Resource report

closer
The home of longitudinal research

User needs study for the Uniform Search Platform (USP)

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1. INTRODUCTION

The UK is home to the largest and longest-running longitudinal studies in the world. The Cohort and Longitudinal Studies Enhancement Resources (CLOSER) programme aims to maximise the use, value and impact of these studies both within the UK and abroad. Nine studies are involved in the CLOSER programme:

- Avon Longitudinal Study of Parents and Children (ALSPAC)
- 1970 Birth Cohort Study (BCS)
- The Hertfordshire Cohort Study (HCS)
- Life Study
- MRC National Survey of Health and Development (MRC NSHD)
- Millennium Cohort Study (MCS)
- National Child Development Study (NCDS)
- Southampton Women's Survey (SWS)
- Understanding Society

1.1. CLOSER Uniform Search Platform

A key element of CLOSER will be the Uniform Search Platform (USP). The aim of this platform is to provide a single tool that enables researchers to find the variables they need for their analyses across all the cohort and longitudinal studies involved. The search platform will be designed for use by a wide range of researchers with very different levels of experience in data management, data analysis and data discovery. It will provide a simple, intuitive interface, which will return relevant results for both basic and advanced queries.

The proposed USP will be an aggregated search portal; search results related to different sources of information such as reports, datasets, survey questions and variables will be fed back to the user. The search functionality must allow users to find items on a specific topic, of differing formats, across different surveys and time periods. In addition to providing information about individual data items (such as single questions and measures), the search platform will be used to disseminate the work carried out to harmonise variables across the different studies. Variables derived from administrative datasets that have been linked to data from the individual studies will also be documented and described via the search platform. The USP has to take into account the fact that there are thousands of variables across the nine studies; therefore it will be necessary to identify and prioritise those of most relevance to the widest range of users.

The team responsible for the USP will work closely with those responsible for the MRC Research Data Gateway, which through the Population and Patient Research Data Directory, holds study metadata, plus information on phases, data collection events and variables; but not the research data themselves as these are held by the respective studies. The MRC directory currently holds metadata on over 45,000 variables for four cohort studies; three of the CLOSER studies (ALSPAC, NSHD, SWS), plus the Whitehall II study.[1]

[1] Medical Research Council, 2013

1.2. User Needs Study Aims and Objectives

This document describes the results of the user needs study. The study aimed to highlight characteristics of the potential users; who they are, their information needs and behaviours. It also examines the communitywide disciplinary context and outlines recommendations to support the development of the USP. The study looked at the current and potential user base for the USP, outputs of current CLOSER resources, disciplinary research trends around CLOSER studies, and the implications of this context for the USP and surrounding work. It draws on data and reports previously collected by CLOSER partner organisations and makes recommendations for benchmarks and metrics that can be used to evaluate CLOSER's performance in meeting the needs of its users and increasing the use of the cohort studies within high quality research.

The study will provide recommendations to the CLOSER Leadership Team and the USP design Work package in the following priority areas:

CLOSER USP User Needs Study Priorities :

- **Priority 1:** Define Key User Groups for CLOSER USP
- **Priority 2:** Explain how user behaviour should inform the design of CLOSER USP
- **Priority 3:** Outline the information needs and behaviours of the Key Users Groups
- **Priority 4:** Suggest How the CLOSER USP can reach these users
- **Priority 5:** Explain How the CLOSER USP can best serve the users needs
- **Priority 6:** Outline the disciplinary subjects or topics that the users are most interested in
- **Priority 7:** Outline lessons learned from similar initiatives
- **Priority 8:** Create user scenarios for the key USP user groups to inform the USP design
- **Priority 9:** Recommend benchmarks and metrics that can be used to evaluate how CLOSER meets users' needs

2. WHO ARE THE USERS?

The research data, outputs and evidence produced by the studies included in CLOSER are of interest to a wide and diverse range of groups; they are used in academic research, teaching, and to support the formation of policy and practice in government and public services. The findings are also often of interest to the media and general public. Table 1 provides a broad overview of the potential users for CLOSER resources.

The USP will be designed to provide detailed information about the data available from the individual studies and about data which has been harmonised that can be used as the basis for cross-cohort work. This section considers priority 1, defines the key user groups for the USP and outlines the reasons for including or excluding each user category. The needs of the key user groups will be examined in section 4.

The focus here is on the end users of the USP as a tool for data discovery across the cohort and longitudinal studies that are participating in CLOSER. However, another important user group are the data managers, researchers, and data assistants at the individual studies who will be using tools produced as part of the USP project to collate, and improve metadata from their individual studies. Many of the issues raised under recommendation 7 will also relate to this important group of stakeholders as well as to the end users of the USP as a data discovery tool.

Table 1: Potential Users of CLOSER Resources

Sector	User Category
General Interest/Non Educational or Research	General Public
	Participants
	Media
Government, Policy, Service Providers	Practitioners
	Politicians/Senior Policy Makers
	Government Researchers
	Funders
Secondary Education	A level Students
	A Level Teachers
Higher Education Teaching	Undergraduate Students
	Post Graduate Students
	Higher Education Teachers
Higher Education Researcher	Postgraduate Researcher
	Higher Education Researcher

2.1. General Interest Non-academic Research

The categories within this sector are not a priority group for the USP as they are generally served by higher level information such as study overviews, summaries of findings, reports, press releases and articles in the media and do not need access to information about specific questions asked in the studies. Such higher level information is available via the individual study websites and the CLOSER website.

Survey participants are likely to be more interested than other members of the general public in the detail of the CLOSER studies as many have been part of the study process for a great number of years. Some may have specific queries around data protection and access policies, as well as an interest in findings; however unless they are also a member of another priority group they are unlikely to be interested in the fine grain detail about variables, and scales that the USP will provide.

2.2. Government, Policy, Service Providers

This sector probably has the most diverse range of interests and needs, ranging from a politician who wants key findings to inform policy to a government researcher who is engaged in using the raw data from the CLOSER studies in active research. The needs of the latter, rather than the former make them a priority group.

Two other user categories in this sector must be considered in the USP design: research funders and practitioners with a specialist area of interest. Both are likely to have an occasional need to use the USP, but not sufficient for inclusion as a priority user group. Their channel to evidence will tend to be via PIs and other researchers.

2.3. Secondary Education

It is probable that future A level reforms will seek to build and increase quantitative skills among students[2]. This provides an opportunity to engage with teachers and students and promote the use of CLOSER resources. It will, therefore, be useful to provide information for A level teachers around teaching datasets and learning resources within the USP so that these can be fed into the A level curriculum and lesson plans. Consequently, A level teachers are included as a priority group; students should be considered in the design as part of raising skills and awareness.

2.4. Higher Education Teaching

At present, most effort to build quantitative skills takes place at undergraduate and post-graduate levels. Teachers and students within higher education institutions should have the same access to teaching and learning datasets and resources, as well as digging deeper into research topic areas to learn more advanced research methods. For this reason all three groups (undergraduates, postgraduates and teachers) are included as priority groups.

2.5. Higher Education Researchers

This group will probably be the most frequent users of the USP as post-graduate and higher education researchers, carrying out original analysis and research, will often be using the primary resources it provides and signposts. This group will contain researchers and data users who need metadata about the different surveys, variables and questions.

Bent *et al* (2007) categorise a researcher's life into a series of stages which they call 'The Seven Ages of Research':

1. Masters students
2. Doctoral students
3. Contract research staff
4. Early career researchers
5. Established academic staff
6. Senior researchers
7. Experts[3]

Different learning needs and levels of information literacy are linked to each stage. However, for the purposes of defining the USP key groups, Masters and Doctoral students (1 and 2) are classed as 'Postgraduate Researchers'; 3 to 7 as 'Higher Education Researchers'.

Table 2 outlines the recommendations for the USP user group prioritisation from the sectors and user groups outlined at the beginning of this section. Panel (a) shows the priority user groups, Panel (b) user groups to be considered in the USP design and Panel (c) user groups unlikely to need the USP. The latter group will still be interested in the work of the CLOSER studies and is a potential target audience for the main CLOSER website.

[2] http://www.education.gov.uk/inthenews/speeches/a00222547/ioe-open-lecture-on-a-level-reforms

[3] Bent et al 2007

Recommendation 1: The Key User Groups for prioritisation in the design of the CLOSER USP should be:

- Higher Education Researchers
- Postgraduate Researchers
- Government Researchers
- Higher Education Teachers
- Post Graduate Students
- Undergraduate Students
- Secondary Education (A Level) Teachers

Table 2: CLOSER USP user group prioritisation

(a) Priority User Groups for the CLOSER USP

Sector	User Group
Higher Education Researcher	Higher Education Researcher
	Postgraduate Researcher
Government, Policy, Service Providers	Government Researchers
Higher Education Teaching	Higher Education Teachers
	Post Graduate Students
	Undergraduate Students
Secondary Education	A Level Teachers

(b) User Groups to be considered in USP design

Sector	User Group
Government, Policy, Service Providers	Funders
	Practitioners
Secondary Education	A level Students

(c) User Groups unlikely to Need USP

Sector	User Group
Government, Policy, Service Providers	Politicians/Senior Policy Makers
General Interest/Non Educational or Research	General Public
	Media
	Participants

3. HOW USERS SEARCH

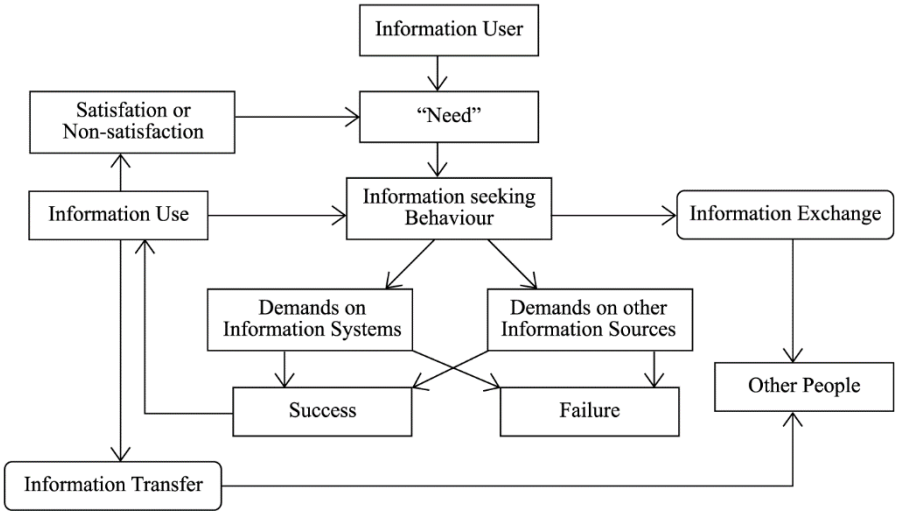
This section reviews literature on how users search for information and aims to meet priority 2 of the study in explaining how user behaviour should inform the design of the USP

3.1. Users' Information Needs and Behaviours

Figure 1 shows Wilson's model of information behaviour. Through the model Wilson suggests that information-seeking behaviour arises as a consequence of a need perceived by an information user, who, in order to satisfy that need, makes demands upon formal or informal information sources or services, which result in success or failure to find relevant information. If successful, the individual makes use of

the information found, either fully or partially satisfying the perceived need; if the need is not satisfied, the search process will be changed. The model also shows that information seeking behaviour may involve other people through information exchange and that information perceived as useful may be passed to other people, as well as being used (or instead of being used) by the individual. [4]

Figure 1: Wilson's model of information behaviour[5]



The design of the USP needs to take into account the information seeking behaviour of each of its priority groups so that the information required can be found, used or transferred, thus efficiently meeting the informational needs of each group.

Regardless of the organisation or affiliation of the user, Broder (2002)[6] has identified three categories of web users' needs: **informational**, **navigational** and **transactional**. For navigational search, the immediate intent is to reach a particular site (e.g. NSHD Homepage); for informational search, the intent is to acquire information contained in one or more web pages (e.g. information about variables contained within the MCS); and, for transactional search, the intent is to perform some web-mediated activity (e.g., download list of variables to form the basis of an application for access to data, download teaching dataset, carry out a literature review, interrogate some statistics). Using search log analysis, Border reports that 48% of the logged queries were informational, 20% navigational and 30% transactional.

The main aim of the USP is to provide a single tool that enables researchers to find the variables they need for their analyses across all the cohort and longitudinal studies involved. It will need, therefore, to provide an informational search that then leads to transactional information use on other CLOSER partner resources, such as downloading data from the UK Data Service or the MRC Gateway. Additional transactional functions could be to create a listing of relevant variables to inform future applications for access to data, download a teaching dataset or download syntax and protocols for harmonizing data. The USP should not need to respond to navigational needs as a simple internet search. Effective links on the CLOSER website should be sufficient in this regard.

[4] T. D. Wilson 1999

[5] T. D. Wilson 1999

[6] A. Broder, 2002.

The CIBER (2008) report '*Information behaviour of the researcher of the future*' commissioned by the British Library and JISC provides a useful characterisation of information seeking behaviours in virtual libraries as follows:[7]

- Horizontal information seeking: A form of skimming activity; researchers view just one or two pages from an academic site and then 'bounce' out, perhaps never to return. Around 60% of e-journal users view no more than three pages and a majority (up to 65%) never return.
- Navigation: researchers in virtual libraries spend a lot of time simply finding their way around; in fact as much time is spent finding their bearings as actually viewing material.
- Viewers: The average time spent on e-book and e-journal sites is very short; four and eight minutes respectively. Users are not reading online in the traditional sense; indeed there are signs that new forms of 'reading' are emerging as users 'power browse' horizontally through titles, contents pages and abstracts going for quick wins.
- Squirreling behaviour: Academic users have strong consumer instincts and CIBER's research shows that they will squirrel away articles and papers, in the form of downloads. In spite of this behaviour, there is no evidence as to the extent to which these downloads are actually read.
- Checking information seekers: Users assess authority and trust for themselves in a matter of seconds by dipping and cross-checking across different sites and by relying on favoured brands (e.g. Google).

