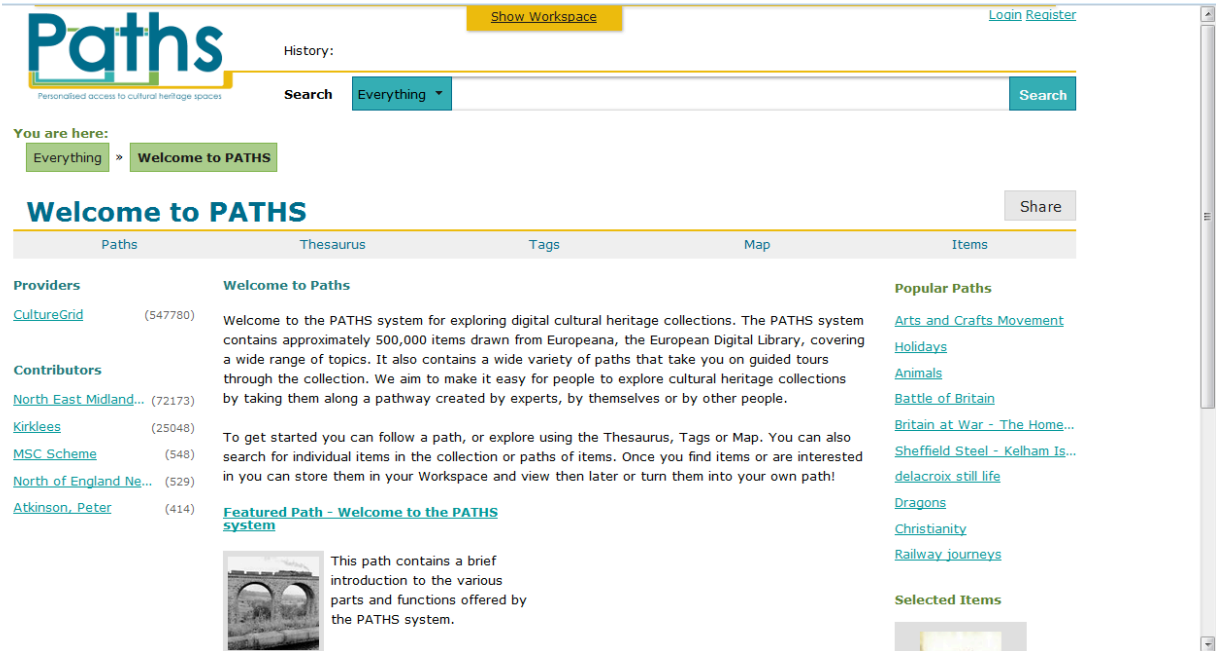

Figure 120 P2 interface and main functionality

5.1.1 Response to key functionality of PATHS

5.1.1.1 Finding and following a path

In the first prototype functions for finding a path were limited to Search and Explore. A simple quick search function was available, by clicking the tab Search the main search screen appeared. The search screen included a list of keywords which the user could select from, a single free-text search field as well as a scrolling field of sample content thumbnails representative of the contents of each of the keywords. The keywords were derived from the data processed in *D2.1: Processing and Representation of Content for First Prototype* and *D2.2: Processing and Representation of Content for Second Prototype*. The second mode of finding a path was to use the Explore options (more detail in sections 4.4 and 5.1.1.2).

5.1.1.1.1 Ease of use

Comparing participant responses we find that:

P1		P2	
Demonstration	**Laboratory**	**Demonstration**	**Laboratory**
Finding a path 85%	Finding a path 62%	Finding a path 80%	Finding a path 77%
Following a path 77%	Following a path 71%	Following a path 89%	Following a path 95%

Figure 121 P1 and P2: Finding and following a path: Ease of use
(Note that the categories “Very easy” and “Easy” were combined for ease of presentation.)

In three out of four cases, the evaluation groups scored Ease of use better for the second prototype, the exception being Finding a path where the Demonstration group scored the

first prototype slightly higher (85%) for the first prototype than the second (80%), both being very good scores. It appears that PATHS rates highly in Ease of use and overall, the second prototype is an improvement on the first.

5.1.1.1.2 Flexibility of following a path

Comparing participant responses we find that:

P1		P2	
Demonstration	**Laboratory**	**Demonstration**	**Laboratory**
Following a path flexible 52%	Following a path flexible 48%	Following a path flexible 85%	Following a path flexible 74%

Figure 122 P1 and P2: Finding and following a path: Flexibility of following a path
(Note that the categories "Very flexible" and "Flexible" were combined for ease of presentation.)

The Flexibility of following a path has improved markedly in the second prototype, going from around 50% to an average of around 80% for both groups combined. The % increased by over 25% for both groups even though the Laboratory group was slightly less positive at 74% compared to 85% for the Demonstration evaluators for the second prototype.

5.1.1.1.3 Whose paths would you like to see

Comparing participant responses we find that:

P1		P2	
Demonstration	**Laboratory**	**Demonstration**	**Laboratory**
Museum/Gallery Curators 88%	Museum/Gallery Curators 86%	Museum/Gallery Curators 65%	Museum/Gallery Curators 79%
Cultural organisations 84%	Cultural organisations 83%	Cultural organisations 83%	Cultural organisations 77%
Researchers 70%	Researchers 83%	Researchers 65%	Researchers 68%
Museum/Gallery Educators 66%	Museum/Gallery Educators 66%	Museum/Gallery Educators 50%	Museum/Gallery Educators 67%
Teachers 56%	Teachers 43%	Teachers 39%	Teachers 41%

Figure 123 P1 and P2: Finding and following a path: Whose path would you like to see

Both evaluation groups indicated similar broad preferences for both prototypes, i.e. Museum/Gallery Curators and Cultural organisations are the two most popular choices for 'Whose path you would like to see'. The percentages are nearly all lower for both evaluation groups with the second prototype but this could be a reflection of the type of evaluator as much as the difference between the prototypes. Since Museum/Gallery educators and Researchers score between 50% and 68% and Cultural organisations & Museum/Gallery Curators 65%-83%, it can be safely assumed that there is strong interest in seeing paths created by knowledgeable people. This fulfils one of the main objectives of PATHS which is to demonstrate the feasibility and desirability of integrating PATHS into existing cultural heritage digital library services.

5.1.1.2 Exploring with PATHS

Exploration of cultural heritage collections forms a key area of research within PATHS. In the first prototype exploration was offered through two functions: in the first function, the screen which appeared when clicking the Explore tab showed a cycling slideshow of items and item-titles from the underlying collections, providing the user with random suggestions of content to explore. The second function comprised a Tag Cloud, which gave a view of all the items with a thumbnail image and a title. This allowed end-users to browse the collections visually. By clicking on either of the thumbnails, the corresponding item was displayed.

Exploration functionality has been greatly extended in P2, with Thesaurus, Tag Cloud, Map and Item options comprising the different exploration modes. The Thesaurus page displays the thesaurus hierarchy using indentation to represent the parent - child relationship. Additionally to give the users an idea of what they can expect to find if they select a topic in the hierarchy, for each topic the number of sub-topics, items, and paths are displayed.

The main area of the Tag Cloud shows the sub-topics for the current topic with the size of each sub-topic representing the number of items within that sub-topic. Moving the mouse over any of the sub-topics displays the number of sub-sub-topics, items, and paths within the sub-topic. All other components and the potential interactions they offer are the same as on the Thesaurus page.

As is the case with the Thesaurus and Tags Cloud, the Map is initially zoomed and centred on the current topic. The Map page consists of the map itself and the zoom control that can be used to zoom in and out of the map. The Map is not a spatial map, but a semantic map that represents the thesaurus hierarchy in a two-dimensional arrangement. While the thesaurus and tags pages represent information such as the number of items in a topic textually, in the map this information is represented by the size of the topic areas shown on the map. All other components are as on the Thesaurus page.

5.1.1.2.1 Ease of use

Comparing participant responses we find that:

P1		P2	
Demonstration	**Laboratory**	**Demonstration**	**Laboratory**
Explore 78%	Explore 37%	Thesaurus 82%	Thesaurus 79%
		Tag Cloud 74%	Tag Cloud 59%
		Map 62%	Map 44%

Figure 124 P1 and P2: Explore: Ease of use
(Note that the categories “Very easy” and “Easy” were combined for ease of presentation.)

There was a large difference between the two evaluation groups for the Explore function in the first prototype where only 37% of the Laboratory group found this Very easy/Easy compared to 78% of the Demonstration group. Prototype 2 was enhanced to provide three different methods to exploring a path, all of which scored better with the Laboratory evaluation. Overall, both evaluation groups liked the Thesaurus method best (82% and 79%) with the Tag cloud being a second choice and the Map third. Both the Map and Tag cloud

were less popular with the Laboratory group than the Demonstration by around 18% and 15% respectively. Overall, it can be concluded that the Ease of use has improved in the second prototype and the Thesaurus is the preferred exploration method.

5.1.1.2.2 Usefulness

Comparing participant responses we find that:

P1		P2	
Demonstration	**Laboratory**	**Demonstration**	**Laboratory**
Explore 74%	Explore 46%	Thesaurus 69%	Thesaurus 79%
		Tag Cloud 53%	Tag Cloud 47%
		Map 59%	Map 59%

Figure 125 P1 and P2: Explore: Usefulness
(Note that the categories "Very Useful" and "Useful" were combined for ease of presentation.)

The responses to the Usefulness of the exploration methods produced some interesting results, especially if compared to Ease of use. As with the Ease of use for the first prototype, the Demonstration group were much more positive than the Laboratory group about the Usefulness of the Explore function. For the second prototype, the Laboratory group were more positive about all the methods than for prototype 1 but rated the Map more useful than the Tag cloud. The Demonstration group likewise found the Map more Useful than the Tag cloud. The Laboratory group also rated the Thesaurus more highly (79% to 69%) than the Demonstration group for Usefulness. The results suggest that the Map could possibly be made easier to use and the evaluators are fairly neutral about the Usefulness of the Tag Cloud with the Thesaurus being the preferred option.

5.1.1.2.3 Inventiveness

Comparing participant responses we find that:

P1		P2	
Demonstration	**Laboratory**	**Demonstration**	**Laboratory**
Explore 47%	Explore 43%	Thesaurus 17%	Thesaurus 15%
		Tag Cloud 31%	Tag Cloud 65%
		Map 68%	Map 59%

Figure 126 P1 and P2: Explore: Inventiveness
(Note that the categories "Very Inventive" and "Inventive" were combined for ease of presentation.)

Less than half the people in both evaluation groups thought that the Explore option was Very Inventive/Inventive for prototype 1 but the response (43% and 47%) was not negative. By contrast, the three different modes in prototype 2 produced a range of responses. Both groups agreed that the Thesaurus was not Inventive (17% and 15%). The Laboratory evaluators rated the Tag cloud as the most Inventive (65%) whilst the Demonstration group were far less positive (31%), preferring the Map (68%). The Laboratory group also gave the

Map a good rating at 59%. Overall, the Map rated well whilst the Tag cloud produced very diverse responses.

5.1.1.2.4 Exploration mode preferred

Comparing participant responses to exploration modes preferred we find that:

P1		P2	
Demonstration	**Laboratory**	**Demonstration**	**Laboratory**
Both 42%	Both 48%	Thesaurus,1st choice by 53%	Thesaurus, 1st choice by 68%
Image Cloud 36%	Image Cloud 23%	Tag Cloud 2nd choice by 40%	Tag Cloud, 2nd choice by 53%
Tag Cloud 22%	Word Cloud 26%	Map 3rd choice by 42%	Map 3rd choice by56%

Figure 127 P1 and P2: Preferred exploration mode

During the interviews, some Laboratory participants remarked that they did not feel able to choose between the Tag cloud and Map for their second and third choices, since they had not used either of them during the evaluation. It is possible that their answers were influenced by the order in which the choices appeared in the questionnaire. However, the addition of Thesaurus mode to exploration functionality in the second prototype appears to have been well received by the majority of participants, providing better support for exploration of content within cultural heritage collections.

5.1.1.3 Path Creation

In the first prototype the path creation screen included a form on the left where information about the path such as title, description, tags and duration could be entered. On the right/centre part of the screen, the nodes of the path were listed. Buttons to save drafts or publish the path for public viewing were available above the nodes. The title of each node was by default that of the item it was based on, but was editable using the user interface. Using the “edit” pencil button which was displayed to the far right of the title of each node, other node metadata could be edited.

When a path was created it was available as a separate information element through the user interface and could be viewed just like an item. The path viewing screen included basic metadata on the path including: suggested paths; possibility to interact with social networks; add ratings; comments or tags; and choose whether or not to follow the path. If the user chose to follow the path, the screen showing the node appeared. The node screen consisted of information on the path on the left hand side of the screen, including a list of crossing paths (paths which include one or more identical items). The right/centre side of the screen was occupied by information about the node itself including all user specified metadata such as title, description etc.

The screen allowed for user interaction including social network bookmarks, rating and comments. A set of buttons connected by “breadcrumbs” were shown directly above the node information, providing functions to move to the next or previous node.

In the second prototype the path creation function has been developed and extended considerably. The Workspace consists of the workspace item area and buttons to create a path, refresh the workspace, and clear the workspace. For each item the thumbnail, title, and user's notes are displayed along with two buttons to edit the notes and remove the item from the workspace. The workspace supports the following primary interactions: 1) Clicking on the item's title or thumbnail to be taken to the Item page for the item; 2) Clicking on the Create Path button to create a new path and be taken to the Path editing page and, 3) Clicking on the Edit Notes button for an item to edit the notes associated with the item.

The user accesses the Path editing page either by clicking on an edit link for one of their own paths or by clicking on the Create path button in the workspace. The path-editing component has changed significantly from the first prototype; the path editing interaction design was completely redesigned. The page consists of a toolbar and the main area for laying out a path. The toolbar consists of the preview button that launches a preview of the path in its current state and the edit path meta-data button that shows the path meta-data and lets the user edit it. To publish a path the user opens the path meta-data and selects the desired access rights.

In the main area for laying out a path the individual path nodes and the relationships between the nodes are shown. The user can re-arrange the path nodes by dragging and dropping them to their new location. As the user is dragging the node the area for laying out a path highlights where the node will be moved to if the user drops it. The same mechanism is used to add new nodes to the path by dragging in items from the workspace. Each node also has preview, edit, and delete buttons that the user can use to preview individual nodes, edit the text associated with a node and delete the node. If the user selects to preview or edit a node, then they can easily switch between the two modes in using the buttons provided in the node editing user interface.

5.1.1.3.1 Ease of use

Comparing participant responses we find that:

P1		P2	
Demonstration	**Laboratory**	**Demonstration**	**Laboratory**
Path Creation 81%	Path Creation 70%	Path Creation 72%	Path Creation 59%

Figure 128 P1 and P2: Path Creation: Ease of use
(Note that the categories "Very easy" and "Easy" were combined for ease of presentation.)

Both evaluation groups found Path creation easier in the first prototype with a 10% combined drop in ratings for the second prototype. However, given that the functionality and options greatly increased between the two prototypes, this would be expected. Responses of 72% and 59% for the Demonstration and Laboratory evaluators respectively are positive regarding the Ease of use for PATHS.

5.1.1.3.2 Usefulness

Comparing participant responses we find that:

P1		P2	
Demonstration	**Laboratory**	**Demonstration**	**Laboratory**
Path Creation 89%	Path Creation 83%	Path Creation 87%	Path Creation 79%

Figure 129 P1 and P2: Path Creation: Usefulness
(Note that the categories "Very Useful" and "Useful" were combined for ease of presentation.)

The differences between the two prototypes regarding Usefulness are far less marked, both between the two evaluation groups (6% and 8% difference) and the prototypes (2% and 4%). In all cases, the responses are very positive (79% to 89%) which suggests that the PATHS concept is highly popular and has been quite well implemented given the Ease of Use ratings.

5.1.1.3.3 Inventiveness

Comparing participant responses we find that:

P1		P2	
Demonstration	**Laboratory**	**Demonstration**	**Laboratory**
Path Creation 66%	Path Creation 86%	Path Creation 62%	Path Creation 74%

Figure 130 P1 and P2: Path Creation: Inventiveness
(Note that the categories "Very Inventive" and "Inventive" were combined for ease of presentation.)

Path creation in the first prototype was rated more Very Inventive/Inventive than for the second, the Laboratory group being 20% more positive than the Demonstration group. The Demonstration group response dropped by 4% for the second prototype and by 12% for the Laboratory group (some of whom had also evaluated P1). Overall, the responses are positive.

5.1.1.3.4 Experience of path creation task

Comparing participant responses we find that:

P1		P2	
Demonstration	**Laboratory**	**Demonstration**	**Laboratory**
Not applied to Demonstration	Easy to complete 58%	Not applied to Demonstration	Easy to complete 53%
Not applied to Demonstration	Enjoyable 74%	Not applied to Demonstration	Enjoyable 68%

Figure 131 P1 and P2: Path Creation: Path creation task
Based upon +3 to +1 responses (excluding 0 neutral, and negative -1 to -3)

The Laboratory participants found creating paths enjoyable for both prototypes (74% and 68%), but slightly less easy to complete (58% and 53%). Overall, the second prototype received lower ratings but these are still positive.

5.1.1.3.5 Preferred order of items

In the first PATHS prototype, the path was initially created with items listed according to the order in which they were collected, and users could then rearrange them to suit their needs, in a linear format only. In the second prototype, users are required to actively move items into the path one by one, and they can be placed in more complex formats, using varying degrees of branching (hierarchies).

Comparing the preferred order of items within a path we find that:

P1		P2	
Demonstration	**Laboratory**	**Demonstration**	**Laboratory**
Not applied to Demonstration	Chronological order 32%	Theme 59%	Theme 50%
Not applied to Demonstration	Narrative 23%	Narrative 59%	Narrative 23%
Not applied to Demonstration	Theme 9%	Chronological Order 49%	Chronological Order 9%

Figure 132 P1 and P2: Path Creation: Ordering items in a path

In the second prototype both sets of evaluation participants responded that ordering a path by Theme, Narrative and Chronological Order were their preferred ways to structure their paths. It appears that the functionality has a strong impact on the type and format of paths created, and in the latest prototype, we are able to support the thematic and narrative-based structures that are often favoured in cultural heritage contexts.

5.1.1.3.6 Participants' own rating of path quality

Comparing participant responses we find that:

P1		P2	
Demonstration	**Laboratory**	**Demonstration**	**Laboratory**
Not applied to Demonstration	Rating 1-3 45%	Not applied to Demonstration	Rating 1-3 53%
Not applied to Demonstration	Rating 4-6 48%	Not applied to Demonstration	Rating 4-6 32%
Not applied to Demonstration	Rating 7-9* 7%	Not applied to Demonstration	Rating 7-9 15%

Figure 133 P1 and P2: Participants' own rating of path quality

The highest score for P1 was 7, the highest score for P2 was 9

A slightly higher proportion of laboratory users rated their path as only 1-3, and 4-6 out of 10 for P2 than for P1. There is however an increase in the perceived quality of the paths created by a small number of users, with 15% rating their path 7-9 out of 10, compared with only 7% rating their path in this range for P1. The highest ratings had also increased overall; 7 out if 10 for P1 and 9 out of 10 for P2. These findings are perhaps to be expected given the increased complexity of the path creation tools in P2, meaning that there is likely to be a somewhat steeper learning curve in producing paths, especially for more novice users.

However, the findings also suggest that once users become more proficient, they are likely to be able to create paths of a higher quality, that better suit their needs.

5.1.1.3.7 Preference for sharing paths

Comparing participant responses, listed in order of preference, we find that:

P1		P2	
Demonstration	**Laboratory**	**Demonstration**	**Laboratory**
Share for reuse, edit allowed 43%	Share, no edit allowed 53%	Share, no edit allowed 46%	Share for reuse, edit allowed 38%
Share, no edit allowed 30%	Share for reuse, edit allowed 20%	Share for reuse, edit allowed 28%	Share, no edit allowed 32%
Keep private 8%	Keep private 13%	Keep private 2%	Keep private 15%

Figure 134 P1 and P2: Path Creation: Preference for sharing a path

The responses regarding the preferences for sharing paths highlight the differences between the evaluation groups more than the prototypes. However, in all cases, a small minority indicated that they would keep their paths private (least 2%, most 15% - both P2) with most opting to share their paths. The highest number of evaluators in the Demonstration group for P1 would share and allow editing (43%) with the Laboratory group having the highest value (53%) for sharing with no editing.

Overall, sharing with editing allowed was 63% for P1 and 66% for P2. Sharing, no editing was 83% for P1 and 78% for P2, i.e. a majority opting for this mode for both prototypes.

5.1.2 Contextual and additional content preferences

Participants were asked about additional exploration features that were currently offered in PATHS, or being investigated for future implementation, including related items, recommended items, and links to external related content. There were no tasks specifically requiring the use of these features, but the Demonstration sessions for both the first and second prototype did discuss these with participants. The main purpose of these questions was to investigate and understand the potential usefulness of these features.

5.1.2.1.1 Related items & paths

Comparing participant responses we find that:

P1		P2	
Demonstration	**Laboratory**	**Demonstration**	**Laboratory**
Related items & paths 96%	Related items & paths 90%	Related items & paths 88%	Related items & paths 85%

Figure 135 P1 and P2: Contextual & additional content: Related items & paths
(Note that the categories “Very Useful” and “Useful” were combined for ease of presentation.)

In response to P1 participants gave overwhelming support for the option to see related content items and paths, with 96% of Demonstration participants and 90% of Laboratory participants finding this Useful or Very useful.

The second prototype participants also indicated that Related Items and Paths would be either Very Useful or Useful. A total of 88% of Demonstration participants and 85% of Laboratory participants responded that Related Items and Paths would either be Useful or Very Useful.

Relatively few Laboratory participants were observed making use of this feature in the course of completing the previous tasks during evaluation of the second prototype, and seemingly less so than for the first prototype. This may be due to several factors: the related content is not available for all items and paths at the present time; there may possibly be an interface design issue in displaying this content; or, there were sufficient other tools available to complete the tasks without needing to use related items.

5.1.2.1.2 Related external content

In the first prototype PATHS offered links to Wikipedia articles on topics derived from the item record. In the second prototype links to external content in Wikipedia are provided as an additional source of contextual information and as a means of exploration. These links are presented as topic hyperlinks in the item record, although there is no immediate indication of where they lead to if followed.

Comparing participant responses we find that:

P1		P2	
Demonstration	**Laboratory**	**Demonstration**	**Laboratory**
Related external content 84%	Related external content 80%	Related external content 85%	Related external content 76%

Figure 136 P1 and P2: Contextual & additional content: Related external content
(Note that the categories “Very Useful” and “Useful” were combined for ease of presentation.)

