EICSTES DELIVERABLE D1.4

STATE OF THE ART
PART A: WP6

Intermediaries on the world wide web: literature and issues

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0. Introduction.

This paper mainly consists of an introductory overview of current literature on web-based intermediaries across a range of disciplines, professions, and overlapping issues of interest. However it is also intended as a preliminary study for the particular task of devising a taxonomy of web intermediaries that is recognisable by a software agent.

In the broader literature, taxonomies of intermediaries have been developed from a number of perspectives, including studies which address the web as a marketplace, as a medium of communication, or as an information search space. In general, however, a broad number of forms on the web have been described as intermediaries. This includes sites which provide guides or links to other sites, as well as sites which aggregate products and services from a variety of organisations. An initial list might include:

Search engines and directories. Search engines, such as www.Google.com and Alta Vista www.av.com, provide query-bases search facilities, based on data generated by proprietary 'spiders'. Directories, such as www.Yahoo.com (www.uk.yahoo.com), Open Directory (www.dmoz.org), and www.About.com, are categorised by hand, based on submissions from candidate web sites. Variations include specialised directories (eg the www.apgate.com, for electronics, engineering, and the plastics and rubber industry sectors in the UK), directories of directories (eg www.Gogettem.com), and Metasearch engines (eg www.MetaCrawler.com) that search over other search engines and directories.

Search agents (Search bots) gather material from other sites. Eg www.Shopbot.com/ searches across online shops;

Portals. Provide a gateway to the web, egs include ISP home pages such as www.AOL.com. Variations on the portal as gateway are: a horizontal portal or user-

customised gateway (eg: my Yahoo); a vertical portal or sectoral or special interest portal, (eg www.CNET.com; and an enterprise information portal, which is an organisation's home page for employees, including corporate info and selected links (cf Isaacs, 1999).

e-tailers On-line shops, such as www.amazon.com.

Shopping malls. Sites that group together different online stores as tenants. (eg, the Scottish Shopping Mall, www.ibmpcug.co.uk/~ecs/mall.html).

Vertical market integrators Sites that group together vendors and others from a specific sector. (eg www.verticalnet.com)

Brokers.

Auctions Sites that support online auctions (eg www.ebay.com or www.ebay.co.uk)

1. The (resistible?) rise of cybermediaries

Some of the earliest writings about the economic impact of the internet predicted the disappearance of intermediaries – shopkeepers, wholesalers, publishers and others – whose services would no longer be required, because direct communication would be possible between producer and consumer (eg: Gellman, 1996; Malone, Yates and Benjamin, 1987). The "disintermediation" argument partly relied on the idea that, on the internet, intermediaries were an unnecessary cost. For example, Benjamin and Wigand (1995) argued that the retail price of high-quality shirts could be reduced by 62% if wholesalers and retailers were removed from the chain. This view has been challenged from several quarters. Sarkar, Butler and Steinfeld (1995), in a much cited paper, argued that such predictions made unwarranted assumptions about relative transaction costs to the producer, and also underestimated the range of facilitating services offered by intermediaries; they suggested that it was just as likely that the web would result in the proliferation of intermediaries, including many new forms of 'cybermediaries'.

Sarkar et al produced a list of about ten market functions of intermediaries (search and evaluation; needs assessment and product matching; customer risk management; product information; product distribution; product information dissemination; purchase influence; provision of customer information; producer risk management; transaction economies of scale; and integration of consumer and producer needs), and a list of about a dozen cybermediaries, discussed in terms of their intermediary roles (including 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).

Bailey and Bakos (1997) argued that some market functions of intermediaries are likely to become increasingly important in electronic markets. They proposed a four-fold categorisation of market functions, as a framework for tracking the significance of intermediaries: aggregation, trust, facilitation and matching. In a later paper, Bakos (2001) identified a number of developments in the role of intermediaries in retail e-commerce, including the increased importance of aggregating intermediaries who may,

for example, bring together producers, or a mix of products and services (for example, in the American car market, Auto-by-Tel or Microsoft's Carpoint); and the underpinning of trust by intermediaries such as search agents who are perceived as providing unbiased product recommendations (cf Bizrate.com which rates suppliers; Comparenet.com which offers feature-based comparisons).

The above discussions represent a perspective that argues from market functions to a typology of of web intermediaries (cf also Steinfield, Kraut and Plummer, 1995; Bakos, 1998; Giaglis, Klein and O'Keefe, 1999). Michael Rappa (2001) includes several of the same functions within a typology of business models on the web, including: brokerage; advertising; infomediary; merchant; manufacturer; affiliate; community; subscription; utility. This typology does not focus on the role of intermediaries as such, although clearly almost all these models are counter-examples to early predictions of unmediated relations between producer and consumer.

