Development of Subject Gateways: A Status Update

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ABSTRACT

Development of the internet and the world wide web has made impact on the libraries like never before. Ownership of documents has given way to access, forcing a rethinking of the functions and services to be performed by libraries for providing the specific documents/information needed by users from the ocean of digital resources. One such service designed to provide access to evaluated, and selected information resources pertaining to a particular subject field is the subject gateway service. This article traces the development of subject gateways from 1999 till 2013 and critically studies the longest surviving subject gateways. It shows that the most critical feature expected of a subject gateway, i.e., evaluation of resources prior to selection, is missing in majority of the subject gateways.

Keywords: Subject gateway, gateway development, gateway characteristics

1. INTRODUCTION

The networked environment has brought about a change in the concept of the 'collection' of the modern library. Today's libraries are termed 'Libraries without walls', essentially because they serve their users not only with the help of the collection painstakingly built up on their shelves, but also with the help of 'externally located collections', meaning resources held on remote servers and accessed through the internet. Ownership has given way to access, more so in the context of digital resources.

By late twentieth century, the web had been flooded with a plethora of information resources on each and every topic. Serious thought began the world over regarding how to manage the growing web-based resources. Two lines of action emerged in the decade from 1991-2000. The first was the initiation of web preservation projects to preserve the contents of this new, ever-changing medium for historical and scholarly research use. Several web preservation projects began in 1996 with the National Libraries taking the lead. Understanding the Herculean efforts involved in web preservation, several collaborative projects were later initiated.

The second activity undertaken to have bibliographic control over the internet resources was the setting up of subject gateways. This option supported access to remote resources over ownership. Rather than relying upon the unpredictable internet search engines to fetch resources, it was thought fit to provide access to useful resources using quality-controlled databases of resource descriptions.

2. DEFINITIONS

According to Lorcan Dempsey[1], "Subject gateways are internet services which support systematic resource discovery. They provide links to resources (documents, objects, sites or services) predominantly accessible via the internet. The service is based on resource description. Browsing access to the resource via a subject structure is an important feature".

The definition given by the IMesh Toolkit project[2] is, "A subject gateway is a website that provides searchable and browsable access to online resources focused around a specific subject. Subject gateway resource descriptions are usually created manually rather than being generated via an automated process. As the resource entries are generated by hand, they are usually superior to those available from a conventional web search engine." The DESIRE project[3] has defined subject gateways as, "Selective subject gateways on the internet are characterised by their quality control. The core activities of resource selection and description rely on skilled human input (by librarians, academics and experts) and are not activities that lend themselves to automation."

The characteristics of a subject gateway can be summarised as:

(a) An online service that provides links to numerous other sites or documents on the internet

(b) Manual creation/intervention, often by information and/or subject specialists

(c) Selection of resources according to published quality and scope criteria

(d) Intellectually produced content descriptions, ranging in length from short annotation to review

(e) Search and browse access, and

(f) Collection management policy, supported by maintenance and updating procedures.

3. DEVELOPMENT OF SUBJECT GATEWAYS

(a) Follett Report

The most significant step that led to the establishment of subject gateways was the review of libraries and related provision in higher education in UK commissioned in 1992, and the recommendations given in the resulting comprehensive report, popularly known as the Follett Report[4]. The Review Group was chaired by Prof Sir Brian Follett. Its membership included nominees of the four funding bodies, and other representatives from the higher education and related sectors. The Review group met at regular intervals and its report, consisting of eight comprehensive chapters, was brought out in December 1993. It led to several initiatives for increasing the effectiveness of libraries, especially through the application of IT for network access, navigation tools, electronic document storage and delivery, etc.

(b) DESIRE (Development of a European Service for Information on Research and Education) Project

It was a collaborative project among ten institutions from four European countries–the Netherlands, Norway, Sweden, and UK. It was funded by the European Union. The aim was to promote the use of the web within the European Research Community. The DESIRE project ran from 1996-2000 as DESIRE I and II. Phase 2 finished at the end of June 2000. To support the DESIRE vision of a network of European cross-searchable information gateways, UKOLN produced the DESIRE Information Gateways Handbook5. It offered a step by step guide and points to tools, examples and documentation which can support the process of setting up a gateway.

