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Author(s)	*Janet Vaux, Nigel Gilbert, Peter Morris, Tomàs Baiget*
EC Project Officer	*Antonios Vorloou*
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Abstract (for dissemination)	The initial aim of this report was to provide an approach to categorising web intermediaries that would both be relevant to current socio-economic debates and be amenable to automatic recognition by a software agent.
	We have approached this, first, through a taxonomy of taxonomies, asking what questions are supported through different approaches to classification. This includes: market-function typologies and business-model typologies that view the web primarily as a market place; search-task typologies that view the web primarily as a navigation space; and hybrid typologies that deal with the business of search tools. We propose a typology of 'transit sites' to combine navigational and market-based categories.
	The above approaches to the categorisation of web intermediaries help define a range of socio-economic questions, but may not easily be made recognisable to a software agent. Nonetheless a limited number of features (such as size and complexity of sites, numbers of links in and out) may enable the computer-assisted investigation of trends in the development of web intermediaries, such as a tendency to convergence in 'portalisation'.

EICSTES DELIVERABLE D6.1

Intermediaries' functions, operations and types – a taxonomy

Janet Vaux, Nigel Gilbert and Peter Morris
University of Surrey

Tomàs Baiget
Institut d'Estadística de Catalunya

First deliverable of Workpackage 6, EICSTES Project

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Janet Vaux, Nigel Gilbert and Peter Morris
University of Surrey
Tomàs Baiget,
Institut d'Estadística de Catalunya, Barcelona, Spain

1.0 Introduction

This is the first deliverable under Workpackage 6 (Intermediaries Role) of the EICSTES project. The aims of this workpackage are to document the development of Internet intermediaries, looking at the growth of different types of intermediaries, the ways in which users interact with them, and their economic impact.[1] The current deliverable is intended to develop a typology of intermediaries, to lay the groundwork for the automatic collection of data about the use of different types of intermediaries. The aims of this deliverable, therefore, are largely conceptual and involve two sorts of broad constraints. On the one hand, it should offer a typology of intermediaries that is relevant to current socio-economic debate: for example, claims for a New Economy. On the other hand, the typology should be recognisable to a software agent and relate to indicators and metrics being developed elsewhere in the EICSTES project.

We began with two specific hypotheses, one that intermediaries would become the major economic growth points of the web, and the other that intermediaries are able to shape users' perceptions and experiences of the web. Both hypotheses relate to, and in some respects challenge, some New Economy claims, in particular, that the internet would be a force for 'disintermediation' allowing producers and consumers to communicate freely and directly. To arrive at an understanding of what 'intermediary' means in the context of discussions of the web, we have drawn on a number of discussions and analyses that provide different approaches to categorising web intermediaries. From this, we produce what is, in effect, a taxonomy of taxonomies. In the course of this, we aim to establish the significance of some sub-categories of intermediary, particularly those we call 'transit sites' – a term which we introduced in our contribution to the state-of-the-art overview (deliverable 1.4), to signal our interest in the navigational aspects of intermediary sites.

The idea of a transit site focuses on those aspects of any web site that act to guide and control a user's navigation through the web. This includes both qualitative and quantitative data and, among the latter, issues such as the number and complexity of links in and out of a site, which provides some points of comparison with the quantitative studies of web metrics in other workpackages. The Annexe to this deliverable includes material contributed by another EICSTES partner, IDESCAT, which provides the first steps in a classification of intermediary web sites primarily concerned with the provision of information, sometimes known as 'infomediaries'. At present, we have located this taxonomy within our taxonomy of taxonomies, [and it will provide a source of material for later study within the workpackage]. The next steps in this workpackage include the collection of data that will allow us to test hypotheses about intermediaries and the way that they are changing. We indicate some possible approaches at the conclusion of this paper.

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[1] The stated objectives of Workpackage Six are:

To quantify the growth of intermediaries through the collection of a range of statistics about their number, the traffic through them, and their inter-relationship, in each case studied through time in order to get a picture of growth and development. These data will be used to examine the hypothesis that intermediaries, far from disappearing, will become of the major future economic growth points of the web.

To understand the role of intermediaries through studies of their web sites and users' behaviour when accessing the Internet. These data will be used to examine the hypothesis that intermediaries are able to shape the users' (both business and individual) perceptions and experience of the Internet.

