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Surfing for Knowledge in the Information Society

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This essay explores the use of a network sampling method to locate and map authoritative sites on the World Wide Web that are involved in the debates concerning Genetically Modified (GM) foods. The prospect of finding and navigating hot routes (and storylines) through the ‘issue networks’ is discussed. The essay concludes with implications for participating, both online and off-line, in the distinctive ‘information societies’ implied in the composition of issue networks.

Introduction

Quite distinct from its other popular manifestations as library, marketplace, dark room, rumour mill, parliament or pasteboard for the creative and the homely, the World Wide Web also may be conceived as a public ‘debate space,’ made up of a series of ‘issue networks’.¹ Indeed organisations, especially those practising an ‘.org-style’ mode of communication, openly make their positions known on their Web sites. Either in preparation for a major summit, or as a matter of course, active, ‘.org-style’ NGO’s, governments, corporations and less frequently scientific groups (i.e.,

organizations in the .org, .gov, .com and .edu domains, or the national subdomain equivalents) all put their viewpoints online per issue. In doing so, they publicly position themselves vis-à-vis other parties debating particular issues from a researcher-surfer's point of view. Such organisational positionings put debate on public display, or what we call 'public debate on the Web', with significant participatory implications.

Note that this definition of 'public debate on the Web,' and the prospect of participation by other active groups, are to be distinguished from more popular, 'cyber-democratic' notions of debate and participation, resident in the notions of a 'speaker's corner', a 'debate cafe' or other single comment spaces, like bulletin boards and forums. There, surfers are invited to leave comments for other passers-by, and for more specific surfing audiences that soliciting organisations have in mind. In these cases, 'participation' in 'public debate' is mainly for its own sake, largely because the channels of dissemination beyond the forum itself are rare, unclear, or absent.² In such a case, a surfer may feel as if she is participating, publicly, in a debate, but the stakes may be no greater than those of phoning into a radio talk show. This is not 'participation' in 'public debate on the Web' to which this paper refers.

In other words, we do not put our hopes on a single 'forum' site and analyze participating surfers' inputs as if they were the makings of meaningful debate with high stakes for current or future information societies. Rather, we view a spectrum of major and minor organizations' sites (and the deeper pages on their sites dealing with specific issues) as the makings of an issue network, and possibly public debate. The

key is to determine which organizations belong to the network of organizations dealing with the issue, and to query that network for debate. (Later we come to a strict definition of who's in the 'issue network', and who's out, thereby defining the notion of an issue network by a demarcation technique.³ We subsequently look for certain network properties to ascertain whether the parties in the issue network are engaging in debate.) The determination of the relevant players in an issue network is made by analyzing hyperlinking patterns.

It has been shown that organisations display their inter-organisational affinities, or make known their strategic affiliations, through hyperlinking.⁴ For some time now, the question *to whom to link* has been a serious matter of organizational policy.⁵ Whilst the rationale behind making a hyperlink may be viewed in many ways, the very act of linking and the selectivity it implies are emphasized here. Through selectively hyperlinking, parties are made relevant by the Webmaster of an organization. In this way, the act of not linking, non-reciprocal linking, or un-linking similarly reveals a *politics of association* by hyperlinking.

The extent to which issue networks constitute a debate has to do with common recognition of positions (the use of similar language), common routing directions (shared link recipients), and cross-domain participation ('transdiscursivity'). The last criterion is of crucial significance, for it may be stated plainly that narrower groupings through selective hyperlinking (inter-linking and network formation between only .com's, or between only .com's and .gov's) loosely map onto forms of

laissez faire or expert decision-making, respectively. As opposed to .com-centric or .gov-.com-centric networks, issue networks exhibiting transdiscursivity (or cross-domain acknowledgement between .org's, .com's, .gov's, and .edu's) are chosen as the exemplary Web debate spaces, to be navigated by surfers and the debating parties themselves.⁶

In all, the Web, when methodically charted, furnishes the surfer with a kind of 'debate geography,' comprising different topographies of social interaction and decision-making. We see these topographies as implying different kinds of information societies, made up of different kinds of knowledgeable participants. That is to say, if that topography is well-charted and well-navigated, it may be read and understood. It becomes a 'knowledge map' for debate rapporteurs and participants. The topography also may lead to novel forms of participation in public debate. Webby participation is achieved not by leaving a comment on a site (as in the 'cyberdemocratic' school),⁷ but rather by mounting a site, by positioning one's own viewpoints on the site vis-à-vis others in the issue network, and by becoming a 'stop' (or network node), preferably along the more 'heated' routes through the debate. In order to become a node, relevant organisations must link to you. Such is the achievement of certain actors in the GM food debate.⁸ The achievement of relevance in an issue network (i.e., making it onto the map) should not be underestimated at a time when agenda-setting authorities (not to mention security agencies) are beginning to look to the Internet and to vocal, well-organised, and highly mobile webby

networks for discussion partners, online and off-line.⁹ Locating new groupings of debating parties, in online and off-line spaces, at any given time and for any given issue, has implications for putting forward as well as organizing preferred ‘information societies’.