Another variation on the debate about disintermediation begins not with a perceived economic 'good', but with a political or cultural ideal. For example, Volokh (1996) argued that the internet and other high-bandwidth delivery networks would allow unmediated communication between, for example, authors and their readers, leading to freer and more democratic practices of communication. Kling (1996) responded that there was no reason to suppose that the new technologies would "take the idiosyncratic musician or author into mainstream access". In contrast to the authors discussed above, who identify intermediaries in terms of market functions, Kling suggests a broader sense of 'intermediary' which includes, for example, not only the publisher and bookstore, but also the transport you need to get you to the bookstore; on this approach, the internet simply substitutes one set of intermediaries (publisher, store and transport to get to the store) with another (electronic database or virtual mall, and PC with printer to download the work).

2. In search of a metaphor: business models on the web.

Market analyses and case studies, in contexts ranging from management science journals to the trade press, describe the development of intermediary forms in the marketing of products and services over the web. These discussions are concerned with issues such as developing business models, strategic developments, and the implications for specific sectors. Profitability is a major point of interest, whether from the sale of goods and services over the web, or from advertising revenue. On either approach, a minimal measure of success is the number of hits (unique visits) that a site receives. However, the crucial issue for e-commerce sites is turning visitors into customers without spending more in the process than the customers themselves do. Agrawal et al (2001) claim:

> During the first half of 1999, it cost, on average, more than $1,100 to acquire a customer, who would typically spend a total of $400 on at least two purchases in that period. Similar customers in the second half of the year cost only $800 to acquire, though their spending still didn't exceed $400.

In the case of portals and search engines, advertising revenue, which depends on site traffic, is similarly not free of cost in attracting and retaining users. For all types of commercial sites, then, attracting, converting and/or retaining users is critical.

One of the perceived impediments to making money on the web is a cultural tradition of free exchange, that "consumers who will pay $4 for a magazine at the checkout counter refuse to pay $4 to view it on-line"[1]. Sociological commentators, such as Barbrook (1998), have described the net as a 'gift economy', influenced by 60s radicalism,[2] academic traditions of freely exchanged ideas ('giving papers' and 'contributing ideas') and specific 'techie' traditions of interactive development (for example, Linux), shareware and free content.[3] One response to this among management consultants has been to modify the early idea of online marketplaces as virtual 'shopping malls', and to incorporate elements of the web's 'native' culture by hosting virtual communities that generate free content to attract and retain users (eg Rayport and Sviokla, 1995; Hagel and Armstrong, 1997). Werry (1999) contrasts the 'pioneering' or 'frontier' narratives told by consultants in the early 1990s – such as Canter and Siegel (1994) who claimed that there is no community in Cyberspace – with management texts from 1995 onwards, in which

> 'Community' became a polite way of talking about audience, consumer demographics, and market segmentation while seeming sensitive to Internet users, their culture and community.

Ideas of commercialising virtual communities were partly inspired by descriptions of virtual communities, such as the Well (cf Rheingold, 1993). In suggesting virtual communities as the basis of a business model, Hagel and Armstrong use the language of 'consumer power'; they suggest that a virtual community is a 'reverse market' where instead of vendors pressing products on consumers, customers will link up with each other to seek out those vendors giving the best deal. Nonetheless, novice organisers of virtual communities are advised to create an environment that will attract users,[4] through the chance to communicate with people with shared interests and experiences, and through exploring fantasy worlds[5], as well having the chance to trade information and carry out other transactions.[6] Much of what they describe may be viewed in terms of the struggle to attract and retain users through offering added value – by various sorts of cybermediaries. Some of the types of virtual communities that they describe may be identified in following descriptions of intermediaries, [identified as promising business models].

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[1] Agrawal et al (2001), p 35.

[2] More specifically, Barbrook refers to the Situationists, who drew explicitly on Marcel Mauss's (1950) description of societies based on the exchange of gifts, or 'potlatch'.

[3] Stadtler (1999) counters the slightly romantic overtones of the view, arguing that gift-based models, like advertising-based models, are not as free-for-all as they may appear: while dependence on advertising favours the formation of large conglomerates such as AOL, a dependence on gifts can sustain the academic staus quo, favouring 'distributed but highly interconnected knowledge elites'.

[4] They suggest: "Virtual communities are not, ultimately, about aggregating information and other kinds of resources …. Virtual communities are about aggregating people". (Hagel and Armstron, 1997, p 18)

[5] "It's not hard to imagine the application of fantasy to detailed simulation games in business-to-business virtual communities …" (*ibid* p 21).

[6] Werry (1999) also notes the closure of some community clubs by [name?] site organisers .....