2.0 Some typologies and their owners

We begin this paper by exploring some available typologies of intermediaries, asking what questions are supported by the different approaches to classification. That is to say, we are asking what the typologies are for and in what context they are being produced, in order to refine our own approach to an appropriate taxonomy of intermediaries from the point of view of the user. We have identified two main perspectives on the classification of intermediaries, one from the point of view of the market, the other from a navigational perspective. From the first perspective, an intermediary is taken to be an economic actor mediating between a producer and a consumer; from the second, an intermediary is a navigational aid that offers to mediate between a user and her goals. While the identification of intermediaries as navigational aids may seem the more obviously appropriate to our question about the user's experience of navigating the web, we hope to show also that discussions of the web as a market place are relevant to some of the ways in which web intermediaries set out to guide and/or control the user.

Finally, it is worth noting that there is a broad agreement on what populates the web. Most analysts include, as examples of their respective typologies, sites such as search engines and directories, specialist integrators, auction sites and chat rooms.

3.0 The web as a market place

Market-based discussions of the web have partly arisen from discussions of the impact of the worldwide web on the marketplace and in a subsequent literature looking at the development of the web as a marketplace. In addition, there is a fairly eclectic literature on business models, which overlaps with the market-function literature in some respects. Among the business-model texts in particular, there is a variety of contexts and implied audiences, from academic market analysis to business school texts, management consultants and professional business writers.

3.1 Market-function typologies

In the early days of the commercial development of the Internet, an argument was put forward that the Internet would lead to the disappearance of traditional intermediaries (such as shops and publishers) because direct communication would be possible between producers and consumers (Malone, Yates and Benjamin, 1987; Benjamin and Wigand, 1995; Gellman, 1996).[2] This speculation has been attacked in a spate of articles that argue on both analytic and empirical grounds that the market functions of retailers and other intermediaries are being reproduced on the World Wide Web (e.g. Sarkar, Butler and Steinfeld, 1995; Bailey and Bakos, 1997; Bakos, 2001).[3] Here we shall not try to adjudicate the substance of these arguments, but to explore some characteristics of the various typologies offered, asking what analytic perspectives they may support.

Most market-function typologies start from an abstract view of the marketplace as exemplified in the so-called 'bricks-and-mortar' market, and then apply these functions to various web intermediaries. For example, Sarkar et al suggest three broad types of intermediary function: those that benefit the consumer; those that benefit the producer; and those that act to resolve conflict between consumer and producer interests. Under these broad categories they identify four functions benefiting the consumer; four benefiting the producer; and two conciliatory functions:

Consumer benefits	Producer benefits	Conciliatory
Search and evaluation	Product information dissemination	Transaction economies of scale

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Needs assessment and product matching	Purchase influence	Integration of consumer and producer needs
Customer risk management	Provision of customer information	
Product distribution	Producer risk management	

Table 1: an example of a market function typology

This typology of functions is followed by a list of 12 different types of web intermediaries (or cybermediaries): gateways; directories; search services; malls; publishers; virtual resellers; web site evaluators; auditors; forums, fan clubs and user groups; financial intermediaries; spot market makers and barter networks; and intelligent agents. Sarkar et al suggest that cybermediaries will be better at some market functions than others; for example that they may be particularly good at facilitating product search, but not necessarily well equipped for product distribution. However, it appears that there are few if any commercial sites on the web that are *not* taken to be intermediaries of some sort.

A similar approach to a typology based in market functions is offered by Bailey and Bakos (1998). They base their typology on discussions in two earlier papers by Resnick, Seckhauser and Avery (1995) and Malone, Yates and Benjamin (1987), and propose a four-fold typology of intermediaries based on their market roles

- *Aggregation* (economies of scale and reducing bargaining asymmetry)
- *Trust* (protecting buyers and sellers from opportunistic behaviour)
- *Facilitation* (by reducing operating costs)
- *Matching* buyers and sellers

They then applied this typology to different sectors asking whether the move to electronic markets increases the importance of such intermediation services and again, more generally, what this says about the reproduction of intermediary services on the web. In a later paper, Bakos (1998) produced a modified three-part typology based on

- Matching buyers and sellers
- Facilitation of transactions
- Institutional infrastructure

Each of these categories includes a number of sub-types, and this reflects a more detailed description of developing intermediary functions in the various sub-categories of each of the three main types. As in the paper by Sarkar et al, it appears that this typology covers most commercial forms on the web. The question of whether the web will act as a disintermediating force bringing producers and consumers into direct contact has almost been defined out of existence: any site that brings producers and consumers together is going to be providing one or more intermediary market functions. The interest in market-function analyses seems rather to be as an analytic tool to chart the market development of sites on the worldwide web.