To understand (by navigating) any charted issue, however, a surfer-researcher must choose the starting points (or initial entry points to the Web) with care. That is to say, an understanding of an issue may follow from initial surfer preferences, and these understandings may differ greatly. Beginning with .org’s, for example, the surfer may be given to understand an issue through the particular discursive framings and hyperlinking behaviours characteristic of NGOs. Alternatively, .com or .gov starting points may open up different networks, routes and storylines.¹⁰ Indeed, in a recent study of the climate change debate on the Web, it was found that .com’s did not participate in the story of ‘climate change and developing countries’, and that .org’s did not participate in the story of ‘climate change and uncertainty’.¹¹ The converses held. So understandings of the climate change issue may differ substantially depending on the surfer-researcher’s preferred entry points to the Web, as .org’s and .com’s are (typically) organising different climate change debates to be explored. These .org-centric or .com-centric issue networks, explored by surfers, are very much unlike the multicultural and pluralistic space the Web is often held up to be.¹² By charting and then querying ‘transdiscursive issue networks’ we attempt to rescue a neo-pluralistic potential of the Web.

For the purposes finding debates and recommending preferred information societies, this paper outlines five entry points for creating an issue network, with varying combinations of .org's, .gov's, .com's, .edu's, depending on various surfer-researchers' preferences and judgement. We consider the extent to which the issue networks, created by different preferences, may be thought of as 'transdiscursive debates', the preferred information society. Counter-intuitively, we have found that 'controversial sites' sometimes lead to an absence of debate, whilst more 'mainstream' sites – e.g., the national Monsanto and Greenpeace sites -- introduce a world of highly contested positions and hot routes where the most Web traffic may flow.¹³ Here, the Web assumes the guise of a 'space of contestation' (in Saskia Sassen's phrase), where the 'great conversations' are taking place, not so unlike the ideal 'great good place' that idealistic Net rhetorics seek and sometimes find.¹⁴

Mapping Debate Spaces on the Web

Prior to mapping issue networks, debates, hot routes and storylines, parties must be sought. Here it is instructive to point to methods of locating relevant parties and mapping debates on the Web. In a series of papers, we have outlined various schools in the Web navigation and source 'recommendation' debate.¹⁵ At the outset, a crucial distinction is made between two approaches that pinpoint sites relevant to finding and studying Web materials, and ultimately Web debate. The first uses surfer recommendations (surfer tracing or 'collaborative filtering') to find relevant materials on the Web. The second (network rubbing or 'debate landscaping') sees the

Webmaster, not the surfer, as the recommending party. Whereas the ‘tracing’ approach views ‘hits’ by ‘collaborating’ surfers (assumed to be like-minded and symmetrically relevant) as the means to measure the relevance of Web materials, the ‘rubbing’ approach uses ‘links’ by ‘divided’ Webmasters as a means of measuring the relevance of parties to a debate. The key is to determine the authority of such sites, i.e., which issue sites should be recommended (and ‘landscaped’ in a knowledge map) for a debate navigator to explore.¹⁶

In order to determine the value of the landscaping technique, we carried out an initial case study. In the study -- on the emerging climate change debate -- we found that hyperlinks are meaningful. Individual organizations link selectively, not capriciously. We also discovered distinctive hyperlinking styles for .org, .com, and .gov, with .org’s highly networked; .gov’s only highly intra-networked; and .com’s lowly networked -- with the exception of Shell, which uses the Web like an .org to mobilise support. We also found that organisations take discursive positions on climate change on their sites, which can be mapped and read, as discussed above. Here, the key players are similarly located and mapped. In contrast to the climate change study, however, we have not mapped discursive positions; rather, the findings are made (and stories told) from mapping hyperlinks alone.

In this paper, we employ largely the same approach and sampling method for mapping online debates as in the climate change case, but with a series of different starting points and a number of methodological permutations different from those used in previous research. We are interested in finding the extent to which different

starting points (URLs) yield similar or different issue networks, and similar or different debates. In keeping with the much propagated Web finding that, on average, all sites are nineteen clicks (or nineteen degrees of separation) away from each other,¹⁷ we ask -- is it possible to locate similar issue networks on the Web using different entry points? By which entry points to the Web are similar qualities of networks found? Certain findings derive from overlaying the networks, as if on transparencies; the analogy is with archaeological guide books. Thus, atop pictures of the ruins of Pompeii one may place transparencies showing how the city looked before the eruption of Mt. Vesuvius.¹⁸ Layering information in an archaeological approach to web debates, may not only bring debate to life (or make the Web speak in new ways) but also provide a knowledgeable tour. This article asks whether and on what conditions there are preferred paths for debate navigators, and ultimately preferred constitutions of information societies.