There was also a high level of support from the first prototype participants for seeing related external content, with 84% of Demonstration participants and 80% of Laboratory participants finding this Useful or Very useful. In undertaking the evaluation tasks, a number of Laboratory participants followed these links, especially when there was very limited descriptive information available within the item record itself.

Related External Content was seen as useful by both sets of participants of the second prototype, with 85% of Demonstration participants and 76% of Laboratory participants responding. However, reservations were expressed by Demonstration participants of the appropriateness of links to Wikipedia, for example *‘Academic rather than Wikipedia’* and *‘Reliable sources - preferably academic/heritage, ie not Wikipedia’*. This is contrary to an earlier question where we found that Wikipedia was one of the most frequently used sources of cultural heritage information, and is also cited frequently here a preferred source for background links. In the laboratory, relatively few participants were observed using these background links, yet once again, there is strong support for inclusion of links to external related content.

Other sources mentioned by several participants include museum, gallery, archive and library web sites, other general content such as the Encyclopaedia Britannica and the Oxford Dictionary, specialist subject collections, scholarly sources such as journal articles, and multimedia content including images, videos and maps.

5.1.3 PATHS as a tool to facilitate use of cultural heritage collections - supporting information tasks

5.1.3.1.1 Level of support for info tasks

Participants were asked to consider during evaluation of P1 (Laboratory only) and P2 (both Demonstration and Laboratory) how well PATHS supported different types of information tasks.
Comparing participant responses we find that:

P1		P2	
Demonstration	**Laboratory**	**Demonstration**	**Laboratory**
Not applied to Demonstration	Creating Resources 67%	Finding items on a Topic 88%	Serendipity and Discovery 91%
Not applied to Demonstration	Using content created by others 67%	Exploring a Collection 88%	Sharing content with others 79%
Not applied to Demonstration	Serendipity and Discovery 63%	Creating Resources 87%	Creating Resources 79%
Not applied to Demonstration	Sharing content with others 60%	Serendipity and Discovery 81%	Exploring a Collection 74%
Not applied to Demonstration	Finding items on a Topic 57%	Sharing content with others 76%	Finding items on a Topic 62%

Figure 137 P1 and P2: Facilitating use of CH collections: Level of support for information tasks

Participants of the first prototype responded Very well or Quite well to most task types, the exceptions being communicating with others (30%), fact-finding (33%) and developing ideas (43%). The highest negative response was also for fact-finding (40%). Fact-finding was not a primary task associated with PATHS and there are inherent issues with the test collection content with regard to fact-finding.

However, whilst exploration is intended to be a core element of the system responses to P1 attracted a relatively high negative response, where only 37% of the Laboratory group found this Very easy/Easy compared to 78% of the Demonstration group. Further development of this function was therefore deemed critical. However, even with these mixed responses to explore within the first prototype, there were high positive ratings for other key tasks that PATHS was designed to support, including; *Creating resources (67%), Using content created by others* (67%), *Serendipity and discovery* (63%), *Sharing content with others* (60%) and *Finding items related to a topic* (57%).

Exploration and support for tasks were developed and extended considerably for P2 in light of these findings and results from participants of the second prototype show very high levels

of positive responses for tasks related to *Serendipity and discovery*, *Finding items on a topic*, *Exploring a collection*, *Sharing content with others* and *Creating resources*. The path following task (*Using content created by others*) received no negative responses, and responses to this question have improved substantially across all tasks, including those which are core to PATHS, over responses given for the first prototype.

5.1.3.1.2 Tasks for which participants would use PATHS

In accordance with the findings for the previous question, participants were also asked to select the three tasks that they would be most likely to use PATHS for.

Comparing participant responses we find that:

P1		P2	
Demonstration	**Laboratory**	**Demonstration**	**Laboratory**
Not applied to Demonstration	Exploring the collection 1st by 24%	Creating resources 1st by 31%	Exploring the collection 1st by 24%
Not applied to Demonstration	Finding items on a topic 2nd by 18%	Exploring the collection 2nd by 30%	Serendipity/discovery 2nd by 18%
Not applied to Demonstration	Creating resources 3rd by 21%	Sharing content with others 3rd by 20%	Finding items on a topic 3rd by 21%

Figure 138 P1 and P2: Facilitating use of CH collections: Top 3 tasks

In accordance with the previous findings, participants of the first prototype were also asked to select the three tasks that they would be most likely to use PATHS for and (surprisingly, give the somewhat negative reaction to how supportive the first prototype was for *Exploring the collection*), the most frequently selected task is *Exploring available content*, placed 1st by 24% of participants. The 2nd place selection is *for Serendipity and discovery* by 18% of participants and *Finding items on a topic* was the 3rd highest place task rated by 21% of participants.

The most popular tasks amongst participants of the second prototype were *Exploring the collection* and *Creating resources*, placed first by both Laboratory and Demonstration participants. *Serendipity and discovery*, *Sharing content with others* and *Finding items on a topic* all ranked amongst the top three uses for PATHS. The re-development of exploration modes and support for users of PATHS appears to have had a positive impact on participant responses to the second prototype.

5.1.4 Overall response to the first and second PATHS prototype, Semantic Differentials

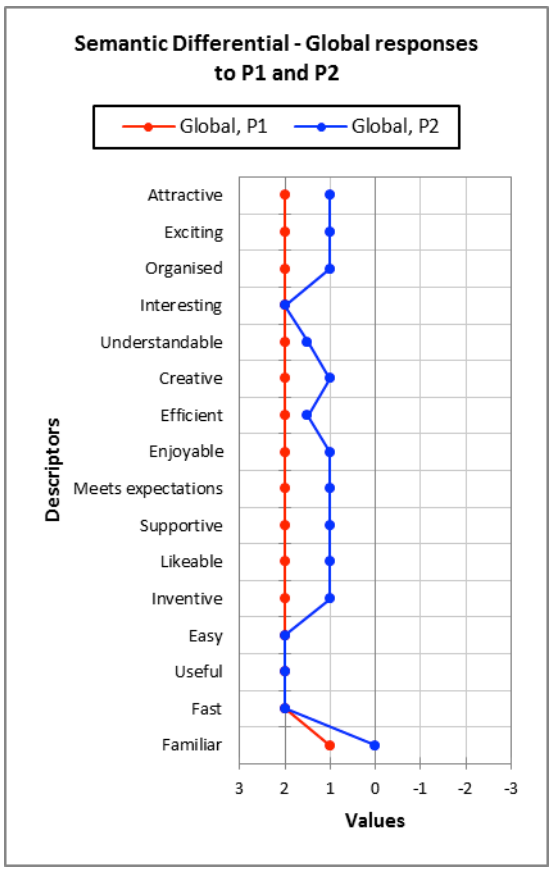

Figure 139 Global response to P1 and P2: Demo

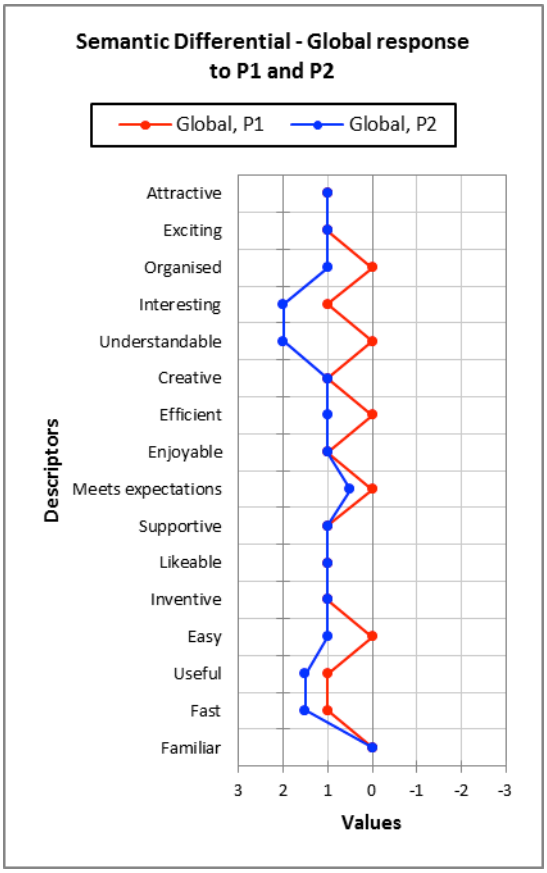

Figure 140 Global response to P1 and P2: Laboratory

Globally perceptions by the Demonstration participants to the first prototype across almost all scales were extremely positive, with a median of 2 for all usability scales except Familiarity, which had a median of 1. Familiarity consistently scored lowest across all participants, unsurprising for a new system. Results from Laboratory participants were also mostly positive/neutral, with medians ranging from 0 to 1. Highest rated were Attractive, Exciting, Interesting, Creative, Enjoyable, Supportive, Likeable, Inventive, Useful, and Fast.

Global responses to the second prototype were also very positive, although not quite as high for the Demonstration participants. Medians for P2 from the Demonstration participants ranged from 1 to 2 (with 0 for Familiarity again), peaking at Interesting, Easy, Useful and Fast. Laboratory participants also showed an increased positive response to the second prototype, with medians ranging from 0.5 to 2 (with 0 for Familiarity). Usability aspects rated most highly were Interesting, Understandable, with Useful and Fast closely behind.

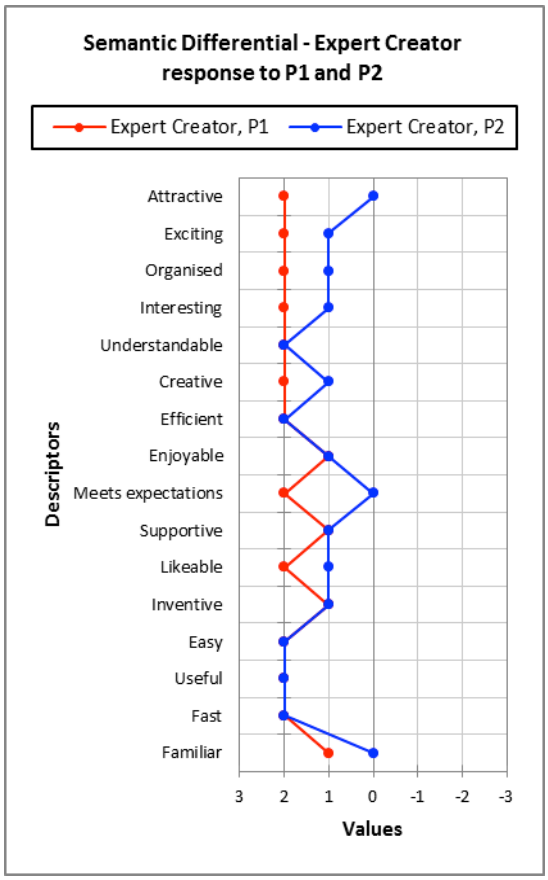

Figure 141 Expert Creator P1 and P2: Demo

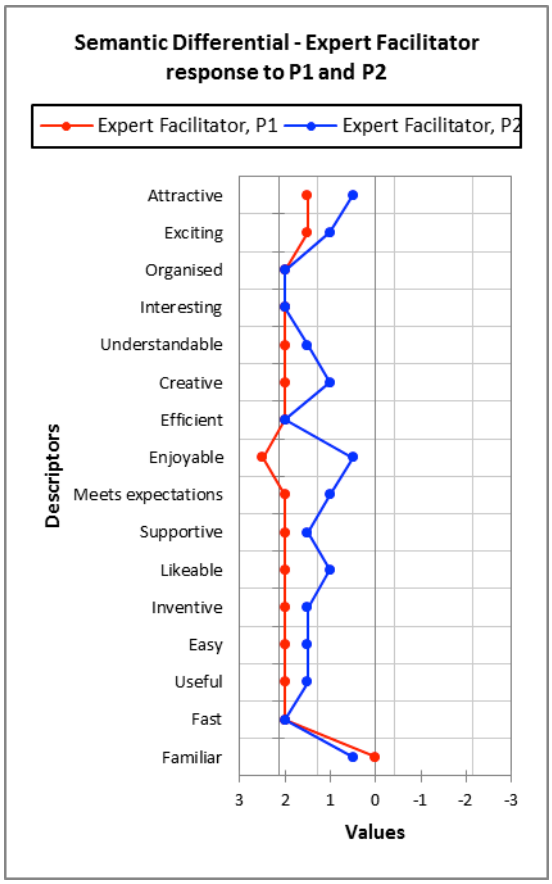

Figure 142 Expert Facilitator P1 and P2: Demo

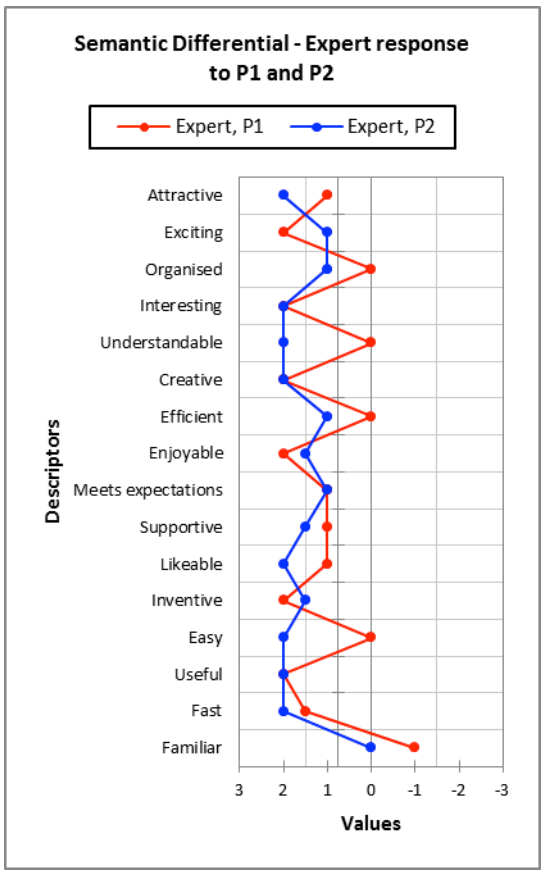

Figure 143 Expert P1 and P2: Laboratory responses

Response to the first prototype by Demonstration *Expert Creators* ranged from 1 to 2. Usability scales Attractive, Exciting, Organised, Interesting, Understandable, Creative, Efficient, Meets expectations, Likeable, Easy, Useful and Fast were rated highest. *Expert Facilitators* responses ranged from 0.5 to 2.5 (with 0 for Familiarisation again). Expert Facilitators rated Enjoyable most highly, closely followed by Organised, Interesting, Understandable, Creative, Efficient, Meets expectations, Supportive, Likeable, Inventive, Easy, Useful and Fast.

Experts from the Laboratory evaluation expressed a mixed response to the first prototype, with medians ranging from 0 to 2, with -1 for Familiarisation. Most highly rated were Exciting, Interesting, Creative, Enjoyable, Inventive and Useful.

Responses to the second prototype by the *Expert Creators* from the Demonstrations were also mainly positive, ranging from 0 to 2. Usability aspects scoring most highly were Understandable, Efficient, Easy, Useful and Fast. *Expert Facilitators* responses ranged from 0.5 to 2, with Organised, Interesting, Efficient and Fast rated highest.

Laboratory *Expert* participants responses ranged from 0.5 to 2 (with 0 for Familiarity again). Usability aspects rated most highly were Attractive, Interesting, Understandable, Creative, Easy, Useful and Fast.

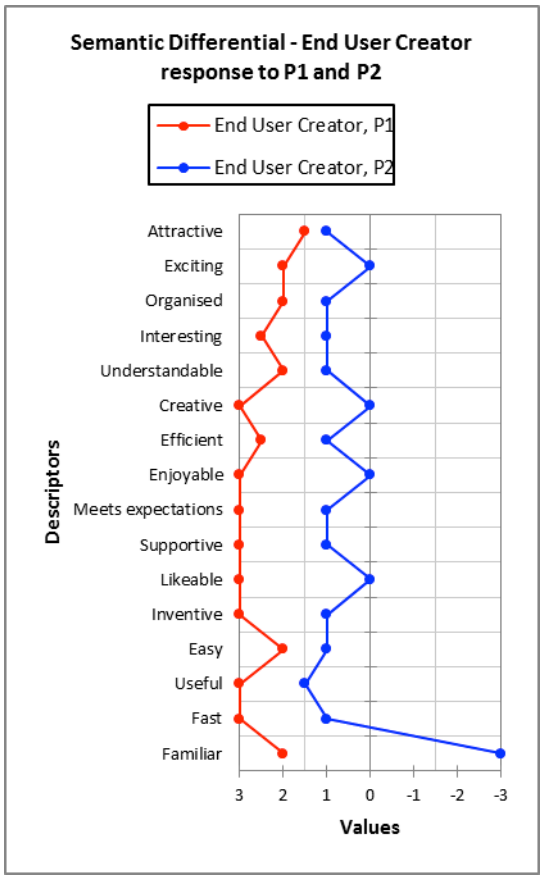

Figure 144 End User Creator P1 and P2

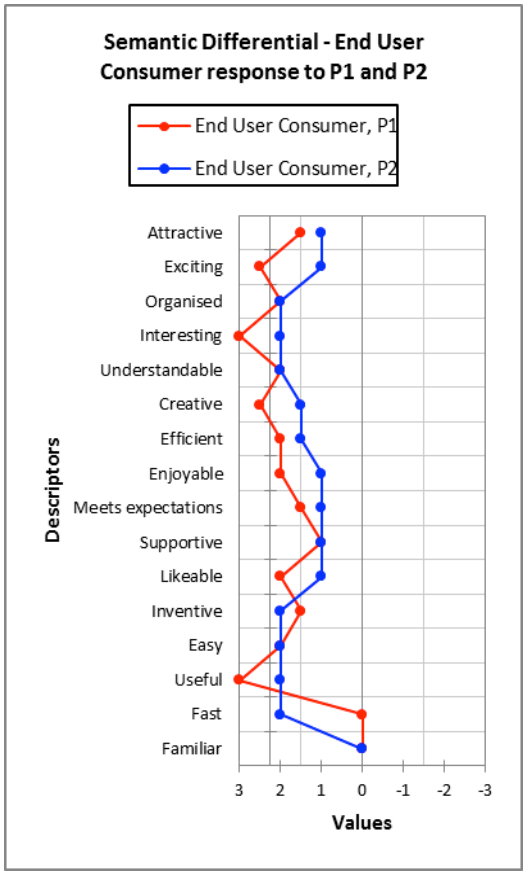

Figure 145 End User Consumer P1 and P2

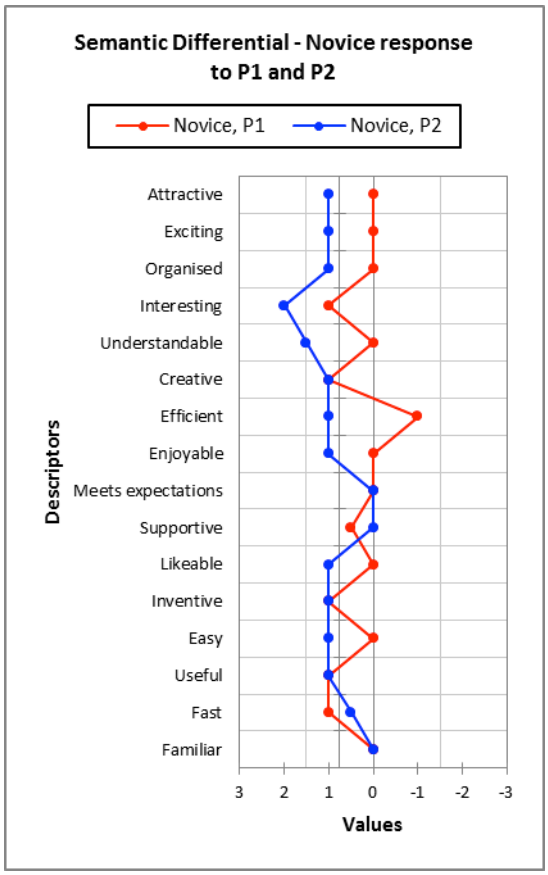

Figure 146 Novice P1 and P2: Laboratory responses

End User Creator participants from the Demonstrations had extremely positive views on the first prototype, with medians ranging from 1.5 to 2 (Familiarity scored 2). Most highly rated of the usability scales were Creative, Enjoyable, Meets expectations, Supportive, Likeable, Inventive, Useful and Fast. *End User Facilitator* responses were also very positive, ranging from 1 to 3 (0 for Familiar). Interesting and Useful were most highly scored.

Novice users from the Laboratory evaluation activities for the first prototype were neutral/positive, with medians across the usability scales ranging from -1 to 1 (with Familiarity at 0). Most highly rated were Interesting, Creative, Inventive, Useful and Fast.

Responses to the second prototype by the *End User Creators* from the Demonstrations were mainly positive, although more muted than for P1. Medians across the scales ranged from 0 to 1.5 (with -3 for Familiarity). Useful was most highly rated, followed closely by Attractive, Organised, Interesting, Understandable, Efficient, Meets expectations, Supportive, Inventive, Easy and Fast. End User Facilitators were positive in their view of the second prototype, with ratings ranging from 1 to 2 (0 for Familiarity again). Usability aspects most highly rated were Organised, Interesting, Understandable, Inventive, Easy, Useful and Fast.

Novice Laboratory participants responded more positively to the second prototype, with scores ranging from 0 to 2 (0 for Familiarity). Interesting was most highly rated, followed closely by Understandable and then Attractive, Exciting, Organised, Creative, Efficient, Enjoyable, Likeable, Inventive, Easy and Useful.

5.2 Changes in observed user behaviour between the first and second prototypes

Observations and screen-recordings of the laboratory evaluations reveal a number of differences in the information behaviour, navigational and exploration strategies adopted by users, as well as differences in the paths they created. The extended functionality offered in the second prototype, along with changes in the interface design and layout, can all be seen as impacting the way users interact with the system, and in turn, the results achieved in completing tasks.

The main area of difference relates to users' browsing and exploration strategies. In the first PATHS prototype (P1), users commonly resorted to simply browsing multiple pages (more than 10, and as many as 50 in some instances) of search results, as the most effective way of navigating through topics to find items of interest. Other options were used less frequently and with varying degrees of success: 'explore' (a simple tag cloud) was often viewed but quickly abandoned; 'related items' were popular in a few instances, but completely ignored by others; and, facets were used most often as a means of trying to filter results to those with images. In contrast, the second PATHS prototype (P2) is much more supportive of browsing and exploration, and consequently, users were observed making much greater use of the primary exploration modes (thesaurus, tag cloud and map), and much less use of browsing pages of search results (typically less than 3 pages). The most popular exploration mode by far was the thesaurus, with a number of users also observed using it as a surrogate for search reformulation, viewing results consecutively for multiple related topics, as well as using it as a means of gaining an overview of the collections and identifying available topics in their area of interest.