3.2 Business-model typologies

Business-model typologies offer a further approach to describing market developments on the web, focusing not on the abstractions of market functions but the specifics of company operation. However there is not complete agreement about what a business model is, and even less about how the categorisation of web business models should proceed.[4] Some authors have attempted to impose a more abstract analytic taxonomy; for example, Timmers (1998) identifies eleven different business models extant on the web, and offers a classification comparing functional integration against degree of innovation. However the majority view on business models may perhaps be summarised in Rappa's (2001) words as 'the method of doing business by which a company can sustain itself.'

Rappa's own approach to providing a taxonomy of business models – in the context of writing on-line course material for business students – is to attempt a broad overview.[5] He begins with an eight-part list of generic business models, under each of which he places a number of sub-categories as exemplified on the web:

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[4] As Rappa (2001) points out, there is also a new legal interest in the identity of web business models, with the increased use of patenting to attempt to protect novel models.
[5] Cf http://digitalenterprise.org/

- Brokerage
- Advertising
- Infomediary
- Merchant
- Manufacturer
- Affiliate
- Community
- Subscription
- Utility

Brokerage (bringing buyers and sellers together) and Advertising (free content, revenue from advertising) are by the far the most populated categories in Rappa's taxonomy. An infomediary is an intermediary dealing with information in any of the various links of the value added chain between the authors and the readers or information users. Electronic infomediaries include: primary publishers (texts, images, factual databanks, etc.), document delivery repositories, secondary publishers (bibliographic databases, OPACs [online public access catalogues], search engines, search directories, distributors (hosts, vendors, aggregators, syndicators, facilitators, third party searchers (consultants, libraries and information centres) and so on. While Rappa does not offer an analysis, he suggests that such a taxonomy will be useful for identifying which models are thriving on web.

Some other typologies address very specific issues. For example Fisher (2000), in a study of two market leaders in the content-distribution business, provides a two-part contrast between Service models (e.g. Akamai's traffic-diversion service) and Product models (e.g. Inktomi's Traffic Server software, which allows servers to cache frequently requested objects). Here the 'model' appears to relate simply to what it is (a service or a product) that the business sells. It may also be noted that while this rates as a market-based typology, because it is describing different ways of doing business, the distinction being made is also relevant to a navigation-based typology, because it refers to different ways of facilitating page retrieval.

Kaplan and Sawhney (2000) focus on a subset of web business models in business-to-business (b2b) markets, which they call 'hubs' (e.g. vertical integrators and electronic markets). They focus on two questions, *what* the businesses buy and *how* they buy, and from this produce a taxonomy of three dimensions:
- Value creation mechanisms (aggregation vs. matching)
- Purchase situation (systematic vs. spot purchasing)
- Bias of the market-maker (biased vs. neutral)

Again, this taxonomy is used to identify likely opportunities for different business models on the web.

Business-model typologies do not set out to give a typology of intermediaries as such, but in effect they address the categorisation of a subset of intermediaries, namely commercially based sites with an interest in finding a route to profitability. From the point of view of the producer, this has turned out to be a slightly intransigent problem. Rayport (1999), in a sceptical commentary on the history of web business models, describes a succession of popular models from (i) content-based, to (ii) advertising-based, to (iii) e-commerce and finally to (iv) 'monetising' models (the latter involves giving products and services away in order to harvest customer loyalty in the future some time).[6]

3.3 Market-based typologies and user behaviour

Market-based typologies are not, in general, meant to be read by the consumers or users of the web sites they describe. Apart from their academic interest, they primarily address the producers of commercial strategies and of ideas for new web businesses. Market-function analyses tend to be concerned with the development of

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This is a guide to e-commerce literature for a graduate-level business course at North Carolina State University.

[6] Bambury (1998) uses a distinction between 'real-world' intermediary business models and 'native internet' disintermediated business models to explain difficulties for companies in developing profitable business models: in effect he is suggesting that money-making (as opposed to barter and gift) is alien to the web and cannot work.

market forms on the web, and business-model analyses are usually concerned with issues of how best to survive and profit as a web business (with some exceptions, such as Timmers' business-model typology which addresses more general market-development issues).   However, the typologies often *target* users in the sense that they contain interpretations and predictions of how users are likely to behave: market-function analyses contain theories of consumer behaviour, and business models are intended as models which will draw the user in.   Therefore these perceptions of how the web is developing are likely to shape the sorts of web sites which users encounter, and may potentially shape users' perceptions of their own needs.