There is an over-arching reason for exploring issue networks and mapping debates on the Web. It may be argued that there are two basic epistemological problems with respect to the Web and its use.¹⁹ That is to say, the Web designers (of .com, .org., .gov and .edu sites) as well as Web designer-engineers (of search engines, portals, etc.) face issues of maintaining a reliable and authoritative status for online versions of their institutions and viewpoints (as well as for their recommendation devices and spaces). Moreover, those who use the Web confront indexing issues, uncertainty, and a diversity of entry points to any given topic. We believe it is important to become better equipped to evaluate different Web entry points, and to

grapple with the basic epistemological problems of coming to an understanding (via the Web) of an issue – one type of ‘key word’ that search engines handle. In addition, we also consider what a Webmaster (and by extension, an organization) may do to organise, knowledgeably, an issue for a surfer-researcher. How, too, can a Webmaster aid an organisation in becoming a relevant party (gain significant ‘presence’) in an issue network?

Web Anthropology: Surfer-Researcher Preferences and the Location of Issue Networks

The preliminary step of the research involved a brainstorming session in which a number of methods (loosely defined) to evaluate one’s choice of entry points to the Web was enumerated. They include hits, links, search engines (key words), conventional media stories, public trust logics, associative reasoning, directories (yellow pages), ‘experts’, (Dutch-style) science shops and science help lines, and discussion lists. Significantly, each kind of starting point stakes some claim to recommending authoritative sources, and leading the surfer-researcher to potentially relevant networks of sources. The relevance of information yielded by hits, for example, rests on site popularity among surfers, by links on Webmaster recommendations, by media stories on journalistic method, by public trust logics on publicly trusted actors, by associative reasoning on Web literacy and ‘playing hunches’, by directories on taxonomy and encyclopedic completeness, by experts on recognised acumen, by (Dutch-style) science shops and science help lines on institutionalised public services, and by discussion lists on informed discussants.

While each has its merit, the ten were collapsed and narrowed to five distinct means for determining entry points. Each method was then assigned to someone familiar with it: search engines (to a frequent searcher of AltaVista and its ‘fancy features’), associative reasoning (to a literate Web-user), public trust (to a researcher versed in the public understanding of science), media stories (to a media researcher and designer of tools for digital journalism), and discussion lists (to a discussion list analyst).²⁰ Each trusted his or her own method; the methods were the surfer-researchers’ own ‘preferences’ (or personal net-archaeological methods to unearth potentially relevant and reliable material). Most of the surfer-researchers also depicted the networks of sources in their preferred manners in order to understand them (and navigate them, if need be).

The starting points yielded by the researchers’ preferences set into motion a more formally defined method to demarcate an issue network. The method was followed through to varying stages of ‘completion’ depending on the surfer-researcher’s ideas about the relevance of the network of parties found through the initial entry points and demarcation method. Thus at various stages of demarcation, certain networks of sources were abandoned, as is the surfing norm. Other surfer-researchers, however, remained ‘on message’, so to speak, locating and understanding issue networks.

The sampling method begins by locating ‘central players’ for the issue at hand, deemed to be the most relevant. (Details are provided below on the different means by which the researchers located central players, according to their net-

archaeological expertise and preferences.) Common outward links from the central players are then found, and a pool of organisations (the central players as well as the common recipients of links) become candidates for relevant parties in the ‘issue network’. In this group of candidates those organisations receiving common links (often three, depending on the preferred ‘authority threshold’) were deemed to be elected as relevant by the ‘issue network.’ Thus beyond individual preferences (and the expertise of the methodologists, broadly defined) is a commonly held viewpoint. Once the starting points are chosen, the Web (or networks on the Web) decide upon relevance. Such a move is largely in keeping with the core assumption built into all (automated) search engine logics promising relevant rankings, i.e., that ‘the Web’, one way or the other, is the judge.²¹

As for the entry points, briefly, the search engine technique follows from key word inputs, and involves interlinking the results of a search on GM food using AltaVista. Associative reasoning involves educated guesses of relevant URLs, e.g., by typing intuitively significant URLs, as milk.org, into the browser and then mapping the inter-linking relationships between the outward links located. Public trust involves a familiarity logic whereby the surfer-researcher seeks sites that are expected to be involved in the debate; in this case Monsanto.com and Greenpeace.org are the starting points. The media story technique follows all parties listed in an authoritative media source (in this case, a BBC online news story) to determine the degree of interlinking between these sites. Finally, the discussion list technique interlinks all URLs listed during a select time period on an active discussion list on the issue (GenTech).