(c) Electronic Libraries Programme (eLib)

This was an initiative of the Joint Information Systems Committee (JISC) of UK. The gateways established under eLib were SOSIG (Social Science Information Gateway, which slightly predated eLib, and acted as a model for other gateways), ADAM (Art, Design, Architecture and Media), EEVL (Edinburgh Engineering Virtual Library), OMNI (Organising Medical Networked Information) and BizEd (Business Education).

(d) Resource Discovery Network (RDN)

This new service was started in 1999 under funding from JISC to maintain these gateways on a long-term basis and to co-ordinate their activities. RDN comprised eight gateways set up between 1999 and 2003 out of which five were new: Altis (Hospitality, Leisure, Sport and Tourism), Artifact (Arts and Creative Industries), GEsource (Geography and Environment), Humbul (Humanities) and PSIgate (Physical Sciences). Three converted from existing eLib gateways – ADAM, BizEd and BIOME, which was formed out of OMNI, EEVL, and SOSIG.

(e) ROADS (Resource Organisation and Discovery in Subject-based Services)

An impetus to the development of subject gateways was provided by the JISC funded collaborative project, 'ROADS'. The purpose of ROADS was to produce a software package for setting up subject gateways, to investigate methods of cross-searching and interoperability, development of standards for the indexing, cataloguing and searching of resources. The resulting ROADS toolkit, a freely available system of software and standards was used for building several eLib gateways.

4. PURPOSE OF THE STUDY

Setting up and sustenance of a subject gateway is a complex task involving a lot of critical issues. In order to provide a reliable, responsive, efficient and scalable subject gateway service, enablers such as network connectivity, hardware configuration, operating system software, subject gateway database and associated software, web server software are necessary. Some issues arise out of the fact that human intervention is involved in the selection, evaluation and description of resources. Development of scope policy and selection criteria, hiring and training of staff and catalogue development are some strategic issues. Since a subject gateway represents web-resources that are dynamic in nature, it itself also has to be dynamic. New resources might be added and existing ones removed. The contents might undergo changes and the resources might move to new locations (URL). This necessitates maintenance of the resource catalogue (collection management) involving validation of records, link checking and updation of resource descriptions. If the gateway service is to be run smoothly, technical maintenance of the server is also necessary.

It was thought necessary to investigate how subject gateways, the new service that was set into motion in 1999 has developed over the years. How many and which subject gateways were added, how long have they been sustained, who has been active in this area, what is the nature of the currently existing services are some of the issues which need to be studied.
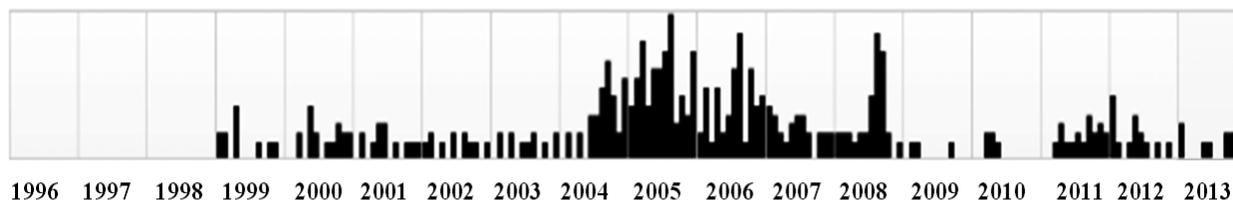
5. RESEARCH METHODOLOGY

To find out how many and which subject gateways were set up over the years, it was decided to use 'Pinakes: A Subject Launchpad' website5. This has

been created in order to provide access to major, high-quality subject gateways on a wide range of academic subjects and is hosted by the Heriot-Watt University, Edinburgh, Scotland. The list of Subject gateways displayed on the site is updated regularly, with new ones added and extinct ones removed. Each subject gateway is represented by its name and a graphic image. Links are provided to the subject gateways. Subject gateways are grouped in two groups, one consisting of gateways devoted to specific subjects/areas and the other consisting of gateways covering all subjects (multi-subject gateways).