4.0 The web as a navigation space

Navigating the worldwide web is often represented as problematic because of the size and complexity of the web. Navigational aids such as search engines and directories offer an intermediary service, guiding the user to where she wants to be and also providing visibility to web sites.   In addition, most other sites offer some sort of navigational aids, through selected links sometimes with specialist knowledge. In the following pages we look at some typologies intended to make sense of the variety of available search intermediaries, including those offered by search tutorials and those offered, at least implicitly, in industry analyses of the search industry (which are described in Section 5.0, below, as an example of hybrid typologies). In both cases, these are typologies of search tools; but we are describing the typologies commonly offered in the search tutorials as search-task typologies in recognition of the emphasis placed on the search task in their categorisations.

4.1 Search-task typologies

Search tutorials, available on the web and aimed primarily at college students, are offered by a growing number of sites, mostly associated with university libraries. We have drawn on a number of web-based tutorials, mostly from universities (including UC Berkeley's Teaching Library,[7] the Spider's Apprentice at the University of Monash,[8] the Bare Bones tutorial at Beaufort Library site, University of South Carolina[9], and the Albany library, SUNY[10]) and academic-related sites (such as SOSIG[11] and the Librarians' Index[12]). These sites vary in emphasis and scope, and disagree on some issues (such as the value of meta-search engines). However most tend to:

a) **provide a description of types of search tools,** for example:
> *search engines*; compiled automatically; search by query terms; larger databases;
> *subject directories*; compiled by humans; browse (and search); may annotate; search top page only

b) **provide a search strategy**, for example:
> type of query (how to analyse your query)   - -≫   tool to use, and how to use it
> (including use of advanced search
> features)

The tutorials' search strategies suggest an ideal user of search tools who would select 'rationally' among the search sites and the various tools on offer. This 'educated user' should be the outcome of following the tutorial, but may not in practice reflect how experienced searchers search.[13] At the same time, however, the tutorial sites produce an implicit user (of their own sites and of the web more generally) who requires assistance in an unfamiliar environment, a novice user. For this user, because everything is strange, everything is explained. Some of the specific things that are taken to be strange include: the compiling of databases (by robots or humans); the visibility, or not, of the web; the deconstruction of the user's own search question into a query consisting of 'terms', a question that may be 'general' or 'specific' (etc); the tendency of

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[7] http://www.lib.berkeley.edu/TeachingLib/Guides/Internet/FindInfo.html

[8] http://www.monash.com/spidap.html

[9] http://www.sc.edu/beaufort/library/bones.html

[10] http://library.albany.edu/internet/

[11] http://www.sosig.ac.uk/vts/sociologist/index.htm

[12] http://www.lii.org/search

[13] Do most users search rationally? Search engines tend not to put advanced search features on their top page, which suggests they expect most not to make extensive use of advanced search features.

search queries to generate thousands of results, and the difficulty of finding 'relevant' results. The following table does not do justice to the detail of some of the search tutorials' own tables of tools, but is intended to *re*present their way of categorising search tools (into search engines, directories, etc) as a typology of users' problems.

Type of tool	Examples	Potential area of search	Issues	Type of search	Type of query
Search engines	Google	All visible web	Size 'Relevant' results Advanced features	Search	specific
Meta-search engines	Metacrawler	(but meta-search more limited?)			
Subject directories (Virtual libraries) (Gateways)	Yahoo WWW Vlib Lii.Org	Visible web (but top pages only?)	Size Authority General or specialist	Browse Search	general
INVISIBLE WEB Specialist databases	ESRC REGARD	Own site (plus visible web?)	Size Authority General or specialist	Browse Search	expert