Each final network map reveals relationships between sites found with respect to their degree of inter-linking, and their neighbourhoods.²² The research then explores what the networks share and how they differ (mainly with respect to the presence of nodes and routes; density is not included here). Do the networks provide diverse assemblages of sites involved in, for example, different contexts or subcultures of the GM food debate? Are the networks found contingent upon the different ways the Web is accessed and the respective preferences of the surfer-researchers, or is there ultimately one authoritative ‘mother network’ or type of network to be sought for the issue in question? Furthermore, is it worthwhile to locate and recommend one type of network by a triangulation of techniques, or through an analytical as well as normative argument for the network yielded by only one technique? (A similar debate concerns the value of using Metacrawler.com or other engines that amalgamate the results of leading engines for one query, or just Google.com, often considered to house the finest relevance logics of all leading search engines to date.)

As indicated, the debate on GM food has been selected as a salient example of an *emerging* science and technology debate. In part, this topic was chosen to provide a contrast to the climate change project, and more specifically to enquire into whether the GM food debate was ‘globalising’ in the same manner as climate change. The research on climate change revealed that the debate was well formed and key players well established; it was found to be a global debate, centring around a principle knowledge claim made by the Intergovernmental Panel on Climate Change (IPCC) -

its statement on “the balance of evidence suggests a discernible human influence on global climate.” The discursive positionings of the relevant players in the climate change debate could be mapped. In separate discursive analysis (mentioned above), broader climate change storylines and those participating in, for example, ‘climate change and developing countries’ and ‘climate change and uncertainty’ also were found. By contrast, the GM food debate is much fresher, and seems much less defined; in this way it can be perceived as a prospective structure awaiting surfer-researcher routing instructions. Perhaps the primary reason that the GM food debate appears so fresh is that there seems to be no statement around which a debate is formed. (Hence the absence of discursive analysis in this article.) Thus, as we touch on below, the terminology of the issue itself is only beginning to settle around ‘genetically modified food’ from earlier terms such as ‘genetically engineered food’ or ‘genetically altered food’ (from the North American context). The terminological differences also point to only a gradual emergence of a global, or globalising debate. Here it should be noted that the research does recognise the value of providing time series analysis, i.e., a series of snapshots of the different stages or states of the issue networks (and the discursive and organisational positionings) over time in order to chart the *globalisation of issues in the making*, among other interests.

Entering Issue Networks by Surfer-Researcher Preferences

Search Engine (AltaVista)

Search engines crawl and index information in significantly different ways.²³ It is beyond the scope of this article to recount the logics of search engines, leading or otherwise. Suffice it to say that of all key word entries, ‘issue’ searches, unlike those for single institutions or individuals, yield considerably different sets of returns across engines, as was found in the climate change research and anecdotally noted in the GM food work. (Hence both the value, in terms of diversity, and the dubiousness, in terms of authority, of metacrawlers.) For the search engine entry point, we used AltaVista because of its ‘relevance’ logics, the above-average size of its database and its capacity for advanced search specifications (‘fancy features’). Boolean syntax permits (among other things) an assessment based on the number of inward links to each located site.

The search engine sampling technique involved the following.

1) AltaVista was queried for “genetically modified food” and “genetically engineered food”. GM food was selected for further analysis because international organisations (UN and NGO’s), European bodies (EU as well as national governments and NGO’s) and transnational corporations (Monsanto and Novartis) were found to be using the terminology.

2) In the top ten returns, only four organisations appeared, which became obvious when the amount of links into the individual pages and the amount of links into the sites as a whole were examined.

3) Next, the surfer-researcher followed a preference to assemble the DNS information for the four core sites.²⁴ (Viewing the actual names and addresses of organisations, as one may do using Alexa, presumably informs the surfer-researcher’s own ideas about

their relative authority.) Figure one displays the four core sites, the lack of interlinking between them, and their DNS information (for the sake of completeness).

4) The researcher concluded the exercise because of the apparent absence of a network yielded by AltaVista. (None of the four core sites was interlinked.) The surfer-researcher lost interest.

<insert figure one about here>

Figure 1: Search Engine Technique. Depiction of the four organizational pages (with no interlinking between them) returned in AltaVista's first ten results from the query "GM Food", 26 July 1999. Image by Alexander Bruce Wilkie.