The JISC report '*The digital information seeker: report of findings from selected OCLC, RIN and JISC user behaviour' (2010)* found that users begin their information searches on search engines: 84% of all users reported doing so, compared to just one per cent who began on a library web site. [8] It is therefore important that enough high quality information from the USP appears in search engine results to enable successful information seeking.

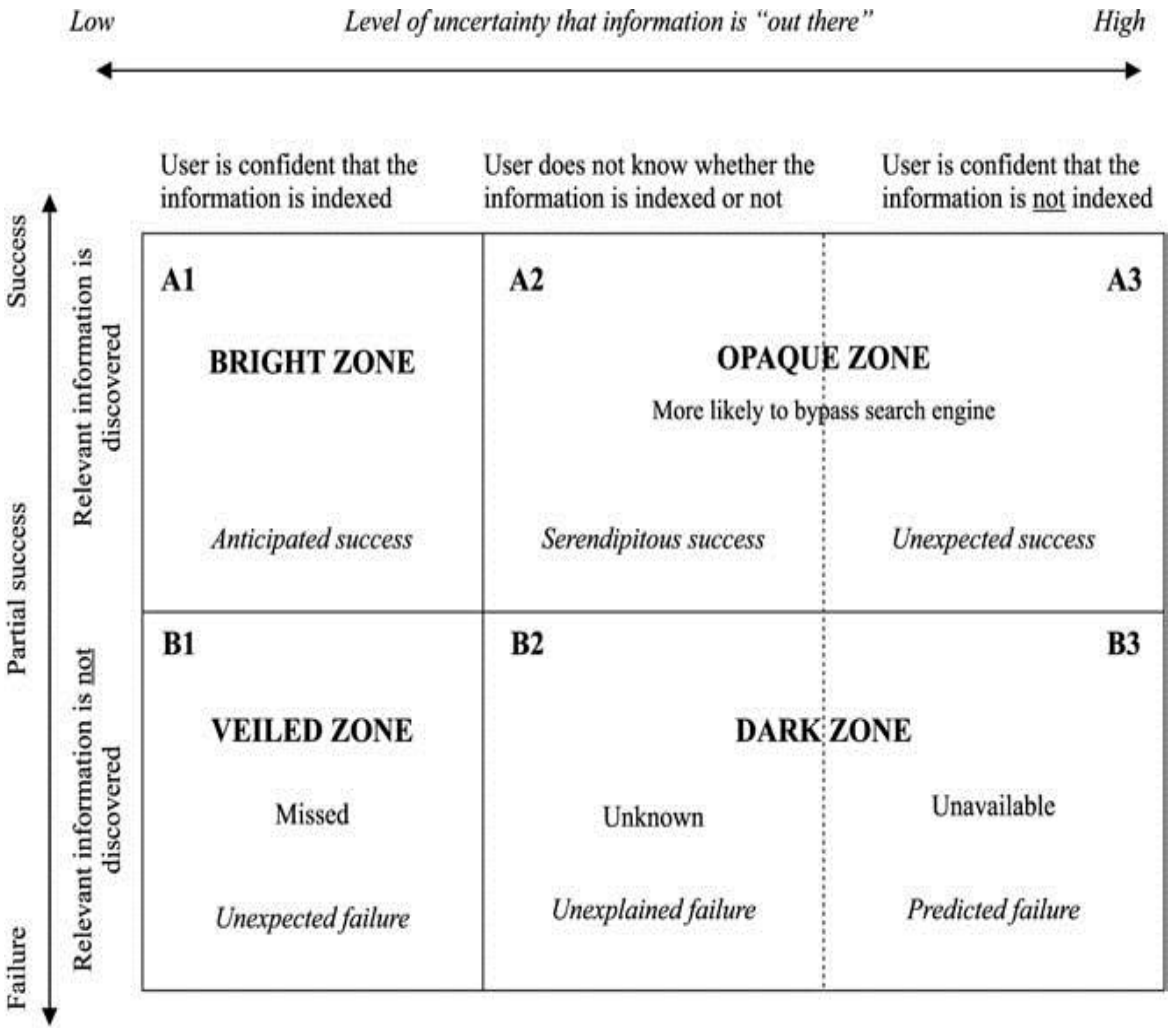
In the study *'An integrative model of "information visibility" and "information seeking" on the web'*, Mansourain et al (2008) outline a model of information visibility (figure 2). This model shows that the most successful discovery of information occurs in the 'Bright Zone' where users anticipate success and are certain that the required information has been indexed by the search tool or tools they are using. Serendipitous success occurs in the opaque zone despite the fact that the user is unsure whether the required information is available; unexpected successes occur when the user locates something that they have good reason to suppose could not be found.

In terms of failed searches, unexpected failure occurs when the user assumes that the information being sought is available on the web, yet it is not found with no obvious reasons for failure. Predicted failure occurs when users are certain that the information they require is not available on the web and regard failure as inevitable, for example when looking for something very specialized. To avoid these types of unsuccessful search, the USP must feature highly in relevant search engine results and allow successful searches regardless of user expectation. One way of doing so is by exposing variable metadata to search engines, and thus facilitating specialist searches.

[7] CIBER 2008.

[8] Connoway et al 2010

Figure 2: Mansourian et al's Model of Information Visibility[9]



When designing a new information resource it is also important to consider when users stop searching and what constitutes success. In the study, *'What is enough? Satisficing information needs'*, Prabha et al (2007) outline the concept of *satisficing*, an information competency whereby individuals assess how much information is good enough to satisfy their information need. Scholars from different fields have drawn on the satisficing concept to reflect on the "contrast between choosing what is satisfactory and choosing what is best"[10].

When individuals satisfice, they compare the benefits of obtaining "more information" against the additional cost and effort of continuing to search[11]. The consequences of putting time and effort into finding optimal solutions can be costly; "decision makers must be willing to forgo the best solution in favor of one that is acceptable". In so doing, information seekers "...satisfice...and choose the one [solution] that produces an outcome that is 'good enough'"[12]. The USP must, therefore, provide access to

[9] Mansourian et al 2008

[10] Byron, 2004 in Prabha et al (2007)

[11] Schmid, 2004 in Prabha et al (2007)

[12] Stroh et al., 2002 in Prabha et al (2007)

information in an efficient manner allowing users to more than satisfice their needs, easily and via an intuitive interface, with minimal time and effort spent.

3.2. Users' Information Literacy

When examining users' information needs and behaviours and designing new services it is important to take into account different levels of information literacy. The SCONUL "7 Pillars of information literacy" model (SCONUL Working group on Information Literacy, 2011) identifies skills and competencies, attitudes and understandings that are present in an 'Information Literate Person'. These pillars are shown in figures 1 and 2 and suggest that an information literate person will be able to: **identify** a need for information to address a research question; **scope** out their current knowledge and identify gaps; **plan** and construct strategies for locating information and data; locate and access (**gather**) the information and data they need; review the research process and compare and **evaluate** information and data; **manage** information professionally and ethically; and **present** the results of their research, synthesising new and old information and data to create new knowledge , disseminating it in a variety of ways.[13]

Recommendation 2: User behaviour findings to be taken account of in the development of the CLOSER USP:

- Take into account the information seeking behaviour of the key user groups in terms of 1. Finding the USP and 2. Using the USP
- Focus on Informational user behaviour that should lead to transactional information use of CLOSER partner resources.
- Make CLOSER USP information visible to search engines
- More than satisfice the users – provide comprehensive information about variables in an easily discoverable and usable form requiring minimal time and effort put in.

4. CLOSER USP KEY USER GROUP NEEDS

This section explores the needs of the key groups of users shown in Table 3, and considers priorities 3 and 4 in outlining the information needs and behaviours of the key user groups and suggesting how the USP can meet these users.

Table 3: CLOSER Key User Groups

Sector	User Group
Higher Education Researcher	Higher Education Researcher
	Postgraduate Researcher
Government, Policy, Service Providers	Government Researchers
Higher Education Teaching	Higher Education Teachers
	Post Graduate Students
	Undergraduate Students
Secondary Education	A Level Teachers

4.1. Higher Education Researchers

Over the past three decades there have been changes in research trends from researchers working alone with only their own data, to working alone with everyone's data, to working in teams in one place with

[13] SCONUL Working group on Information Literacy, 2011

single-study data, to working in teams in one place with data from many studies, to working in distributed teams with massive data sets.[14] The agreed need for the USP is in response to these trends; it will allow researchers or research teams to use data from many studies more efficiently.

The RIN report *'Researchers and discovery services behaviour, perceptions and needs'* outlined important facets of researchers' behaviour. First, it identified research colleagues as one of the most important sources for virtually every type of enquiry; they also featured as important providers of advice to others on resources and tools, and as recommenders of new services. Second, networks of colleagues were especially important to postdoctoral researchers, who tended to be least confident in their research discovery skills[15]. These networks should be taken into account when planning promotional and dissemination activities for the USP and CLOSER should consider targeting supervisors and mentors of researchers within university departments, who could recommend the USP as a key information resource. CLOSER should also target researchers through a presence at key conferences and events.

Recommendation 3: HE Researchers: CLOSER must be aware of and take into account the importance of networks of colleagues in the dissemination and sharing of information amongst HE researchers:

- CLOSER should consider targeting supervisors and mentors of researchers within university departments, who could recommend the USP as a key information resource.
- CLOSER should also target researchers through a presence at key conferences and events.

The RIN study also stated that researchers see resource discovery activities as an integral part of the research process. Almost half of the researchers interviewed adopted a strategy of refining down from an initial large set of results. Only a relatively small group (17%) started with a precise search; a third undertook both kinds of search depending on the nature of the enquiry. There were concerns about irrelevant search results, but the researchers interviewed were more worried about missing important information. Some researchers felt that general search engines delivered too many irrelevant results, irrespective of discipline, though this was a problem for disciplines where the object of enquiry could not be easily described in language that differentiated it from general usage. Researchers in such areas wanted to see specialised scholarly services to overcome this problem. Some researchers did feel overwhelmed by information, but most seemed happy with large sets of results and felt confident that they could navigate through them[16].

Recommendation 4: HE Researchers: CLOSER to act as a specialised scholarly service which will decrease researchers' irrelevant search results around study areas:

- Researchers from all disciplines report that general search engines deliver too many irrelevant results. Researchers would like to see specialised scholarly services to help overcome this problem.
- CLOSER can help to meet this need by reducing irrelevant search results.

The design and promotion of the USP should take into account the fact that researchers are not a homogeneous group; their activities, discourse, approaches to research, and information needs differ, in

[14] Braman, 2006

[15] Research Information Network, 2006

[16] Research Information Network, 2006

particular in relation to their discipline and/or subject and its culture, and the stage of their career. In the JISC report '*Towards a profile of the researcher of today: what can we learn from JISC projects? Common themes identified in an analysis of JISC Virtual Research Environment and digital repository projects*.', Connaway and Dickey (2009) found that the culture of the disciplines dictated how and what information is shared, stored, reported, etc. For example science researchers, such as biomedical researchers, were more likely to use digital repositories, a virtual research environment and Twitter; social scientists on the other hand were more reluctant to use new technologies and thus less likely to Tweet or use a laptop at a conference.[17] The Interdisciplinary nature of the CLOSER Studies means that the USP needs to ensure that the data generated serves the needs of researchers from varied fields asking varied questions.

Recommendation 5: HE Researchers: CLOSER must be aware of and take into account disciplinary differences when providing information to and reaching its research audience:

- The Interdisciplinary nature of the CLOSER Studies means that the USP needs to ensure that the information generated serves the needs of researchers from varied fields asking varied questions.

Table 4 shows the number of academic professionals in UK universities by discipline. The CLOSER studies' core areas are highlighted dark blue, the peripheral areas, light blue. It indicates that the CLOSER studies are likely to be very relevant to about a fifth of academic professionals and of at least some relevance to up to half of them. University departments with a strong presence in the shaded areas should be targeted as potential users of the USP.

[17] Connoway and Dickey, 2009

Table 4: Number of Academic Professionals by discipline: HESA 2010/11

	professionals (no's)	professionals (% of Total)
HESA Academic cost centres		
Clinical medicine	18,396	13%
Clinical dentistry	1,014	1%
Veterinary science	1,075	1%
Anatomy & physiology	1,287	1%
Nursing & paramedical studies	7,795	5%
Health & community studies	3,378	2%
Psychology & behavioural sciences	4,372	3%
Pharmacy & pharmacology	1,649	1%
Biosciences	10,560	7%
Chemistry	3,313	2%
Physics	3,833	3%
Agriculture & forestry	839	1%
Earth, marine & environmental sciences	2,765	2%
General engineering	2,595	2%
Chemical engineering	750	1%
Mineral, metallurgy & materials engineering	993	1%
Civil engineering	1,413	1%
Electrical, electronic & computer engineering	3,681	3%
Mechanical, aero & production engineering	3,373	2%
Architecture, built environment & planning	2,985	2%
Mathematics	3,201	2%
Information technology & systems sciences & computer software engineering	5,734	4%
Catering & hospitality management	660	0%
Business & management studies	10,911	8%
Geography	1,718	1%
Social studies	11,557	8%
Media studies	2,315	2%
Humanities & language based studies	8,811	6%
Design & creative arts	8,226	6%
Education	7,248	5%
Modern languages	3,261	2%
Archaeology	608	0%
Sports science & leisure studies	1,761	1%
Continuing education	534	0%
Total academic cost centres	142,611	100%
Academic Professionals in Cohort Study Core Areas	30,566	21%
Academic Professionals in Cohort Study and Peripheral Areas	41,718	29%

Recommendation 6: HE Researchers: CLOSER to target university departments which are strong in the cohort study core areas to increase awareness of the CLOSER USP and other resources:

- CLOSER studies are likely to be very relevant to over 20% of academic professionals and have some relevance to up to 50% of professionals.
- University departments with a strong presence in disciplines related to the studies should be targeted in dissemination activities as potential users of the CLOSER USP

As outlined in section 3, researchers often complete information searching tasks by 'satisficing' (accepting a satisfactory answer or solution over an optimal one)[18] and require support that is driven by their needs, integrated into their workflows, available at the point of need, is good enough and is discipline specific.[19] They want services that are easy to use, with minimum overheads, which fit in with their workflows. They are also looking for more personalised services,[20] which might take the form of the recommendation systems used in online retail environments e.g. people interested in this variable are also interested in these others. Providing users with individual workspaces could also increase personalisation. These needs

[18] Prabha et al, 2007

[19] Aukland, 2012

[20] Aukland, 2012

should be reflected in the design of the USP; the evidence indicates that a complex resource with a high training requirement would have low take up amongst the research community.