Since the Pinakes webpage reflect only the current gateways, the archived versions at the Wayback Machine[6] were used for obtaining information about the subject gateways listed from time to time by Pinakes. The Wayback Machine is an interface offered by internet archive[7] , a non-profit organisation set up in 1996 with the purpose of providing permanent access to historical collections that exist in digital format.

Table 1. Sample captures

Sample capture number	Capture date
1.	17 Jan 1999 (First capture at Pinakes)
2.	04 Nov 1999
3.	10 Nov 2000
4.	06 Nov 2001
5.	03 Dec 2002
6.	03 Dec 2003
7.	04 Dec 2004
8.	05 Dec 2005
9.	06 Dec 2006
10.	07 Dec 2007
11.	03 Dec 2008
12.	10 Mar 2009
13.	15 Mar 2010
14.	09 Mar 2011
15.	22 Apr 2012
16.	22 Oct 2013 (Last capture at Pinakes)

Figure 1. Screen dump of Pinakes captures on wayback machine.

The interface is available for the public to access archived versions. It provides access to individual website snapshots or captures (i.e. the state of the website at that moment) and also allows them to be browsed within their historical context.

5.1 Data Selection

A search for Pinakes on the Wayback Machine revealed that 444 snapshots or captures existed over a fourteen year period, ranging from the first capture on 17 January 1999 and the last capture taken on 22 Oct 2013. This is seen in Figure 1, which is a screen dump of the timeline showing the dates on which snapshots of Pinakes were taken. Sixteen captures were selected for study, one for each of the fourteen years, and the first capture available at Pinakes (Table 1). The second sample capture was taken from the end of 1999 (04 Nov 1999), the year when subject gateway service was initiated to see how it developed over the year. After that, captures taken on the nearest date during the following years were selected as samples (e.g. 10 Nov 2000 was selected as third instance). Since the capture on 17 Sep 2009, the next nearest date gave a 'not found on the server' error message, and there were no more captures during the year, the last capture before 17 Sep, i.e., 10 Mar 2009 was

taken as the twelfth instance. Thereafter, captures nearest to this date in the subsequent years were taken as instances. For the year 2013, the last capture taken on 22 Oct 2013 was taken, since this gave the latest picture.

6. DATA ANALYSIS AND OBSERVATIONS

6.1 Number of Gateways

It was found that there was a mention of 77 gateways over the 14 year period. However, 14 of them underwent a name change or were merged to form new entities (with a change in the source and URL in most cases). One gateway underwent name change twice (OMNI became BIOME in 2000 and Intute in 2006). It was observed that 63 unique subject gateways were created.

The total number of multi-subject gateways listed was 16. However, since two of them underwent name change, 14 unique multi-subject gateways were identified. Table 2 lists out the subject gateways and multi-subject gateways identified from sample captures from Pinakes.

In Table 2, 'Y' indicates presence of a subject/ multi subject gateway at a particular sample capture, 'N' indicates its absence. Years of first and last occurrence are according to observations of the sample captures, and might not be the actual years.