Much less use was made of the related items feature, even though it was now expanded to indicate different types of relatedness. Conversely, much greater, more successful use was made of the facets for filtering search results, possibly due to the improved search results (including fewer items without images), and therefore more specific, targeted filtering was possible. In addition, a new form of exploratory navigation was observed, in the use of the topic hierarchy breadcrumbs as a means of broadening a set of search results to a more generic topic level, and in a similar vein, using the 'Everything' breadcrumb to reset the search box or return to the top-level of the topic hierarchy.

When viewing search results and selecting items for use in a task, more users appeared to navigate to the item record, possibly due to the lack of snippets in the search results of P2. Many users also navigated out of PATHS to the larger source images available from the original content providers, resolving one of the major complaints of P1 that the thumbnail images were not large enough.

Due to the more advanced path structures enabled by P2 and the substantially different path workspace interface, changes were also noted in the path following and path creation activities, compared with P1. For example, when following paths with branching some users kept to a linear navigation and stopped when they reached a dead end, whilst others navigated back and forth to see all of the available nodes, in both systematic and more ad hoc ways. In the path creation task, images are now included in the collection workspace, in

addition to titles, and it may be that this is the reason that fewer users added notes at this stage, as they no longer needed a reminder of what the image portrayed.

More critically, the path creation workspace is different in many respects, and this has altered both the process of creating a path, and the paths created. In P1 the path was automatically populated with all items that had been collected, whereas in P2, the user is presented with a blank workspace and has to add items to the path one-by-one. This seems to lead users to giving much greater consideration of the structure and narrative of the paths contain from the very start, with paths being added to in a specific order. New features, such as the branching options and text nodes (used for adding theme headings and descriptors) were embraced by many users, with several examples of complex and well-structured paths being created.

Another major, but less positive difference was observed in the use of functionality for adding metadata and annotations. In P1, with essentially a form-based path creation workspace, most users began by adding a title, path description and keywords, and several also added annotations and edited titles for several items in their path. In P2, these features require the use of pop-up dialog boxes and were used much less, and more often, metadata and path title/description were added at the end of the process rather than the beginning, causing some issues with re-finding the path if the user navigated away to locate additional items. Users did however often use the pop-up dialogs as a means of previewing the individual nodes, and some also made use of the path preview button.

6. Recommendations for future development

The evaluation work reported here is part of a programme of evaluation activities that began with the evaluation of the first prototype, *D5.1 Evaluation of the first PATHS Prototype* (2012) and will be completed in the final round of field trials and technical testing to be reported in *D5.3 Report on results of field trials of the PATHS system*. Engaging with participants representative of the target end-user communities in a series of field-based demonstrations and laboratory trials has provided us with a wealth of data regarding the second PATHS prototype.

6.1 Areas of positive response from participants

As with the first prototype (which was also well received by participants), it is evident that the majority of participants had an overall positive response to PATHS, finding it mostly *Interesting*, *Understandable*, *Easy*, *Useful* and *Fast*. The system was also seen as offering novel functionality that could be useful in a number of different user scenarios. Exploration and support for tasks were developed and extended considerably for the second prototype in light of findings and results from participants of the first prototype and now show high levels of positive responses for tasks related to *Serendipity and discovery*, *Finding items on a topic*, *Exploring a collection*, *Sharing content with others* and *Creating resources*. The path following task (*Using content created by others*) received no negative responses, and responses to this question have improved substantially across all tasks, including those which are core to PATHS, over responses given for the first prototype.

Additionally, the most popular tasks amongst participants of the second prototype were *Exploring the collection* and *Creating resources*, placed first by both Laboratory and Demonstration participants. *Serendipity and discovery*, *Sharing content with others* and *Finding items on a topic* all ranked amongst the top three uses for PATHS. The re-development of exploration modes and support for users of PATHS appears to have had a positive impact on participant responses to the second prototype.

Areas of positive responses may be summarised as:

Functionality	**Comment**
Finding and following a path	In three out of four cases, the evaluation groups scored Ease of use better for the second prototype for finding and following a path.
Flexibility of a path	The Flexibility of following a path improved markedly in the second prototype, going from around 50% to an average of around 80% for both groups combined.
Whose path would you like to see?	Both evaluation groups indicated similar broad preferences for both prototypes, i.e. Museum/Gallery Curators and Cultural organisations are the two most popular choices for 'Whose path you would like to see'. Since Museum/Gallery educators and Researchers score between 50% and 68% and Cultural organisations & Museum/Gallery Curators 65%-83%, it can be safely assumed that there is strong interest in seeing paths created by knowledgeable people. This fulfils one of the main objectives of PATHS which is to demonstrate the feasibility and desirability of integrating PATHS into existing cultural heritage digital library services.

Path Creation, usefulness	In all cases responses to the usefulness of PATHS were very positive (79% to 89%) which suggests that the PATHS concept is highly popular and has been well implemented given the Ease of Use ratings.
Preferred order of items	In the second prototype both sets of evaluation participants responded that ordering a path by Theme, Narrative and Chronological Order were their preferred ways to structure their paths. It appears that the functionality has a strong impact on the type and format of paths created, and in the latest prototype, we are able to support the thematic and narrative-based structures that are often favoured in cultural heritage contexts.
Preference for sharing paths	Sharing paths, whether with or without editing allowed was the most favoured option, indicating the desire for social interaction with cultural heritage resources. Overall, sharing with editing allowed was 63% for P1 and 66% for P2. Sharing, no editing was 83% for P1 and 78% for P2, i.e. a majority opting for this mode for both prototypes.
Level of support for information tasks	Exploration and support for tasks were developed and extended considerably for P2 and results from participants of the second prototype show very high levels of positive responses for tasks related to *Serendipity and Discovery*, *Finding items on a topic*, *Exploring a collection*, *Sharing content with others* and *Creating resources*. The path following task (Using content created by others) received no negative responses. Whilst further investigation of the exploration modes of PATHS is recommended (section 6.2) overall responses to level of support PATHS offers to differing information tasks has improved substantially, including those which are core to PATHS.
Top 3 tasks for which participants would use PATHS	The most popular tasks amongst participants of the second prototype were *Exploring the collection* and *Creating resources*, placed first by both Laboratory and Demonstration participants. *Serendipity and discovery*, *Sharing content with others* and *Finding items on a topic* all ranked amongst the top three uses for PATHS. The re-development of exploration modes and support for users of PATHS appears to have had a positive impact on participant responses to the second prototype.
Overall perceptions of PATHS	Global responses to the second prototype were very positive, although not quite as high for P2 as for P1 from the Demonstration participants, this may be due to the increased complexity of prototype 2. Medians for P2 from the Demonstration participants ranged from 1 to 2 (with 0 for Familiarity again), peaking at *Interesting*, *Easy*, *Useful* and *Fast*. Laboratory participants also an increased positive response to the second prototype, with medians ranging from 0.5 to 2 (with 0 for Familiarity). Usability aspects rated most highly were *Interesting*, *Understandable*, with *Useful* and *Fast* closely behind.

Figure 147 Summary of positive responses

6.2 Areas for further investigation

Whilst there have been positive responses to the second prototype there are areas where further investigation through extended field trials will bring useful insights. These can be summarised as:

Functionality	Comment
Preferred exploration mode, ease of use, usefulness and inventiveness	The addition of Thesaurus mode to exploration functionality in the P2 has been well received by the majority of participants, providing better support for exploration of content within cultural heritage collections. Overall, Ease of use has improved in P2 and the Thesaurus is the preferred exploration method. Participants were more positive about the exploration methods but rated the Thesaurus most useful, followed by the Map and then Tag cloud. The results suggest that the Map and Tag Cloud could possibly be made easier to use. Participants agreed that the Thesaurus was not Inventive, across the participants the Map rated well whilst the Tag cloud produced very diverse responses. Further investigation of exploration modes is recommended.
Path Creation ease of use and inventiveness	Both evaluation groups found Path creation easier in the first prototype. However, given that the functionality and options greatly increased between the two prototypes, this would be expected. Responses of 72% and 59% for the Demonstration and Laboratory evaluators respectively are positive regarding the Ease of use for PATHS. Path creation in the first prototype was rated more highly for inventiveness than for the second, the Laboratory group being 20% more positive than the Demonstration group. The Demonstration group response dropped by 4% for the second prototype and by 12% for the Laboratory group (some of whom had also evaluated P1). Overall, the responses were still positive. Further investigation of path creation is recommended.
Participants and experience of path creation task and own rating of path	The Laboratory participants found creating paths enjoyable for both prototypes (74% and 68%), but slightly less easy to complete (58% and 53%). Overall, the second prototype received lower ratings but these are still positive. The overall profile of the rating for Ease of use of finding and following a path are roughly similar for both prototypes – most people rate this between 1 and 6 (93% and 85%). Those who rated this function between 7 and 9 increased from 7% to 15% and the rating value increased from 7 to 9, indicating that a small minority struggled more with the second prototype. This would be expected due to the increased complexity of prototype 2. Further investigation of path creation is recommended.

Suggestions for improving Path Creation	The main areas of feedback can be summarised into three main categories: navigating and arranging the path in progress; adding contextual content to the path; and, issues with visibility of some elements of the interface. In addition there were a number of comments relating to small bugs within the PATHS system, mainly relating to the display of nodes within the path workspace. Observations show that a high proportion of users experienced these bugs, which along with the increased complexity of this functionality, may account for the very high number of users saying that path creation could be improved. Further investigation of path creation is recommended, ensuring that bugs have been remedied.

Figure 148 Areas of for further investigation

Based upon qualitative (verbal and written) feedback, and observations of participants' information behaviour during the laboratory evaluations, the following more specific recommendations can be made about desirable modifications to the PATHS system:

Functionality	Comment
Search	Consider possibilities for searching in context, i.e. searching to locate paths or topics within each main section. Suggestions based upon synonyms (rather than simply alternative spellings) may assist some users when no results are found.
Explore	Thesaurus/tag cloud: make it clearer how to navigate to collections when there is more than one available. Map: increase the size, and adjust the zoom levels for easier navigation.
Item records	Consider how make the related items and other content links more prominent.
Add to workspace	Make the drop down workspace easier to navigate (reduce scrolling), and consider options for sorting of items collected.
Path following	Make it easier to find paths by topic. Make the path overview more explicit in terms of visibility and use. Add thumbnails to the path overview. Make it easier to get 'back to path' after straying to explore other content.
Path creation	Add a title as soon as the path is created. Make it easier/more obvious how to edit nodes. Make it easier/more obvious how to add metadata. Have a separate button for publishing the path and setting access rights. Need a prominent 'my paths' button visible at all times.

Figure 149 Specific recommendations for PATHS

These recommendations are not exhaustive, but highlight some of the main issues arising when participants actively engaged in undertaking various information based tasks in the PATHS system. The suggestions are also not prescriptive in how they may be resolved; this would need further user requirements analysis before appropriate solutions can be devised. They do however provide a useful basis for discussion on the further development of the PATHS system, and may also inform future work in the wider research areas related to the project.

Finally, the results of the demonstration and laboratory activities reported here have enabled us to confirm that the second PATHS prototype system does meet user requirements as identified in *D1.1 User Requirements Analysis* (2011) and is viewed as usable, useful and supportive of exploration of cultural heritage collections.

Lessons learnt from carrying out the evaluation of the first prototype primarily related to time and resources. We used this to knowledge when undertaking the demonstration and laboratory evaluation activities for the second prototype – conducting these earlier meant that we were able to engage with a wider and greater number of organisations and groups, 13 in total. The final phase of activities will be extended to include field trials in different scenarios and evaluation of the mobile application. The timing of the sessions has been planned around the beginning of new academic terms, and after summer vacation periods across Europe to enable both local host institutions and participants to be recruited to take part. These field trials will involve a group of invited participants who will be encouraged to use PATHS in a naturalistic setting, undertaking their own work tasks (with some guidance to enable further investigation of areas identified above), and over a period of time of their choosing. This will not only overcome the restrictions of time limit for path creation tasks with the laboratory, but will also provide invaluable insight into how PATHS might actually be used in the real world. To this end, we have identified a number of volunteers from the second prototype evaluation activities who are interested in using it again for their own purpose, including use within teaching and learning settings.

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D2.2: Processing and Representation of Content for second Prototype (2012) http://www.paths-project.eu/eng/Resources

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Appendix 1 Demonstration evaluation: Participant Pack including Information Sheet, Consent Form and Questionnaire

PATHS Project User Evaluation
Participant Pack

[NB p1-3 to be retained by the participant, p4-12 to be collected by the Moderator]

*You have been invited to take part in user evaluation for **PATHS**, an EU-funded collaborative research project which aims to build a system that enables enhanced, personalised exploration of digital cultural heritage collections.*

You don't have to take part, but your participation and feedback will be important to help us build a system that works best for you as a user, and that will hopefully be of use to you in the future.

Taking part:

At the session you will be asked to:

- Fill in a short questionnaire to tell us a little about you.
- Watch a demonstration of the PATHS system.
- Discuss your opinions and thoughts on the system with a small group of other participants.
- Complete a survey with your feedback on the system.

We will be recording the session – these recordings will only be used by project staff to assist in noting the discussion.

A few things you should know:

- You're free to withdraw from the research at any point.
- All the information we collect as part of your participation will be kept strictly confidential and anonymised before it is used for reporting.

Thank you for taking part in PATHS!

There's a Q&A on the next few pages if you want a few more details.

PATHS Project User Evaluation
Research Information Sheet

1. Research Project Title: PATHS Project User Study

2. Invitation paragraph
You are invited to take part in PATHS (Personalised Access To cultural Heritage Spaces), an EU-funded research project between the University of Sheffield, University of the Basque Country, MDR Partners, Asplan Viak Internet Ltd, and i-Sieve Technologies Ltd.

Before you decide to participate it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information, which explains what will be involved and how the information you provide might be used in support of the research goals. Thank you for reading this.

3. What is the project's purpose?
Given the vast quantities and diversity of digital information available from cultural institutions, users may find it difficult to navigate collections, to locate exact items of interest, and to interpret their meaning. At the same time, cultural heritage institutions are looking at new ways for users to interact with their collections, and are using new technologies to enrich the online experience, and to encourage deeper engagement, especially in areas of knowledge discovery and learning. We aim to build a system that will address these issues by enabling easier exploration of digital cultural heritage collections, enhanced by personalisation and recommendations, and with additional tools for information organisation and sharing. More information about PATHS can be found at the project website http://www.paths-project.eu/. This project will end in December 2013.

4. Why have I been chosen?
We need input from a wide variety of potential users, both expert and novice, in areas such as cultural heritage and education, as well as a wide variety of general users with an interest in using cultural heritage collections for leisure, study, personal or professional research. You have been identified as potentially belonging to one of these user categories and will be one of approximately 30-70 users taking part in this study.

5. Do I have to take part?
It is up to you to decide whether or not to take part. If you do decide to take part you will be required to sign a consent form in advance, or in the case of online research to tick a box to the same effect. You are free to withdraw from the research at any time. You do not have to give a reason.

6. What will happen to me if I take part?
If you agree to take part in the study you will be asked to make an appointment to visit the Information School in person to undertake the following activities:

- Fill in a questionnaire about your characteristics, experience and preferences
- Watch a demonstration of the PATHS system and provide feedback

The demonstration will also be audio-recorded. Some group photos may also be taken. Once your session is completed, no further input to the study will be required.

7. What do I have to do?
You will be required to use a computer screen for approximately 2 hours, with a break after 1 hour. You will be given a number of tasks to complete to the best of your ability and in any way you feel is appropriate. There are no right or wrong responses to any of the research exercises and you will not be judged on anything you do or say in this context. During the evaluation we ask that any information you provide is accurate to the best of your knowledge, and where your opinion is sought that you provide honest and frank responses.

8. What are the possible disadvantages and risks of taking part?
There are no foreseen risks involved in taking part in this study. If there is any information you do not wish to provide, you are free to decline.

9. What are the possible benefits of taking part?
Whilst there are no immediate benefits for those people participating in the project, it is hoped that this work will help to improve access to cultural heritage resources, supporting exploration of collections and creative use of materials in new ways that may be of use to yourself and others in the context of work, education and/or leisure interests.

10. What happens if the research study stops earlier than expected?
If for any reason the study has to stop, we will announce this on the project website and make sure that all data supplied up to that point is managed in accordance with the University of Sheffield's research ethics procedures.

11. What if something goes wrong?
If you have any questions about the study or wish to make any complaint, please contact Jillian Griffiths at jillian.griffiths@mdrpartners.com.

12. Will my taking part in this project be kept confidential?
All the information that we collect about you during the course of the research will be kept strictly confidential and will be managed in accordance good practice of ethical procedures. All information you provide will be anonymised and you will not be able to be identified in any reports or publications resulting from the research.

13. What type of information will be sought from me and why is the collection of this information relevant for achieving the research project's objectives?
We will collect information about your needs, preferences and experiences in using cultural heritage collections online, and in particular via the new PATHS system. Input from representative end users is vital in building and refining a system that is easy to use and that provides information and tools to support the various types of activities that its users may wish to complete.

14. What will happen to the results of the research project?
The information you provide will be combined with that from other participants and will be used to make recommendations for the refinement and ongoing development of the PATHS system. Results from this study will be published in a report in the first instance, which will be freely available via the PATHS web site (http://www.paths-project.eu). Data may also be used at a later date for subsequent related research and will be subject to the same conditions outlined above.

15. Who is organising and funding the research?
This work is supported by funding from the European Union under the Seventh Framework Programme (FP7). Information on this programme is available at http://cordis.europa.eu/fp7/home_en.html.

16. Who has ethically reviewed the project?
This project has been ethically approved via the ethics review procedure operated in the Department of Information Studies at the University of Sheffield. The University's Research Ethics Committee monitors the application and delivery of the University's Ethics Review Procedure across the University.

17. Contacts for further information
Evaluation and Field Trials Leader – Jillian Griffiths, jillian.griffiths@mdrpartners.com
INSERT LOCAL COORDINATOR'S NAME HERE

Thank you for taking part in this project!

Please keep a copy of this sheet for your future reference.

Participant Consent Form

Title of Research Project: *PATHS – Personalised Access to Cultural Heritage Spaces: User Evaluation*

Name of Principle Local Investigator: **INSERT LOCAL CONTACT NAME and EMAIL ADDRESS**

Participant identification name (nickname) _____

for this project (only to be used if you wish to withdraw at a later date

1. I confirm that I have read and understand the information sheet entitled *PATHS Project User Evaluation Research Information Sheet* explaining the above research project and I have had the opportunity to ask questions about the project. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline. ☐

3. I understand that my responses will be kept strictly confidential. I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research without prior consent. ☐

4. I agree for the data collected from me to be used in future research. ☐

5. I agree for photographs of the group to be used in research reports and project mate ☐

9. I agree to take part in the above research project. ☐

_____ _____ _____

Name of Participant **Date** **Signature**

(*or legal representative if the participant is under the age of 18*)

_____ _____ _____

Name of person taking consent **Date** **Signature**

(*if different from Local Contact Researcher*) *To be signed and dated in presence of the participant*

Please write a nickname (this will only be used if you wish to withdraw at a later date)
_____

Gender
Female ❑ Male ❑ Prefer not to say ❑

Age group

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

Which country do you currently live in?
Greece ❑ Spain ❑ UK ❑

In which of these roles do you use cultural heritage information online? (Tick ALL that apply)

	Often	Sometimes	Never
General museum visitor	❑	❑	❑
Student	❑	❑	❑
Lecturer / Teacher	❑	❑	❑
Librarian/Information specialist	❑	❑	❑
Researcher (academic)	❑	❑	❑
Researcher (leisure)	❑	❑	❑
Cultural heritage professional	❑	❑	❑
Business professional	❑	❑	❑
Other (please state) _____	❑	❑	❑

How experienced are you in using the internet?
Advanced user ❑ Intermediate user ❑ Basic User ❑ No experience ❑

How often do you search for cultural heritage information online?
Never ❑ Rarely ❑ Sometimes ❑ Often ❑

Do you use any of the following websites for information about cultural heritage?

	Never	Rarely	Sometimes	Often
Museum website	❑	❑	❑	❑
Gallery website	❑	❑	❑	❑
Archive website	❑	❑	❑	❑
Library website	❑	❑	❑	❑
Europeana	❑	❑	❑	❑
Wikipedia	❑	❑	❑	❑

	Never	Rarely	Sometimes	Often
Other (please state) _____	❑	❑	❑	❑

That's the first bit of form filling done, now we'll demonstrate PATHS to you!

1)

Did *finding* a path seem (please circle your choice):

Very easy Easy Neutral Complicated Very complicated

Did *following a path* seem (please circle your choice):

Very easy Easy Neutral Complicated Very complicated

What degree of flexibility did you feel there is in how you can follow a Path? (for example, moving between items on the Path, changing direction or be able to stop, start and go backwards?)

Very flexible Flexible Neutral Limited flexibility No flexibility

Whose paths would you like to see?

Cultural organisations ❑ Museum/Gallery Curators ❑ Teachers ❑ Students ❑
Museum/Gallery Educators ❑ Researchers ❑ Other users ❑ None of these ❑

Could we improve *following a path*?

Yes ❑ No ❑

If Yes, please tell us how _____

_____

2)

Did the *Thesaurus* seem (please circle your choice):

Very easy Easy Neutral Complicated Very complicated
Very useful Useful Neutral Useless Completely useless
Very inventive Inventive Neutral Conventional Very conventional

Did the *Tag Cloud* seem (please circle your choice):

Very easy Easy Neutral Complicated Very complicated
Very useful Useful Neutral Useless Completely useless
Very inventive Inventive Neutral Conventional Very conventional

Did the *Map* seem (please circle your choice):

Very easy Easy Neutral Complicated Very complicated
Very useful Useful Neutral Useless Completely useless
Very inventive Inventive Neutral Conventional Very conventional

Thinking of *adding items* - did it seem (please circle your choice):

Very easy Easy Neutral Complicated Very complicated
Very useful Useful Neutral Useless Completely useless
Very inventive Inventive Neutral Conventional Very conventional

2) cont.

Which exploration mode did you prefer? (please rank 1st, 2nd, 3rd)

	First	Second	Third
Thesaurus	❑	❑	❑
Tag cloud	❑	❑	❑
Map	❑	❑	❑

Would it be useful to see *related* items or *related* Paths (please circle your choice)?

Very useful Useful Neutral Not useful Completely useless

How useful would you find the following types of *related* items or paths?

	Very Useful	Useful	Neutral	Not useful	Completely useless
Related creators	❑	❑	❑	❑	❑
Related location	❑	❑	❑	❑	❑
Related people	❑	❑	❑	❑	❑
Related topics	❑	❑	❑	❑	❑
Similar description	❑	❑	❑	❑	❑
Similar time period	❑	❑	❑	❑	❑
Similar topics	❑	❑	❑	❑	❑
Most relevant related items					

Would it be useful to see *recommended* items or paths (please circle your choice)?