In '*The lives and technologies of early career researchers: a JISC funded investigation'* James et al (2009) provide recommendations to those thinking about building information resources with researchers in mind:

'…..projects to create new technologies and tools should budget for time and resource to engage with the research community they are targeting. This might mean user research activity, followed by skilled usercentric design practices; or it may mean using developers who are embedded in the research environment, engaging with the culture and practices of the research group first hand. Well designed user interactions are key to reducing the barriers to take-up of new tools, and this should be considered at all stages of development projects. This must include genuine examination of the real workflows, and how they fit with existing and other research activities.'[21]

Related to this is the design of simple and intuitive user interfaces, as James et al state:

'This should not be the afterthought which is so common in software projects, where a developer-lead design is put in front of a handful of users just before release, and a few tweaks made to wording or layout to meet any instantly observable problems. UI [user interface] design should be integrated at all stages of the project, and to get a truly great UI design a project must engage users from day one to ensure that the tasks the system will enable are useful to the researcher and being approached in an appropriate way.'[22]

Borgman (2007) highlights the importance of communicating with researchers to examine how tools might fit with existing workflows:

The design of research and discovery tools is often best informed by communicating with researchers to figure out how a specific tool might support them. In many cases, the most effective tools are not stand-alone services, but instead work in conjunction with other tools to function as a suite of services that collectively form an information infrastructure, which forms a "value chain of scholarship." [23]

Recommendation 7: CLOSER USP User interface should be intuitive and CLOSER should involve researchers and other key groups in the design process:

- Well designed user interactions are key to reducing the barriers to take-up of new tools, and this should be considered at all stages of development projects.
- Development must include genuine examination of the real workflows, and how they fit with existing and other research activities
- The most effective tools are not stand-alone services, but instead work in conjunction with other tools to function as a suite of services

A popular impression of early career researchers is that they are embracing new technologies and using them in innovative ways to support their research. Digging into this a little deeper revealed that while researchers almost universally search for documents online, their use of 'Web 2.0' tools in service of their research is not happening to the degree that many might first have imagined. James et al (2009) found that 72% of early career researchers do not use Web 2.0 or social media tools to share their research (see Table 5 for examples). Given the current barriers that researchers and institutions need to break through

[21] James et al, 2009

[22] James et al 2009

[23] Borgman, 2007

for these tools to have any significant influence in the early careers of researchers,[24] Web 2.0 tools should not be an early priority for the USP.

Table 5: Examples of Web 2.0 research tools

Web 2.0 Tool	URL	Functionality
BibMe	http://www.bibme.org/	Create fast and easy bibliographies
bubbl.us	https://bubbl.us/	Brainstorming
		Visual data
		Flow charts
CiteULike	http://www.citeulike.org/	Store references you find online
		Discover new articles and resources
		Automated article recommendations
		Share references with your peers
		Find out who's reading what you're reading
		Store and search your PDFs
Confolio	http://www.confolio.org/	Store files, links, ideas
		Collaborate with others by sharing info
		Publish opinions on contributions of others
Gapminder	http://www.gapminder.org/	Interactive, dynamic data visuals
		Trend analysis
		Statistical analysis
Google Drive	http://www.google.com/drive/	Co-construction and online creation
		Manuscripts, interview transcripts, spreadsheets, presentations
		Collaboration.
Mendeley	http://www.mendeley.com/	Sharing, building online research libraries
		Collaboration.
Mindmeister	http://www.mindmeister.com/	Mindmaps
		Schematic diagrams
Zotero	http://www.zotero.org/	Bibliographic plugin for organizing research

Early career researchers make great efforts to keep abreast of their field, using a variety of methods according to their knowledge and preference. Publication alerting services are one and some early career researchers reported routinely scanning journal websites for new material, or subscribing to journal's tables-of-contents emails. This suggests that a route to publicising the USP and reaching researchers is through relevant discipline publications, such as the International Journal of Epidemiology and the Society for Longitudinal and Life Course Studies Journal.

Recommendation 8: HE Researchers: CLOSER to target researchers through a presence in key disciplinary publications:

- Researchers make great efforts to keep abreast of their field, using a variety of tools according to their knowledge and preference.
- Publication alerting services are used and researchers reported routinely scanning journal websites for new material, or subscribing to journal's tables-of-contents emails.
- This may suggest that a route to publicising the CLOSER USP and reaching researchers may be through relevant discipline publications

[24] James et al, 2009

Researchers want to be able to identify the resources that are relevant to them, to narrow searches, and retrieve information effectively.[25] As stated in section 3, the majority of researchers rely heavily on search engines as their major information discovery resource, In fact, according to the CIBER report states that this applies irrespective of age and experience. [26]. For example, participants in the RIN British Library study *'Patterns of information use and exchange: case studies of researchers in the life sciences'* regarded Google as a key resource. They liked its ease of use, word-search capability and ostensibly large index where searches often deliver serendipitous information in addition to that expected[27]. A second RIN report *'Researchers' Use of Academic Libraries and their Services'* found that researchers liked to use Google and behaved according to the familiar phrase, 'if Google doesn't find it, it doesn't exist'. This evidence again highlights the need for the USP to figure highly in Google search results.

Connaway and Dickey (2009) found that researchers want to have accurate metadata associated with their publications and documents, and their research data. The research found that researchers had insufficient time to provide accurate metadata themselves, and would like more accurate and consistent processes for adding it. There could be a role for the USP to enable researchers to easily create metadata for derived datasets based on the CLOSER studies. This is supported by the findings of a 2010 Digital Curation Centre report which suggested there is an issue with researchers not sharing this type of data:

'Typically researchers will request data from one of the guardians of national longitudinal surveys, such as the General Household Survey, or from a centrally-funded cohort study such as the 1970 British Cohort Study, and perform some re-analysis of parts of the data to answer specific research questions. Although such work typically leads to publications, the new derived datasets are not systematically shared with others.'[28]

The USP will provide variable level information to help metadata generation for these derived datasets, which in turn could enable researchers to share derived data more easily and effectively.

Heidorn (2008) outlines a barrier to information seeking/transfer in science, which he calls the *'Digital Tower of Babel'*, created with seemingly countless proprietary as well as open data formats. Some of the formats are very efficient for the individual applications for which they were designed including word processing, databases, spreadsheets and others, but do not support interoperability and preservation, and can be incompatible.[29] Early career researchers have also complained about the over-use of proprietary, Microsoft, products in research resources[30]. This means that downloads contained on the CLOSER website and USP should use open and interoperable file formats where possible, to allow users to access and use information effectively.

Recommendation 9: CLOSER to use open and interoperable file formats for downloads on the CLOSER website and USP:

- Researchers have complained about the over-use of proprietary products in research resources. These products can be ineffective in supporting interoperability and preservation
- This means that downloads contained on the CLOSER website and USP should try to use open and interoperable file formats where possible, so that users can open and use information effectively.

[25] Bent et al, 2007

[26] CIBER 2008

[27] Research Information Network and the British Library, 2009

[28] Digital Curation Centre, 2010

[29] Heidorn 2008

[30] James et al 2009

4.2. Postgraduate Researchers

Many of the findings discussed above also apply to postgraduate researchers. For example networks of colleagues are as important, and Craswell (2007) indicates that supervisors and supervisory teams are seen as having primary responsibility for the research training of Masters and Postgraduate students[31].

The British Library/JISC report '*Researchers of tomorrow'* looks at information seeking behaviour of doctoral students, including 'Generation Y', the 'digital native' students who have grown up around information technology, many of whom are now in or entering postgraduate research. The report states that:

"In a survey enquiry asking about their last incident of information-seeking activity, the majority of all doctoral students (including Generation Y) across all subject disciplines were looking for text-based and secondary, pre-published research resources (journal articles, books etc) and not primary source materials."[32]

This finding has implications for CLOSER as, if it wants to promote the use of longitudinal data, it may need to use secondary sources as a 'hook' to lure researchers in. Borgman (2009) expands on this idea:

"Links between journal publications and the datasets on which the article is based, allow an interested user to discover either the dataset or the publication first, as the link provides the user with easy access to other components in the chain. Therefore, one is able to enter the chain at any point and continue to "follow the relationships".[33]

Recommendation 10: Postgraduate Students: CLOSER to use secondary research resources as a 'hook' for postgraduates to find out about primary resources:

- Findings show that postgraduate students are not very comfortable discovering primary research resources, however they are very comfortable with secondary sources such as journal articles.
- If CLOSER can create links between journal publications and the datasets on which the article is based this would allow users to discover either the dataset or the publication and follow the relationships between the two.

Most students found the information they sought in more than one kind of research resource, but e-journals dominated. The overwhelming majority ended their information-seeking incident with a book (e-book or print), a journal article (e-journal or print), a reference or abstract of an article, not primary or original source material such as data, photographs, newspaper articles, or archival material.

Of the total survey sample, 30% used Google or Google Scholar as their main information-seeking source. However, the data shows some interesting differences by subject and discipline: Google sources were strongly favoured above other sources by arts and humanities, social science and engineering and computing science students.

This cohort of students rarely seemed to be aware of the actual publisher or e-information source itself when searching for e-journal articles, for example relying on their libraries' own e-resource interface or a Google application to locate and access resources, without being particularly interested in the names or

[31] Craswell (2007)

[32] JISC and British Library 2012

[33] Borgman, 2009

nature of the originating organisations. This also has implications for CLOSER as if it is shut off as a stand alone resource it may be missed. CLOSER resources will need to appear in Google results and library catalogues to obtain maximum exposure; open metadata that is shared and easily harvestable by library catalogues and other tools will also help ensure a greater reach of CLOSER resources and use of the USP.

Recommendation 11: CLOSER USP to open metadata to search engines (Google) and allow harvesting by library catalogues and other tools to allow a greater reach of resources:

- Postgraduate students rely mainly on Google results during their information searches.
- CLOSER needs to be indexed by Google as if it is shut off as a stand alone resource it may be missed by postgraduate students and others.
- Open metadata that is shared and easily harvestable by library catalogues and other tools may help ensure a greater reach of CLOSER resources and use of the USP.

In common with early career researchers, data from the surveys suggests overall low levels of use of specialist applications or Web 2.0 in postgraduate research (such as the examples in Table 4.2), with very little difference between the ages of the students. According to one social science student:

"My supervisor and I … both found it slightly amusing that I was expected to be making use of 'virtual research environments, social bookmarking, data and text mining, wikis, blogs and RSS-feed alerts'. I don't know what most of those things are, but I'm pretty sure none of them are reading articles, writing down my ideas, and discussing them with my supervisor, so I'm not going to panic about my development just yet!"[34]

Technology tools were readily taken up among cohort students if they complemented and enhanced the students' established research practices and behaviour, could be relatively easily understood and absorbed into existing work practices. This echoes the findings for early career researchers, that tools should be intuitive and fit into existing research workflows[35]

The above findings are confirmed in the JISC report: *'Digital information seekers: How academic libraries can support the use of digital resources'*. This report summarised 12 reports from around the world which looked at the use of digital resources by researchers. The main findings were that:

- Disciplinary differences do exist in researcher behaviours, both professional researchers and students.
- E-journals are increasingly very important to the process of research at all levels.
- The evidence provided by the results of the studies supports the centrality of Google and other search engines.
- Google is often used to locate and access e-journal content.
- At the same time, the entire Discovery-to-Delivery process needs to be supported by information systems, including increased access to resources.

The realities of the online environment observed above led several studies to some common conclusions about changing user behaviours:

[34] JISC and British Library 2012

[35] James et al, 2009

- Regardless of age or experience, academic discipline, or context of the information, need, speed and convenience are important to users.
- Researchers particularly appreciate desktop access to scholarly content.
- They also desire enhanced content to assist them in evaluating resources.
- They seem generally confident in their own ability to use information discovery tools.
- However, it seems that information literacy has not necessarily improved.
- High-quality metadata is thus becoming even more important for the discovery process.
- More digital content of all kinds and formats is almost uniformly seen as better.

In some cases, the studies reviewed included contradictory findings:

- There is evidence for both broad and narrow range of tools used for scholarly research.
- There is evidence both in favour and against formal training in electronic searching.
- There are mixed conclusions on the question of whether recommendations, provided by recommender systems (such as Mendeley) and social media are having an impact on information seeking.

The ESRC Doctoral Training Centres (DTC) are an important route to postgraduate researchers. It is important, therefore, that the USP prioritise engagement with DTC's with a high number of CLOSER relevant subjects and promote the use of the CLOSER studies and USP within these centres, perhaps through research methods courses. Table 6 shows the number of subjects that each ESRC Doctoral Training Centre offered at the end of 2012 for the 2013 application period. These subjects were taken from their website and then analysed for relevance to CLOSER studies.