Table 2. Subject gateways & multi-subject gateways from 1999-2013

S. No.	Name of gateway	Gateway present on 17 Jan 1999	Gateway present on 22 Oct 2013	Year of first occurrence	Year of last occurrence
Subject gateways					
1.	AccessToLaw	N	N	2005	2011
2.	ADAM	Y	N	1999*	2006
3.	ADS (Archeology Data Service) http://archaeologydataservice.ac.uk/	N	Y	2012	2013+
4.	aecportico (renamed NBS) http://www.thenbs.com/resources/index.asp	N	Y	2005	2013+
5.	Aerospace Resources on the Internet (renamed AERADE) http:/aerade.cranfield.ac.uk	N	Y	1999*	2013+
6.	AGRIGATE	N	N	1999*	2007
7.	AHDS	Y	N	1999	2011
8.	ALTIS (renamed Intute)	N	N	2002	2011
9.	Artifact (renamed Intute)	N	N	2003	2011
10.	BioethicsWeb	N	N	2005	2005
11.	Biogate	N	N	2002	2007
12.	Biz/ed http:/www.bized.ac.uk	Y	Y	1999	2013+
13.	BUBL	Y	N	1999	2011#
14.	CAIN	Y	N	1999	2005
15.	Careers Guide http://www.careers-guide.com	N	Y	2012	2013+
16.	ChemDex http://www.chemdex.org/	Y	Y	1999	2013+
17.	Education & Training, UK http:/www.educationandtraining.org.uk	N	Y	2012	2013+
18.	EdWeb	Y	N	1999	2008
19.	EELS	Y	N	1999	2001
20.	EEVL (renamed Intute)	Y	N	1999	2011
21.	ELDIS http:/nt1.ids.ac.uk/eldis	Y	Y	1999	2013+
22.	FMO (Forced Migration Online) http://www.forcedmigration.org	N	Y	2006	2013+
23.	GEM -Gateway to Educational Materials (renamed The Gateway to 21st Century Skills) http:/thegateway.org	Y	Y	1999	2013+
24.	Geo-Information Gateway	Y	N	1999	2007
25.	Gesource (renamed Intute)	N	N	2003	2011
26.	Go-Geo! http://www.gogeo.ac.uk	N	Y	2005	2013+
27.	HDS (History Data Service) http:/hds.essex.ac.uk/history	N	Y	2012	2013+
28.	History http://www.ihrinfo.ac.uk	Y	Y	1999	2013+
29.	Human Languages Page (renamed iLoveLanguages) http://www.ilovelanguages.com	Y	Y	1999	2013+
30.	HUMBUL (renamed Intute)	Y	N	1999	2011
31.	InfoLaw http://www.infolaw.co.uk	Y	Y	1999	2013+
32.	Internet Directory for Botany	Y	N	1999	2011
33.	Law and Legal http://www.lawandlegal.co.uk	N	Y	2013	2013+
34.	LAWLINKS	N	N	2001	2012
35.	Links for Chemists http://www.liv.ac.uk/Chemistry/Links/link.html	N	Y	2000	2013+
36.	MCS http://www.aber.ac.uk/~dgc/gate.html	N	Y	1999*	2013+
37.	MedHist http:/medhist.ac.uk	N	N	2003	2013+
38.	Moving Images Gateway http://www.bufvc.ac.uk/gateway	N	Y	2006	2013+
39.	Music (BUBL Link)	Y	N	1999	2011#
40.	NetEc	Y	N	1999	2004

41. NOVAGate	Y	N	1999	2004
42. OMNI (renamed BIOME, later changed to Intute)	Y	N	1999	2011
43. Oxford Text Archive http://ota.ox.ac.uk/	N	Y	2012	2013+
44. PADI http://nla.gov.au	N	Y	2001	2013+
45. Philosophy Around The Web http://users.ox.ac.uk/~worc0337/phil_index.html	Y	Y	1999	2013+
46. Philosophy in Cyberspace	Y	N	1999	2005
47. PhysicsWeb Resources (renamed Physicsworld.com) http:/physicsworld.com	N	Y	2001	2013+
48. PICK	Y	N	1999	2001
49. Port	N	N	1999*	2006
50. Portal to Legal Resources in the UK and Ireland http:/www.venables.co.uk	N	Y	2000	2013+
51. psci-com	N	N	1999*	2005
52. PSIgate (renamed: Intute)	N	N	2002	2011
53. Psych Web http:/www.psywww.com	Y	Y	1999	2013+
54. Reproductive Health Gateway http:/www.rhgateway.org	N	Y	2005	2013+
55. RUDI http:/rudi.herts.ac.uk	Y	Y	1999	2013+
56. Sapling http://www.sapling.info	N	Y	2002	2013+
57. SciCentral http:/www.scicentral.com/index.html	Y	Y	1999	2013+
58. SOSIG (renamed)	Y	N	1999	2011
59. TechXtra http:/www.techxtra.ac.uk	N	Y	2006	2013+
60. The Math Forum http:/forum.swarthmore.edu/library	Y	Y	1999	2013+
61. TIPTOP	Y	N	1999	2000
62. VADS (Visual Arts Data Service) http://www.vads.ac.uk/index.php	N	Y	2012	2013+
63. World Wide Arts Resources http:/wwar.com	Y	Y	1999	2013+
Multi-Subject Gateways				
1. Librarians' Internet Index (renamed ipl2 -Internet Public Library) http:/www.ipl.org	N	Y	2007	2013+
2. NISS Directory of Networked Resources	Y	N	1999	2002
3. Renardus	N	N	2002	2006
4. MetaMatters (Australia-based gateways)	N	N	1999*	2004
5. RDN (Resource Discovery Network)	N	N	2000	2005
6. Intute: all subjects	N	Y	2006	2011#
7. DutchESS	N	N	1999*	2007
8. DMOZ: The Open Directory Project http:/dmoz.org	N	Y	2002	2013+
9. About.com Education http:/home.about.com/education/index.htm	N	Y	2000	2013+
10. Academic Info http:/www.academicinfo.net/index.html	N	Y	1999*	2013+
11. BUBL Link	Y	N	1999	2011#
12. INFOMINE http:/infomine.ucr.edu/Main.html	N	Y	1999*	2013+
13. Scout Report Signpost (renamed Scout Report Archives) https://scout.wisc.edu/archives/	N	Y	1999*	2013+
14. WWW Virtual Library http://vlib.org/	Y	Y	1999	2013+