Very useful Useful Neutral Not useful Completely useless

How useful would you find the following types of *recommended* items or paths?

	Very Useful	Useful	Neutral	Not useful	Completely useless
Item / path of the day (random selection)	❑	❑	❑	❑	❑
Item / path of the day (curated selection)	❑	❑	❑	❑	❑
People who viewed this item/path, also viewed these	❑	❑	❑	❑	❑
Most viewed or shared items/paths	❑	❑	❑	❑	❑
Star rating (voted by other users)	❑	❑	❑	❑	❑
Personal recommendations (based upon profile information or recent behaviour)	❑	❑	❑	❑	❑
Generic recommendations (highly rated items suggested to all users)	❑	❑	❑	❑	❑

2) cont.

Would it be useful to see related external content (e.g. from Wikipedia)?

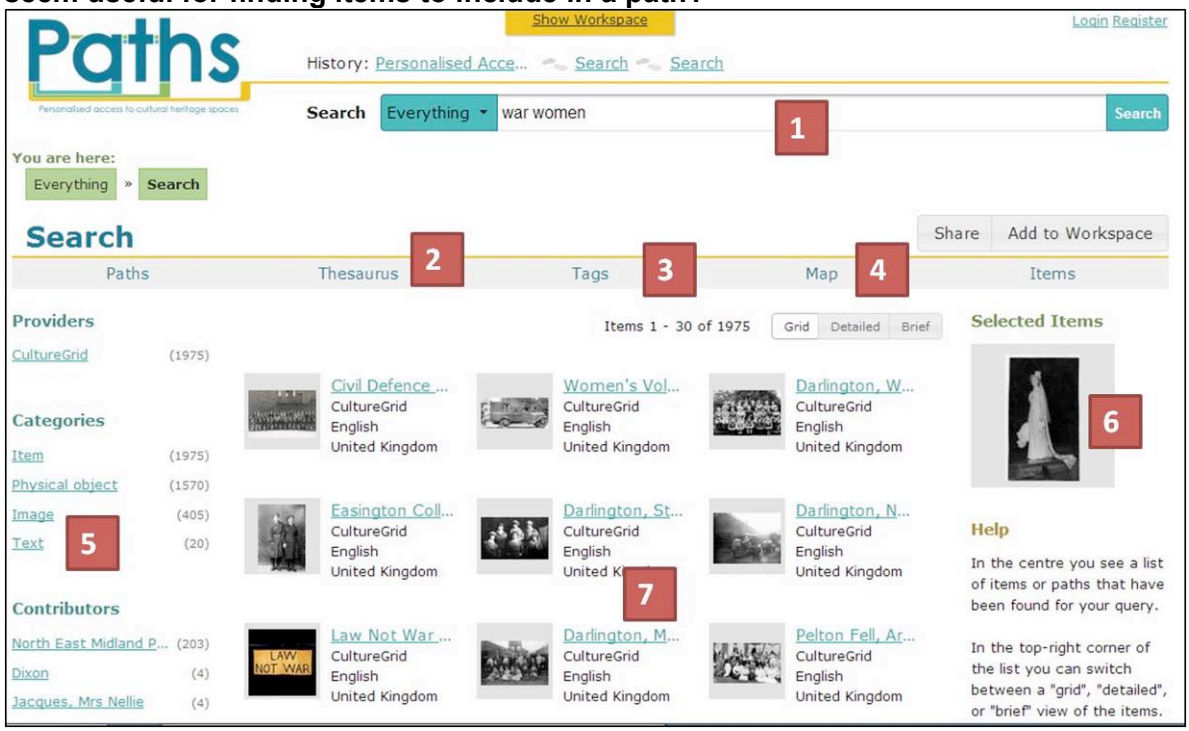
Very useful Useful Neutral Not useful Completely useless

What sources of related content would you prefer to see? _____

_____

3)

This screen shot is a reminder of some of the features we've looked at, did these seem useful for finding items to include in a path?

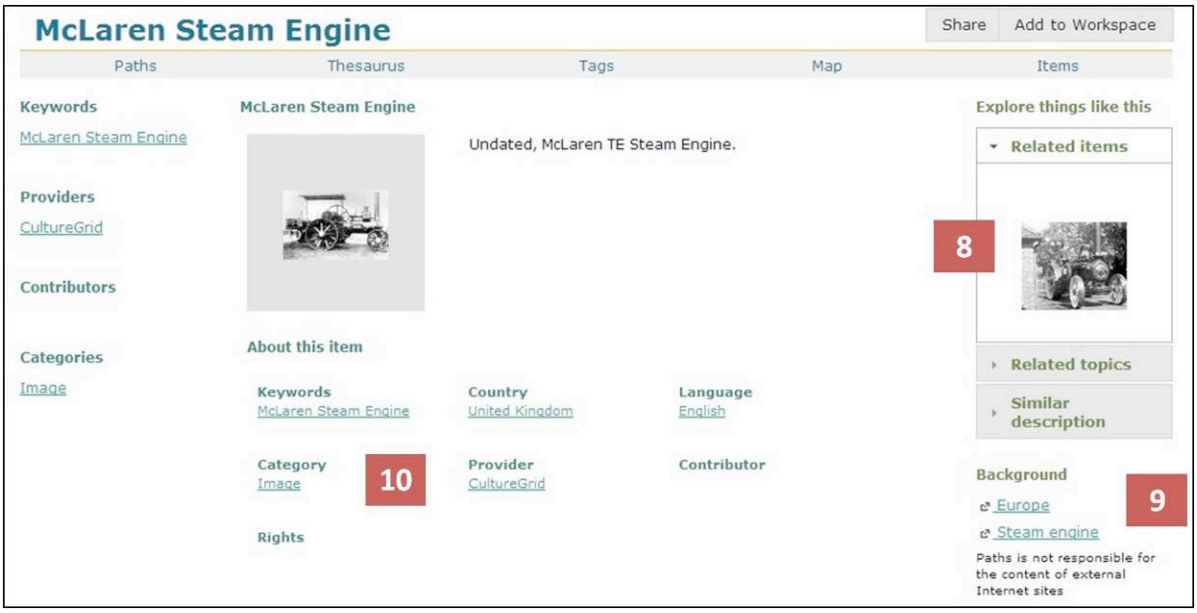


How useful did the following features seem for finding items to include in the path?

	Very Useful	Useful	Neutral	Useless	Completely Useless
1) Search box	❑	❑	❑	❑	❑
2) Thesaurus	❑	❑	❑	❑	❑
3) Tag cloud	❑	❑	❑	❑	❑
4) Map	❑	❑	❑	❑	❑
5) Search filters (facets)	❑	❑	❑	❑	❑
6) Selected items	❑	❑	❑	❑	❑
7) Browsing multiple pages of items	❑	❑	❑	❑	❑

3) cont.

This screen shot is a reminder of some of the features we've looked at, did these seem useful for finding items to include in a path?



How useful did the following features seem for finding items to include in the path?

	Very Useful	Useful	Neutral	Useless	Completely Useless
8) Related items	❑	❑	❑	❑	❑
9) Background links (Wikipedia)	❑	❑	❑	❑	❑
10) Keywords/metadata	❑	❑	❑	❑	❑

What information would you be most likely to use when choosing items for your path? (Select all that apply)

Image ❑ Title ❑ Text description ❑ Metadata / tags ❑

What criteria would you use when choosing items for your path? (Select all that apply)

Typical examples ❑ Unusual / unique ❑ Aesthetically pleasing ❑
Interesting description ❑ All that was available ❑
Other (please state) ❑ _____

How would you usually order items in a path?

Theme(s) ❑ Chronological ❑ Narrative ❑ Geographical ❑ Importance ❑Interestingness ❑ No particular order ❑
Other (please state) ❑ _____

3) cont.

Did the *Path Creation* function seem (please circle):

Very easy	Easy	Neutral	Complicated	Very complicated
Very useful	Useful	Neutral	Useless	Completely useless
Very inventive	Inventive	Neutral	Conventional	Very conventional

Did each of these elements of creating a path seem:

	Very easy	Easy	Neutral	Complicated	Very complicated
Collecting items in the workspace	❑	❑	❑	❑	❑
Moving items into the path from the workspace	❑	❑	❑	❑	❑
Adding text nodes to the path	❑	❑	❑	❑	❑
Arranging items in the path	❑	❑	❑	❑	❑
Describing the path / adding metadata	❑	❑	❑	❑	❑
Annotating items in the path	❑	❑	❑	❑	❑
Publishing / sharing a path	❑	❑	❑	❑	❑

How would you most prefer to Share a path?

Share your path for reuse and allow others to copy/edit ❑

Share your path but not allow editing ❑

Keep your path private ❑

Another way ❑ _____

Could we improve the *Path Creation* function?

Yes ❑ No ❑

If Yes, please tell us how _____

_____

_____

_____

_____

_____

_____

4)

Having spent time on PATHS what are your final views? Do you think it is :

Attractive						Unattractive
+3	+2	+1	0	-1	-2	-3
Exciting						Boring
+3	+2	+1	0	-1	-2	-3
Organised						Cluttered
+3	+2	+1	0	-1	-2	-3
Interesting						Not interesting
+3	+2	+1	0	-1	-2	-3
Understandable						Not understandable
+3	+2	+1	0	-1	-2	-3
Creative						Dull
+3	+2	+1	0	-1	-2	-3
Efficient						Inefficient
+3	+2	+1	0	-1	-2	-3
Enjoyable						Annoying
+3	+2	+1	0	-1	-2	-3
Meets expectations						Does not meet expectations
+3	+2	+1	0	-1	-2	-3
Supportive						Obstructive
+3	+2	+1	0	-1	-2	-3
Likeable						Unlikeable
+3	+2	+1	0	-1	-2	-3
Inventive						Conventional
+3	+2	+1	0	-1	-2	-3
Easy						Complicated
+3	+2	+1	0	-1	-2	-3
Useful						Useless
+3	+2	+1	0	-1	-2	-3
Fast						Slow
+3	+2	+1	0	-1	-2	-3
Familiar						Unfamiliar
+3	+2	+1	0	-1	-2	-3

If familiar, what did it remind you of? _____

4) cont.

In your opinion, how well does PATHS support each of the following tasks?

	Very well	Quite well	Neutral	Not very well	Not at all
Fact-finding	❑	❑	❑	❑	❑
Finding items related to a topic	❑	❑	❑	❑	❑
Exploring what content is available in the collection	❑	❑	❑	❑	❑
Serendipity / discovering new things	❑	❑	❑	❑	❑
Developing ideas	❑	❑	❑	❑	❑
Creating resources from cultural heritage collections	❑	❑	❑	❑	❑
Sharing content with others	❑	❑	❑	❑	❑
Communicating with other users	❑	❑	❑	❑	❑
Using content created by other users	❑	❑	❑	❑	❑

What would you be most likely to use PATHS for? (please select up to three choices, numbered 1-3, where 1 is most likely)

	1	2	3
Fact-finding	❑	❑	❑
Finding items related to a topic	❑	❑	❑
Exploring what content is available in the collection	❑	❑	❑
Serendipity / discovering new things	❑	❑	❑
Developing ideas	❑	❑	❑
Creating resources from cultural heritage collections	❑	❑	❑
Sharing content with others	❑	❑	❑
Communicating with other users	❑	❑	❑
Using content created by other users	❑	❑	❑

Do you have any other comments or suggestions about using of PATHS?

_____

_____

_____

_____

_____

_____

That's all the form filling done, thanks!

Appendix 2 Demonstration evaluation: Moderator Pack, including focus group schedule

PATHS Project User Evaluation
Moderator Pack

This document comprises the notes for the Moderators of the Demonstrations, including:

Information notes
Script for the introduction
Demonstrations tasks
Focus group discussion questions
Concluding remarks

Points at which questionnaire completion are indicted, please refer to the questionnaire within the Participant Pack.

v2.0

P2 demonstration evaluation v1.0

1. 10.00 Introduction to the study by the Moderator. 10 MINS FOR 1-3.

2. Distribution of **Participant Pack, including Information Sheet** and **Consent Form**.

3. Completion of **the Profile section of the individual questionnaire** (providing basic demographic information, nickname to identify their questionnaire should they wish to withdraw, country within which the evaluation activity is taking place).

4. 10.10 **Demonstration** of PATHS, a tour of the system, key features and a number of Tasks as detailed below including: 50 MINS
   - Homepage – welcome to PATHS
   - Show the Paths section, path finding and following
   - Show the Explore section, Thesaurus, Tag Cloud, Map, Items
   - Path creation, create a path

   Intersperse each area demonstrated with questionnaire completion and discussions. Discussion to be recorded.

5. 11.00 Conclusion of study, by moderators.

TOTAL TIME =60 MINS

10.00: Start
If the demonstration sessions starts at 10.00am then timings would be as indicated throughout this document – please adjust as necessary.

1. Introduction to the study by the group moderator. **10MINS FOR 1-3.**
2. Distribution of **Participant Pack.**
3. Completion of Profile section of the individual questionnaire (providing basic demographic information, nickname to identify their questionnaire should they wish to withdraw, country within which the evaluation activity is taking place, online search experience etc).

Objective	This part provides a broad introduction to the research. It should orientate the participants but not be so specific as to influence the results. It should also establish a friendly and collaborative atmosphere.
Actors	1. Moderator 2. Second moderator taking notes (and distributing and collecting forms), if possible 3. Teacher and/or Curator (if with children) 4. c. 3-7 participants in the focus group
Duration	10 min

Notes to the Moderator:
Suggested timings are provided by each section.
Normal text is a note for the Moderator, Bold text can be read out to the participants.
Where appropriate, the most important questions in each area are highlighted in yellow.
Demos are highlighted in blue.
Place name cards at each place and invite participants to sit at their place.

Responding to Participant Comments:

- Head Nodding
  - if slow continuous nod given to everyone, often signals encouragement
  - fast head nod probably signals agreement, and, as a result, tends to elicit additional comments of the same type: moderators should try to restrict it

- Short Verbal Responses
  - neutral responses such as “Okay”, “Yes” or “Uh huh” are okay
  - avoid responses that suggest accuracy or agreement (“correct”, that’s good”, “excellent”)
- Humour
  - smiles typically connote warmth, caring and empathy and are powerful factors in promoting conversation.
  - humour is a powerful bonding agent too, but can fall flat when used excessively

Responding to Participants' Questions:

Questions before the focus group begins
- often about the purpose of the focus group, about who's using the results etc.
- give answers but not give information that might be leading!

Questions after the introduction
- Don't invite these questions: risky, because there are a number of questions you may not want to answer until the end of the group. This can make the moderator appear defensive, evasive and apologetic.
- The moderators introduction usually takes only a few minutes and you should move directly into the opening questions.

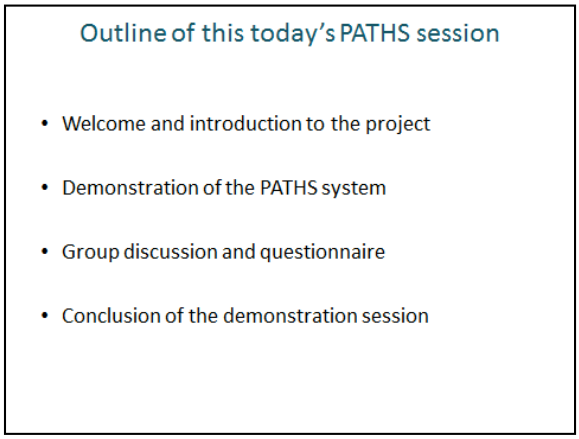
If someone does ask a question:
- if it's a straightforward question that won't bias the discussion: answer it
- if it could influence the group, delay; say something like: "I'd love to answer that question at the end of our discussion. Remind me and we'll talk about it then."

Questions during the focus group
Can relate to a variety of topics, moderator will have to consider each of these individually.

Questions at the conclusion of the group
- are welcomed and encouraged
- If a questions was postponed, be sure to bring it up at the end of the focus group
- Here you can tell more about the study: what other groups have said etc.

Hello, my name is xxxx and we are here (with your teacher/curator – if with schoolchildren**) to find out if a new way of finding and organising/collecting material from museums, archives, libraries and audio visual collections works for you. We highly appreciate your participation, and the opportunity to learn from you.**

We are going to search for cultural materials using a new system called PATHS. This is not the final finished system, it is the second version we have built and we need feedback from you to tell us what works well, and what we could improve.



There are no right or wrong answers. We expect that you will have different points of view. Please feel free to share your point of view even if it differs from what others have said. Feel free to have a conversation with one another about these questions. I'm here to ask questions, listen and make sure everyone has a chance to share. We're interested in hearing from each of you. This is an activity in which we want to learn from you.

You are part of a set of focus groups. We have groups running in the UK, Greece and Spain, and we have some work being done in a computer lab in Sheffield, UK.

We are audio recording of our session; this will be used only by our colleagues who are not able to be in xxxxx today but also would like to learn from your experience. All audio recordings and data collected will be treated in confidence. We will not disclose any of the individual data collected to anyone else. All data collected through questionnaires and your responses will be anonymised.

Ice Breaker, to get the conversation going, go around the table getting people to introduce themselves:

Please could you say who you are, and what collections you currently use, for example libraries, archives, museums and wheter you go there in person or use them online?

Thank you everyone, let's fill out the forms ……this form gives some information about you. I also would like to ask you to sign a consent form after that we will be ready to start!

Participant Information Sheet

Consent form

Individual questionnaire

10.10: Demo start

Demonstration and introduction to PATHS, a tour of the system and the key features: 50MINS.

Objective	This part provides a demonstration to the PATHS system. It should demonstrate the main functions of the system and give sufficient information so that the participants understand the system at a basic level.
Actors	1. Moderator 2. Second moderator taking notes (and distributing and collecting forms), if possible 3. Teacher and/or Curator (if with children) 4. c. 3-7 participants in the focus group
Duration	**50 min**

10.10: Discussion start

Group Discussion (to gather impressions of PATHS). Discussion to be recorded.

Objective	This part is a focus group discussion to capture the impressions of the PATHS system.
Actors	1. Moderator 2. Second moderator taking notes (and distributing and collecting forms), if possible 3. Teacher and/or Curator (if with children) 4. c. 3-7 participants in the focus group
Duration	**Throughout the Demonstration**

Questionnaire completion (to provide written feedback of first impressions). 5MINS.

Objective	This part requires participants to complete the Individual questionnaire to record their impressions of the PATHS.
Actors	1. Moderator 2. Second moderator taking notes (and distributing and collecting forms), if possible 3. Teacher and/or Curator (if with children) 4. c. 3-7 participants in the focus group
Duration	**Throughout the Demonstration**

Now we are going to show you a demonstration of PATHS, we'll be asking for your opinions as we go through, so please comment or ask questions as we go. At various points I'll ask you to fill in a short section of your questionnaire too.

Please remember:
The 5-second pause (before asking next question):

- often used after a participant comment;
- often prompts additional points of view or agreement with previously mentioned position.

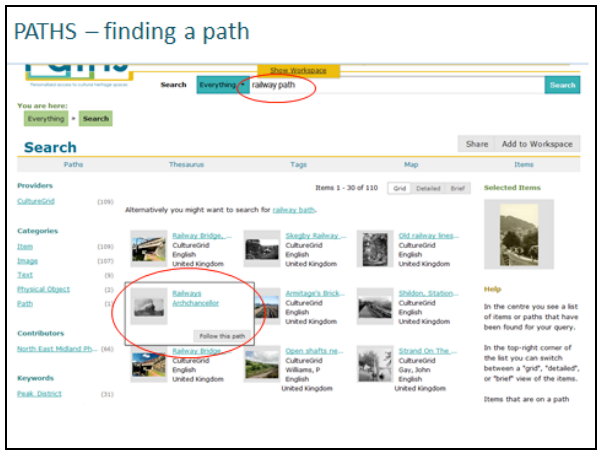
The probe:

- request for additional information, e.g. Would you explain further? / Can you give us an example? / Tell us more. / Is there anything else? / Please describe what you mean. / I don't understand.
- Use the probe a few times early in the discussions to communicate the importance of precision in responses.

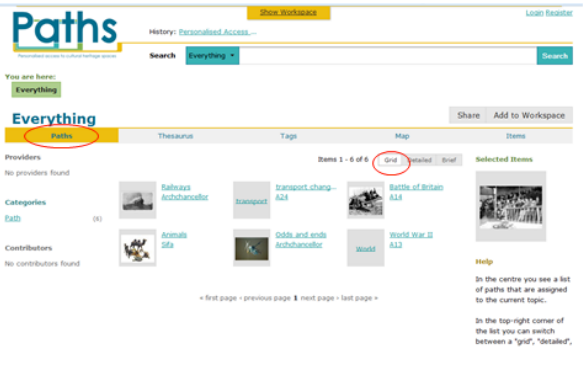
PATHS – go to demo website and show (also have screen shots in PowerPoint in case of internet connection problems, embedded here to assist Moderator):

Homepage - - Talk about PATHS, what it does, the purpose. Discuss features circled in red.

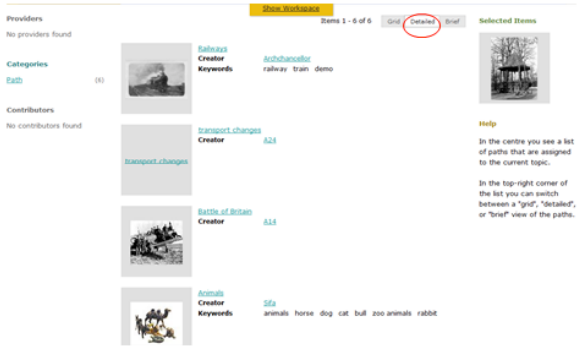
Task 1 Finding and following a path: Demonstrate the Path function, focus first on *finding*. DISCUSS FEATURES CIRCLED IN RED.