Table 6: ESRC Doctoral Training Centres Offer – 2012

ESRC Doctoral Training Centre	All Subjects Offered	CLOSER Relevant Subjects	% CLOSER Relevant Subjects
Bloomsbury Consortium DTC	32	26	81%
Southampton University DTC	41	29	71%
Essex University DTC	26	16	62%
Birmingham University DTC	28	17	61%
Wales DTC:	38	22	58%
Warwick University DTC	23	13	57%
South-West DTC:	49	28	57%
Sussex University DTC	28	15	54%
South-East DTC:	36	18	50%
North East DTC:	40	20	50%
Kings College London	64	31	48%
Nottingham University DTC	36	16	44%
North West DTC:	83	36	43%
London School of Economics DTC	63	27	43%
White Rose DTC	51	21	41%
Queen Mary and Goldsmith DTC:	23	9	39%
Oxford University DTC	42	16	38%
University College London DTC	24	8	33%
Scottish DTC	46	15	33%
Cambridge University DTC	29	9	31%
London Business School DTC	8	1	13%
Grand Total	**810**	**393**	**49%**

Recommendation 12: Postgraduate Students: CLOSER to prioritise dissemination activities to ESRC DTC's which have a high proportion and number of CLOSER relevant subjects on offer.
These include:

- Bloomsbury Consortium DTC
- Southampton University DTC
- Essex University DTC
- Birmingham University DTC

4.3. Government Researchers

There are a large number of potential CLOSER users in central government, the devolved administrations and in local authorities and NHS trusts. For example, Table 7 lists the members of The 'Longitudinal Champions' group; who could all use research outputs from the CLOSER Studies to inform their policy development.

Table 7: Government department (policy) users include (From Government Longitudinal Champions)

Government Body
Department for Business, Innovation and Skills
Department for Communities and Local Government
Department for Education
Department for International Development
Department for transport
Department of Health
Department for Work and Pensions
Food standards Agency
Government Equalities Office
Home Office
Ministry of Defence/Defence Analytical Services and Advice
Ministry of Justice
Office for National Statistics
Scottish Government
Welsh Government

Government researchers share many of the same characteristics and needs as academic researchers and will use many of the same tools to achieve their research aims. As government researchers are more focused on current policy issues and delivering research around the government's legislative program, they will need to use the USP to access information about variables relevant to that work. Government researchers are under time and resource pressure to deliver their research, so the USP could best assist by highlighting resources relevant to current government policy areas and programmes using vocabulary and language which chimes with current policy discourse.

Recommendation 13: Government Researchers: CLOSER USP to highlight resources relevant to government policy areas and programmes:

- Government researchers will be under time and resource pressure to deliver their work so the CLOSER USP can assist in meeting the needs of these researchers by highlighting resources relevant to current government policy areas and programmes.

To promote CLOSER studies and the USP government departments and organisations, CLOSER should target those with an expressed interest in policy areas relevant to the studies, and use groups such as the UK Data Forum, where government and academic researchers and resource providers are represented, to promote the service.

Recommendation 14: Government Researchers: CLOSER to prioritise dissemination activities to government departments with an expressed interest of policy area relevant to the studies and also to engage government users via the UK Data Forum:

- In promoting CLOSER studies and the CLOSER USP it is suggested that CLOSER target government departments and organisations with an expressed interest in policy areas relevant to the studies
- CLOSER should also consider disseminating via groups such as the UK Data Forum where government and academic researchers and resource providers are represented.

4.4. Higher Education Teaching

At present there is a recognised deficit in quantitative skills amongst UK social science students and graduates.[36]

Some CLOSER studies already provide teaching datasets that HE teachers can use in research methods and other courses and now is a good time to assess how the needs of teachers and students can be met by the USP and other CLOSER resources. CLOSER could provide information resources for teachers and practical materials for students to practice quantitative methods on.

The British Academy states that:

"Such courses (Quantitative methods) are often taught in isolation, and can appear irrelevant to the core discipline. Quantitative methods are taught most effectively when embedded within the wider undergraduate degree course, allowing students to understand the context for, and application of, the methodology. International best practice in the teaching of quantitative methods integrates methods training and hands-on research into the mainstream of academic subjects."[37]

This statement would suggest that adopting a discipline and topic based approach to providing teaching resources would be advised.

Recommendation 15: Higher Education Teachers: CLOSER to assess HE teaching needs and to investigate providing discipline and topic focused teaching materials:

- There is an identified quantitative skills gap and the current efforts to reduce it provide CLOSER studies a good opportunity to reach students earlier.
- Now is a good time to assess how the needs of teachers and students can be met by the USP and other CLOSER resources.
- CLOSER could provide information resources for teachers and practical materials for students to practice quantitative methods on.
- Quantitative methods are taught most effectively when embedded within the wider undergraduate degree course, so a discipline/topic focus relevant to the course would be more effective than a stand alone methods approach.

Given quantitative skills relevance to individual disciplines and the above recommendation, CLOSER may wish to investigate working in partnership with learned societies and subject associations when drawing up resources for teaching and learning. According to The British Academy, The Royal Statistical Society has been active in promoting statistical literacy in schools, universities, government, media, business and the wider public. The Royal Geographical Society (with the institute of British Geographers) is also piloting new work in quantitative geography with schools and postgraduates.[38]

[36] British Academy 2012

[37] British Academy 2012

[38] British Academy 2012

Recommendation 16: HE and Secondary Teaching: CLOSER to explore potential partnerships with learned societies and subject associations to prepare and promote teaching resources:

- The Royal Statistical Society has been active in promoting statistical literacy in schools, universities, government, media, business and the wider public.
- The Royal Geographical society (with the Institute of British Geographers) is also piloting new work in quantitative geography with schools and postgraduates

Most of the current postgraduates will be part of the 'Google generation': born after 1993, and growing up in a world dominated by the internet. This phrase has entered popular usage as "a shorthand way of referring to a generation whose first port of call for knowledge is the internet and a search engine, Google being the most popular. This is offered in contrast to earlier generations who "gained their knowledge through books and conventional libraries". [39]

Some headline findings from a global survey by OCLC suggests that the Google generation stereotype may be broadly true:

- 89% of college students use search engines to begin an information search (while only 2% start from a library web site);
- 93% are satisfied or very satisfied with their overall experience of using a search engine; and,
- search engines fit college students' life styles better than physical or online libraries and that fit is `almost perfect'[40]

Research into how children and young people become competent in using the internet and other research tools is patchy but some consistent themes are beginning to emerge:

- the information literacy of young people, has not improved with the widening access to technology: in fact, their apparent facility with computers disguises some worrying problems;
- the speed of young people's web searching means that little time is spent in evaluating information, either for relevance, accuracy or authority;
- young people have a poor understanding of their own information needs and thus find it difficult to develop effective search strategies;
- they exhibit a strong preference for expressing themselves in natural language rather than analysing which key words might be more effective;
- faced with a long list of search hits, young people find it difficult to assess the relevance of the materials presented and often print off pages with no more than a perfunctory glance at them; and,
- young people have unsophisticated mental maps of what the internet is, often failing to appreciate that it is a collection of networked resources from different providers as a result, the search engine, be that Yahoo or Google, becomes the primary brand that they associate with the internet.[41]

[39] Wikipedia

[40] CIBER, 2008

[41] CIBER, 2008

CLOSER will have to acknowledge the characteristics and changing information behaviours of young people when providing teaching and learning resources.

Recommendation 17: HE and Secondary Teaching: CLOSER to acknowledge the characteristics and changing information behaviours of young people when providing teaching and learning resources:

- The information literacy of young people, has not improved with the widening access to technology, the speed of young people's web searching means that little time is spent in evaluating information.
- Young people have a poor understanding of their information needs and thus find it difficult to develop effective search strategies. They exhibit a strong preference for expressing themselves in natural language rather than analysing key words.
- Faced with a long list of search hits, young people find it difficult to assess the relevance of the materials.
- Young people have unsophisticated mental maps of what the internet is, as a result, the search engine, be that Yahoo or Google, becomes the primary brand that they associate with the internet.

4.5. Secondary Teaching

In relation to the quantitative skills deficit the UK Academy states:

"the problem starts in schools. Too many students enter higher education with poor numerical skills, little confidence in their mathematical abilities or an appreciation of their relevance. This is a severe handicap in developing quantitative skills more generally. The UK is dramatically behind many other countries in the study of mathematics after sixteen."[42]

Again this gives an opportunity for CLOSER to engage with secondary education to promote the use of resources and engage students at an early age. This group, however, will not be expected to carry out primary research, so CLOSER should focus on providing and highlighting resources for secondary teachers. Again, like HE teaching, this should be relevant to discipline and teaching topic, so CLOSER should look for opportunities within the A level curriculum to see where resources could be provided to secondary school teachers.

Recommendation 18: CLOSER to look for opportunities within the A Level curriculum to provide teachers with resources for quantitative skills lessons:

- CLOSER should focus on providing and highlighting resources for secondary teachers.
- These resources should be relevant to discipline and teaching topic.

5. CLOSER INFORMATION RESOURCES

Information about the studies which are part of CLOSER are located in many different places from survey websites, to data centres, such as the UK Data Service, to funding bodies. Appendix 10.2 gives an overview of information contained on CLOSER studies' websites. It is not envisaged that the USP will host these resources; however, it will try and meet its users' (and potential users) informational needs by hosting metadata to point and link to the resources they are looking for. This section looks at study priority 5 in explaining how the USP can best meet its users' needs. It examines current CLOSER

[42] The British Academy, 2012

information resources and looks at which will be relevant in meeting the needs of the key USP User Groups. The section will then examine the current user behaviour and publication outputs of the CLOSER studies to meet study priority 6 in examining discipline trends to inform priorities on work such as data harmonisation and data linkage, which will be accessible via the USP.

5.1. Location, type and use of resources

Table 8 shows the type of information services and products that CLOSER studies provide to their users, their current locations and the type of information seeking behaviour associated with each product.

Table 8: Types of CLOSER Information Resources, Location and User Need

Information Products and Services	Location of Resource	Information Seeking Behaviour
Study information/Contacts	Cohort Study Teams	Navigational, Informational
Press Releases/Media Quotes	Cohort Study Teams, Funders, Data Providers (UK Data Service / MRC Gateway)	Informational
Executive Summaries/Highlights	Cohort Study Teams, Funders,	Informational
Key Indicators/Stats Digest	Cohort Study Teams, Funders, Data Providers	Informational, Transactional
Bibliographies	Cohort Study Teams, Data Centres, Funders	Informational
Research Papers	Cohort Study Teams, Institutions, Publishers	Informational, Transactional
Teaching Datasets/Learning Resources	Cohort Study Teams, Data Providers	Informational, Transactional
Data Access Policies	Cohort Study Teams, Data Providers	Informational
Detailed Metadata/Technical Documents	Cohort Study Teams, Data Providers	Informational, Transactional
Dataset Downloads	Cohort Study Teams, Data Providers	Transactional

Recommendation 2 states that the USP should provide an informational search interface that potentially leads to transactional information use of primary research products. Navigational needs, which can be met with a simple internet search or following links on the CLOSER website, are out of scope for the USP.

Little research has been carried out to evaluate data providers' websites. Gal (2003)[43] examined the websites of six statistics agencies and found that they were characterised by complex web designs and dense types of information, with many options and pathways for users to follow. Gal's study found that websites varied in organisation and ease of use, and contained a wide range of products. Search options were often cumbersome and led to many irrelevant hits; help systems were often generalised and did not provide specific help for non-specialists. Technical glossaries were formal and demanding, and access to information required familiarity with various computer programs and operations. Press releases and executive summaries varied in length and location, and appeared to often demand substantial statistical and mathematical knowledge, despite not being solely aimed at specialists. Gal did not go on to suggest a model for best practice.

[43] Gal, 2003

These findings present a challenge for the USP as there will be diverse levels of information literacy within the key user groups. The USP should be as intuitive as possible, with guides on how to use the resource if possible and small hints within the user interface where there is any need for complexity.

Recommendation 19: Consider CLOSER USP users ICT literacy:

- The requirements and design of the CLOSER USP should take into account the diverse levels of ICT literacy within the key user groups
- The USP design should be as intuitive as possible, with guides on how to use the resource if possible and small hints within the user interface where there is any complexity.

Table 9 maps the needs of all user groups to CLOSER information resources (the key USP user groups are highlighted). To illustrate possible combinations of users' needs and skills, it sketches fourteen user groups and eleven categories of common information products or services that are released by CLOSER organisations. The Table is designed so that the complexity of information products and services increases from top to bottom and that the statistical and ICT literacy skills expected by different user groups increases from left to right within each user group sector. This is a broad picture and it is important to remember that each user group differs in skills and needs.