Portals. Portals are often claimed to be the most lucrative locations on the web, the site of large visitor numbers and hence of opportunity for advertising revenue (cf Dewan et al, 1999). Portals offer a gateway on to the web and may also offer signposting, selected links and other services to attract users. ISP home pages are an example of portals, and the large ISPs offer a wide range of added value services. Some portals address special interests, for example CNET provides a portal for uers interested in developments in IT. Patelis (2000) argues that while ISPs (such as AOL) represent themselves as offering a way into the web, they also act to constrain the user's movements.

E-tailers or consumer shopping sites. Amazon is the subject of many analyses [refs]. While starting as simply a bookshop on the web it has added a variety of products and types of services, including a 'shopping mall' of zshops. By contrast, Tesco is a primarily offline retailer which is (successfully?) offering web-based order and delivery services (cf discussion re multiple channels).

Vertical market integrators. Web sites that typically serve business sectors, especially for B2B (business to business) marketing of products and services, letting out site space to vendors and others and providing support for business processes relevant to the sector served.[7] Two major types of vertical integrators have been identified: strictly defined vertical portals focused on one industry; and 'syndicate' sites that include a variety of vertical classifications within them.[8] VerticalNet is an example of the latter – and has expanded from its original, US-based site to also offer VerticalNet Europe and VerticalNet UK. Single-industry integrators include: MetalSite; Chemdex; PaperExchange. For example, Instill Corp operates as an intermediary for more than 2,000 catering managers and 100 or more suppliers. While vertical integrators have been represented as potentially dominating e-commerce (cf Flynn and Flynn, 2000; Kane, 1999), recent reports indicate that VerticalNet, one of the pioneers in syndicated integration, is building up increasing levels of loss (Kane, 2001). This may be seen as a symptom of the continuing fluidity of commercial forms on the web.

[*Sectoral issues*
Sectors to look at could include: travel industry (cf Kanellou 1995; McCubbrey 1999); exhibition business (Flynn and Flynn, 1999); publishing; estate agency (cf Yahoo site)]

3. Knowledge brokers and the politics of presence

For academic and research users, the web offers access to information through journals, directories, libraries of resources, and links to and from individual web sites. This raises possible conflicts between easier (disintermediated) scholarly communications and trustworthiness, or the sort of controls on quality traditionally enforced, for example, by refereed journals (cf Kling and Mckim, 1999). However, the brokering of knowledge

[7] Integrators typically include services that support business processes, including auctions, event calendars, industry news, association updates, chat rooms and job offerings.
[8] Flynn and Flynn (2000) discuss some of the differences between integrators for different sectors. (Cf also Kane, 1999)

may also offer opportunities for universities and other institutions to consolidate social capital in the form of a reputable and visible web presence. This is partly possible because of their institutional ability to aggregate content (cf Stadler 1999), but also takes place in the context of a policy emphasis on the economic value of science and technology, and the importance of academic-industrial links (cf, eg, OST 1993; CEC, 2000).

There are a variety of examples of knowledge-brokering sites, offering information about academic research to industrial (and other) users. In the UK, for example, following the Foresight exercise, the Natural Environment Research Council (NERC) initiated a project, with support from the other research councils, to set up a 'virtual market place', to facilitate partnerships between companies and universities, called NEST (Network for Exploitation of Science and Technology).[9] Other more mature examples include CORDIS in Europe, and the National Technology Transfer Centre (NTTC) in the US.[10] Such sites act both to validate research in the database and to make it visible to potential industrial exploiters. In addition, individual universities may promote their research wares on the web, usually as an extension of existing industrial liaison activities. One of the earliest such sites was at MIT, where the Industrial Liaison Program uses the web to provide a database of MIT research and other information for fee-paying industrial members. A rather different approach is found in the Leeds Virtual Science Park, which includes about 20 'tenants', from industry, government and academia (including links in to Leeds University departments).[11] One of the most recent initiatives, under the European Research Area (CEC, 2000) involves the idea of virtual centres of excellence, which will provide links to identified centres of excellence within a given field (eg VIROS - Virtual Institute for Research in Official Statistics).

Such knowledge brokering sites are of interest to the EICSTES project insofar as it and they are concerned with issues of the dissemination of science and technology. In addition, as examples of intermediaries, although the sites do not rely on advertising do raise issues of the consolidation of some sites; in addition, they tend to emphasise quality and to maintain some control over the user (this may be detectable, in some case, because hosted sites are presented within the host sites URL; for the user, control is also sometimes signalled by the presence of the host site's border around tenant sites).