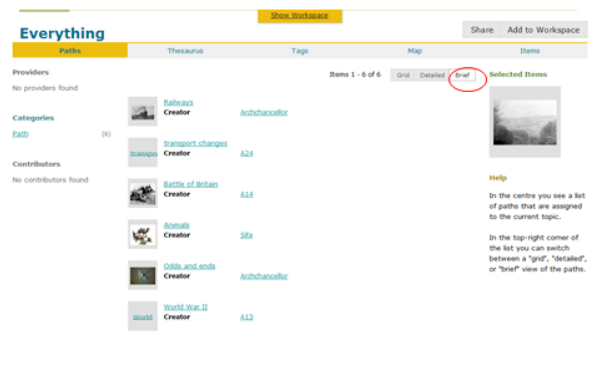
The Paths section – Grid view



The Paths section – Detailed view

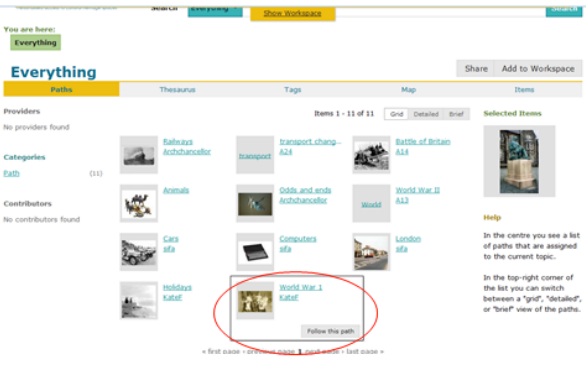


The Paths section – Brief view



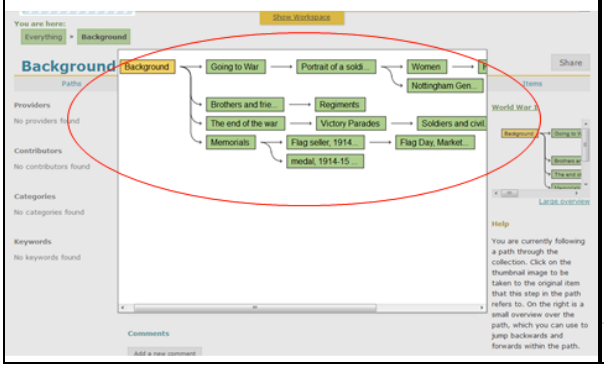
Following a path:

The Paths section – following a path

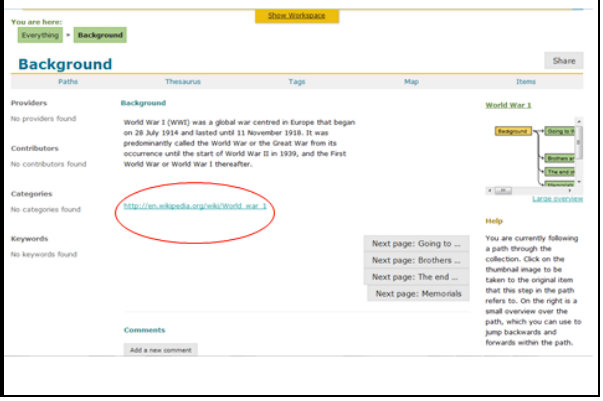


The Paths section – following a path

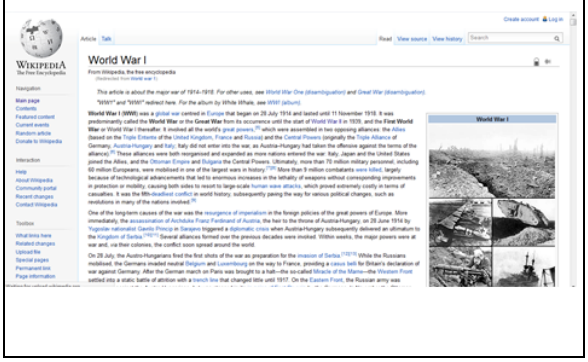
The Paths section – following a path: path overview



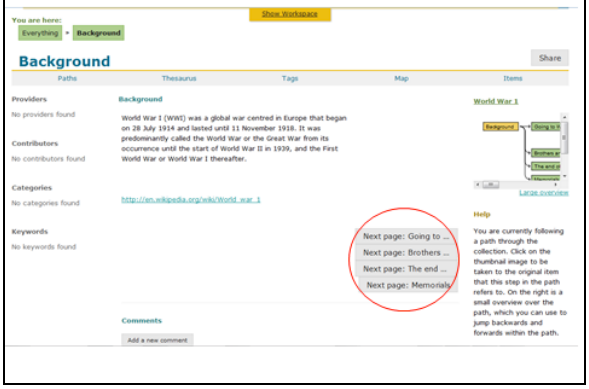
The Paths section – following a path: external links



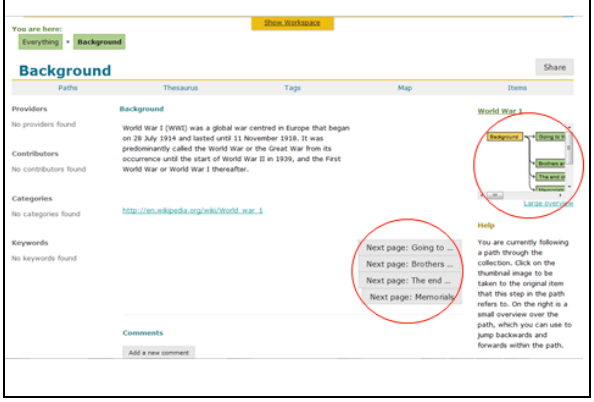
The Paths section – following a path: external links



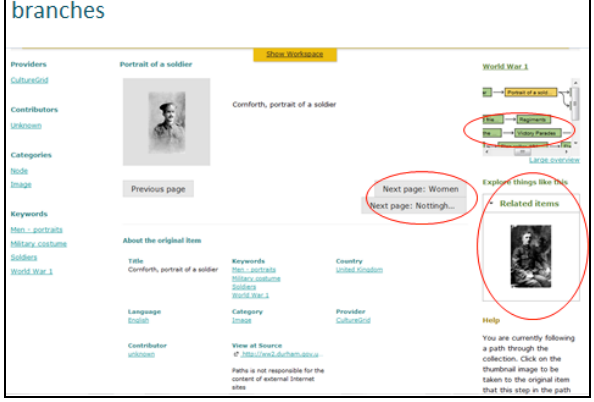
The Paths section – following a path: next page



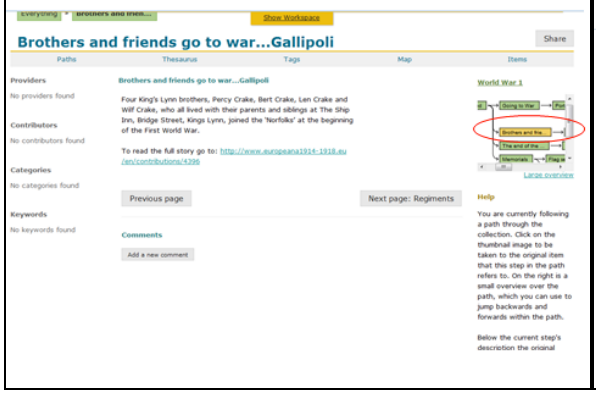
The Paths section – following a path: next page



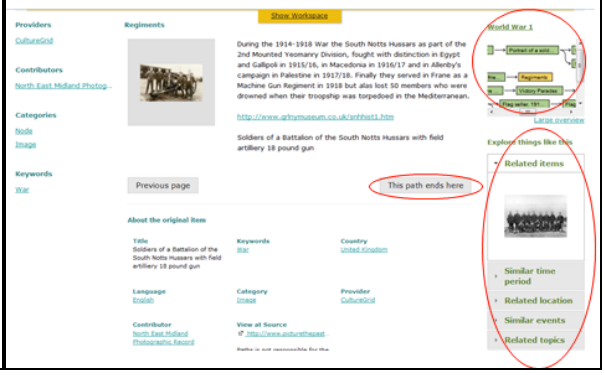
The Paths section – following a path: next page and branches



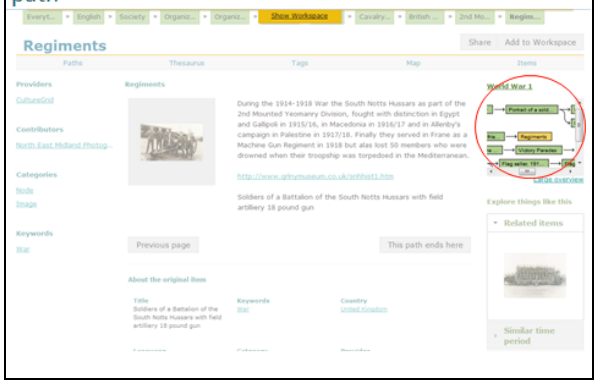
The Paths section – following a path: branches



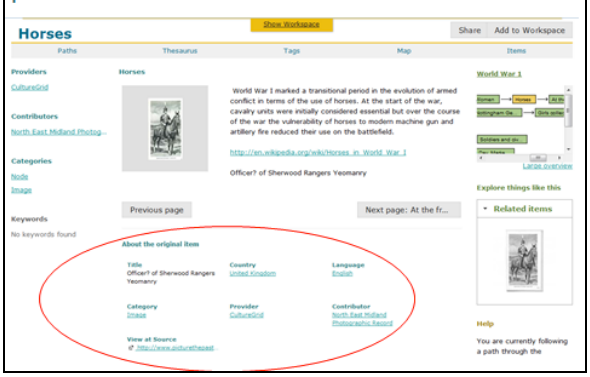
The Paths section – following a path: branches, related items



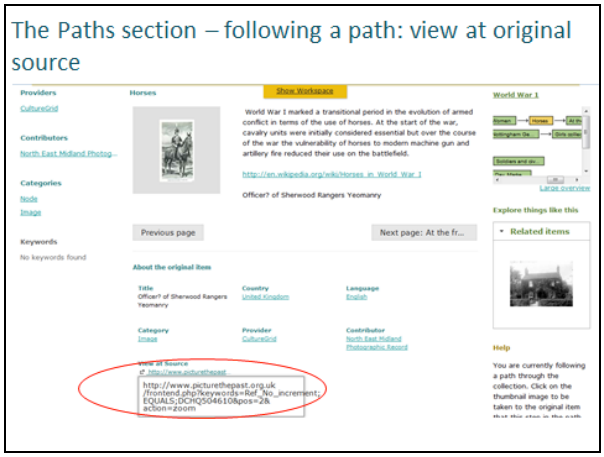
The Paths section – following a path: back to original path



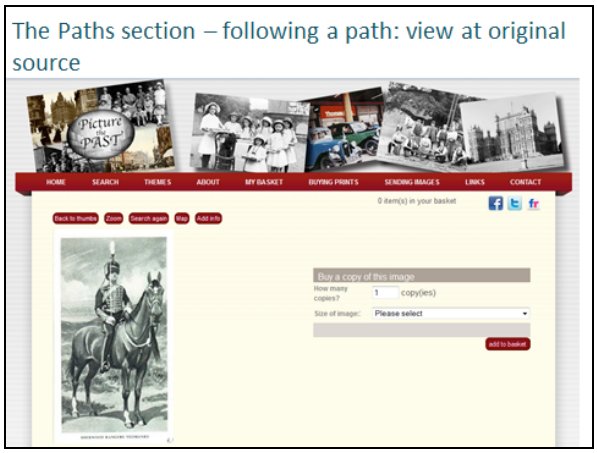
The Paths section – following a path: back to original path

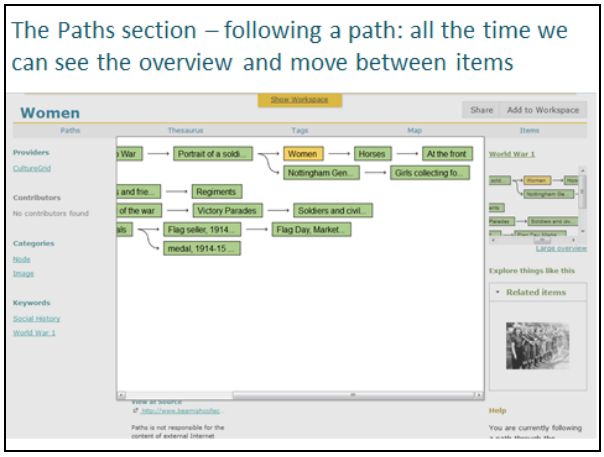


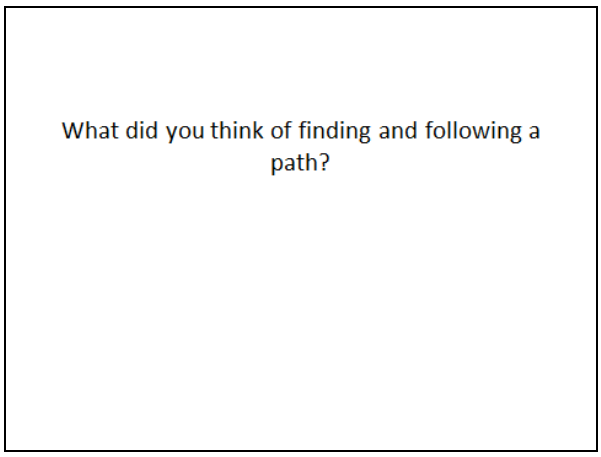
The Paths section – following a path: view at original source



The Paths section – following a path: view at original source







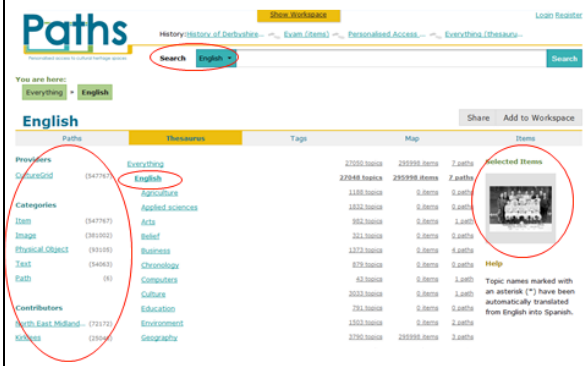
What did you think of finding and following a path?

Please now complete section 1 of the questionnaire.

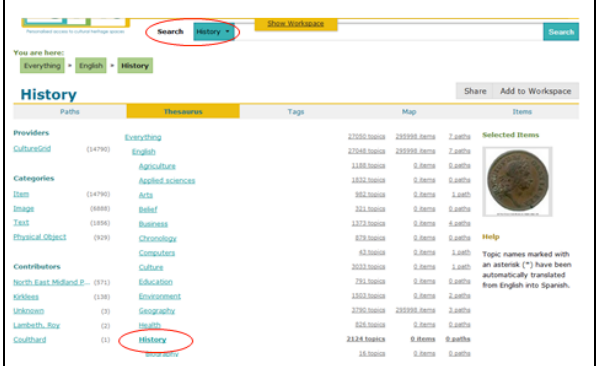
Task 2 Exploring: Demonstrate the Exploring functions, including Thesaurus, Tag Cloud, Map, Items DISCUSS FEATURES CIRCLED IN RED.

THESAURUS

Exploring the collection - *Thesaurus*



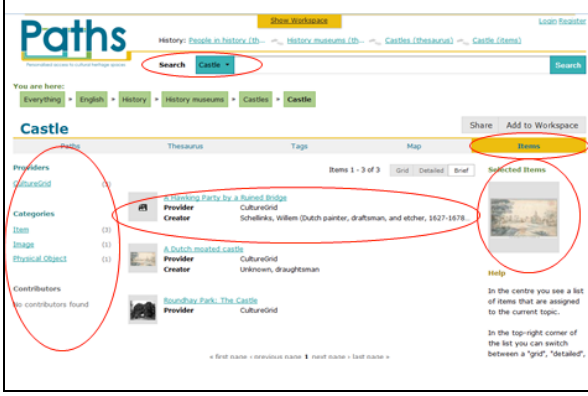
Exploring the collection - *Thesaurus*



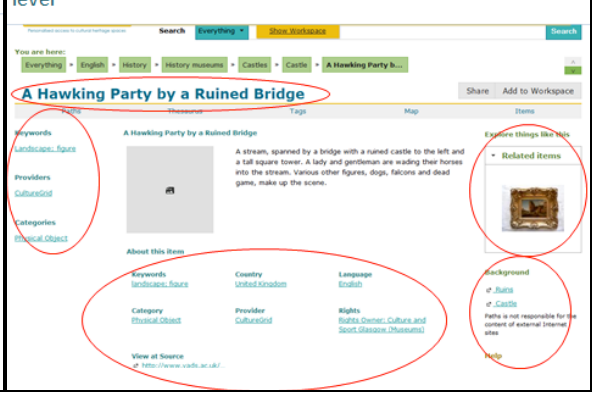
Exploring the collection - *Thesaurus*

Exploring the collection - *Thesaurus*

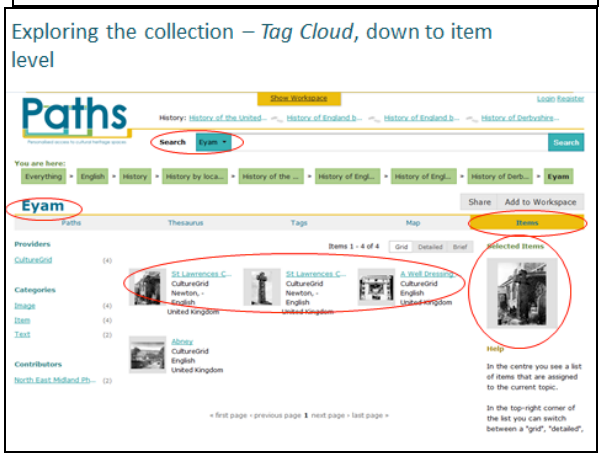
Exploring the collection – *Thesaurus*, down to item level

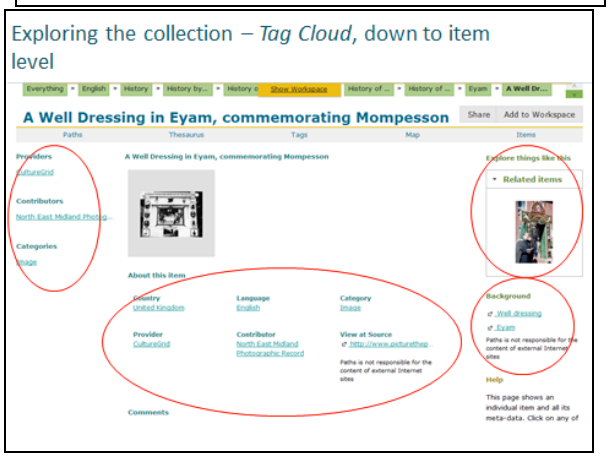


Exploring the collection – *Thesaurus*, down to item level

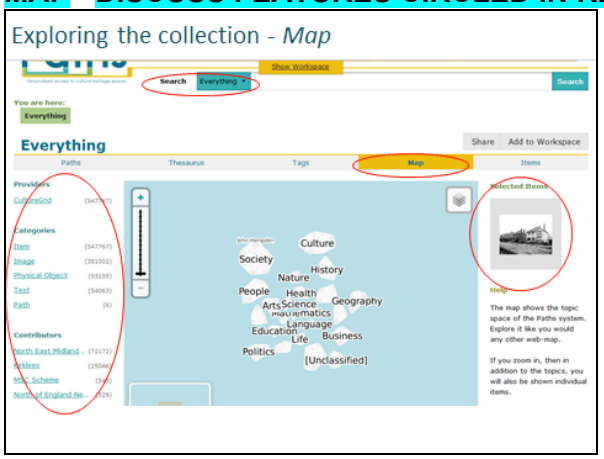


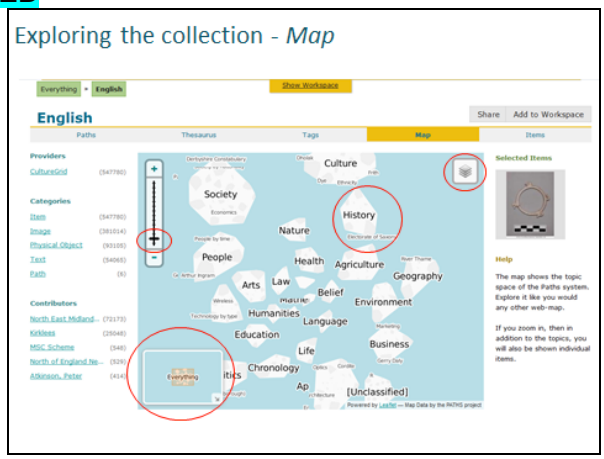
TAG CLOUD - DISCUSS FEATURES CIRCLED IN RED





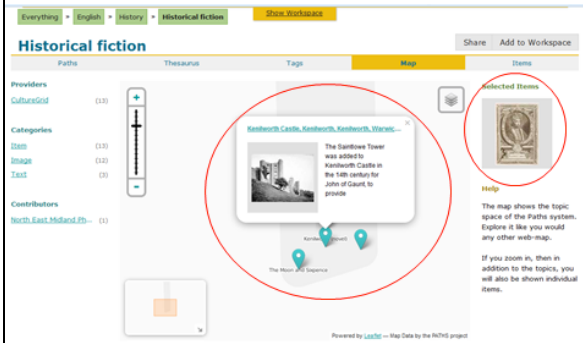
MAP - DISCUSS FEATURES CIRCLED IN RED





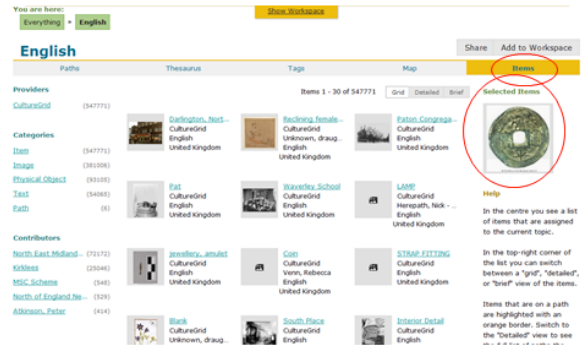
Exploring the collection - *Map*

Exploring the collection – *Map*, down to item level



ITEMS - DISCUSS FEATURES CIRCLED IN RED

Exploring the collection – *Items*

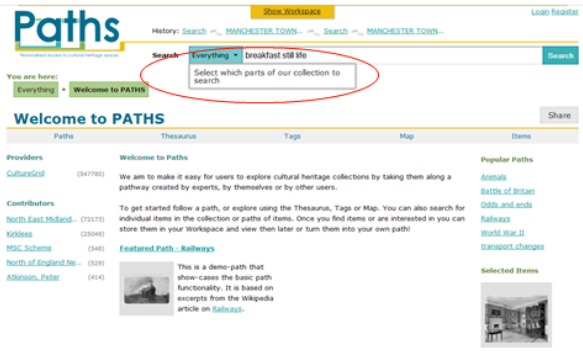


What they would do to find the following? Allow discussion and suggestions. Try out some of their ideas.

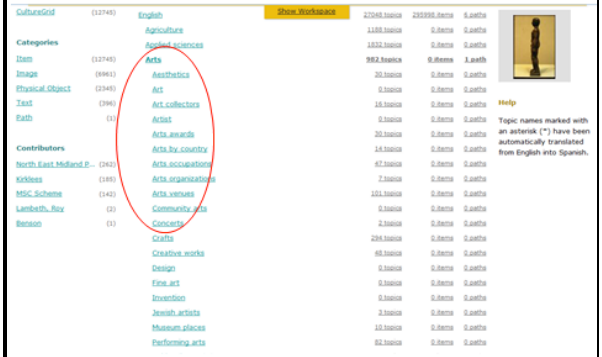
Now you have seen the different ways to explore the collection, what would you do to find the following?