Table 9: Mapping User Group Information Needs to CLOSER Information Resources

Information Products and Services	Location of Resource	Information Seeking Behaviour	User Groups														
			General Interest/Non Educational or Research			Government, Policy, Service Providers				Secondary Education		Higher Education Teaching			Higher Education Researcher	
			General Public	Media	Participants	Politicians/Senior Policy Makers	Funders	Practitioners	Government Researchers	A level Students	A Level Teachers	Undergraduate Students	Post Graduate Students	Higher Education Teachers	Postgraduate Researcher	Higher Education Researcher
Press Releases/Media Quotes	Surveys, Funders, Data Centres	Informational														
Executive Summaries/Highlights	Surveys, Funders,	Informational														
Study information/Contacts	Surveys	Navigational, Informational														
Key Indicators/Stats Digest	Surveys, Funders, Data Centres	Informational, Transactional														
Bibliography	Surveys, Data Centres,Funders	Informational														
Research Papers	Surveys, Institutions, Publishers	Informational, Transactional														
Teaching Datasets/Learning Resources	Surveys, Data Centres	Informational, Transactional														
Data Access Policies	Surveys, Data Centres	Informational, Transactional														
Detailed Metadata/Technical Documents	Surveys, Data Centres	Informational, Transactional														
Dataset Downloads	Surveys, Data Centres	Transactional														

Very Likely To Need Resource	Likely to Need Resource	Occasional Need of Resource

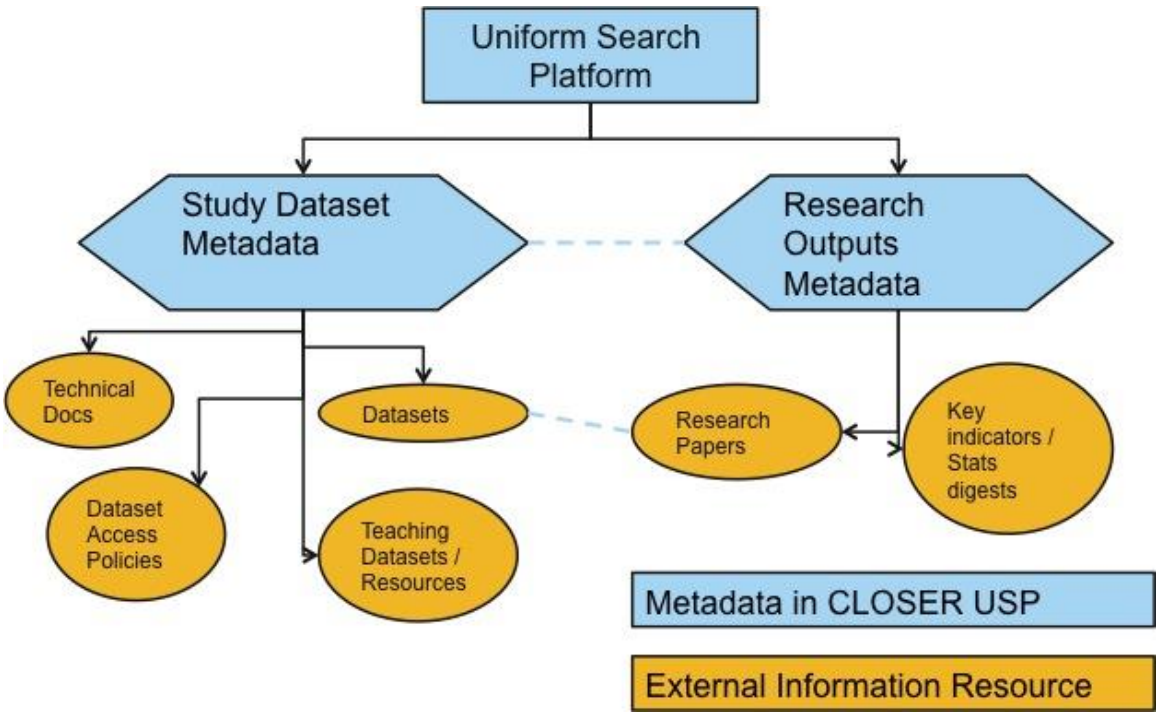
Table 9 shows that in addition to information needs around data and metadata discovery, all of the key USP users have informational and transactional needs around study research outputs such as research papers, key indicators and statistical digests. The CLOSER leadership team should consider whether metadata around research outputs should be part of the USP. Currently bibliographies and metadata around research outputs are held by each of the Cohort Study Teams and are fed into centralised databases held by CLS for ESRC studies and MRC, within their Researchfish system, for their funded studies.

There are a several reasons why the use of research outputs' metadata that links to resources on publishers' websites, institutional repositories and study websites may be useful for the USP:

- it creates a link from the primary research data to the published outputs;
- it may entice new users to the USP, who may not originally want to use primary data or metadata, but become aware of the resources;
- it broadens the audience for the USP;
- it would highlight the diverse topics and wealth of research available via the CLOSER studies; and,
- the data already exists and would be relatively straightforward to import into the USP.[44]

Figure 3 shows how the CLOSER transactional information resources could be accessed via the USP and the links that could be made by the addition of research outputs metadata

Figure 3: CLOSER USP Information Resources



[44] As part of the EC funded ODIN project the British Library is creating a centralised research outputs metadata database as part of a proof of concept around the use of CLOSER studies

Recommendation 20: CLOSER to consider adding bibliographic metadata into the USP:

- Having research outputs alongside study metadata may entice new users from the key user groups, broadening the USP audience and highlighting the wealth of research created by the use of the CLOSER studies

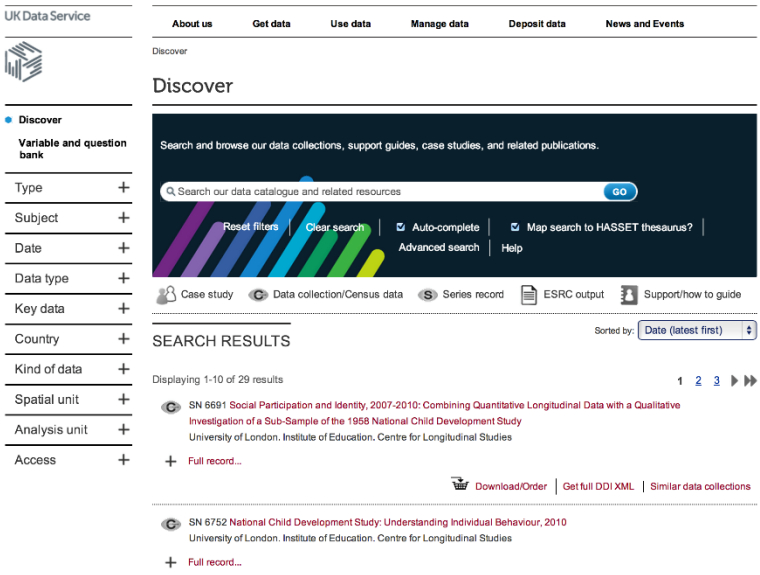
5.2. Discipline and topic Trends

This section examines evidence around the current use of the CLOSER resources and their publication outputs to look at discipline trends and inform priorities on work such as data harmonisation and data linkage, which will be accessible via the USP.

5.2.1. Data Search and Use

Currently the cohort studies' data are held by the UK Data Service for ESRC funded studies and with the study teams themselves for the MRC funded studies. User behavior such as search data and variable downloads are collected by UK Data Service and some study teams and can be used to provide information around current use and to suggest likely future users' needs.

Figure 4: UK Data Service Data Discovery

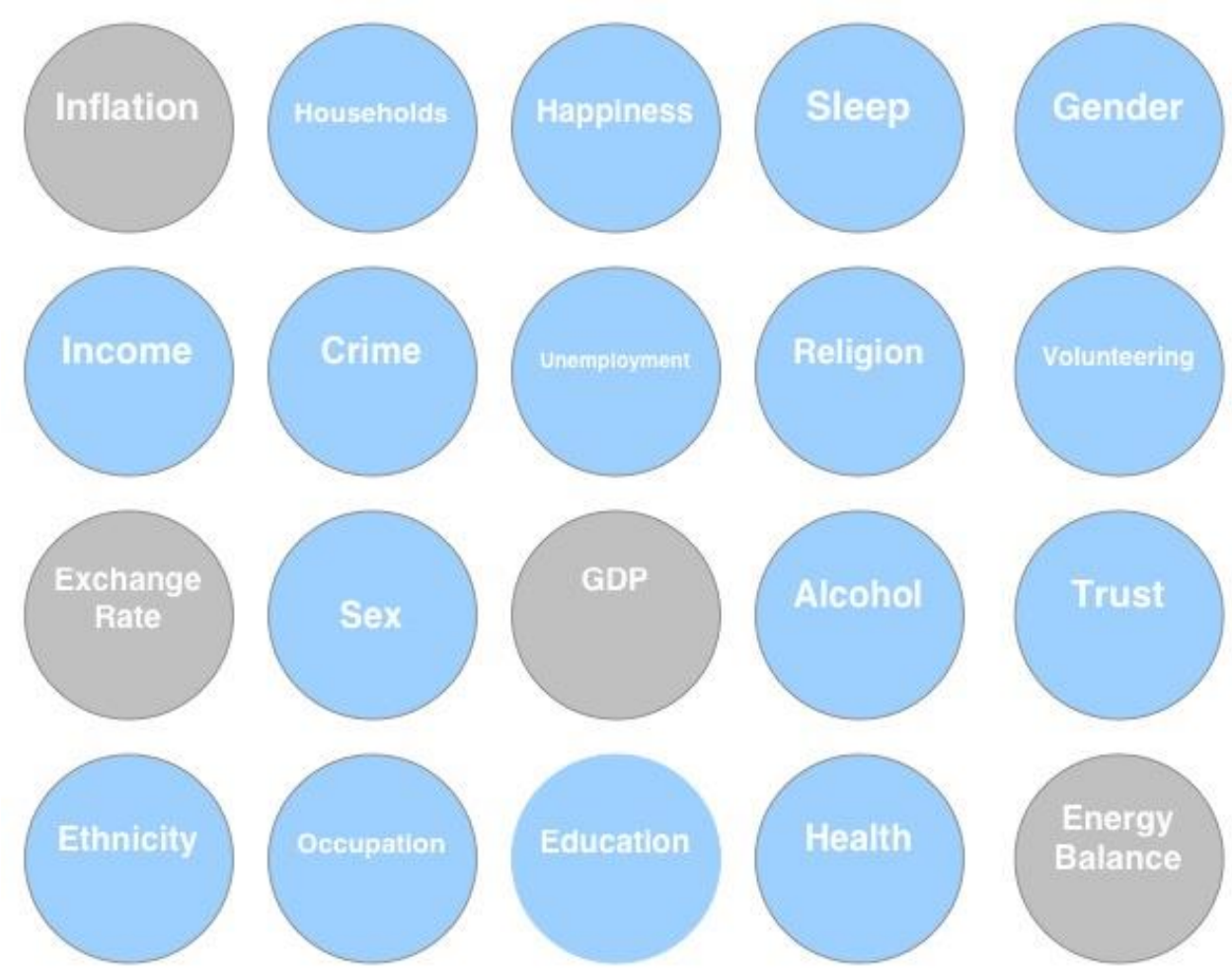


Some data on user behaviour comes from what users type into search boxes. Figure 5.2 shows the top searches carried out on different parts of the UK Data Service website in 2012[45]. A number of themes that overlap with the evidence provided by CLOSER studies are coloured blue. One of the CLOSER studies, Understanding Society, was second top search in the UK Data Service catalogue in 2012. It is clear from figure 5 that CLOSER studies can offer a great deal to UK Data Service users; the table suggests that

[45] These are standardised topics from the top 20 search results for each of the ESDS catalogue, variable and survey question bank searches in 2012

employment issues, crime, education and health in general, should be prioritised for the work being carried out in parallel to the USP.

Figure 5: UK Data Service: Top Searches 2012



Data has also been retrieved from the MRC NSHD SWIFT variable retrieval tool. This tool allows registered users to create their own bespoke NSHD data sets. Table 10: shows the percentage of variables saved in baskets as a result of searches in SWIFT in 2012, broken down by variable category.[46]

[46] Some variables may belong to more than one category and will be counted multiple times. The creation of shared "standard" baskets which are used by many new collaborators and students may bias these figures.

Table 10: NSHD Swift saved variable categories 2012

% of variables saved	Category Label
13.75	General health
9.91	Women's health
9.23	Other socioeconomic circumstances
6.49	Other health behaviours
6.43	Anthropometry
5.83	Employment history
5.72	Cardiovascular health
4.3	Contact
3.86	Cognitive function
3.72	Musculoskeletal health and physical capability
3.63	Marital history
3.58	Temperament or personality
3.39	Mental health
3.2	Respiratory health
3.16	Wellbeing
3.14	Education
2.36	Puberty or fertility history
2.21	Social support or life events
1.73	Social class
1.24	Household structure
1.07	Hospital admissions
0.51	Mortality
0.48	Nutrition
0.44	Medication
0.44	Other health care
0.14	Blood and urine samples
0.03	DNA samples

There is some commonality between the users of ESDS and those of NSHD SWIFT with socioeconomic factors such as unemployment and health issues and behaviours topping those variables added into baskets.

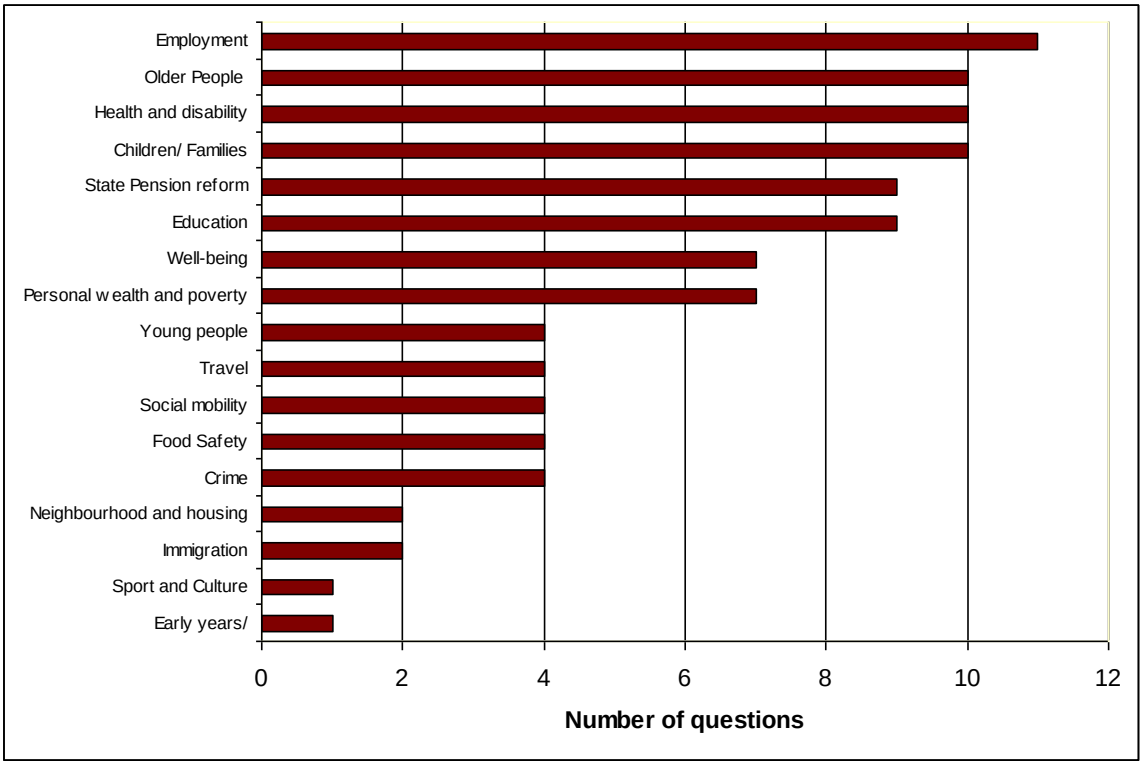
Recommendation 21: Topics to prioritise from existing observed user behaviour include: Health issues and behaviours and socio-economic circumstances such as employment and unemployment:

- These areas should be prioritised for variable harmonisation and resources around them should be highlighted in the USP

5.2.2. Government Policy Needs

A good summary of the disciplinary priorities needed by government and public service providers can be found in the needs expressed by the 'Government Longitudinal Champions Group'. Figure 6 shows the number of questions asked around broad disciplinary topic areas.