Associative Reasoning

The Associative Reasoning technique addresses the issue of personal interpretative processes (educated guesses) in Web navigation. Here the GM food debate is entered from URLs selected on the basis of a hunch about the relationship between a domain name and the issue. Such thinking is in keeping with general Web-literate expectations; that is, one could expect the most basic terms for a product or an issue would be turned into a domain name by a relevant source, perhaps after that source has purchased the domain from a 'poacher' - an individual or company that reserves a name only to sell it. In the technique, a series of generically relevant domain names was chosen, and plotted in the following steps.

1) The researcher's initial hunch about a potential relationship between milk and genetic modification led to the selection of a URL to begin the analysis:

<http://www.milk.org>. From milk.org the links out were followed in the hopes of finding a set of intuitively relevant parties (on the basis of domain name alone). Of

the 'relevant' parties found - a Dutch Ministry, two UN bodies and two main EU sites - there were no common link recipients; indeed there appeared to be distinctly separate networks around the EU and the UN, with GM food being one of many subjects. (A similar problem was encountered in the initial stage of the public trust logics method, below.) The organisations found were not deemed 'central' for their lack of 'network'. They were abandoned.

2) Keeping to the idea that relevant domain names are owned by relevant parties and that a series of .org's is more likely to lead the surfer-researcher to a network, to milk.org was added corn.org and grains.org as potentially relevant parties. (The domains gmfood.org as well as gmfood.com had been reserved by a poacher and a hit- and banner ad-seeker, respectively; the former is not online and the latter site contains only banner ads, and a borrowed engine.) Between these newly selected candidates for central players, four common link recipients were located: fao.org, wto.org, usda.gov and econ.ag.gov (a branch of the USDA). In previous work, of the candidates in the pool - the starting points and common link recipients - central players were chosen owing to the scope of their presentation of the issue, in terms of coverage and the transdiscursivity of the links in their link lists. Here the surfer-researcher now had seven sites (milk.org, corn.org, grains.org, fao.org, wto.org, usda.gov and econ.ag.gov) in the pool of actors to create a GM food issue network from associative reasoning and common link following. It was assumed that an .org/.gov mix of starting points would produce an issue network of sufficient scope and transdiscursivity.

3) All the outward links from the pool were captured, and, applying an authority threshold, only those organisations (sites) receiving 3 or more links from the central players were elected as relevant. The following sites were captured (but not depicted).

<http://www.epa.gov>
<http://www.econ.ag.gov>
<http://www.wto.org>
<http://www.fao.org>
<http://www.usda.gov>
<http://www.fas.usda.gov>
<http://www.ars.usda.gov>

The researcher decided to abandon the mapping of the network dominated by US governmental agencies, the UN and the WTO owing to the lack of transdiscursivity. It had become an inter-governmental issue network.

Public Trust Logics

Public trust involves a familiarity logic of a different kind from associative reasoning. Here the individual seeks organisations they trust and/or expect to be involved in the GM food debate. Here, the researcher 'trusted' Monsanto.com and Greenpeace.org to be in the GM food debate.

1) The method began with comparing the outward links from Greenpeace.org and Monsanto.com. The first sweep revealed that these two URLs had no links in common, and it was unclear which organisations discuss GM food. This phase resulted in an amorphous set of only generally related bodies. A preliminary assessment suggested that on the global level the GM food debate has not been articulated, institutionalised and inter-networked in the manner of the climate change debate. The phase was abandoned.

2) While the debate is not well formed on an international level, a national focus might reveal more telling inter-linking patterns. Thus the new experimentation began with the UK sites of Monsanto and Greenpeace. Here it was found that several organisations appear on both link lists. Then the link lists of the linkees (link recipients) were consulted, and from these lists the interlinkings between all the organisations in the pool (the central players plus the common link recipients) were plotted.

3) In keeping with the general network sampling method, it was decided to increase the authority threshold of the organisations within the network. For this sample of organisations only those organisations with more than 3 links in from the pool were selected.

4) An inter-link map outlining the network relationships between the key players in the (UK) GM food debate was crafted (see figure two); among other things it reveals (only) a gradual globalisation of the (scope of the actors in the) debate beyond the national context.

<insert figure two about here>

Figure 2: Public Trust Technique. Depiction of the organisations (and their interlinkings) in the GM food issue network, October 1999. Image by Noortje Marres and Stephanie Hankey.

Media Stories

Instead of employing a search engine, guessing URLs (in the associative reasoning method) or following the ‘usual suspects’ (in the public trust method), surfer-researchers may prefer to read and follow links from a story by an authoritative online (or off-line) news source to understand the issue. The attempt here is to ascertain

whether, at least in this particular case, the story leads to an issue network (and, perhaps, reveals whether the journalist followed conventional snowballing or newer link-following techniques in an emerging form of ‘digital journalism’). The media story demarcation procedure began with a piece from BBC Online News - “GM Experiment will continue,” July 26, 1999. The links within the story as well as those listed as ‘related’ links were collected.