Table 2: some characteristic interests of search-task typologies

As already mentioned, this typology is actually broken down into types of tools, and then interrogated in relation to search tasks. In the first column, the three-part typology of families of search tools follows the UC Berkeley tutorial[14]; the terms in brackets are added from other tutorials. The issue is complicated because terms like 'gateway' and 'portal' have slightly different connotations in different contexts. Also from Berkeley is the focus on the visible/invisible divide. The examples and the last three columns are taken from a variety of sources. Most tutorials also have a section on the evaluation of websites – which could be applied to search sites themselves – advising the user to, e.g., check the domain, the author (organisation or individual), timeliness, general reliability (e.g. check links-in to see if comment on it). We've included the latter sort of consideration under the *issues* column as 'authority'. While some tutorials identify searching and browsing as appropriate methods for different tools, Berkeley warns against browsing through searchable directories![15] Most tutorials also include sections advising users how to analyse their own queries, and this requirement emphasises that these are sites of social interaction, where the user is *expected* to modify her own behaviour (even if she declines to do so).[16]

Several of the issues raised by the search tutorials are important to our description of what the web is like for users. For example, the gap between the intended use of the web sites and how the users actually use them is an issue for further study. Again, however, the differences signalled by issues such as authority or specialisation cannot easily be made recognisable to a software agent.

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[14] The Berkeley tutorial is perhaps the most detailed and the one most often recommended on other sites.
[15] "If you can find a search box, search a directory. Browsing is sometimes fun rarely as efficient". (www.lib.berkeley.edu/TeachingLib/Guides/Internet/Strategies.html)
[16] Cf discussions of 'strange' user behaviour – e.g. using search boxes to get to familiar URLs. Cf the CyberAtlas story, "Search Engines, Browsers still Confusing Many Web Users', based on a report by Alexa Research: http://cyberatlas.internet.com/big_picture/traffic_patterns/article/0,,5931_588851,00.html

4.2 A typology of reference sites

Web reference sites, that is sites offering useful links to users of a specific organisation or institution (such as university libraries) may be difficult to navigate, especially if they grow to be large and complex. Sowards (1998) has developed a typology intended to help the designers of such reference sites, based on the depth of the site (number of pages) and various organisational schemes available (such as lists presented alphabetically or grouped by subject matter, and the use of site search engines). This allows him to derive twelve different types of reference site, identifying the most common types in terms of size and complexity.

Soward's typology is relatively simple and this approach, if automatable, would give some data about the size and complexity of some sites (though search-only databases would presumably look like small, simple sites).

4.3 Navigation and the user

Navigation-based typologies are fairly directly relevant to our purposes in that they speak to the user's experience of navigation. However, they tend to focus on normative practices of search and design, and usually do not pay much attention to the market context of the web. The latter is needed for a full analysis of ways in which the user's navigation is shaped and guided by the various navigational tools available on the web.

5.0 Hybrid typologies

Hybrid typologies are those typologies that represent the web both as market place and as navigation space. Several of the examples already described of market- and navigation-based typologies have elements of both. One example of a set of discussions that includes, at least implicitly, a more thoroughly hybrid approach may be found in the news sites and reports concerned with the business of search. They are interested both in the performance of the search tools (how efficient they are, for the user) and with their market success (how likely they are to survive and/or make a profit). Our own approach to a typology of transit sites (section 6.0) is also classifiable as a hybrid typology because it is concerned not only with the behaviour of transit sites from the point of view of the user, but also with the way in which market strategies and design theories are implied in the sites which the user visits.

5.1 Search-business typologies

Search-business analyses address an audience that includes web masters, corporate web strategists and individual enthusiasts, as well as market analysts in industry and academia, and sociologists and others tracking developments in web use. They provide stories and data that compare search tools in terms both of search performance and market performance. Most of the sites offering this service are news and information sites, offering up-to-the-minute stories and data, often with additional information available to paying customers and sometimes linked to corporately priced market reports. Examples include specialists in the search-business field, such as Search Engine Watch,[17] CyberAtlas,[18] and, targeting reference librarians, Research Buzz,[19] as well as more general electronic technology news sources such as Cnet,[20] and the now defunct Industry Standard[21]

The variety of audiences and issues is illustrated by the home page of Search Engine Watch, which divides its site into the following areas:
- Search Engine Submission Tips
- Web Searching Tips

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[17] http://www.searchenginewatch.com/
[18] http://cyberatlas.internet.com/resources/newsletter/article/
[19] http://www.researchbuzz.com/
[20] http://www.cnet.com/
[21] http://www.thestandard.net/

- Search Engine Listings
- Reviews, Ratings & Tests
- Search Engine Resources
- Search engine newsletters

The first category, for example, is directed at webmasters trying to make their sites visible to search engines, the second to users trying to find better ways of searching. The reviews, ratings and tests incorporate tables from a number of other sources, including varieties of traffic data that are of interest to market analysts and web traffic analysts. The news stories offered in the associated newsletters (Search Engine Watch and Search Day) include articles about individual companies, business approaches, new search features and functions, user behaviour, and so on.