Note: In the 'Year of last occurrence' column, * indicates that the gateway was not present at first capture, but appeared in second capture in the year 1999; + indicates that the subject gateway is currently existing; # indicates that though the gateway was listed on Pinakes web site at the last capture, it has been closed down since 2011 and no longer updated

Total 31 subject gateways were found existing on 17 Jan 1999 (first capture). The second sample capture was taken for 04 Nov 1999, which showed the addition of 6 new subject gateways. Thus, thirty 36 gateways were identified in 1999. The year 1999 was a watershed year as far as setting up of subject gateways is concerned, with the impetus provided by the Electronic Libraries Programme (eLib). The five gateways established under eLib (SOSIG, ADAM, EEVL, OMNI, and BizEd) were available at the first capture (17 January 1999).

Resource Discovery Network (RDN), which was formed in 1999 with a few elib gateways and a few new ones was renamed 'Intute' in July 2006 and the 8 subject gateways under it were re-organised under four major subject groups: Intute: Arts and Humanities (Artifact and Humbul), Intute: Science, Engineering, Technology (EEVL, GEsource and PSIgate), Intute: Health and Life Sciences (BIOME), Intute: Social Sciences (Altis and SOSIG). Intute was discontinued in 2011 (the service is to be made available till 2013 without any updations[9]).

There was a spurt of activity in 2005, with the addition of 5 new subject gateways. The years 2007-2011 show no additions. Sudden activity was again seen in 2012, when 6 new subject gateways began. Out of the 63 unique subject gateways, 55 (nearly 87 %) were seen in the captures between 1999-2006. Though 36 subject gateways are listed on the Pinakes webpage at the last capture (22 October 2013), BUBL and Music (BUBL link) were closed down in 2011, and the sites are no longer updated since then as per the remark at the websites (http:/bubl.ac.uk and http:/link.bubl.ac.uk/music respectively). Hence 34 subject gateways exist currently (as marked with '+' in Table 2).

Out of the 14 unique multi-subject gateways, 3 existed at the first capture (17 Jan 1999). Another 5 were added in 1999 and were seen in the second sample capture (04 Nov 1999). The last multi-subject gateway was added in 2007. Though Intute: all subjects and BUBL: all subjects is represented on the webpage, they were closed down in 2011, and the sites are no longer updated as per information at the websites (http://www.intute.ac.uk/ and http:/bubl.ac.uk/link respectively). Therefore, 7 multi-subject gateways exist currently (as marked with '+' in Table 2).