Figure 6: Longitudinal Champions priorities – Policy users needs:



The chart indicates that government users' priorities focus on employment issues, older people, health and disability, children and families, with state pension reform and education linked to these categories. Evidence on these priorities also fall within the data collected by the CLOSER studies and the variables should be highlighted to government researchers within the USP.

Recommendation 22: Topics to prioritise from government users' needs are employment issues, older people, health and disability, children and families, with state pension reform and education being linked to these categories:

- These areas are around current government policy initiatives and should be prioritised for variable harmonisation and resources around them should be highlighted in the USP

5.2.3 Publications Analysis

This section looks at the publications that feature the use of data from studies involved with CLOSER. Journals in table 11 were identified using the Centre for Longitudinal Studies online bibliography. This covers three separate cohorts and shows the number of published papers for key journals that use data from at least one of the three CLS cohorts. Table 12 was derived from the MRC Researchfish system and shows the top Journal titles for the MRC funded studies.

There are some commonalities; Nature Genetics, The Journal of Epidemiology and Community Health, The International Journal of Epidemiology, and Archives of Disease in Childhood all include a large number of articles that use data from studies that are part of CLOSER. In engaging with the CLOSER key user groups it is recommended that in addition to the USP pointing to research outputs in these publications and linking them with data sources, that these publications be used to promote the work of CLOSER and highlight the USP.

Recommendation 23: Identify and use key publications to promote the work of CLOSER and highlight the CLOSER USP. These publications could include:

- Nature Genetics,
- The Journal of Epidemiology and Community Health,
- The International Journal of Epidemiology
- Archives of Disease in Childhood

Table 11: journal Titles with over 8 Articles in the CLS bibliography[47]

Title	Number of Articles in CLS Bibliography
British Medical Journal	67
Nature Genetics	67
Journal of Epidemiology and Community Health	51
Archives of Disease in Childhood	30
Social Science and Medicine	28
International Journal of Epidemiology	27
Lancet	26
Diabetes	17
British Journal of Sociology	16
Pediatrics	15
Nature	14
British Journal of Educational Psychology	13
Human Molecular Genetics	13
International Journal of Obesity	13
Journal of Child Psychology and Psychiatry	12
Social Psychiatry and Psychiatric Epidemiology	12
Annals of Human Biology	11
British Journal of Psychiatry	10
Developmental Medicine and Child Neurology	10
Genes & Immunity	10
Longitudinal and Life Course Studies	10
Psychological Medicine	10
Thorax	10
American Journal of Public Health	9
Diabetologia	9
European Journal of Public Health	9
New England Journal of Medicine	9
American Journal of Clinical Nutrition	8
American Journal of Epidemiology	8
Annals of the Rheumatic Diseases	8
Intelligence	8
International Journal of Social Research Methodology	8
Oxford Review of Education	8

[47] The CLS bibliography was analysed in October 2012 and contained 2445 records

Table 12: journal Titles with over 5 mentions for CLOSER Studies in MRC Researchfish 2006-2011

Journal	Number of articles
The Journal of clinical endocrinology and metabolism	22
Pediatrics	21
The American journal of clinical nutrition	19
Archives of disease in childhood	19
Journal of epidemiology and community health	16
International Journal of Epidemiology	16
European journal of clinical nutrition	16
The British journal of nutrition	14
Public health nutrition	13
PloS one	12
The British journal of psychiatry : the journal of mental science	11
Nature genetics	10
Journal of bone and mineral research : the official journal of the American Society for Bone and Mineral Research	9
Journal of child psychology and psychiatry, and allied disciplines	9
Human molecular genetics	8
American journal of epidemiology	8
International journal of pediatric obesity : IJPO : an official journal of the International Association for the Study of Obesity	8
The Journal of allergy and clinical immunology	8
Social science & medicine (1982)	7
Pediatric research	7
International journal of obesity (2005)	6
BMJ (Clinical research ed.)	6
Psychological medicine	6
Hypertension	6
The American journal of psychiatry	6
Diabetologia	6
European journal of epidemiology	6
Journal of the American Academy of Child and Adolescent Psychiatry	6
Paediatric and perinatal epidemiology	6

Table 13 shows the MRC studies publications by subject (Thompson Web of Science Categories) 2006-11[48]. This table breaks down the broad subject categories, such as health, in more detail and could be used to inform the detailed prioritisation work for data harmonisation and linkage. Unfortunately this level of detail is only available for the MRC funded studies. Further work could be carried out to identify subject disciplines for publications that use ESRC funded studies.

In the future it will be important to monitor whether or not CLOSER is meeting the needs of its key user groups. One way to do this will be to monitor the use of data from CLOSER studies in key journals across

[48] Data from the MRC Researchfish system.

disciplines. Table 14 outlines a possible process for doing so. A selection of nine journals across social science, medical and public health topics were chosen from the CLS bibliography and the MRC Researchfish tables, ensuring that a broad range of disciplines was represented. These were then analysed for mention of CLOSER studies. Where possible this was carried out over three full years from start of 2010 to end of 2012. However where the journals had a large volume of articles the period was reduced to one or two years.

Table 14 shows that the number of articles citing or mentioning CLOSER studies was highest in the medical related disciplines and lower in the social sciences. Continued monitoring will help the evaluation of CLOSER and the USP and check whether they are generating more peer reviewed papers in high quality journals. This exercise could also be expanded to include key words from each article to highlight detailed popular research topics.

Recommendation 24: To monitor if CLOSER and the USP are promoting the use of cohort studies in research journal publications should be monitored holistically through a system similar to MRC Researchfish and a selection of key disciplinary journals should be monitored in detail for use of CLOSER resources and popular research topics:

- In the future it will be important to monitor if CLOSER is meeting the needs of its key user groups. One way this can be done is to monitor the use of CLOSER studies in key journals across disciplines

Table 13: MRC studies publications by subject (Web of Science Categories) 2006-11

Subject	Number of publications
Public, Environmental & Occupational Health	99
Nutrition & Dietetics	86
Paediatrics	85
Endocrinology & Metabolism	81
Psychiatry	75
Genetics & Heredity	41
Developmental Psychology	34
Obstetrics & Gynaecology	27
Psychology	25
Geriatrics & Gerontology	21
Peripheral Vascular Disease	19
Biology	18
General & Internal Medicine	16
Clinical Neurology	14
Biochemistry & Molecular Biology	13
Neurosciences	13
Immunology	13
Gerontology	12
Allergy	12
Clinical Psychology	11
Respiratory System	9
Biomedical Social Sciences	9
Cardiac & Cardiovascular Systems	7
Dentistry, Oral Surgery & Medicine	7
Otorhinolaryngology	7
Behavioural Sciences	7
Substance Abuse	7
Psychology, Multidisciplinary	7
Health Care Sciences & Services	6
Reproductive Biology	6
Sport Sciences	6
Anthropology	5
Environmental Sciences	5
Physiology	5

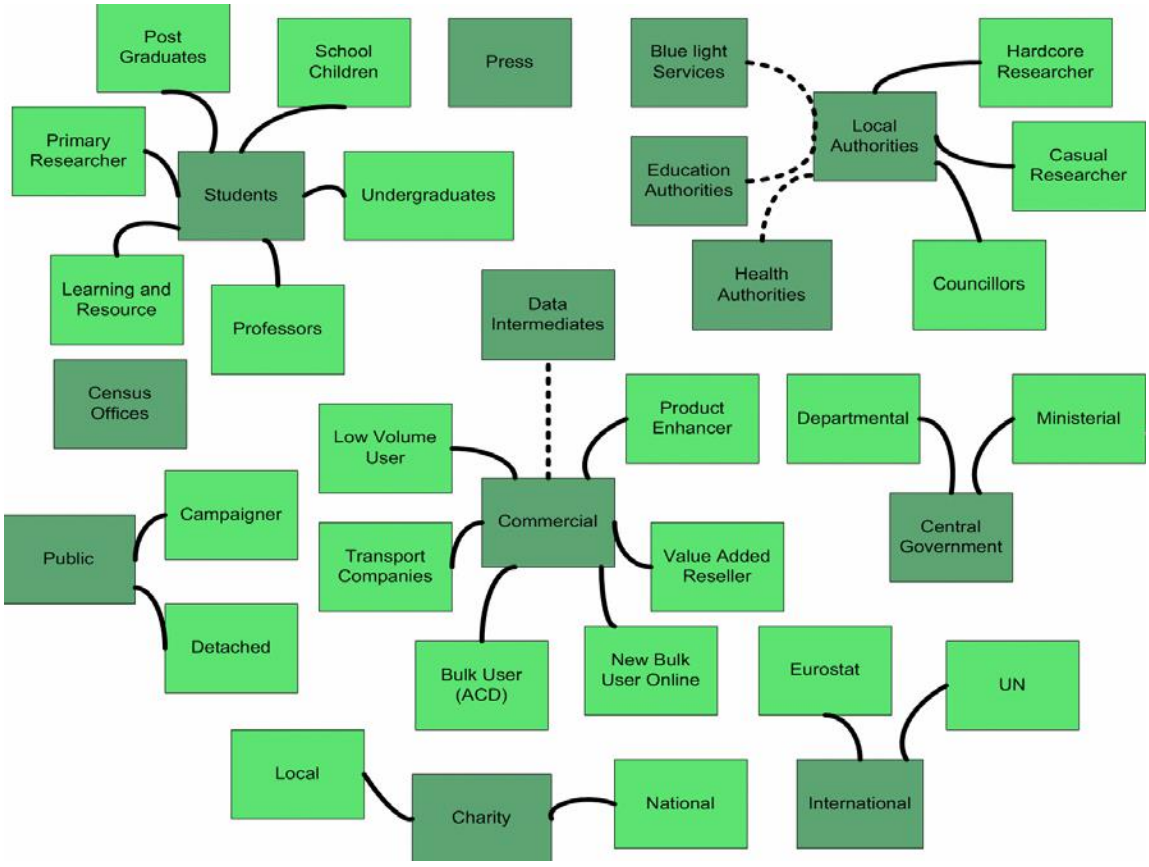
Table 14: Journal articles analysed for references to CLOSER studies. Subject Categories from Thompson Web of Science

Journal	Time Period	Journal Subjects	Journal Impact Factor	No Articles	No CLOSER Articles
International Journal of Epidemiology (2010-2012)	2010-2012	Public Environmental Occupational Health	6.414	643	29
British Journal of Sociology (2010-2012)	2010-2012	Sociology	1.621	110	4
European Sociological Review (2010-2012)	2010-2012	Sociology	1.935	142	3
Oxford Economic Papers (2010-2012)	2010-2012	Economics	1.112	102	2
Nature Genetics (2012)	2012	Genetics Heredity	35.532	284	15
British Journal of Educational Psychology (2010-2012)	2010-2012	Psychology Educational	1.423	114	0
Journal of Child Psychology and Psychiatry (2012)	2012	Psychiatry, Psychology, Psychology Developmental	4.218	143	5
Social Science and Medicine (6 months 2012)	Last 6 months 2012	Public Environmental Occupational Health, Social Sciences Biomedical	2.699	249	4
The American journal of clinical nutrition (6 months 2012)	Last 6 months 2012	Nutrition & Dietetics	6.7	195	1

6. OTHER INITIATIVES - 2011 CENSUS OUTPUTS DISSEMINATION

Potential lessons for the USP can be drawn from related digital information resources, such as the Census Outputs Strategy. A key aim of the latter is the provision of 2011 Census data via systems and services which exploit modern technologies, enabling users to interact flexibly with the data at various levels. It uses the web as the primary dissemination route, meeting the common needs of users and incorporating the facility for users to create their own products. The 2011 Census Outputs Strategy states *"The ultimate benefits of the census are realised when the users of census data make use of the published outputs."*[49] In looking at its dissemination activities the ONS identified the main users of the Census and its outputs; these users are shown in figure 7.

Figure 7: Census User Groupings[50]



The 2011 Census Outputs Strategy states:

"Each user group brings with it a variety of levels of experience in using census data and a similar variety of requirements for access and uses of the data. Delivering systems and service which meet the full requirements of all would not be practical or financially viable. We will therefore seek to deliver a service which meets the common user needs whilst working with partners to extend functionality to meet the specific needs of certain groups."[51]

[49] Office for National Statistics, 2010

[50] Office for National Statistics, 2010

[51] Office for National Statistics, 2010

In delivering this service, ONS is disseminating census outputs using its existing web infrastructure, which provides different interfaces and complexity depending on the end user. ONS is responsible for four websites, each offering a different service:

- The ONS website, which publishes all bulletins, and most of the data, from its releases, as well as offering background information and guidance.
- Neighbourhood Statistics (NeSS), an ONS web service specialising in the dissemination of detailed, small-area data. The NeSS website has an API.
- Nomis, a web service provided by the ONS to give access to detailed UK labour market and other population statistics from official sources. This site is designed to handle complex tables.
- The Publication Hub, owned by the UK Statistics Authority, and operated by ONS on behalf of the National Statistician. It announces and links to statistical releases from across the Government Statistical Service – the statistical units from UK government departments.[52]

CLOSER should follow ONS' example in not trying to create a service for everyone, but should provide services relevant to key audiences in relation to their needs and information literacy. CLOSER should also share information with ONS and aim to learn from their experiences in providing information resources.