4. Approach to a typology of intermediaries: types of transit sites

[9] NEST was initially funded by the Office of Sceince and Technology. Its initial approach was to bring together a research database on model of a Virtual Science Park being developed at Leeds University and an industrial 'want list' generated by members of the Centre for Marine and Petroleum Technology (CMPT). (http://www.nerc.ac.uk/industry%2Dgateway/partnership.htm#nest)

[10] This is by no means an exhaustive list of projects: several projects arose out of EC funding in the 1990s, including PROSOMA, a 'virtual trade fair' funded by EPSRIT; and ADVISER which was initially funded under the EU 4th Framework programme, and was intended to disseminate European research and provide access to research experts and technology brokers.

[11] Examples of the services provided by tenants of the VSP include: Graduate/Professional Education and Training; Knowledge Management Services; On-line Consultancy; Collaborative Projects; and Information Brokerage. http://www.vsp.co.uk/

What *is* an intermediary? The literature survey seems to suggest that almost any life form on the web may count as an intermediary from some point of view (this is especially so of the list of cybermediaries suggested by Sarkar et al). I sugggest there are two main reasons for this. This inclusive sense of 'intermediary' arises partly from a perspective of countering arguments of *disintermediation*. Faced with the prediction that the web will enable widespread unmediated contact between individual producers (whether of goods, art works or ideas) and individual consumers, many have responded that this is both unlikely and not happening in practice. In addition, much of the literature has been located within a *problematic of the market*; that is to say, it is asking either about the impact of the web on existing marketplaces or attempting to analyse the development of market forms (business models) on the web. It is thus appropriate for these texts to base their analyses in market functions – and from this point of view an intermediary is anything that helps bring together producer and consumer, and smooth their relationship. Again, this implies an inclusive sense of 'intermediary'.

However, there is another sense of 'intermediary' which is implicit in some of the discussions (because support for search is an identified market function), but which is specifically relevant to questions of the behaviour of users in their movements around the web. This is the sense of an intermediary as an aid to navigation on the web, as a site which helps users to find further sites. Paradigmatic examples of this sort of intermediary are search engines and directories. Portals, as gateways to the web, usually offer both search and sign-posting. For the user, the only alternative to passing through these intermediaries, is to have prior, off-line knowledge of the site required.[12] However, often the user does not know even what, or how many, appropriate sites there may be for the item or information they are seeking. The intermediaries that users visit in order to locate and move on to further sites can perhaps be described as *transit sites*. From a business-model point of view, transit sites are characteristically dependent on advertising revenue[13] and therefore need to attract the maximum number of users passing through; from the user's point of view, transit sites are more or less useful according to the ease and efficiency with which they locate other 'relevant' sites; and from the point of view of a study of the behaviour of traffic on the web, transit sites are likely to display some specific characteristics which it would be useful to understand.

As a first step in characterising transit sites it is useful to distinguish between:

> **request-based sites** (sites that retrieve lists of links in response to a request) including directories and search engines
>
> **signpost sites** (sites which provide given links to other sites) including portals and perhaps also including specialist directories, aggregating sites, vertical market sites, virtual organisations, shopping malls (and so on).

This makes a distinction between open, request-based sites and more controlled sign-posting sites (although in practice few sites are purely of one or the other sort). From the

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[12] . In fact substantial advertising money goes into advertising sites off-line (eg posters and media ads), and simple, 'obvious' URLs are much sought after (eg it is easy to find Yahoo just by trying www.yahoo.com or www.yahoo.co.uk).

[13] However, they may also have other sources of incomes, such as licensing deals with other sites (eg Google provides the search service for many other sites).

point of view of the user, faced with a web that is 'vast and impossible fully to search' (cf Rogers, 2000), open, request-based, key-word, searches may just add to the confusion. Advanced searching (putting on Boolean constraints) may help, but requires at least a minimal training. Directory searches (such as Yahoo) impose some order, but not necessarily an order that is relevant to the user. So specialist directories and specialist, sign-posting sites can be seen as offering a higher degree of (supposedly) relevant ordering, and it makes sense to regard these sorts of sites as offering a real intermediarising transit service to the user. This suggests that transit sites can be compared in relation to a single parameter, running from *breadth* to *selection*. For example, search engines such as Google and Alta Vista offer a high degree of breadth; vertical integrators such as MetalSite, or virtual centres of excellence such as VIROS, offer a high degree of selection; and directories such as Yahoo, and portals such as AOL, might be somewhere in the middle on both counts.

The question, then, is whether it would be possible to automatically identify transit sites in general and the different types of transit site in particular. This will be approached using data about links and in-links across a range of selected transit sites, which will be carried out in conjunction with further exploration of selected sites to assess the value of the automatically generated distinctions. In addition it may be useful to use a tracker agent on a small sample of users.

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Ratings and figures

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Cyberatlas http://www.cyberatlas.internet.com/
Nielsen Net Ratings http://209.155.36.114/index.jsp
Search Engine Watch http://www.searchenginewatch.com/
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