Thus, maximum number of subject and multi-subject gateways were represented in the 1999 captures, which covered the gateways set up after 1995 as a result of the elib programme. The sudden activity in 2005 and 2012 cannot be explained, since there is no mention in literature of any new programme/project like elib taken up to establish subject gateways. The originating institutions are diverse and have set up the gateways independently. For example, out of the new subject gateways started

in 2012, Education & Training UK is an organisational service, VADS (Visual Arts Data Service) has been created by the University for the Creative Arts, UK while Oxford Text Archive is the product of Oxford university computing services.

6.2 Year of Formation

Table 3 shows the distribution of newly formed subject gateways and multi-subject gateways as found in sample captures of years ranging from 1999 to 2013.

36 out of the 63 subject gateways and 8 out of the 14 multi-subject gateways were seen in the captures taken in 1999. They may have been set up earlier, e.g., the elib gateways such as BIZED and SOSIG were set up in early 1996 while ADAM and OMNI were started in 1997[10].

Table 3. Formation of subject/multi-subject Gateways

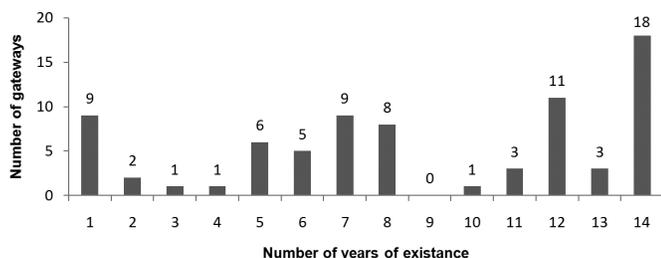| Year	Subject gateways	Multi-subject gateways	Total
1999	36	8	44
2000	2	2	4
2001	3	0	3
2002	4	2	6
2003	3	0	3
2004	0	0	0
2005	5	0	5
2006	3	1	4
2007	0	1	1
2008	0	0	0
2009	0	0	0
2010	0	0	0
2011	0	0	0
2012	6	0	6
2013	1	0	1
Total	63	14	77

Thus, 44 gateways out of a total 77 (57 %) were visible in the first capture year. The analysis shows that 69 out of the 77 gateways (nearly 90 %) have been set up prior to 2007, with several gateways (9) coming up during 2005-2006. The period during 2008-2011 has been a lean period. Six new subject gateways have been added in 2012.

6.3 Duration of Existence

An examination of the duration for which gateways have persisted showed that 14 subject gateways have existed for the longest period of 14 years, till the last capture available for 22 Oct 2013 (Table 4 and Figure 2). Ten existed for 12 years. The shortest period of existence of approximately one year was shown by 9 subject gateways. Four of the multi-subject gateways have existed for 14 years. Three existed for 6 years. In all, 53 gateways (nearly 69 %) persisted for more than 6 years.

Table 4. Duration of existence of subject-multi-subject gateways

Approximate number of years of existence	Number of subject gateways	Number of multi-subject gateways	Total
1	9	0	9
2	2	0	2
3	0	1	1
4	0	1	1
5	3	3	6
6	4	1	5
7	9	0	9
8	7	1	8
9	0	0	0
10	1	0	1
11	2	1	3
12	10	1	11
13	2	1	3
14	14	4	18
Total	63	14	77

Figure 2. Duration of existence

Table 5. Origin of gateways

Place of origin	Subject gateways	Multi-subject gateways	Total
UK	49	4	53
USA	7	6	13
Australia	4	1	5
Sweden	2	0	2
Netherlands	0	1	1
Switzerland	0	1	1
Europe	0	1	1
Finland	1	0	1
Total	63	14	77

Table 6. Creator/originator of subject/multi-subject gateways

Creator/Originator	Subject gateways	Multi-subject gateways	Total
Universities and other academic institutions	41	4	45
Private/commercial institutions	8	3	11
Individuals	5	0	5
Institutes/organisations	4	0	4
Government	1	2	3
Academic consortia	0	3	3
Association	2	0	2
Society	1	0	1
Council	1	0	1
Confederation	0	1	1
Cooperation	0	1	1
TOTAL	**63**	**14**	**77**

6.4 Place of Origin

The data shows that out of 63 unique subject gateways, the majority, i.e., 49 originated in UK, 7 in USA, 4 in Australia, 2 in Sweden and 1 in Finland. Out of the 14 unique multi-subject gateways, maximum i.e. 6 originated in USA, 4 in UK, and 1 each in Australia, Netherlands, Switzerland and Europe (Table 5). Thus, a maximum of 53 out of total 77 subject and multi-subject gateways (69 %) originated in UK, the country that had taken the lead in creating this new service through various programmes such as eLib and RDN. Most of the new gateways created in the past couple of years have also originated in UK. Thirteen gateways have been set up in USA and 5 in Australia.