1) Six URLs were listed on the story page. The surfer-researcher also was able to locate the URL for the other leading actor in the story, a ‘lone scientist’, whose homepage or institutional Web site was not listed on the BBC story page. The interlinkings of the seven sources were depicted (for the actors in the story and their interlinkings, see figure four). Given the authority of the news source, all sources were retained as central players.

2) All the links out of the seven URLs were captured, and given the large quantity of candidates for the pool only those organisations receiving two or more links from the central players in the BBC news story were captured. Thus the surfer-researcher employed an authority threshold at an earlier stage.

3) The interlinkings between all the 21 actors were then sketched (see figure 3a).

<insert figure 3a about here>

Figure 3a: Media Stories Technique. Depiction of the organisations (and their interlinkings) in the GM food story pool, from BBC online's "GM Experiment will continue," 26 July 1999. Image by Stephanie Hankey.

4) All the links out of all 21 actors were collected (some 720 in all). Applying the authority threshold only those organisations receiving 3 or more links from the network were mapped as relevant parties to the debate. 21 actors made the map (including the original seven). 17 actors, receiving 2 links from the network, were

stricken from the map. A lower authority threshold, which we could dub 'high' inclusiveness in the debate, would have allowed these actors onto the map. Here, however, they were deemed less relevant for a debate with 'medium' inclusiveness. ('Low inclusiveness would mean that the authority threshold is raised to 4 links in from the sample.) The technique seeks the highest authority threshold that still exhibits transdiscursivity. Such strictness also is in keeping with a perceived need to avoid 'democratic overload' in meaningful online and offline public debating.

5) The surfer-researcher made an alternative depiction of the network through 'actor profiles' (see figure 3b). In depicting the quantity of links each actor has received from the sample, these actor profiles demonstrate the relative authority of the actors according to the network.

<insert Figure 3b about here>

Figure 3b: Media Stories Technique, Actor Profiles. Depictions of the relative authorities (by quantities of links received from the network) of actors in the GM food story network, from BBC online's "GM Experiment will continue," 26 July 1999. Image by Stephanie Hankey.

Discussion Lists

Some of the more net-literate and interested users subscribe to discussion lists to gain insight on an issue, often from other subscribers of similar mind, politics, and/or profession. (The outcomes of such like-mindedness with regards to the content of the discussions as well as the link recommendations made could be dubbed the 'list effect'.) The discussion list technique described here interlinks all URLs listed during a five day window (July 28th – August 1st 1999) on an email discussion list debating

GM food. The discussion list, *GenTech*, was located by following links from the BBC story, discussed above. Though the lists could be reached by the surfer-researcher inclined to follow media stories together with discussion lists, we decided not to combine the URLs recommended by the discussion list with those recommended by the BBC story. We decided to keep the methods separate in this analysis for the sake of clarity. Network demarcation ensued.

1) The mailing list archives for email discussion list *GenTech*

(<http://www.gene.ch/archives.html>) were accessed for a five-day period (July 28th – August 1st 1999).

2) The URLs mentioned or referenced in the discussion list were collected, yielding 7 individual URLs.

<http://www.econ.ag.gov/whatsnew/issues/biotech/>

<http://www.econ.ag.gov/whatsnew/issues/gmo/index.htm>

<http://www.ul.ie/~biotech>

http://www.biotech-info.net/RR_yield_drag_98.pdf

<http://www.greenpeace.org>

<http://www.monsanto.com/monsanto/investor/summary/default.htm>

<http://www.hfxnews.southam.ca/story6.html>

3) Owing to the absence of a network around [greenpeace.org](http://www.greenpeace.org) and [monsanto.com](http://www.monsanto.com)

(found with the public trust method), the search for a network around these sites was abandoned by the surfer-researcher.