Search Engine Watch also illustrates the potential for detailed sub-categories of search engines, according to market position, vertical markets, targeted consumers, and so on, in the following list of types of news stories:

- The Major Search Engines
- News Search Engines
- Metacrawlers
- Multimedia Search Engines
- Paid Listings Search Engines
- Speciality Search Engines
- Kids Search Engines
- Regional Search Engines
- Search Utilities

More generally, while the search-business discussions provide useful insights and background into developments on the web and the way it is used, these discussions do not require a systematic analytic perspective.

6.0 An analysis of transit sites.

On the basis of existing typologies, we have produced a typology of typologies as follows:

Market-based typologies
market-function typologies
business-model typologies
Navigation-based typologies
search-task typologies
a typology of reference sites
Hybrid typologies
search-business typologies

Our own typology of transit sites is also intended as a hybrid typology, in that it is based on issues of navigation (what it is like for the user to find their way around the world-wide web), but in the context of the web as a marketplace. We have explored different types of transit sites:

a) through sample searches in selected sectors (tourism and offshore finance)
b) through a methodological exploration applying visual semiotics (on search engine sites)

We provide a brief account of each of these studies, before introducing an approach to a typology of transit sites.

6.1 Exploring transit sites by sector

We carried out a number of example searches in different sectors, including tourism and offshore finance. Although we began these searches through the use of a large search engine (Google), the main part of our search tended to be through more specialist sites. The purpose of these searches was: to discover the deployment of different sorts of mechanisms in the context of a 'real' search; to explore what mechanisms may be found in more specialised and local search sites; and to ask about the possible stylistic differences between different sectors. We expected the two selected sectors – tourism and offshore finance – to display

differences in relation to different target audiences and different styles of performed identities. The selected tasks also involve a potentially significant distinction in that one is an open search to see what's out there (looking for a hotel and other tourist information) and the other is a search for information about a specific service which also acts to test its visibility on the web (Guernsey's support for offshore e-commerce).

In our first search, we set ourselves the task of finding a hotel in the Cretan resort of Hersonissos, together with relevant tourist information. Our initial Google search on "Crete+hotels+Hersonissos" generated a list headed by a number of specific hotel sites, and from these sites we found links to local information sites. This route meant that we usually entered the information sites through a back door, rather than the home page and, in some cases at least, the home page was not easily reachable.[22]

We collected a sample set of local tourist sites, ranging from tourism gateways to Greece (travelinfo.gr) and Crete (Creteweb.gr) to more informal and chatty sites (explorecrete.com and jiannis.com). Both Travelinfo.gr and Creteweb provide an organised set of links catering to a tourist's travel needs (ticket booking, car hire, hotels, etc), as well as extensive links about local tourist attractions. Creteweb (which states that its aim is "to help the Greek Businessman to promote his business over the Internet") also includes local business links, for example to estate agents and lawyers. ExploreCrete and Jiannis are both more open, each in slightly different ways. ExploreCrete, which describes itself as "the guide about the real Crete" focuses on tourism-related pages and links, but includes a number of feature writers and also encourages users to add their own reviews of local hotels etc, add favourite Crete links and join a chat room. Jiannis also offers a virtual tour of Hersonissos, and a large set of links to local attractions and hotels, as well as a chat room and a forum. However, it is less rigorously a tourist site in that it includes some links which are not particularly relevant to the local area; for example, it includes links to general search engines, to a horoscope site,[23] and its own webcam (showing Jiannis' restaurant) also links to webcams around Europe.