Which artist painted
Breakfast still life
and who is the Rights Owner?

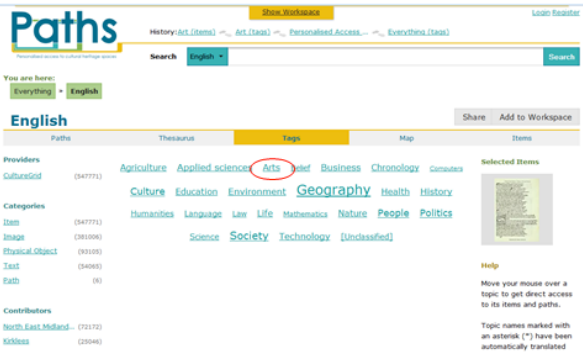
Finding specific items – if you would *search* (everything selected if you are at the homepage)



Finding specific items – if you would *explore: Thesaurus*

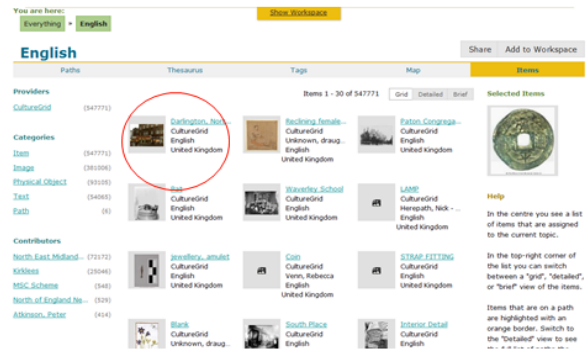


Finding specific items – if you would *explore: Tag Cloud*

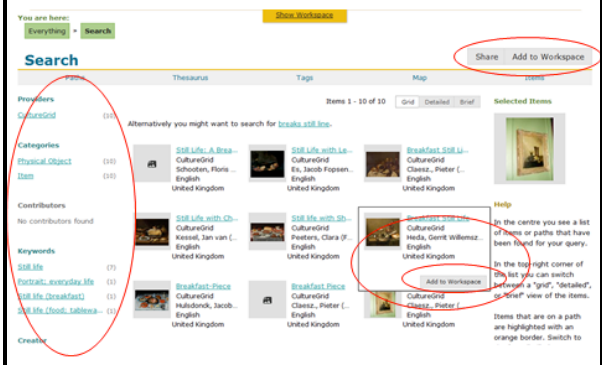


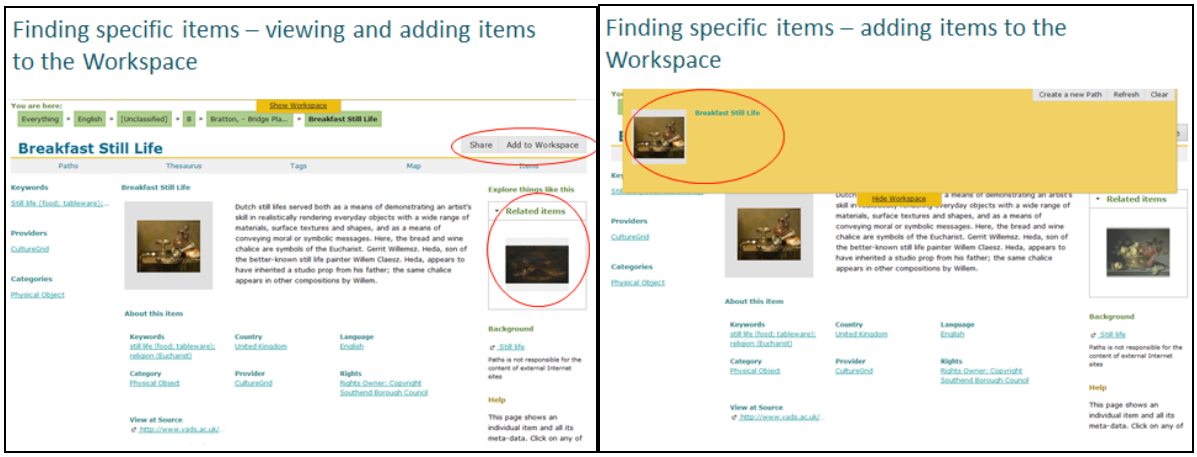
Finding specific items – if you would *explore: Map*

Finding specific items – if you would *explore: Items*



Finding specific items – if you had *searched*





What would you do to find different examples of transport?

Or

Photographs that remind you of a holiday?

The following questions are for discussion, although you may try out some of the ideas participants may have.

Now you have seen the different ways to explore the collection, what would you do to find the following?	Find as many examples as you can illustrating different forms of transport	Find a photograph that reminds you of a holiday or trip you have taken

What did you think of the different ways to explore a collection?

What did you think of the different ways to explore the collection?

ALLOW SOME DISCUSSION, THEN ASK THEM TO FILL IN THE SECTION 2 OF THE QUESTIONNAIRE.

Task 3 Create Path: Demonstrate the Create Path function.

What is a path?

A path is set of selected items in a cultural heritage digital library. These items are usually ordered in some way (e.g. by theme, date...), and supported by contextual information and descriptions that enable the user to work through the path without assistance. A path is created around a topic of interest (e.g. a person, place, art movement, event, subject...). It might be used as an online exhibition, a learning resource, a summary of the collection highlights, a guided tour, a promotional instrument, a reference work, or even as a story-telling device.

Instructions:

- Before you start, clear your workspace of any items from the previous tasks
- **CREATE** a path in front of the group – **CREATE YOUR OWN PATH with items you already know about. You may involve the group with this.**
- Use any of the search and browse options in PATHS to find items for your path.
- When you find items you want to include, add them to your PATHS workspace.
- Use your PATHS workspace to construct your path.
- Discuss the elements of the topic you wish to focus on
- Use features such as branching.

Tips:

The path-creation task is open to personal interpretation, but in order to complete it you may wish to consider the following:

- Decide on a topic of interest (e.g. a subject, place, person, event, artwork)
- Think about what aspects of this topic you want to cover and what messages you want to convey.
- Think about your target audience and consider their needs

IMPORTANT: When you have finished this task to your satisfaction, please

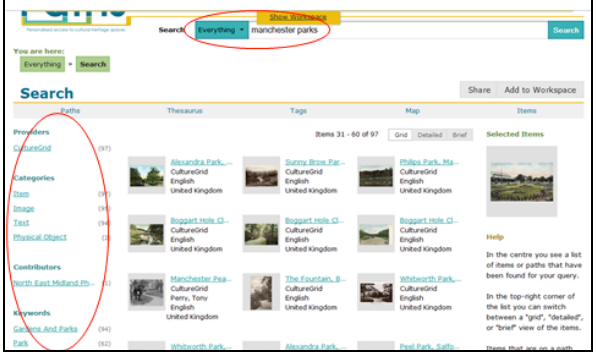
- Go to the Edit Path Metadata button and publish your path by selecting the following option - *"Anybody can access and it is included in the search results"*

Now we are going to create our own path.

The topic will be Manchester's parks and recreation

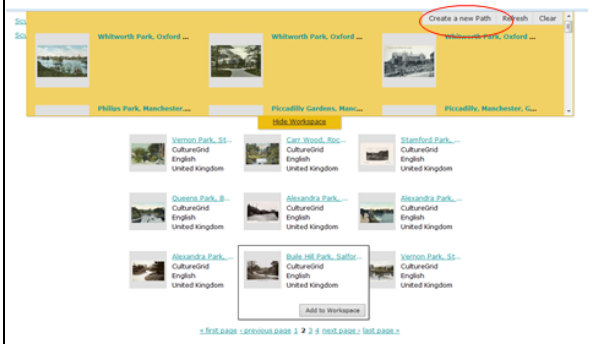
I'm going to search for items, but I could explore the collection using the approaches above.

Creating a path – finding items and adding them to the Workspace

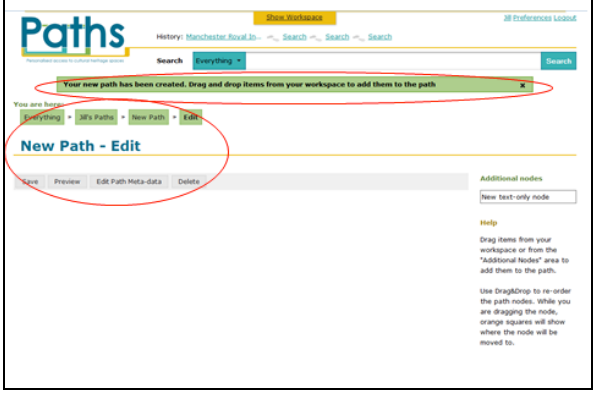


Creating a path – items in the Workspace

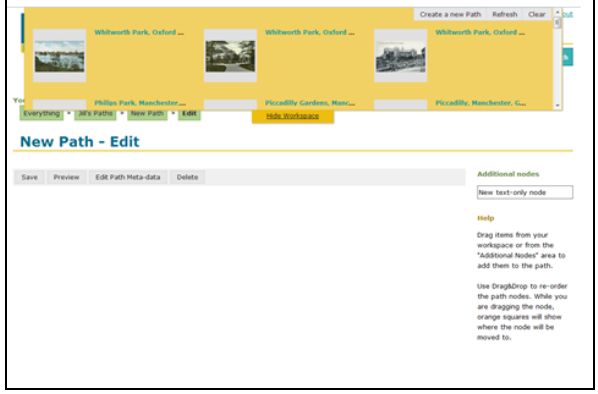
Creating a path – create a path



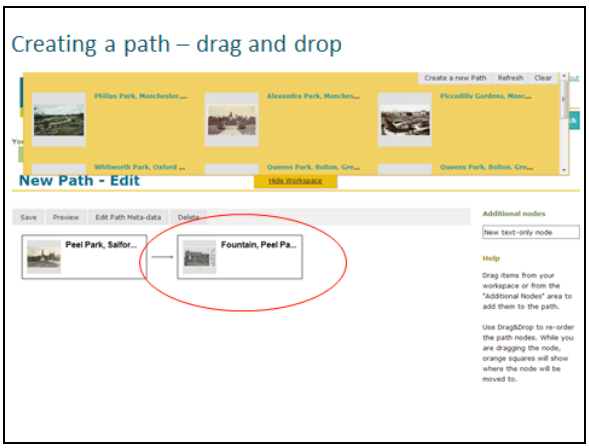
Creating a path – editing the path

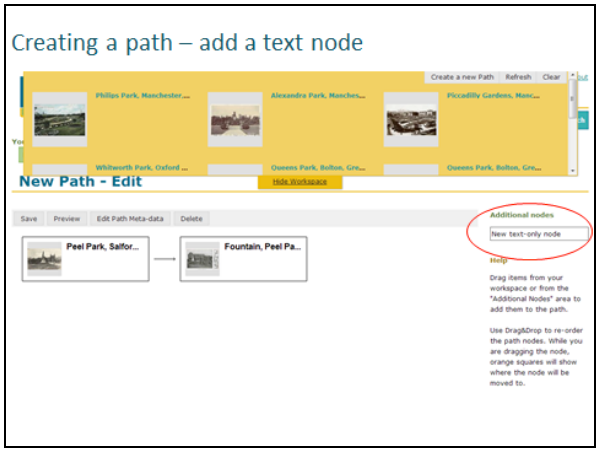


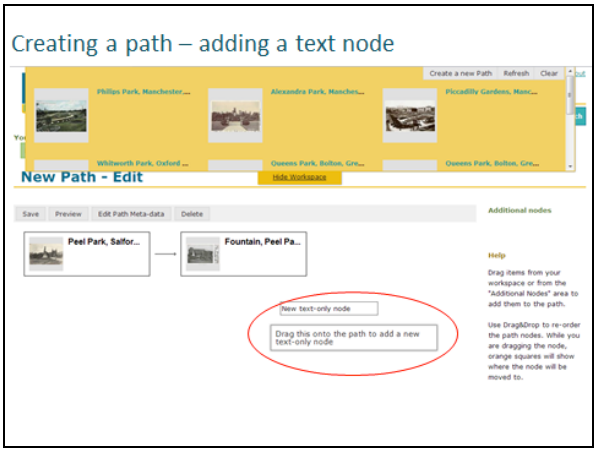
Creating a path – editing the path

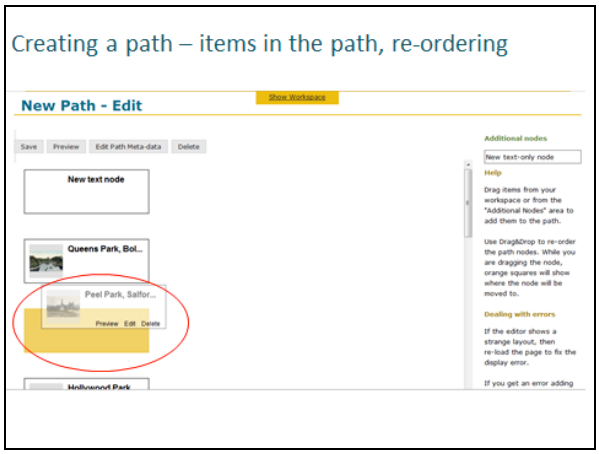


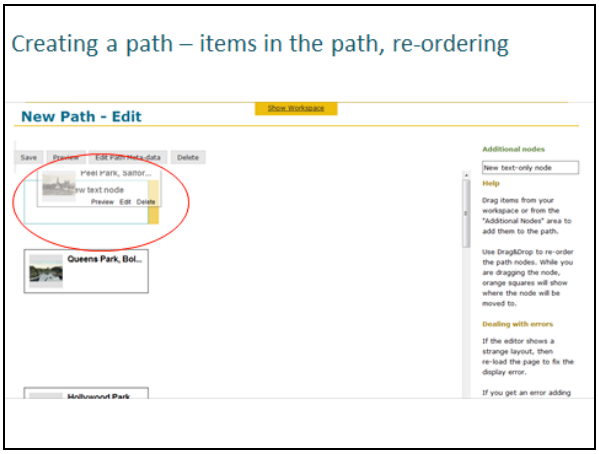

Creating a path – drag and drop
New Path - Edit
Hide Workspace
Save
Preview
Edit Path Meta-data
Delete
Peel Park, Salfor...
Additional nodes
New text-only node
Help


Creating a path – drag and drop
New Path - Edit
Hide Workspace
Create a new Path
Refresh
Clear
Peel Park, Salfor...
Fountain, Peel Pa...
Additional nodes
New text-only node
Help

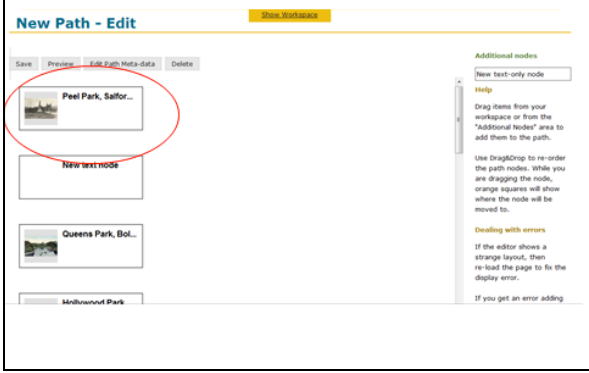

Creating a path – add a text node
New Path - Edit
Hide Workspace
Create a new Path
Refresh
Clear
Peel Park, Salfor...
Fountain, Peel Pa...
Additional nodes
New text-only node
Help


Creating a path – adding a text node
New Path - Edit
Hide Workspace
Create a new Path
Refresh
Clear
Peel Park, Salfor...
Fountain, Peel Pa...
New text-only node
Drag this onto the path to add a new text-only node
Additional nodes
Help

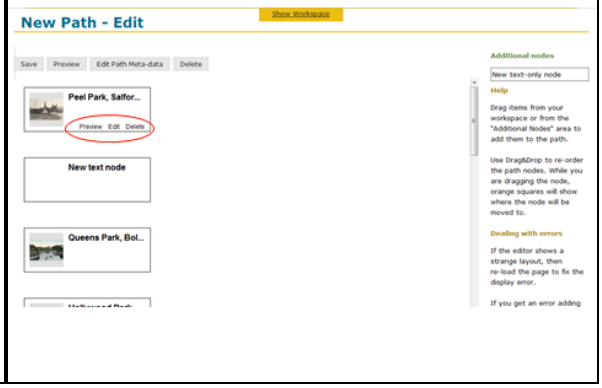

Creating a path – items in the path, re-ordering
New Path - Edit
Show Workspace
Save
Preview
Edit Path Meta-data
Delete
New text node
Queens Park, Bol...
Peel Park, Salfor...
Preview Edit Delete
Additional nodes
New text-only node
Help
Dealing with errors


Creating a path – items in the path, re-ordering
New Path - Edit
Show Workspace
Save
Preview
Edit Path Meta-data
Delete
Queens Park, Bol...
Additional nodes
New text-only node
Help
Dealing with errors

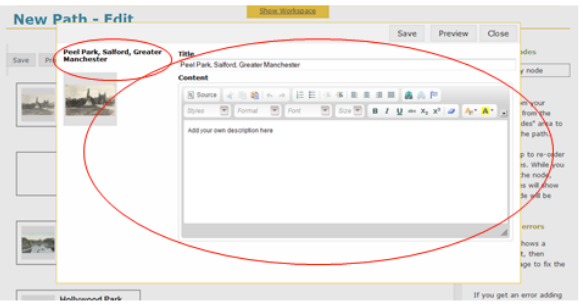
Creating a path – items in the path, re-ordering



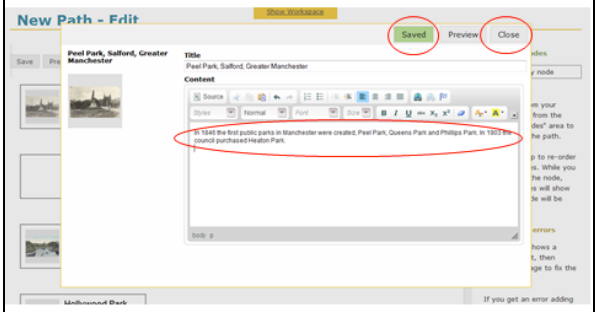
Creating a path – items in the path, annotating



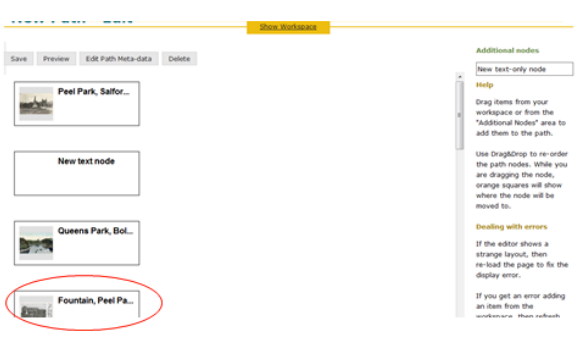
Creating a path – items in the path, annotating



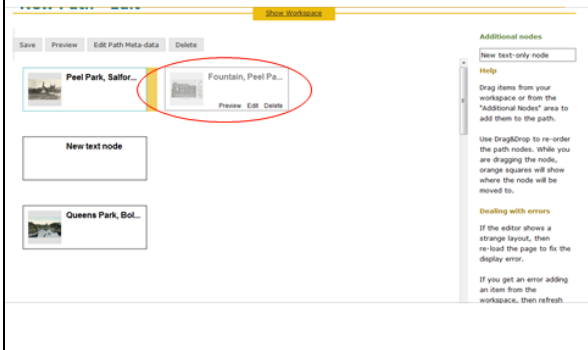
Creating a path – items in the path, annotating



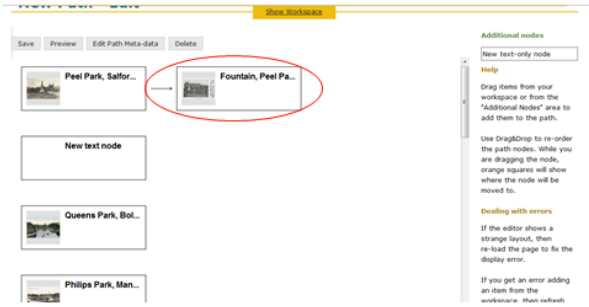
Creating a path – items in the path, branches



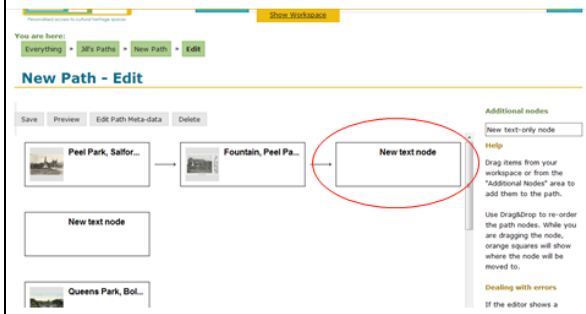
Creating a path – items in the path, branches



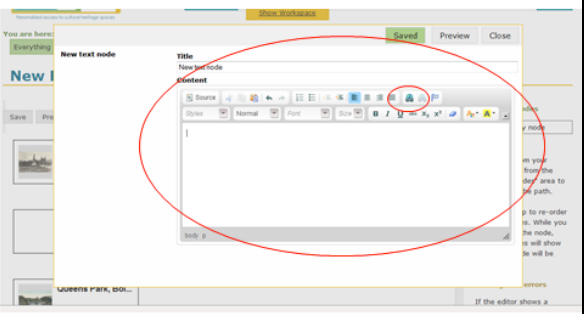
Creating a path – items in the path, branches



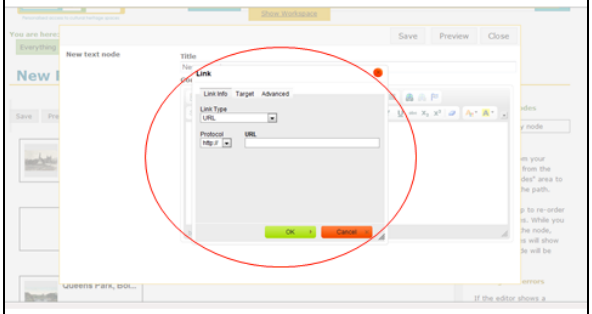
Creating a path – items in the path, adding external content