Preliminary Findings. Hot Routes and Storylines through Issue Networks

It should be emphasised, without remorse, that surfer-researcher preferences, which lie at the heart of ‘finding and knowing’ on the Web, were behind the decisions to abandon the makings of potential, incipient issue networks on GM food at various stages of the formal method, especially in the case of the search engine and less so for associative reasoning and the discussion lists. Apart from the surfer-researchers’ preferences, however, there are more formal (or intuitively obvious) reasons to discount the prospect of locating authoritative issues networks from the search engine. Since AltaVista indexes sites in its database according to self-described metatags and the location and frequency of key words in the site, the database, queried by the surfer, contains any number of sites with mention of GM food. The ones rising towards the top of the rankings are those receiving links from the entire Web (and not necessary from GM food sites). (Other engines, as Direct Hit, further boost sites on the basis of what surfers, querying the same term, have in turn clicked from the engine returns.) The top ten returns may not lead directly to a issue network, not only because ‘issue network authority logics’ are not built into AltaVista but because ‘relevant’ organisations may not be heeding AltaVista’s and other search engine watchers’ tips to rise in the rankings.²⁵ In order to gain a quick idea of a network surrounding an issue, using AltaVista, one or more intuitively authoritative entities may be chosen, and their links in checked through fancy features. The sites occurring frequently may hint at candidate central players. The surfer-researcher decided to abandon such a method owing to the lack of candidate central players in the first set of ten returns.

While further empirical research has yet to be carried out on its efficacy, associative reasoning is rather hit and miss. Whilst the ‘domain name wars’ (a summary term for battles between poachers and legal entities wishing to secure online equivalents of their names, with any number of grey cases) are beginning to result in a loose correlation between well-known institutions and domain names, ‘issue names’ may hardly correspond to authoritative issue associations, lobbies, researchers, institutions, what have you. This much is obvious. In our case, specifically, gmfood.com and gmfood.org are reserved by individuals or companies, and await purchase. Moreover, it is a stretch to expect even the most Web-literate to guess truefood.org (the name of the URL for Greenpeace’s GM food campaign), though the network yielded by milk.org, corn.org and grains.org should cause more formal surfer-researchers to take notice.

The discussion list results are a different matter, for the URLs collected are based on informed discussant recommendations. Though a larger scale analysis would be necessary, it could be expected that the ‘level’ of the list would produce different outcomes. Net-discussants generally assuming a high level of understanding of the issue may suggest more specific and obscure links (‘interesting to the discussion’), while lists exhibiting a tolerance for neophytes to the issue may suggest more basic starting points. In comparison with the outcomes from the other starting points in this research, the discussants recommended any number of palpably relevant parties (e.g., greenpeace.org and monsanto.org), but these did not yield an issue network, as was found in the opening stages of the public trust logics method. Only behind the UK domains was an authoritative network later discovered.

Where the media stories method is concerned, there is merit in assuming that the links recommended in online news stories by traditionally authoritative sources could lead to an understanding of the issue (or, intuitively, ‘the story behind the story’), however much the journalist’s method may not (yet) be that of a ‘digital journalist’. Indeed, it is an empirical question whether stories by individual journalists or individual news companies generally come (in the ‘related links’ sections following the story) with an understanding of ‘networked sources’. Such research, again with larger data sets, would have to be undertaken.

Here, however, we can put the issue differently (and more radically), in order to pursue an understanding (by navigating) of a relationship between digital journalism and online news stories. Could the journalist have written the story by following (‘her related’ and subsequently recommended) sources in a single surf? In other words, is there a route through which the media surfer-researcher could find the journalist’s storyline, on the basis of the recommendations made on the story page? Can one surf the story? With the caveat of the unlinked, ‘lone scientist’ being absent from the Web, here the answer is in the affirmative, at least with the use of the map.²⁶ Below, the single-surf story is highlighted within the original media stories GM food network map. Since the surfer-researcher could not navigate this debate by following links from the sites alone (the directionality is missing), the map would have to be inserted into the surfing process, for a ‘line’ through the journalist’s ‘story’ to be located. For the original seven story nodes to be surfed properly (so to speak), DETR would have to solicit a link from Genewatch.

<insert figure 4 about here>

Figure 4: Digital Journalism abstracted from BBC story. Depiction of a potential 'story path' between interlinked organisations mentioned in BBC online's "GM Experiment will continue," 26 July 1999. Image by Stephanie Hankey and Auke Touwslager.

One may compare node and route findings by overlaying the maps. To begin, it is noted that of the BBC journalist's recommendations, only four of the seven made the public trust logics map. Comparing the final outcomes of the media stories and the public trust network maps, each, however, with a somewhat different network location technique, one notes the overlap of nine nodes. The meta-map with interlinkings, figure five, could serve as a GM food navigator for surfers (and digital journalists) inclined towards a personal net archaeology of trusted actors and authoritative media stories.

<insert figure 5 about here>

Figure 5: Digital Journalism abstracted by overlay of two maps. Depiction of the overlay of the GM story map (figure 3a) and the GM public trust map (figure 2), showing relevant interlinked organisations and new, potential 'story paths'. Image by Marieke van Dijk and Richard Rogers.