In the second sample search, we set ourselves the task of discovering information about the island of Guernsey as a location for offshore e-commerce. We began with a Google search 'offshore+e-commerce' and then 'offshore+e-commerce+guernsey'. One striking characteristic of both these searches was the return in the top ten of a family of related sites involving three of the top ten in the first search, and seven of the top ten in the +Guernsey search (i.e. offshore-e-com, lowtax.net and tax-news):

Google search: offshore + e-commerce	**Google search: offshore+e-commerce+Guernsey**
Top ten of c 60,000 results:	*Top ten of 1,050 results*
www.offshore-e-com.com (information aggregator) [x2]	www.lowtax.net (information aggregator)
www.offshorewebs.net (Isle of Man e-commerce host site)	www.dplus.guernsey.net (consultancy web site) [x2]
www.s-hrm.com (consultancy web site) [x2]	www.offshore.e-com.com (information aggregator) [x2]
www.ecommercetimes.com (online newsletter)	www.tax-news.com (information aggregator) [x2]
www.Escapeartist.com (portal for expatriates)	www.dixcart.net (Guernsey-based consultancy) [x2]
www.baltimore.com/news (news story about Bermuda offshore e-commerce on Baltimore Technology site)	www.baltimore.com/news/press/pr20000313 (news story about Guernsey e-business and Baltimore Technologies)
www.dplus.guernsey.net/ecommerce (consultancy web site)	
www.rpifs.com ('global wealth protection' newsletters)	

Table 3: results of Google searches in offshore e-commerce sector

The types of sites generated by this search included information aggregators, a portal for expatriates, news sites, consultancies and individual news stories. The latter may be effectively discounted as transit sites, but

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[22] For example, the Greek tourism site, www.travelinfo.gr/, which we accessed via a page listing Hersonissos hotels, had no direct link to its home page – although the home page could be reached via some of the other links (such as the Airfare Search).

[23] In fact, by accident or design, this link is actually to a 'bounty' site (cyberbounty.com) offering software and design, in return for advertising space on web sites with a minimum number of visitors in a day.

both the consultancies and the news sites provide some onward links. The most significant, in terms of providing onward links, are the expatriates' portal and information aggregators, while the Isle of Man site provided a selected set of links to Isle of Man websites. The family of information aggregators offered large, complex, interlinked sites, with information, news and links. On all these sites, the links are both highly selected and evaluated. For example, the LowTax site offers links to several pages of information on each of 13 offshore jurisdictions – picking out four as 'supersites'. This editorial position is also reflected in the articles on this family of sites. Since Guernsey was not one of the favoured sites, this acted to make it less visible in terms of numbers of users likely to arrive at its site, illustrating that search engines alone are not keys to visibility.

What the two searches – in tourism and offshore finance – had in common was that local or sectoral intermediaries proved at least as important as search engines in determining the user's final destination. The differences between the sorts of intermediaries we encountered on our sample searches suggest that it is possible to talk of different styles of transit sites in different sectors. For example:

Tourism	*Offshore e-commerce*
Visitor as tourist	Visitor as investor, financial professional
Chat rooms	News
Reviews	Expert information
Relatively open external links	External links rare and closely controlled
e.g. explorecrete.com	e.g. offshore-e-com.com

Table 4: Stylistic differences between different sectors

These sorts of stylistic differences may be significant in the development of different types of web intermediaries within different sectors. It is possible also that some elements, such as the rarity of external links in large complex sites, may be detectable by a software agent.

6.2 How links are presented

In a study related to this workpackage, we are exploring the issue of an appropriate methodology for describing what it is like to visit a web site, and looking particularly at recent work in visual semiotics.[24] A preliminary study suggests that this is a useful way of enriching accounts of user navigation on the web, and of the variety of means by which transit sites may shape user navigation. This approach emphasises a culturally specific dimension to the semiotics of images;[25] and it also stresses the social relationships produced in an image, both in the internal relationships of the 'represented participants', and in the communication between designer and viewer or 'interactive participants'. For example, on the Ask Jeeves search page,[26] the implied user (or audience) is an inexperienced user, and targeting this audience may be at the cost of users who see it as a site for novices and as 'not for them'. This approach also provides ways of distinguishing between different sorts of practices in the representation of links, including the establishment of new conventions – such as blue underline, and the graphical morphing of the pointer to a hand as it is passed over an active link. These practices may also be explored both in terms of the performance of identity of the producer and construal of the user – for example, whether or not it is deemed appropriate to tease the user with hidden links.[27]

This approach may provide significant data in relation to the control of a user's navigation. However, it may be difficult to find programmable indicators, particularly as different ways of representing links are not distinguishable to a software agent.

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[24] We are drawing particularly on Kress and van Leuwen (1996).

[25] Kress and van Leuwen offer conventions of writing and reading from left to right as one example of a culturally specific practice.

[26] http://www.ask.com/index.asp?iredir=false

[27] Cf for example, the use of 'rollovers' on architects' and museum web sites, which may baffle the unsophisticated user (many examples of this, described as 'mystery meat navigation' are given on www.webpagesthatsuck.com.)