6.5 Type of Creator/Originator

As depicted in Table 6, majority of the subject gateways (41) and multi-subject gateways (4) had been set up by universities or other academic institutions (in all 45 or 58 %). This was followed 6 subject gateways and 3 multi-subject gateways set up by private/commercial bodies (in all 11 or 14 %). It is seen that several multi-subject gateways are a result of cooperation among various institutions in the form of consortia, confederations, etc.

6.6 Longest Surviving Gateways

The investigation showed that out of the 63 unique subject gateways, 13 were present at both, the first and last capture. A 14th gateway, AERADE (earlier aerospace resources on the internet), though not present at the first capture of 17 Jan 1999, was seen in the 04 Nov 1999 capture. Since it was found existing till the last capture, it is included in the list of subject gateways that have survived for the longest period (marked with ^). One multi-subject gateway was found existing at both, the first and last capture. Three more, though not present at the first capture, were seen at the second sample capture. They existed at the last capture, and are hence included in the list of longest surviving gateways (marked with ^ in Table 7). In all, 18 gateways were found existing for the longest period of fourteen years as given in Table 7 (multi-subject gateways are at serial numbers 15 to 18).

Table 7. Longest surviving gateways

S. No.	Subject/multi-subject gateway	Subject area	URL	Originator	Place of origin
1.	AERADE^	Aerospace	http:/aerade.cranfield.ac.uk	University	Australia
2.	Biz/ed	Business & Economics	http://www.bized.co.uk	Private institution	UK
3.	ChemDex	Chemistry	http://www.chemdex.org/	University	UK
4.	ELDIS	Development & Environment	http:/nt1.ids.ac.uk/eldis	University	UK
5.	GEM: The Gateway to 21st Century Skills	Educational resources	http://www.thegateway.org	Association	USA
6.	History	Historical studies	http://www.ihrinfo.ac.uk	University	UK
7.	iLoveLanguages	Language-learning & linguistics	http://www.ilovelanguages.com	Individual	USA
8.	InfoLaw	Law	http://www.infolaw.co.uk	Private institution	UK
9.	Philosophy Around The Web	Philosophy studies	http:/users.ox.ac.uk/~worc0337/phil_index.html	Individual	UK
10.	Psych Web	Psychology	http://www.psywww.com	Individual	USA
11.	RUDI	Urban design	http:/rudi.net	Private institution	UK
12.	SciCentral	Science	http://www.scicentral.com/index.html	Individual	USA
13.	The Math Forum	Mathematics	http:/forum.swarthmore.edu/library	University	USA
14.	World Wide Arts Resources	the Arts	http://wwar.com	Private institution	USA
15.	WWW Virtual Library	All Subjects	http://vlib.org/	Confedera-tion	Switzer-land
16.	Scout Report Archives^	All Subjects	https://scout.wisc.edu/archives/	University	USA
17.	INFOMINE^	All Subjects	http:/infomine.ucr.edu/Main.html	University	USA
18.	Academic Info^	All Subjects	http://www.academicinfo.net/index.html	Private institution	USA

^ subject gateway survived for the longest-period

Seven of these longest surviving gateways have been set up by universities. Five have been set up by private institutions, one each by a confederation and association. Surprisingly, 4 have been set up by individuals.