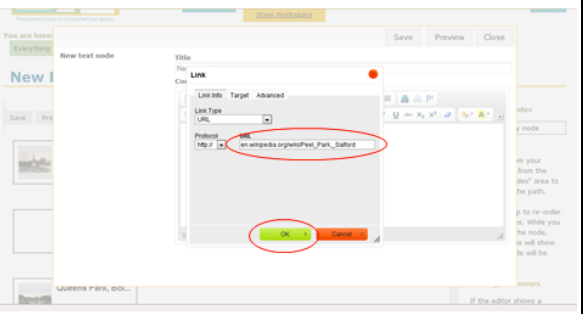
Creating a path – items in the path, adding external content



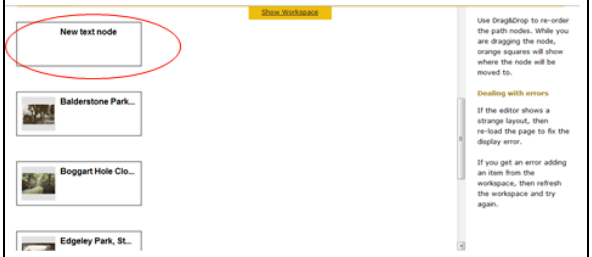
Creating a path – items in the path, adding external content



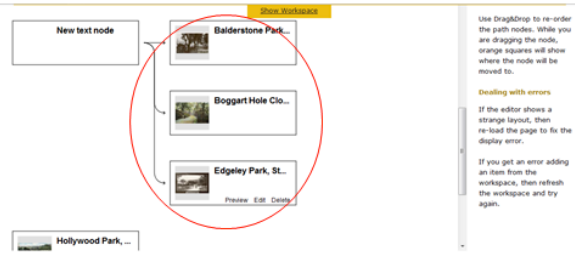
Creating a path – items in the path, adding external content



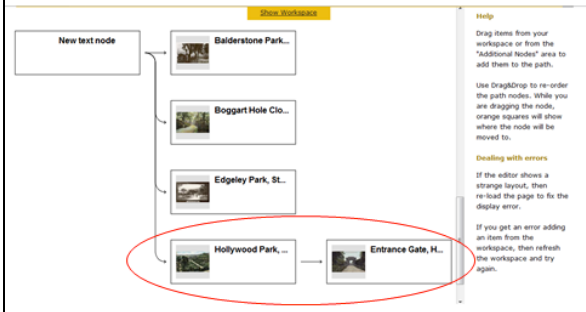
Creating a path – items in the path, multiple branches



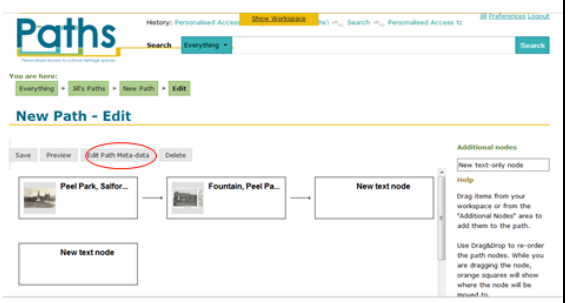
Creating a path – items in the path, multiple branches



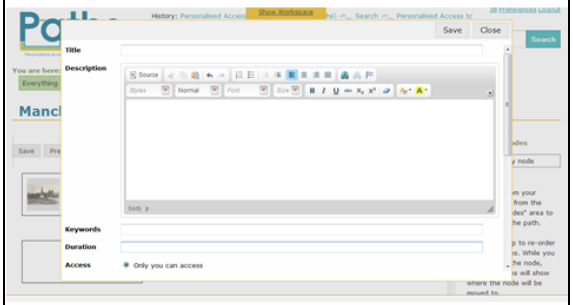
Creating a path – items in the path, multiple branches



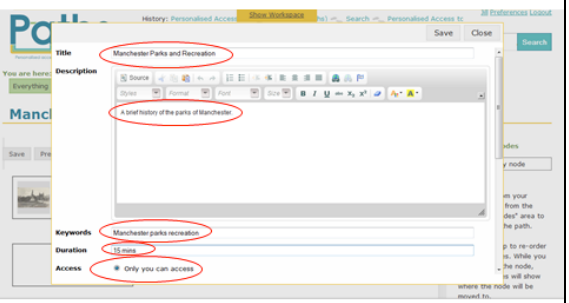
Creating a path – items in the path, add description



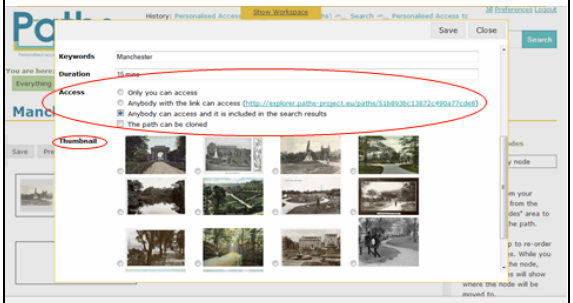
Creating a path – items in the path, add description

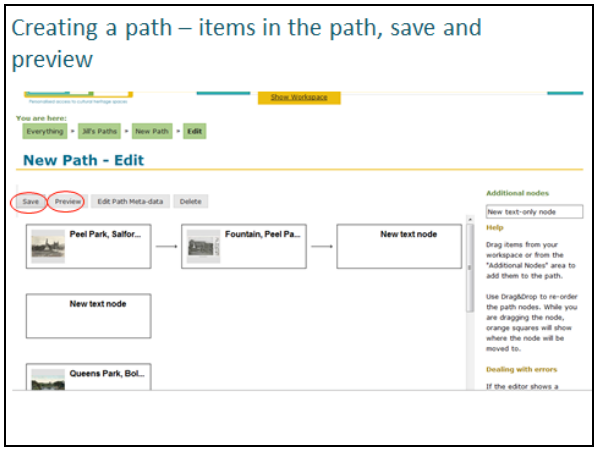


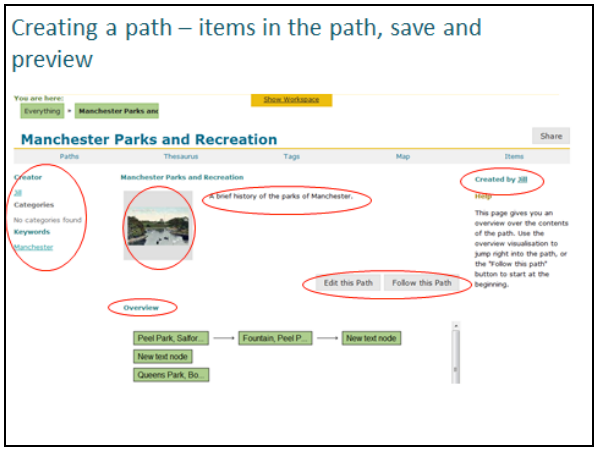
Creating a path – items in the path, add description

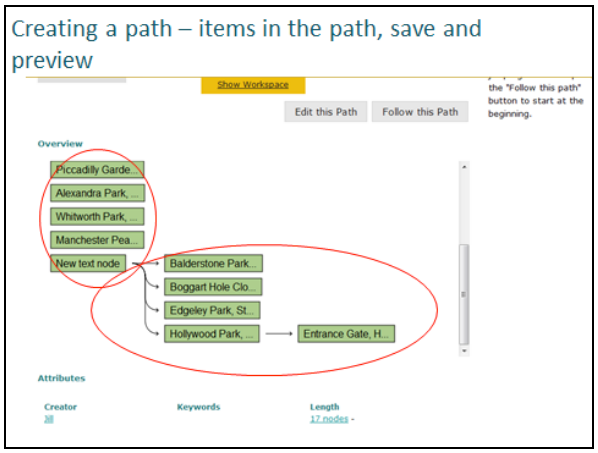


Creating a path – items in the path, add description









What did you think of creating a path?

ALLOW SOME DISCUSSION, THEN ASK THEM TO FILL IN SECTION 3 AND SECTION 4 OF THE QUESTIONNAIRE.

10.55: Final comments

Is there anything we haven't covered that you would like to discuss?

Answer any final questions and thank the group.

Appendix 3 Laboratory Questionnaire

1) User ID Number:

USER PROFILE

2) Gender

1. Female
2. Male

3) What is your native language?

4) Age group:

3. Under 18 years
4. 18-25 years
5. 26-35 years
6. 36-50 years
7. 51-65 years
8. Over 65 years
9. Prefer not to say

5) How experienced are you in using the internet?

8. Advanced user
9. Intermediate user
10. Basic user
11. No experience

6) How experienced are you in using web search engines?

5. Advanced user
6. Intermediate user
7. Basic user
8. No experience

7) How often do you search for cultural heritage information online?

5. Never
6. Rarely
7. Sometimes
8. Often

8) In which of these roles do you use cultural heritage information online? (tick all that apply)

5. General museum visitor
6. Student
7. Lecturer / Teacher
8. Librarian/Information specialist
9. Researcher (academic)
10. Researcher (leisure)
11. Cultural heritage professional
12. Business professional
13. Other _____

9) Do you use any of the following websites for information about cultural heritage?

	Never	Rarely	Sometimes	Often
a. Museum web site	❑	❑	❑	❑
b. Gallery web site	❑	❑	❑	❑
c. Archive web site	❑	❑	❑	❑
d. Library web site	❑	❑	❑	❑
e. Europeana	❑	❑	❑	❑
f. Wikipedia	❑	❑	❑	❑
g. Other	❑	❑	❑	❑

9h) (Other) Please state:

10. How familiar are you with the PATHS system?

10. Unfamiliar – never seen or used
11. Seen a previous version, but never used
12. Seen and used a previous version occasionally
13. Seen and used a previous version often

11) When looking for cultural heritage information online:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
a. I want to see everything that is available	❑	❑	❑	❑	❑
b. I only want to see the highlights of the collection	❑	❑	❑	❑	❑
c. I only want to see items with images	❑	❑	❑	❑	❑
d. I want to get to the relevant facts as quickly as possible	❑	❑	❑	❑	❑
e. I often browse around a topic to build up a more detailed picture	❑	❑	❑	❑	❑
f. I am confident in finding what I am looking for	❑	❑	❑	❑	❑
g. There is too much information and I don't know what to select	❑	❑	❑	❑	❑
h. I like to follow a guided tour or trail on a specific theme	❑	❑	❑	❑	❑
i. I like to save or bookmark items to view again later	❑	❑	❑	❑	❑
j. I like to share interesting things I find with other people	❑	❑	❑	❑	❑

TASK FEEDBACK

TASK A

12) Did finding a path seem:

	Very easy	Easy	Neutral	Complicated	Very complicated
a	❑	❑	❑	❑	❑

13) Did following a path seem:

	Very easy	Easy	Neutral	Complicated	Very complicated
a	❑	❑	❑	❑	❑

14) What degree of flexibility did you feel there is in how you can follow a Path? (for example, moving between items in the Path, changing direction, or being able to stop, start and go back?)

5. Very flexible
6. Flexible
7. Neutral
8. Limited flexibility
9. No flexibility

15) Whose paths would you like to see? (tick all that apply)

6. Cultural organisations
7. Museum/Gallery Curators
8. Museum/Gallery Educators
9. Teachers
10. Students
11. Researchers
12. Other users
13. None of these

16) Could we improve following a path?

9. Yes
10. No

16a) If Yes, please tell us how:

TASK B

17) Which exploration mode(s) did you use to gain an overview of the PATHS collection?(tick all that apply)

3. Thesaurus
4. Tag cloud
5. Map

18) Which exploration mode did you prefer? [Rank 1st, 2nd, 3rd]

- Thesaurus _____
- Tag cloud _____
- Map _____

19) Which topics looked most interesting to you?

20) Why did these topics look interesting to you?(tick all that apply)

1. Leisure interest
2. Study interest
3. Work interest
4. Other

21) Did the thesaurus seem:

	Very easy	Easy	Neutral	Complicated	Very complicated	Did not use
a	❑	❑	❑	❑	❑	❑
	Very useful	Useful	Neutral	Useless	Completely useless	Did not use
b	❑	❑	❑	❑	❑	❑
	Very inventive	Inventive	Neutral	Conventional	Very conventional	Did not use
c	❑	❑	❑	❑	❑	❑

22) Did the tag cloud seem:

	Very easy	Easy	Neutral	Complicated	Very complicated	Did not use
a	❑	❑	❑	❑	❑	❑
	Very useful	Useful	Neutral	Useless	Completely useless	Did not use
b	❑	❑	❑	❑	❑	❑
	Very inventive	Inventive	Neutral	Conventional	Very conventional	Did not use
c	❑	❑	❑	❑	❑	❑

23) Did the map seem:

	Very easy	Easy	Neutral	Complicated	Very complicated	Did not use
a	❑	❑	❑	❑	❑	❑
	Very useful	Useful	Neutral	Useless	Completely useless	Did not use
b	❑	❑	❑	❑	❑	❑
	Very inventive	Inventive	Neutral	Conventional	Very conventional	Did not use
c	❑	❑	❑	❑	❑	❑

24) To what extent to you agree with the following?

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. I gained a detailed overview of the PATHS collection	❑	❑	❑	❑	❑
b. I explored the categories I found most interesting	❑	❑	❑	❑	❑
c. It was easy to find my way around	❑	❑	❑	❑	❑
d. I could find categories of information to suit my interests	❑	❑	❑	❑	❑
e. I explored most of the categories to see what was there	❑	❑	❑	❑	❑
f. I discovered categories that were surprising to me	❑	❑	❑	❑	❑
g. I could see how the categories related to each other	❑	❑	❑	❑	❑
h. I felt overwhelmed by the number of categories available	❑	❑	❑	❑	❑
i. I could see / estimate how many items were in each category	❑	❑	❑	❑	❑
j. I had an idea of what content to expect in most of the categories I viewed	❑	❑	❑	❑	❑

TASK C

25) Answers or comments on Task C:

26) Rate your experience of Task C against the following criteria:

	Familiar +3	+2	+1	0	-1	-2	Unfamiliar-3
a. Your familiarity with the subject	❑	❑	❑	❑	❑	❑	❑
	Easy +3	+2	+1	0	-1	-2	Complicated-3
b. How easy was it to complete the task?	❑	❑	❑	❑	❑	❑	❑
	Enjoyable+3	+2	+1	0	-1	-2	Annoying -3
c. How enjoyable was your experience of doing the task?	❑	❑	❑	❑	❑	❑	❑

TASK D

27) Answers or comments on Task D:

28) Rate your experience of Task D against the following criteria:

	Familiar +3	+2	+1	0	-1	-2	Unfamiliar-3
a. Your familiarity with the subject	❑	❑	❑	❑	❑	❑	❑
	Easy +3	+2	+1	0	-1	-2	Complicated-3
b. How easy was it to complete the task?	❑	❑	❑	❑	❑	❑	❑
	Enjoyable+3	+2	+1	0	-1	-2	Annoying -3
c. How enjoyable was your experience of doing the task?	❑	❑	❑	❑	❑	❑	❑

TASK E

29) Answers or comments on Task E:

30) Rate your experience of Task E against the following criteria:

	Familiar +3	+2	+1	0	-1	-2	Unfamiliar-3
a. Your familiarity with the subject	❑	❑	❑	❑	❑	❑	❑
	Easy +3	+2	+1	0	-1	-2	Complicated-3
b. How easy was it to complete the task?	❑	❑	❑	❑	❑	❑	❑
	Enjoyable+3	+2	+1	0	-1	-2	Annoying -3
c. How enjoyable was your experience of doing the task?	❑	❑	❑	❑	❑	❑	❑

EXPLORING CONTENT (ALL TASKS)

31) Would it be useful to see related items or paths?

5. Very useful
6. Useful
7. Neutral
8. Not useful
9. Completely useless

32) How useful would you find the following types of related items or paths?

	Very Useful	Useful	Neutral	Not useful	Completely useless
a. Related creators	❑	❑	❑	❑	❑
b. Related location	❑	❑	❑	❑	❑
c. Related people	❑	❑	❑	❑	❑
d. Related topics	❑	❑	❑	❑	❑
e. Similar description	❑	❑	❑	❑	❑
f. Similar time period	❑	❑	❑	❑	❑
g. Similar topics	❑	❑	❑	❑	❑
h. The most related items, regardless of type of relationship	❑	❑	❑	❑	❑

33) Would it be useful to see recommended items or paths?

6. Very useful
7. Useful
8. Neutral
9. Not useful
10. Completely useless

34) How useful would you find the following types of recommended items or paths?

	Very Useful	Useful	Neutral	Not useful	Completely useless
a. Item / path of the day (random selection)	❑	❑	❑	❑	❑
b. Item / path of the day (curated selection)	❑	❑	❑	❑	❑
c. People who viewed this item/path, also viewed these	❑	❑	❑	❑	❑
d. Most viewed items/paths	❑	❑	❑	❑	❑
e. Star rating (voted by other users)	❑	❑	❑	❑	❑
f. Personalised recommendations (based upon your profile or recent searches)	❑	❑	❑	❑	❑
g. Generic recommendations (items selected by PATHS - the same for all users)	❑	❑	❑	❑	❑

35) Would it be useful to see related external content (e.g. from Wikipedia)?

6. Very useful
7. Useful
8. Neutral
9. Not useful
10. Completely useless

36) What sources of related content would you prefer to see?

TASK F - PATH CREATION

37) What is the title of your path?

38) Rate your experience of the Path Creation Task against the following criteria:

	Familiar +3	+2	+1	0	-1	-2	Unfamiliar-3
a. Your familiarity with the subject	❑	❑	❑	❑	❑	❑	❑
	Easy +3	+2	+1	0	-1	-2	Complicated-3
b. How easy was it to complete the task?	❑	❑	❑	❑	❑	❑	❑
	Enjoyable+3	+2	+1	0	-1	-2	Annoying -3
c. How enjoyable was your experience of doing the task?	❑	❑	❑	❑	❑	❑	❑

39) How useful did you find the following features for finding items to include in your path?

	Very Useful	Useful	Neutral	Useless	Completely Useless	Did not use
a. Search box	❑	❑	❑	❑	❑	❑
b. Thesaurus	❑	❑	❑	❑	❑	❑
c. Tag cloud	❑	❑	❑	❑	❑	❑
d. Map	❑	❑	❑	❑	❑	❑
e. Search filters (facets)	❑	❑	❑	❑	❑	❑
f. Selected items	❑	❑	❑	❑	❑	❑
g. Browsing multiple pages of items	❑	❑	❑	❑	❑	❑

40) How useful did you find the following features for finding items to include in your path?

	Very Useful	Useful	Neutral	Useless	Completely Useless	Did not use
a. Related items	❑	❑	❑	❑	❑	❑
b. Background links (Wikipedia)	❑	❑	❑	❑	❑	❑
c. Keywords/metadata	❑	❑	❑	❑	❑	❑

41) What information did you use when choosing items for your path? (tick all that apply)

6. Image
7. Title
8. Text description
9. Metadata / tags

42) What criteria did you use when choosing items for your path? (tick all that apply)

5. Typical examples
6. Unusual / unique
7. Aesthetically pleasing
8. Interesting description
9. All that was available
10. Other

43) How did you order the items in your path?

7. Theme(s)
8. Chronological
9. Narrative
10. Geographical
11. Importance
12. Interestingness
13. No particular order
14. Other

44) How would you rate the quality of your path on a scale of 1-10?

45) Given more time, and/or additional tools and resources, what might you have done to improve the quality of your path?

46) Overall, did the Create a Path function seem:

	Very easy	Easy	Neutral	Complicated	Very complicated
a	❑	❑	❑	❑	❑
	Very useful	Useful	Neutral	Useless	Completely useless
b	❑	❑	❑	❑	❑
	Very inventive	Inventive	Neutral	Conventional	Very conventional
c	❑	❑	❑	❑	❑

47) Did each of these elements of creating a path seem easy or complicated?

	Very easy	Easy	Neutral	Complicated	Very complicated	Did not use
a. Collecting items in the workspace	❑	❑	❑	❑	❑	❑
b. Moving items from the workspace into the path	❑	❑	❑	❑	❑	❑
c. Adding text nodes to the path	❑	❑	❑	❑	❑	❑
d. Arranging items in the path	❑	❑	❑	❑	❑	❑
e. Describing the path / adding metadata	❑	❑	❑	❑	❑	❑
f. Annotating items in the path	❑	❑	❑	❑	❑	❑
g. Publishing / sharing a path	❑	❑	❑	❑	❑	❑

48) How would you most prefer to share your path?

9. Share your path for reuse and allow others to copy/edit
10. Share your path but not allow editing
11. Keep your path private
12. Another way _____

49) Could we improve the Create a Path function?

5. Yes
6. No

49a) If Yes, please tell us how:

GENERAL FEEDBACK

50) Rate your overall experience of using PATHS against the following criteria:

	Attractive +3	+2	+1	0	-1	-2	Unattractive -3
a	❑	❑	❑	❑	❑	❑	❑
	Exciting +3	+2	+1	0	-1	-2	Boring -3
b	❑	❑	❑	❑	❑	❑	❑
	Organised +3	+2	+1	0	-1	-2	Cluttered -3
c	❑	❑	❑	❑	❑	❑	❑
	Interesting +3	+2	+1	0	-1	-2	Not interesting -3
d	❑	❑	❑	❑	❑	❑	❑
	Understandable +3	+2	+1	0	-1	-2	Not understandable -3
e	❑	❑	❑	❑	❑	❑	❑
	Creative +3	+2	+1	0	-1	-2	Dull -3
f	❑	❑	❑	❑	❑	❑	❑
	Efficient +3	+2	+1	0	-1	-2	Inefficient -3
g	❑	❑	❑	❑	❑	❑	❑
	Enjoyable +3	+2	+1	0	-1	-2	Annoying -3
h	❑	❑	❑	❑	❑	❑	❑
	Meets expectations +3	+2	+1	0	-1	-2	Does not meet expectations -3
i	❑	❑	❑	❑	❑	❑	❑
	Supportive+3	+2	+1	0	-1	-2	Obstructive -3
j	❑	❑	❑	❑	❑	❑	❑
	Likeable+3	+2	+1	0	-1	-2	Unlikeable -3
k	❑	❑	❑	❑	❑	❑	❑
	Inventive+3	+2	+1	0	-1	-2	Conventional -3
l	❑	❑	❑	❑	❑	❑	❑
	Easy+3	+2	+1	0	-1	-2	Complicated -3
m	❑	❑	❑	❑	❑	❑	❑
	Useful+3	+2	+1	0	-1	-2	Useless -3
n	❑	❑	❑	❑	❑	❑	❑
	Fast+3	+2	+1	0	-1	-2	Slow -3
o	❑	❑	❑	❑	❑	❑	❑
	Familiar+3	+2	+1	0	-1	-2	Unfamiliar -3
p	❑	❑	❑	❑	❑	❑	❑

51) If familiar, what did it remind you of?

52) In your opinion, how well does PATHS support each of the following tasks?