[52] Office for National Statistics, 2013

7. USER SCENARIOS

This section provides suggestions for user scenarios to feed into the design of the USP. The user scenarios are developed around members of the key groups, an estimate of their relative proportion, their characteristics and how they may use and find the USP.

Table 15: CLOSER USP User Scenarios

USER GROUP	**RELATIVE PROPORTION**	**CHARACTERISTICS**	**LIKELY USE OF USP**	**ROUTE TO FINDING USP**
Masters student **with specific interest in methodology & longitudinal data analysis**	6%	Relatively little time to complete project from start to finish; little experience of longitudinal analysis; most likely to be using a single study; needs to ensure dissertation is well referenced; relatively unconstrained about precise research hypotheses but has a general area in mind (e.g. Gender and levels of physical activity); may well want to use a specific type of analysis e.g. SEM; unlikely to use USP more than two or three times (unless they progress to doing PhD being a researcher)	Focus will be on choosing a single longitudinal study as the focus for a dissertation, or at most two studies. Will need information on which studies have the most comprehensive/interesting questions on physical activity, and which have repeated measures or particular type of variables that will be amenable to the preferred type of analysis. Will need references to journal articles that report on the properties of any scales included in the study. Will need information on access arrangements to data and is likely to choose to use studies where access is straightforward and as quick as possible.	Tutor/Course Leader, Search Engine, Other Students, Publications

USER GROUP	RELATIVE PROPORTION	CHARACTERISTICS	LIKELY USE OF USP	ROUTE TO FINDING USP
Master's student with substantive interest	6%	Relatively little time to complete project from start to finish; little experience of longitudinal analysis; most likely to be using a single study; needs to ensure dissertation is well referenced; relatively unconstrained about precise research hypotheses but has a general area in mind (e.g. Gender and levels of physical activity); will want to find resources to work on general area, May not have a methodological grounding in using the studies; unlikely to use USP more than two or three times (unless they progress to doing PhD being a researcher)	Focus will be on finding evidence in the general area of hypothesis. Will likely examine questions and variables to find comprehensive/interesting data in their area. May need guidance on how to use the studies and an explanation of methodology. Will need references to journal articles that report on the properties of study variables. Will need information on access arrangements to data and is likely to choose to use studies where access is straightforward and as quick as possible.	Tutor/Course Leader, Search Engine, Other Students, Publications
PhD student	17%	Relatively unconstrained in terms of time available for the entire project. At the start of the project will have a general area in mind, however this will become a specific hypothesis as the research progresses. They may not have a methodological grounding in using the studies, but will be able to learn specific methods in using the data. They will need to ensure that their thesis is well referenced. Likely to use the USP several times in developing their proposal, forming their hypothesis, researching their hypothesis and writing up their work.	Initial focus will be finding evidence and data in the general area of, this will then be narrowed into a specific research question. Will need information on which studies have the most comprehensive/interesting questions related to their area, and which have repeated measures or particular type of variables that will be amenable to the preferred type of analysis. May need guidance on how to use the studies and an explanation of methodology. Will need references to journal articles that report on the properties of any scales included in the study. Will need information on access arrangements to data and will be willing to use data that is not straightforward to access.	Tutor, Search Engine, Other Students, Publications, Training/events

USER GROUP	RELATIVE PROPORTION	CHARACTERISTICS	LIKELY USE OF USP	ROUTE TO FINDING USP
Academic Researcher planning project proposal	22%	May be under time pressure; will have relatively high knowledge of the cohort studies and longitudinal data. Will have a specific research question in mind and will be looking for secondary data that are relevant to the question to be added into the research proposal. Will be looking for cross-cohort and cross-study questions where possible for their area. They will be familiar with longitudinal methodologies and may have some in mind when they are highlighting the variables in their proposal. Likely to use the USP once or twice in creating the proposal.	Initial focus will be finding questions and variables relevant to their research area. They will need information on which variables are repeated across waves and cohorts and if the variables are amenable to different types of analysis. Will need references to journal articles that report on the properties of any scales included in the study. Not so interested in access to data at this stage, just to know what is available and maybe some frequency distributions.	Colleagues and contacts, Search Engine, Publications, Training/events
Academic Researcher conducting research	32%	May be under time pressure; will have relatively high experience of longitudinal analysis and methods; will have identified data sources and variables for research within their proposal; would like to use cross-cohort analyses; needs to ensure outputs are well referenced; will have a precise research hypotheses and may well want to use a specific type of analysis. Likely to be using the USP multiple times throughout each research project.	Focus will be on obtaining and analysing the data that is identified in the proposal. Will need information on access arrangements to data and will be willing to use data that is not straightforward to access. Will need references to journal articles that report on the properties of any scales included in the study.	Colleagues and contacts, Search Engine, Publications, Training/events

USER GROUP	RELATIVE PROPORTION	CHARACTERISTICS	LIKELY USE OF USP	ROUTE TO FINDING USP
Government analyst conducting research	12%	Will most likely be trying to answer a specific question of direct relevance to policy. For example They will have relatively little time to complete research and are likely to be under time and resource constraints. Will need to have good references to form the evidence base for policy. Likely to use the USP two or three times per research project, Likely to have many research projects.	Focus will be on answering a specific policy research question. Will need to search for specific variables around their question and would like these easily accessible. Will most likely want to see change over the longest period of time possible, so will need information on how often variables occur across studies. Will need references to journal articles that report on the properties of any scales included in the study. Will need information on access arrangements to data. May need information on how data is available for government users, as opposed to academic users.	Colleagues and contacts, Search Engine, Publications, Training/events
PI/Survey manager planning data collection	3%	Likely to be planning data collection on a single study; needs to look at range of questions used by other studies to assess their suitability and for prospective harmonisation; doesn't need data from other studies but does need frequency distributions; focussing on a relatively specific topic area e.g. what questions have been used by other longitudinal studies to assess problem levels of alcohol use; likely to regularly use USP understand structure of longitudinal studies and be a relatively expert user.	Focus will be on looking across all of the studies in the USP and may also look outside the portal at other studies (e.g. international). Will need information on which questions have been used most often across several studies. Would hope for background information justifying the choice of specific measures. Will need references to journal articles that report on the properties of any scales included in the study. Not interested in access to data but is interested in frequency distributions.	Colleagues and contacts, Search Engine, Publications,

USER GROUP	RELATIVE PROPORTION	CHARACTERISTICS	LIKELY USE OF USP	ROUTE TO FINDING USP
Funder	2%	Unlikely to be carrying out research using the studies themselves. Likely to be evaluating research proposals, so will be looking at the range of questions used by the studies to assess their proposals and whether they fit with the studies. The funder could also be evaluating the performance of the studies and of CLOSER.	Focus will be on evaluating variables and questions from other studies, so will be looking to the USP and CLOSER studies as best practice and to see if the other studies are compatible. If evaluating CLOSER they may be evaluating work that has been carried out in harmonising variables. Not interested in access to data but may be interested in frequency distributions.	Colleagues and contacts, Search Engine, Publications

8. RECOMMENDATIONS

This section summarises the recommendations for the CLOSER USP that have been made through this document.

Recommendation 1: The Key User Groups for prioritisation in the design of the CLOSER USP should be:

- Higher Education Researchers
- Postgraduate Researchers
- Government Researchers
- Higher Education Teachers
- Post Graduate Students
- Undergraduate Students
- Secondary Education (A Level) Teachers

Recommendation 2: User behaviour findings to be taken account of in the development of the CLOSER USP:

- Take into account the information seeking behaviour of the key user groups in terms of 1. Finding the USP and 2. Using the USP.
- Focus on Informational user behaviour that should lead to transactional information use of CLOSER partner resources.
- Make CLOSER USP information visible to search engines.
- More than satisfice the users – provide comprehensive information in an easily discoverable and usable form requiring minimal time and effort put in.

Recommendation 3: HE Researchers: CLOSER must be aware of and take into account the importance of networks of colleagues in the dissemination and sharing of information amongst HE researchers:

- CLOSER should consider targeting supervisors and mentors of researchers within university departments, who could recommend the USP as a key information resource.
- CLOSER should also target researchers through a presence at key conferences and events.

Recommendation 4: HE Researchers: CLOSER to act as a specialised scholarly service which will decrease researchers' irrelevant search results around study areas:

- Researchers from all disciplines report that general search engines deliver too many irrelevant results. Researchers would like to see specialised scholarly services to help overcome this problem.
- CLOSER can help to meet this need by reducing irrelevant search results for its areas.

Recommendation 5: HE Researchers: CLOSER must be aware of and take into account disciplinary differences when providing information to and reaching its research audience:

- The Interdisciplinary nature of the CLOSER Studies means that the USP needs to ensure that the information generated serves the needs of researchers from varied fields asking varied questions.

Recommendation 6: HE Researchers: CLOSER to target university departments which are strong in the cohort study core areas to increase awareness of the CLOSER USP and other resources:

- CLOSER studies are likely to be very relevant to over 20% of academic professionals and have some relevance to up to 50% of professionals.
- University departments with a strong presence in disciplines related to the studies should be targeted in dissemination activities as potential users of the CLOSER USP.

Recommendation 7: CLOSER USP User interface should be intuitive and CLOSER should consider involving researchers and other key groups in the design process:

- Well designed user interactions are key to reducing the barriers to take-up of new tools, and this should be considered at all stages of development projects.
- Development must include genuine examination of the real workflows, and how they fit with existing and other research activities.
- The most effective tools are not stand-alone services, but instead work in conjunction with other tools to function as a suite of services.

Recommendation 8: HE Researchers: CLOSER to target researchers through a presence in key disciplinary publications:

- Researchers make great efforts to keep abreast of their field, using a variety of tools according to their knowledge and preference.
- Publication alerting services are used and researchers reported routinely scanning journal websites for new material, or subscribing to journal's tables-of-contents emails.
- This may suggest that a route to publicising the CLOSER USP and reaching researchers may be through relevant discipline publications.

Recommendation 9: CLOSER to use open and interoperable file formats for downloads on the CLOSER website and USP:

- Researchers have complained about the over-use of proprietary products in research resources. These products can be ineffective in supporting interoperability and preservation.
- This means that downloads contained on the CLOSER website and USP should try to use open and interoperable file formats where possible, so that users can open and use information effectively.
-

Recommendation 10: Postgraduate Students: CLOSER to use secondary research resources as a 'hook' for postgraduates to find out about primary resources:

- Findings show that postgraduate students are not very comfortable dealing or discovering primary research resources, however they are very comfortable with secondary sources such as journal articles.
- If CLOSER can create links between journal publications and the datasets on which the article is based this would allow users to discover either the dataset or the publication and follow the relationships between the two.

Recommendation 11: CLOSER USP to open metadata to search engines (Google) and allow harvesting by library catalogues and other tools to allow a greater reach of resources:

- Postgraduate students rely mainly on Google results during their information searches.
- CLOSER needs to be indexed by Google as if it is shut off as a stand alone resource it may be missed by postgraduate students and others.

- Open metadata that is shared and easily harvestable by library catalogues and other tools may help ensure a greater reach of CLOSER resources and use of the USP.

Recommendation 12: Postgraduate Students: CLOSER to prioritise dissemination activities to ESRC DTC's which have a high proportion and number of CLOSER relevant subjects on offer.
These include:

- Bloomsbury Consortium DTC,
- Southampton University DTC,
- Essex University DTC
- Birmingham University DTC

Recommendation 13: Government Researchers: CLOSER USP to highlight resources relevant to government policy areas and programmes:

- Government researchers will be under time and resource pressure to deliver their work so the CLOSER USP can assist in meeting the needs of these researchers by highlighting resources relevant to current government policy areas and programmes.

Recommendation 14: Government Researchers: CLOSER to prioritise dissemination activities to government departments with an expressed interest of policy area relevant to the studies and also to engage government users via the UK Data Forum:

- In promoting CLOSER studies and the CLOSER USP it is suggested that CLOSER target government departments and organisations with an expressed interest in policy areas relevant to the studies.
- CLOSER should also consider disseminating via groups such as the UK Data Forum where government and academic researchers and resource providers are represented.

Recommendation 15: Higher Education Teachers: CLOSER to assess HE teaching needs and to investigate providing discipline and topic focused teaching materials:

- There is an identified quantitative skills gap and the current efforts to reduce it provide CLOSER studies a good opportunity to reach students earlier.
- Now is a good time to assess how the needs of teachers and students can be met by the USP and other CLOSER resources.
- CLOSER could provide information resources for teachers and practical materials for students to practice quantitative methods on.
- Quantitative methods are taught most effectively when embedded within the wider undergraduate degree course, so a discipline/topic focus relevant to the course would be more effective than a stand alone methods approach.

Recommendation 16: HE and Secondary Teaching: CLOSER to explore potential partnerships with learned societies and subject associations to prepare and promote teaching resources:

- The Royal Statistical Society has been active in promoting statistical literacy in schools, universities, government, media, business and the wider public.
- The royal Geographical society (with the Institute of British Geographers) is also piloting new work in quantitative geography with schools and postgraduates.

Recommendation 17: HE and Secondary Teaching: CLOSER to acknowledge the characteristics and changing information behaviours of young people when providing teaching and learning resources:

- The information literacy of young people, has not improved with the widening access to technology, the speed of young people's web searching means that little time is spent in evaluating information.
- Young people have a poor understanding of their information needs and thus find it difficult to develop effective search strategies. They exhibit a strong preference for expressing themselves in natural language rather than analysing key words.
- Faced with a long list of search hits, young people find it difficult to assess the relevance of the materials.
- Young people have unsophisticated mental maps of what the internet is, as a result, the search engine, be that Yahoo or Google, becomes the primary brand that they associate with the internet.

Recommendation 18: CLOSER to look for opportunities within the A Level curriculum to provide teachers with resources for quantitative skills lessons:

- CLOSER should focus on providing and highlighting resources for secondary teachers.
- These resources should be relevant to discipline and teaching topic.
- CLOSER should look for opportunities within the A level curriculum to see where resources could be provided to secondary school teachers.