6.7 Nature of Surviving Gateways

To know how far the nature of these longest surviving gateways is in tune with the characteristics of subject gateways, the information given under 'purpose'/'about us'/'mission statement' at their websites was studied. The observations are given below:

(i) Type of Resources

Online service providing links to numerous other sites or documents on the internet. The types of resources that the gateways provide an access to are wide ranging. They include digital resources (e-books, journals, articles), databases, glossaries, directories, simulations, worksheets, spreadsheets, news, job opportunities, forthcoming conferences, discussion lists, bulletin boards, mailing lists, online library card catalogs, online degrees, courses and distance learning information, language lessons and schools, translation dictionaries and services, software, best practices.

(ii) Evaluation and Selection Process

It is noticed that only 6 subject/multi-subject gateways are undertaking actual evaluation and selection of web-based resources by experts before providing links to them. The gateways are: AERADE, ELDIS, iLoveLanguages, RUDI, SciCentral and Scout Report Archives. Most of the time the resources are reviewed by panels of editors/advisors based on some criteria. The Math Forum has collaborators such as teachers and parents, while www virtual library has expert volunteers doing the job of selecting the links (there is no mention of evaluation of resources in both of these gateways).

(iii) Availability and Scope

All the gateways give the subject scope of their collections, though not in the form of a formal scope policy. Though the gateways that engage experts for evaluation must be following some selection policy, Only one, i.e., SciCentral explicitly lists out the seven criteria used, namely, (a) reliability, (b) timeliness of the information, (c) extent of daily coverage, (d) multidisciplinary coverage, (e) leads to follow up information, (f) presentation, and (g) general appeal.

(iv) Information About the Resources Covered

Out of the 18 gateways, only AERADE and ELDIS provide abstracts/summaries of resources.

(v) Search and Browse Access

All the gateways provide structured access to the resources indexed by them. They can be browsed using directory or tags, or headings and sub-headings. Most of the gateways (except InfoLaw, Philosophy Around The web, Psych web and SciCentral) provide a site search interface. Some gateways have also restricted access through username and password.

(vi) Collection Management Policy

Since these 18 gateways have been existing for nearly 14 years (1999 till date), it is clear that they employ sound collection management policy and carry out maintenance of resource catalogue, links, etc. SciCentral clearly mentions its methodology: "All resources will be reviewed monthly and the rankings adjusted accordingly. We will also continuously assess new sources for possible inclusion to SciCentral. In order for this service to remain effective for users, we will limit the number of resources indexed under any section to a maximum of 5. This means that some sources may disappear from the site as new ones, deemed more extensive, take their place. This is to ensure that SciCentral users will not have to plough through dozens of links and will always have a quick, central access to the 'best in class' resources in any category".

7. CONCLUSIONS

The study has brought out that several subject gateways were taken up as projects and were shut down as the project ended. Often, the funding bodies changed, leading to a name change or merging of gateways to form new entities accompanied by change in site URL. Sixty three (63) unique subject gateways and 14 unique multi-subject gateways were created over the 14 year period between 1999 and 2013, the peak period being between 1999 and 2006 (almost 90 % gateways set up). After a lean period during 2008-2011, 6 new subject gateways have been added in 2012 and one in 2013.

After the discontinuation of several subject and multi-subject gateways and addition of new ones over the years, 34 subject gateways and 7 multi-subject gateways exist currently. The shortest period of existence of approximately one year was shown by 9 subject gateways. The longest period of existence of 14 years was exhibited by 14 subject gateways and four multi-subject gateways. In all, 53 gateways (nearly 69 %) persisted for more than 6 years.

Fifty three 53 (69 %) out of total 77 gateways originated in the UK with active participation of the universities, followed by USA and Australia with 13 and 5 gateways respectively. Most of the new gateways created in the past couple of years have also originated in the UK, thus showing its continued dominance. Majority of the gateways were set up by universities/other academic institutions (58 %), followed by private/commercial bodies (14 %).

Juxtaposing the characteristics expected of subject gateways with the observations made from study of the longest surviving gateways, it is found that they adhere to some of the characteristics. However, the most critical aspect, i.e., evaluation of resources prior to selection that distinguishes subject gateways from automated, search engine type services is missing in several of them (only about 33 % undertake evaluation). Though this involves painstaking and time consuming analysis by trained manpower with subject expertise, the value-addition for information seekers is unparalleled and worth the efforts.

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