6.3 Approach to a typology of transit sites

Our typology begins by identifying the intermediary population of the web in terms given by both the market-based and navigation-based discussions described above, but focusing on sites that, in one way or another, enable the user to navigate the web. As we indicate in the final column of Table 5 (below), these types of sites are each of interest to some of the taxonomies we have discussed above. Our own approach to categorising intermediary sites is based on navigation, but includes types that are relevant to a market-based approach, such as portals and vertical integrators.

Our categories include not only sites dedicated to search, such as search engines and directories; but also other sites that provide navigational assistance in a specific or local context, of the sort that proved particularly important in our sample searches. For example, those primarily in the business of providing information, such as news sites, with relevant links as an added-value service; portals that provide a variety of web services to the user (including email, auctions and shopping); regional gateways that provide links to services (e.g. tourist services); vertical integrators that provide information, services and links within an industrial sector, professional-body sites that provide information to potential customer (e.g. RIBA's information about British architects in different regions, price ranges and specialities).

The typology of infomediaries being developed by our partner IDESCAT (cf Annexe to this paper) would largely be based in the specialist sites. The importance of content as a product is reflected in our finally category of content sites, where the infomediaries would also be located.

Type of site		Description	Examples	Type of Taxonomy* (examples)
Search-tool sites		Sites primarily dedicated to search, either search engines or directories, either general or specialised	Google Open Directory Yahoo	Search Tasks Market Function Search Business
	Search engines Directories			
Portals		Sites primarily dedicated to providing full internet services to user (inc email, auctions, chat, news and search tools); includes search sites, ISPs and others	Yahoo AOL CNET	Business Model Search Business
Specialist sites				Search Tasks
	Vertical integrators	Sector-specific sites. May include advice, chat rooms, links to members sites, searchable database, and sector-specific services.	Verticalnet MetalSite Chemdex PaperExchange	Business Model Market Function
	Gateways	Sites that provide an entry point for users with an interest in a specific field or topic, including geographical regions, professional services, etc. Including links and/or searchable database, perhaps with other relevant services (e.g. chat rooms).	SOSIG RIBA Regional tourist sites (e.g. explorecrete.com) Prous Science	Infomediaries Market Function
Content sites		Sites primarily dedicated to provision of information, either general news sites or (more likely) information aggregators within a specific field or sector; external links as added value, perhaps with editorial guidance/qualification	Search Engine Watch offshore-e-com CNET Lexis Nexis	Infomediaries

This column identifies taxonomies that have a primary interest in the respective types of site.

Table 5: types of transit sites

The possibility of combining navigational-based and market-based categories in one typology partly reflects the importance of attracting and retaining visitors within most business models (although it may only be made explicit in advertising-based models).

7.0 Questions of automation

One of the main purposes of our typology was to prepare the ground for the development of a software agent, which would be able to recognise different types of transit sites and automatically generate data that may help in understanding the development of the web. None of the typologies we have discussed is particularly appropriate for automatic recognition, and it is difficult to identify types that may be unambiguously identified by a robot. Nonetheless a software agent is likely to be an important *assistant* in exploring some aspects of intermediary types. Activities such as counting links, as a way of judging the complexity of a site, may offer a way of assessing the extent of convergence between single-service and portal sites, and other aspects of the economic geography of the web.

One of our initial hypotheses was that intermediaries will become the major economic growth point of the web. The way in which this hypothesis was originally stated reflected a debate about disintermediation that, in the light of discussions of market functions on the web, is not easily arguable, and the case for the importance of intermediaries may be said to have been made. Nonetheless, the relative economic importance of different intermediary types remains a live issue, which raises questions about convergence: is it the case that intermediaries are tending to 'portalise', that is to offer an increasing number of services to attempt to retain the user on their own site? In the case of search sites, will the distinction between search engines and directories disappear? Do successful 'amateur' sites tend to grow to offer the range of services characteristic of a commercial site?

The next steps in this workpackage include the collection of data that will assist us in testing our preliminary descriptions of intermediary types and monitor the way that they are changing. A sample of intermediaries will be located (either through random sampling of internet hosts, or through collecting the 'referrers' from web server logs, or both) and classified, using a computer-aided method, into the categories of the typology. Access to previous forms of the selected sites may be facilitated by the newly available www.archive.org site, which collects past versions of the web.

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