Recommendation 19: Consider CLOSER USP users ICT literacy:

- The requirements and design of the CLOSER USP should take into account the diverse levels of ICT literacy within the key user groups.
- The USP design should be as intuitive as possible, with guides on how to use the resource if possible and small hints within the user interface where there is any complexity.

Recommendation 20: CLOSER to consider adding bibliographic metadata into the USP:

- Having research outputs alongside study metadata may entice new users from the key user groups, broadening the USP audience and highlighting the wealth of research created by the use of the CLOSER studies.

Recommendation 21: Disciplines to prioritise from observed user behaviour include: Health issues and behaviours and socio-economic circumstances such as employment and unemployment:

- These areas should be prioritised for variable harmonisation and resources around them should be highlighted in the USP.

Recommendation 22: Disciplines to prioritise from government users' needs focus on employment issues, older people, health and disability, children and families, with state pension reform and education being linked to these categories:

- These areas are around current government policy initiatives and should be prioritised for variable harmonisation and resources around them should be highlighted in the USP.

Recommendation 23: Identify and use key publications to promote the work of CLOSER and highlight the CLOSER USP. These publications could include:

- Nature Genetics
- The Journal of epidemiology and community health

- The International Journal of Epidemiology
- Archives of Disease in Childhood

Recommendation 24: To monitor if CLOSER and the USP are meeting users needs journal publications should be monitored holistically through a system similar to MRC Researchfish and a selection of key disciplinary journals should be monitored in detail for use of CLOSER resources and popular research topics:

- In the future it will be important to monitor if CLOSER is meeting the needs of its key user groups. One way this can be done is to monitor the use of CLOSER studies in key journals across disciplines.

9. SUGGESTED BENCHMARKS AND METRICS FOR CLOSER PERFORMANCE MEASUREMENT

In the production of this study a trawl of available data around the current use of CLOSER studies was carried out. It was thought to be a useful exercise to capture what information could be available to evaluate how CLOSER is serving the needs of its users during future exercises. These possible benchmarks and metrics are outlined in table 16.

Table 16: Possible data sources for future CLOSER performance measurement

Data/Indicator	Owner	Use
CLOSER website visitors	CLOSER	Measure change in website use
Number of USP Searches	CLOSER	Measure change in USP use
Disciplines/topics of USP searches	CLOSER	Identify high areas of use
Re-directs from USP to Studies	CLOSER	Measure CLOSER signposting
Web analytics, entry point	CLOSER	Identify and measure where users come from
Web analytics, domain of users	CLOSER	Identify and measure types of users based on characteristics captured during simple registration process
Studies' websites visitors	Studies	Measure change in website use
CLOSER Studies Data Downloads	UK Data Service/MRC	Measure change in data use
Use of CLOSER studies in publications	MRC, ESRC, CLS, CLOSER	Measure use of studies (data citations) in published research
Disciplines/topics of CLOSER publications	MRC, ESRC, CLS, CLOSER	Measure disciplines/topics in published research
Mentions of CLOSER disciplines in govt. research/policy	CLOSER	Qualitative measure of impact in government policy

10. APPENDECIES

10.1. Appendix 1 Data Downloads

Data Downloads

The numbers of downloads requested for the MRC funded studies are recorded by the studies themselves and is not requested via the MRC Researchfish evaluation programme. Interviews with staff (at MRC NSHD and ALSPAC) suggest that the numbers of requests as increased significantly over the past five to ten years.

For those studies which have a social science focus and/or which are mainly funded by the ESRC, data is held at ESDS and can be downloaded from this site. The data downloads are monitored by ESDS and numbers of data downloads since the end of 2010 can be seen below:

Figure 8: ESDS Longitudinal Download Statistics December 2010 to Q3 2012

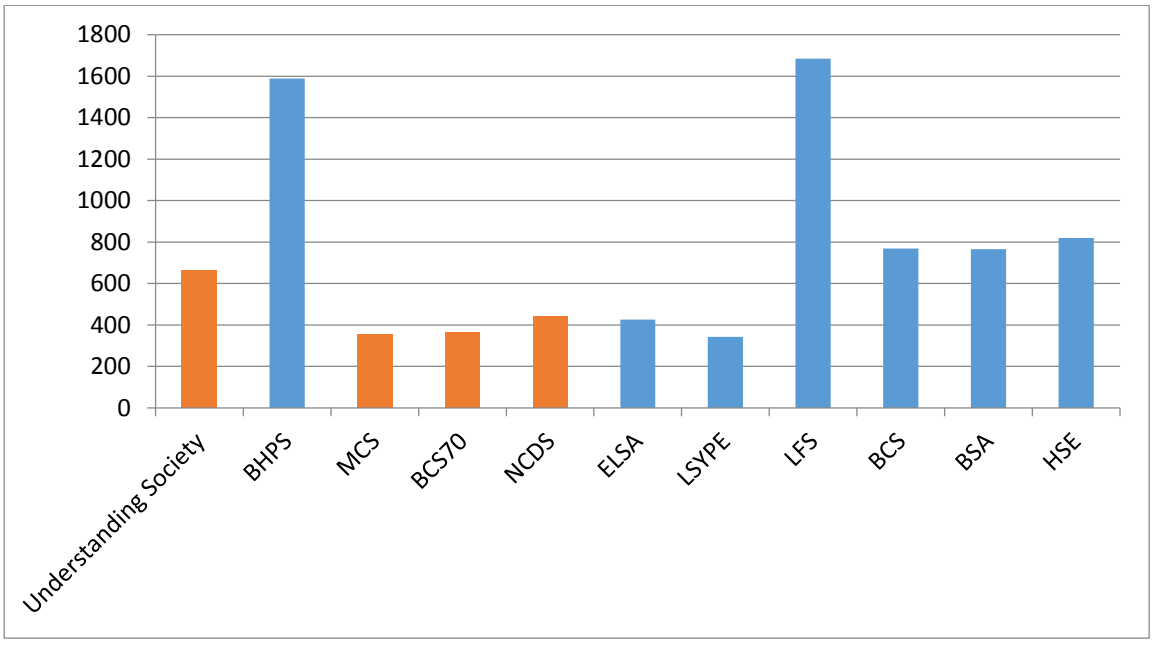
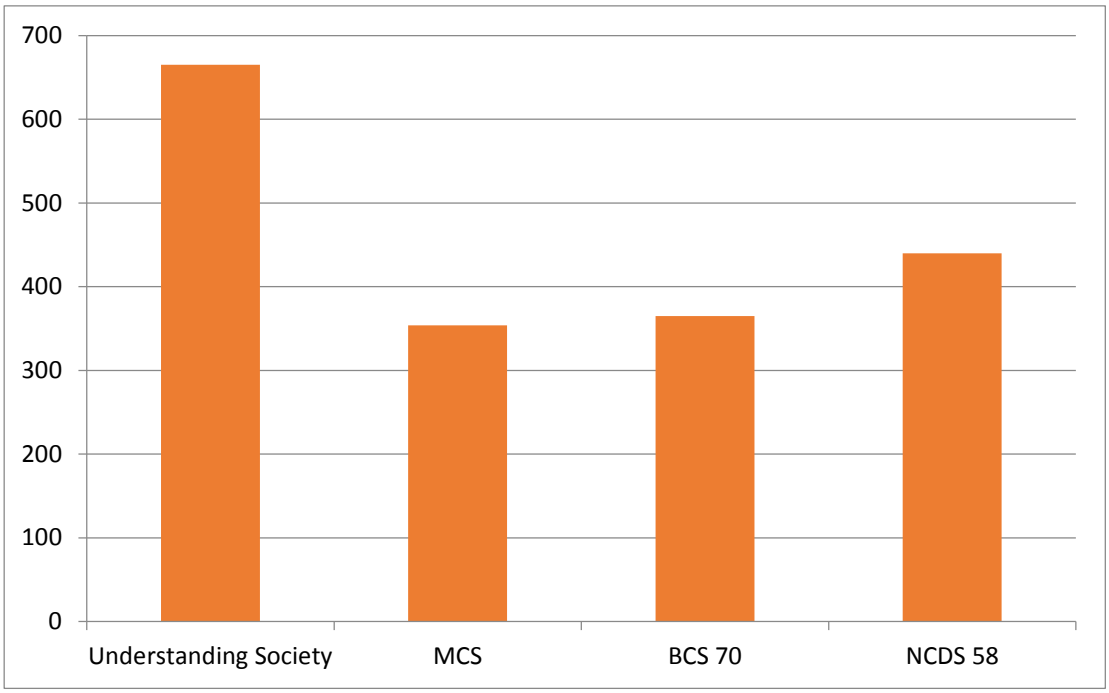


Figure 9: ESDS Longitudinal Download Statistics for CLOSER Studies December 2010 to Q3 2012



10.2. Appendix 2 MRC Data Support Service (MRC DSS)

The MRC Data Support Service project works to facilitate and support data sharing for population and patient studies, in order to optimise the long-term use of rich data assets for new science. MRC Data Support Service project phase 3 ran from August 2011 to July 2012 and the report identifies 7 main user requirements (however in the context of this report it is important to distinguish between requirements and needs):

1. Discovery of population & patient studies and their variables
   - Search and browse across studies, time periods, data collection events, variables
   - Intelligent search
   - Information in directory enables researchers to find suitable variables for their research purposes
   - User-friendly and intuitive
   - Filter results by type, study, subject category, sweep...
   - Results showing overview of structure of metadata (tree), showing where variables fit into study, time period…
   - Explore relations/groups between variables within and across studies and sweeps; relations may be: time period, data collection event, subject category, previous/next variables, cage or standard instrument, age groups…
   - Search in documentation, attachments
   - Standardised subject categories
   - Timeline of collection events across studies
   - Mapping of collection events across studies
   - Order results by relevance

2. Directory content
   - MRC-funded Population and Patient studies (and others)
   - Multiple data types: from surveys, clinics, biomedical, omics, imaging
   - Linked resources

3. Support data access requests
   - Select variables into basket (individual, groups, related variables)
   - Export basket to make data access request to a study
   - Provide information about data access for a study
   - Basket sharing

4. Access control and authorisation to access:
   - Gateway
   - Variable-level metadata

5. Provide support
   - Guidance re. gateway
   - Discussion forums for users
   - Tools & support for ingest of metadata

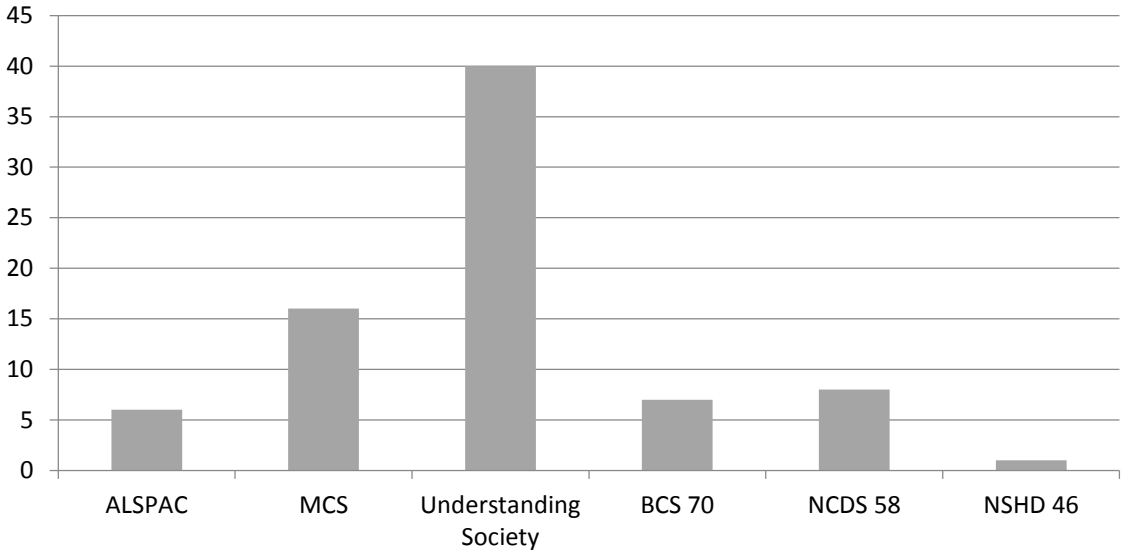
6. Governance
   - Central directory, gateway, tools, guidance (DSS)
   - Individual studies own, hold, curate and provide access to data and metadata
   - Studies publish variable metadata into directory, at regular intervals
   - Studies can edit records for the study and its time periods and collection events

7. Common standards
   - for metadata exchange
   - for concepts, topics, documentation,...

10.3. Appendix 3 Longitudinal Champions Priorities

A summary of Data Priorities for Government Departments which was produced by Dr. Dawn Snape on behalf of the Longitudinal Champions Group. The summary contains information needs from 15 government departments or bodies, has 99 research questions in 15 topic areas.

Figure 10: Mentions of CLOSER studies in the Government Longitudinal Champions Report



11. ACRONYM DEFINITIONS

ALSPAC - Avon Longitudinal Study of Parents and Children
BCS - 1970 Birth Cohort Study
BCS 70 - 1970 Birth Cohort Study
CLOSER – Cohort and Longitudinal Studies Enhancement Resource
CLOSER USP - Cohort and Longitudinal Studies Enhancement Resource Uniform Search Platform
CLS – Centre for Longitudinal Studies
DTC – Doctoral Training Centre
ESDS – Economic and Social Data Service
ESRC – Economic and Social Research Council
HESA – Higher Education Statistics Authority
HCS - The Hertfordshire Cohort Study
IoE – Institute of Education
JISC – Joint Information Systems Committee
MCS - Millennium Cohort Study
MRC – Medical Research Council
MRC DSS – MRC Data Support Service
MRC NSHD - MRC National Survey of Health and Development
NCDS - National Child Development Study
NSHD - National Survey of Health and Development
SWS - Southampton Women's Survey
USP – Uniform Search Platform

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