	Very well	Quite well	Neutral	Not very well	Not at all
a. Fact-finding	❑	❑	❑	❑	❑
b. Finding items related to a topic	❑	❑	❑	❑	❑
c. Exploring what content is available in the collection	❑	❑	❑	❑	❑
d. Serendipity / discovering new things	❑	❑	❑	❑	❑
e. Developing ideas	❑	❑	❑	❑	❑
f. Creating resources from cultural heritage collections	❑	❑	❑	❑	❑
g. Sharing content with others	❑	❑	❑	❑	❑
h. Communicating with other users	❑	❑	❑	❑	❑
i. Using content created by other users	❑	❑	❑	❑	❑

52) Which tasks would you be most likely to use PATHS for? (select three choices, numbered 1-3, where 1 is most likely)

c. Fact-finding _____
d. Finding items related to a topic _____
e. Exploring what content is available in the collection _____
f. Serendipity / discovering new things _____
g. Developing ideas _____
h. Creating resources from cultural heritage collections _____
i. Sharing content with others _____
j. Communicating with other users _____
k. Using content created by other users _____

---ENDS---

Appendix 4 Laboratory Tasks

Instructions for PATHS User Study

INTRODUCTION

1) Watch the PATHS introduction video

2) Complete the tasks A-E:

- Use PATHS to complete each task to the best of your ability, in the time allowed.
- If you reach the time allowed, you will be prompted to stop.
- After you complete each task, fill in the online questions relating to that task.
- NOTE: this is not a test of your ability. Do not worry if you cannot find the answers in the time allowed – we are interested in *how* you use PATHS, not in whether your answers are right or wrong.

3) Take a Break!

4) Complete task F

- Use PATHS to complete the task to the best of your ability, in the time allowed.
- If you reach the time allowed, you will be prompted to stop.
- After you complete the task, fill in the online questions relating to that task.

TASKS

A) Following a path **[Time Allowed: 5 minutes]**

- Find the path about Railway Journeys
- Follow this path
- Find and follow one other path of your choice
- Complete the questions for Task A

B) Getting an overview **[Time Allowed: 5 minutes]**

- Use any one or more of the Thesaurus, Tags and Map sections to gain an overview of what is in the PATHS collection
- Complete the questions for Task B

C) Answer the TWO following questions: **[Time Allowed: 5 minutes]**

a) Which artist painted 'Breakfast Still Life' and who is the rights owner at the present time?

b) Name three factories where cutlery was made in Sheffield.

- Add the items you use to answer these questions to your workspace and type your answers in the online form
- Complete the questions for Task C

D) Complete any ONE of the following : **[Time Allowed: 5 minutes]**

a) Find as many examples as you can illustrating different forms of transport

b) Find as many examples as you can of people engaged in different types of work

- Add the items you use to answer this question to your workspace
- Complete the questions for Task D

E) Complete any ONE of the following: **[Time Allowed: 5 minutes]**

a) Find an artwork you would like to display in your own home or use as a screensaver

b) Find a photograph that reminds you of a holiday or trip you have taken

- Add the items you use to answer this question to your workspace
- Complete the questions for Task E
- Complete the additional questions on EXPLORING CONTENT (ALL TASKS)

BREAK – take a short break if required

Appendix 5 Laboratory Path Task

F) Path-Creation Task: **[Time Allowed: 30 minutes]**

What is a path?
A path is set of selected items in a cultural heritage digital library. These items are usually ordered in some way (e.g. by theme, date...), and supported by contextual information and descriptions that enable the user to work through the path without assistance.
A path is created around a topic of interest (e.g. a person, place, art movement, event, subject...). It might be used as an online exhibition, a learning resource, a summary of the collection highlights, a guided tour, a promotional instrument, a reference work, or even as a story-telling device.

==========

Scenario:
For this exercise you should imagine you are a history or art enthusiast who wants to share their knowledge and interests with friends and other web users. You are to create a path which you will share via a blog and/or social media, on a topic such as a famous person or event from history, an artist or art topic, or a historical guide to a place, activity or object. Your goal is to create a path which is interesting and/or thought-provoking, and will be shared and discussed amongst other like-minded people.

Instructions:

- Before you start, clear your workspace of any items from the previous tasks
- Create a path on a topic of your choice.
- Use any of the search and explore options in PATHS to find items for your path.
- When you find items you want to include, add them to your PATHS workspace.
- Use your PATHS workspace to construct your path (see next page for tips on use}.

Tips:
The path-creation task is open to personal interpretation, but in order to complete it you may wish to consider the following:

- Decide on a topic of interest (e.g. a subject, place, person, event, artwork)
- Think about what aspects of this topic you want to cover and what messages you want to convey.
- Think about your target audience and consider their needs

==========

IMPORTANT: When you have finished this task to your satisfaction, please do the following:

- Go to the Edit Path Metadata button and publish your path by selecting the following option - *"Anybody can access and it is included in the search results"*
- Go to the online form and complete the questions for Task F
- Complete the General Feedback questions relating to your entire experience of using PATHS

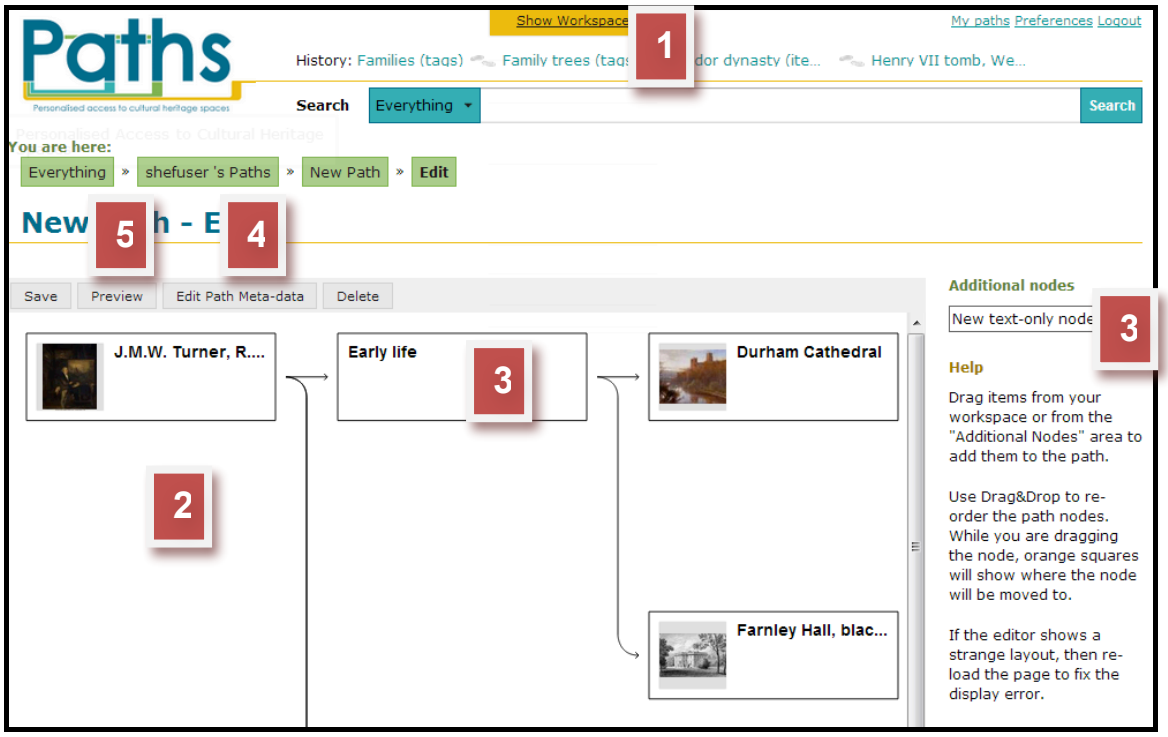
==========

Adding Items to the Workspace

- To create a path, first find and add items to your workspace [1],
- For a quick view of your saved items at any time, click on the workspace tab [1], and click again to hide it
- When you have saved some items, click on the Create Path button within the workspace [1]

Using the Create Path area

- The Create Path area is illustrated below
- In the Create Path area you can annotate, edit, order and delete items, according to your needs
- Drag & Drop to move items from your workspace [1] into your path [2]
- Drag & drop to move items to a new position within your path [2], next to or beneath an existing item. A yellow highlight will indicate where the new item will be placed.
- Drag & drop to add text nodes to your path [3], - use them to add headings and descriptions, or to aid organisation
- Select an item in your path [2] to edit the text, preview or delete it
- Use the Edit Path Metadata button [4] to describe your path, add a thumbnail, and to share/publish your path when you have done
- An overview of your complete path can be seen at any time via the Preview button [5]


Show Workspace
1
My paths Preferences Logout
Paths
Personalised access to cultural heritage spaces
History: Families (tags) Family trees (tags dor dynasty (ite... Henry VII tomb, We...
Search
Everything
Search
You are here:
Everything » shefuser 's Paths » New Path » Edit
New h - E
5
4
Save
Preview
Edit Path Meta-data
Delete
J.M.W. Turner, R....
Early life
3
Durham Cathedral
2
Farnley Hall, blac...
Additional nodes
New text-only node
3
Help
Drag items from your workspace or from the "Additional Nodes" area to add them to the path.
Use Drag&Drop to re-order the path nodes. While you are dragging the node, orange squares will show where the node will be moved to.
If the editor shows a strange layout, then re-load the page to fix the display error.

Appendix 6 Laboratory post task interview schedule

Lab Evaluation Post Task Interview

Ask the main question and let them talk. If they are not too forthcoming, use the prompts to get more detail.

1) Tell me about the path that you created...

a) Topic/concept
- What topic did you choose for your path?
- Why did you decide on this topic?
- Did you modify the topic as you progressed through the task?

b) Collecting items
- How did you find suitable content items for your path? (e.g. search tactics, browse/explore)
- What criteria did you use for choosing items for your path?
- How did you decide you had enough items?

c) Creating the path
- How did you order/organise the items in your path?
- To what extent does your path develop a story or narrative?
- What story or ideas is it trying to get across?
- Do you think it is successful in telling this story?
- What would improve it?

2) What was your experience of the path creation task? (if not answered in Q1)
- What was the simplest aspect of the path creation activity?
- What was the most difficult aspect
- What was the most enjoyable aspect?
- What was the least enjoyable aspect?

3) What did you think of PATHS overall?
- What did you like or dislike about the PATHS system?
- If there anything you would change?
- Are there any additional features you would like to see added to PATHS?

4) Would you be interested in using PATHS tools in other digital libraries or online collections?
- Which ones?
- How would you use the paths tools in these libraries?
- Would you be most likely to create paths or to use paths created by other people?
- If you created paths, would you share them? Who with? (work/leisure/study contexts)
- Which other type of people do you think are most likely to use PATHS and in what contexts?

Appendix 7 Laboratory evaluation Participant Information Sheet

Participant Information Sheet

1. Research Project Title: PATHS Project User Study

2. Invitation paragraph

You are invited to take part in PATHS (Personalised Access To cultural Heritage Spaces), an EU-funded research project between the University of Sheffield and four other organisations; University of the Basque Country, MDR Partners, Asplan Viak Internet Ltd, and i-Sieve Technologies Ltd.

Before you decide to participate it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information, which explains what will be involved and how the information you provide might be used in support of the research goals. Thank you for reading this.

3. What is the project's purpose?

Given the vast quantities and diversity of digital information available from cultural institutions, users may find it difficult to navigate collections, to locate exact items of interest, and to interpret their meaning. At the same time, cultural heritage institutions are looking at new ways for users to interact with their collections, and are using new technologies to enrich the online experience, and to encourage deeper engagement, especially in areas of knowledge discovery and learning. We aim to build a system that will address these issues by enabling easier exploration of digital cultural heritage collections, enhanced by personalisation and recommendations, and with additional tools for information organisation and sharing. More information about PATHS can be found at the project website http://www.paths-project.eu/. This project will end in December 2013.

4. Why have I been chosen?

We need input from a wide variety of potential users, both expert and novice, in areas such as cultural heritage and education, as well as a wide variety of general users with an interest in using cultural heritage collections for leisure, study, personal or professional research. You have been identified as potentially belonging to one of these user categories and will be one of approximately 40-50 users taking part in this study.

5. Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part you will be required to sign a consent form in advance, or in the case of online research to tick a box to the same effect. You are free to withdraw from the research at any time. You do not have to give a reason.

6. What will happen to me if I take part?

If you agree to take part in the study you will be asked to make an appointment to visit the Information School in person to undertake the following activities:

- Fill in a profile questionnaire about your characteristics, experience and preferences
- Take a cognitive style test (profiling how you tend to process information)
- Carry out a number of pre-defined tasks using the PATHS prototype system and providing feedback
- Fill in a post-session questionnaire
- Participate in a short interview to discuss your experience of the tasks and using PATHS in general

The session will be individual to you (no other participants at the same time), and carried out in the iLab in the Information School at the University of Sheffield. The iLab is equipped with a range of technologies for monitoring users' behaviour whilst interacting with information systems. For this study your interactions with PATHS will be monitored via screen-recording, computer log files, and eye-tracking. The interview will also be audio-recorded. Once your session is completed, no further input to the study will be required.

7. What do I have to do?

You will be required to use a computer screen for approximately 2 hours, with a break after 1 hour. You will be given a number of tasks to complete to the best of your ability and in any way you feel is appropriate. There are no right or wrong responses to any of the research exercises and you will not be judged on anything you do or say in this context. During the evaluation we ask that any information you provide is accurate to the best of your knowledge, and where your opinion is sought that you provide honest and frank responses.

8. What are the possible disadvantages and risks of taking part?

There are no foreseen risks involved in taking part in this study. If there is any information you do not wish to provide, you are free to decline.

9. What are the possible benefits of taking part?

Whilst there are no immediate benefits for those people participating in the project, it is hoped that this work will help to improve access to cultural heritage resources, supporting exploration of collections and creative use of materials in new ways that may be of use to yourself and others in the context of work, education and/or leisure interests.

10. What happens if the research study stops earlier than expected?

If for any reason the study has to stop, we will announce this on the project website and make sure that all data supplied up to that point is managed in accordance with the University of Sheffield's research ethics procedures.

11. What if something goes wrong?

If you have any questions about the study or wish to make any complaint, please contact Dr. Paul Clough at the University of Sheffield on 0114 222 2664, or email p.d.clough@sheffield.ac.uk. Your question/complaint will then be handled according to the University's standard procedures. If, however, you feel your complaint has not been handled satisfactorily then you can contact the University's 'Registrar and Secretary'.

12. Will my taking part in this project be kept confidential?

All the information that we collect about you during the course of the research will be kept strictly confidential and will be managed in accordance with the University of Sheffield's research ethics procedures. All information you provide will be anonymised and you will not be able to be identified in any reports or publications resulting from the research.

13. What type of information will be sought from me and why is the collection of this information relevant for achieving the research project's objectives?

We will collect information about your needs, preferences and experiences in using cultural heritage collections online, and in particular via the new PATHS system. Input from representative end users is vital in building and refining a system that is easy to use and that provides information and tools to support the various types of activities that its users may wish to complete.

14. What will happen to the results of the research project?

The information you provide will be combined with that from other participants and will be used to make recommendations for the refinement and ongoing development of the PATHS system. Results from this study will be published in a report in the first instance, which will be freely available via the PATHS web site (http://www.paths-project.eu). Data may also be used at a later date for subsequent related research and will be subject to the same conditions outlined above.

15. Who is organising and funding the research?

This work is supported by funding from the European Union under the Seventh Framework Programme (FP7). Information on this programme is available at http://cordis.europa.eu/fp7/home_en.html.

16. Who has ethically reviewed the project?

This project has been ethically approved via the ethics review procedure operated in the Department of Information Studies at the University of Sheffield. The University's Research Ethics Committee monitors the application and delivery of the University's Ethics Review Procedure across the University.

17. Contacts for further information

Paula Goodale Email: p.goodale@sheffield.ac.uk
Dr. Paul Clough Email: p.d.clough@sheffield.ac.uk Tel : +44 (0) 114 222 2664

Information School
University of Sheffield
Regent Court,
211 Portobello Street,
Sheffield, S1 4DP UK

Thank-you for taking part in the PATHS User Study
Please keep a copy of this sheet for your future reference.

Appendix 8 Laboratory evaluation Participant Consent Form

Participant Consent Form

Title of Research Project: PATHS Project User Study

Name of Researcher:

Participant Identification Number for this project:_____ Please initial box

4. I confirm that I have read and understand the information sheet dated 15/05/2013 explaining the above research project, and I have had the opportunity to ask questions about the project. ☐

4. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline. ☐

5. I understand that my responses will be kept strictly confidential. I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research. ☐

4. I agree for the data collected from me to be used in future research ☐

I agree to take part in the above research project. ☐

_____	_____	_____
Name of Participant (*or legal representative*)	Date	Signature
_____	_____	_____
Name of person taking consent (*if different from lead researcher*)	Date	Signature

To be signed and dated in presence of the participant

_____	_____	_____
Lead Researcher	Date	Signature

To be signed and dated in presence of the participant

Contact: (for further information / complaints / withdrawal from the study)

Dr Paul Clough Email: p.d.clough@sheffield.ac.uk Tel: 0114 222 2664

Copies:
Once this has been signed by all parties the participant should receive a copy of the signed and dated participant consent form and participant information sheet, and any other written information provided to the participants. A copy of the signed and dated consent form should be placed in the project's main record (e.g. a site file), which must be kept in a secure location.

Appendix 9 Comments from the Demonstration Evaluation Participants

Note: Multiple comments from some contributors have been split into separate topics,

Larger images, ability to zoom in

- It would be nice to be able to see larger pictures (e.g. zoom-in while hovering).
- Larger images.
- Larger images without metadata.
- Larger scale images of items.

Clearer graphics/representation of paths, better visualisation

- Clearer graphics/representation of paths - more 'visual'.
- I don't like at all the visualization.
- Visualization of the path overview is not good enough cannot see the whole path.

Extend sources of information

- Extend to information beyond European archives.
- Make the paths more scholarly/academic - perhaps by allowing links to relevant books and journals. Need better citations. Allowing people to edit information could cause misinformation.
- Why is linked to Wikipedia and not to other organizations with "authority"?

Improvements to PATH functions

- Making content of nodes visible by hovering over the green boxes in the Overview.
- The example we followed had four branches off the first item - perhaps some way of adding a little more detail on the subject of each path branch at this first page would help.
- Allow of branches in the Tree diagram.
- More objects/images to be shown per section rather than item at a time (items in a display case, shown together).
- Hovering on paths (Paths tab page) a text teaser (from its description) for the path would make selecting paths easier and faster.
- Print a Path.

Moderation/abuse reporting system required

- Need reporting system in place to guard against abuse/misrepresentation.
- Report/flag option. Regular moderation.

Other more general functions

- Rating option.
- Relate paths according to topics, perhaps via similarity of their items.
- Linking between collections of different organisations.
- Pop-up window seems obtrusive to seamless navigation, especially on tablet devices.
- A field to specify target audience (e.g. General, Key Stage etc.).
- Quick view on related objects to avoid navigating away automatically from path.
- I'd prefer to be able to link a small group of objects to a description in a node, not just single items. E.g. a set of apparatus used for an experiment (battery, transformer, galvanometer).

Profiles of PATHs Creators required

- Also make explicit the profile of the path creator.
- It would be good to specify which kind of profile (curator, etc.) has the creator of a path. In this sense, publishing paths created on dubious criteria could be risky.

Miscellaneous comments

- It's quite complicated to understand how it works.
- I would want to know more about the conceptual framework which governs the formation of the path - why should I be interested to follow someone else's path?
- It's too similar to some searching functions of some museums (like the ones from UK). It's not very clear the relation between items (for example, the painting of Monnet with the Mausoleum of Augustus).

Appendix 10 Summary of responses eliciting how path creation could be improved

Using the workspace

- Navigating the path workspace, being able to see the whole of the path in progress
- Making it easier to add items to a specific place in the path, and to move items around, including whole branches, rather than just individual items
- Change the design of the interface and making bigger the workspace
- Bigger path creation area, perhaps opening in a new window.
- Options for ordering items in the collecting workspace prior to adding them to the path
- Re-positioning of items could be easier - larger workspace.
- I assumed the items in the workspace will be already in the path I was going to create.
- Drag and drop like iMovie.
- Hide the right informative column when creating a path (more space for the creation of the path)
- Workspace and arranging of items could be messy for large paths
- To be more intuitive and order in another way all the elements in a page, in order to make the most of the space available
- I would change the workspace. It's unpleasant to unfold it.
- Items should stay in the workspace after adding them to a path. They should also return in the workspace when a path, they belong to, is deleted.
- Keep items in the workspace when adding them to a path (copy, not cut).

Editing and adding text

- An option to include the original title and text, alongside the user's own annotations
- Annotating items, including adding external content and links
- Make it clearer how to add text nodes and descriptions
- Clearer labelling of items.
- Suggestions as to which keywords to add.
- Adding the user keywords to the search topics and/or tags sections, in order to be discoverable when searching for items.

Path creation and layout

- Making paths of paths
- Exporting items from other paths.
- Adding multiple items into one page rather than one item per page.
- Semi-automatic creation of paths.
- Allow for a node in a path to have more than one parent.
- Allow to converge some branches into only one branch.
- Semi-automatic creation of paths, possibility of sharing parts of the path, for example with another path
- When creating path, allow paths that are not lineal
- More net structure rather than tree.
- Make it easier see more and related items to create richer and larger paths.
- Allow more flexibility in hierarchy/arrangement of the path - items linked under one path item.

Other path functions

- Use a timeline.
- More flexible links.
- Printing out as a resource.
- Change the titles of the existing paths (to be more descriptive).
- Include the possibility that one item could have different origins in the path.
- Allow adding some tags to items in the workspace, in order to identify easier when adding them to a path.
- Allow to filter paths by the profile of the path creator
- Automatic chronological ordering of items.
- Make explicit the creator's profile so that paths could then be filtered out according to that profile
- simpler search functions (e.g. thematic)

More general navigation and layout design

- Make the publish button more obvious
- More obvious ‘create a path’ button displayed with the main area, instead of the workspace
- How to return to a path in progress to add additional content needs to be more intuitive
- Better content organization
- New design
- Better web design, use colour coding to group similar items in the interface e.g. everything related to workspace (buttons etc.) could be yellow
- Improve graphic design (menus, colours)
- improve the visual structure of the web page
- Larger, better quality images.

Other miscellaneous comments

- Add a box to show if the Creator is a scholar with expertise in the area or merely an enthusiast .
- Add variance to label branches - 'and', 'or', 'but not'
- Explaining better for what it can be used and how to do it
- Need to have levels of access, maybe Curators, Students, General Users.
- Being able to select source of metadata enrichment of more scientific character.
- Possibility of creating a great cartography of knowledge is very interesting.
- Need to make sure accuracy of information is maintained.
- Surface how many times an item has been used in paths.