Note that next to highly recognisable NGOs, two UK networks on genetics have achieved great presence on the map - a notable attainment of social relevance for groups presumably without great off-line notoriety. Other parties desiring relevance would have to solicit links from the mapped organisations. In keeping with the organizational policy of strategic hyperlinking, the soliciting parties (practicing 'hyperlink diplomacy') would presumably be vetted by the relevant organisations in

their consideration of the (potential) value of granting them a link. In other words, any solicitation on the part of the aspirants would be an attempted demonstration of relevance, in not so much a beauty contest, but rather a show of the value of their content and affinity. After all, a hyperlink is an invitation issued to leave one's own site for another.

Note, too, that the organisations link-listed presumably would not accept payment for granting a link. Thus the much criticised practice of 'preferred placement' - buying a top slot (i.e., a link and the subsequent hits that go with it) in certain search engine returns - would not apply here. Having located the relevant players in particular issue networks, one could also challenge other seating allotments and 'preferred placements' off-line, as at Davos, where one buys a place in that network in order to participate.

Conclusions. Issue Networks as Debate Spaces: Online and Off-line Implications for the Information Society

The means by which a debate navigator may surf routes (and potentially stories) through the GM food debate online has been treated in the case of the BBC online news story as well as in the outcome of the comparison of the media stories and public trust methods. Maps were overlaid and routes between hot nodes were depicted. These are the new surfer-researcher recommendations, quite distinct in method and 'spirit' from those served up by certain search engines, using metatags and link counts from the entire web, and by collaborative filtering, using previous

surfer paths to point another potentially lost surfer to more Web sites, to phrase it somewhat bluntly. Whereas the collaborative filtering method assumes that surfers on the whole know how to find the authoritative and relevant sources (and makes recommendations from the surfers' 'findings and keepings'), here it is assumed that aid may not be forthcoming from the collective surfer, often exploring issues through search engines or by other means. Indeed, the somewhat anthropological side of the research described above points to any number of abandoned routes made by allegedly expert surfers using not only the search engine but associative reasoning, public trust logics, conventional media stories and discussion lists techniques. These abandoned, expert surfer routes, traced and collectively filtered, probably should not be recommended to other surfers. Instead the recommendations made by Webmasters aids in the demarcation of the issue networks in which they operate, and aids in providing sources the network recommends. These are the authoritative recommendations of choice, it is argued.

More importantly, however, the Web is beginning to reveal distributions of relevant debating parties that have ramifications far beyond surfing for knowledge. In the piece arguing for the public trust logics method, the case is made for the location of an authoritative network displaying the greatest amount of transdiscursivity, or cross-domain acknowledgement.²⁷ It was pointed out that such a network exhibited one state of the debate from one particular authority threshold (three links in from the sample). Higher authority thresholds revealed only .gov's and .com's, and lower thresholds resulted in the inclusion of supermarkets, alternative lifestyle societies as

well as rogue web sites, which impersonate other sites to parody and critique.²⁸ A compromise between democratic overload and expert governance was made, in order to put forward a state of the debate with the highest authority measure, still exhibiting transdiscursivity (threshold three). The public trust network depiction, borrowed from astronomical charts, also may be understood as a roundtable. (Where the overlay map is concerned, the comparative researchers -- the authors -- decided to depict the parties as on distinct sides of a rectangular boardroom table, owing to the lack of interlinkings between the .gov's, .com's and .org's. Kinship linkers, each keeps largely to its own domain.) The roundtable network, contrariwise, exhibits the prospect of neo-pluralist participation, as well as potentially reflexive understandings of each other's viewpoints.

Though an issue network may be found through different entry points and by different net archaeological skills and preferences, the larger issue concerns the preferred 'information society' implied by the network. Here, normative recommendation has been made for the authoritative, transdiscursive network (the roundtable), with sets of relevant parties on the Web awaiting invitation to at least the virtual GM food summit, with potential storylines already in place for the agenda. As discussed above, the parties off the map are left to devise a new Web presence strategy. (They may use the maps.) If the network still does not acknowledge their authority in the debate, they would have to endeavour to buy their way in.

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Notes

¹ On the Web as library, cf. Christine L. Borgman, *From Gutenberg to the Global Information Infrastructure: Access to Information in the Networked World* (Cambridge, MA: MIT Press, 2000); on the Web as marketplace, cf. Dan Schiller, *Digital Capitalism: Networking the Global Market System* (Cambridge, MA: MIT Press, 1999); on the Web as dark room, cf. Allucquere Rosanne Stone, *The War of Desire and Technology at the Close of the Mechanical Age* (Cambridge, MA: MIT Press, 1995); on the Web as rumour mill, cf. Richard Rogers, 'Introduction: Towards the Practice of Web Epistemology', in *Preferred Placement - Knowledge Politics on the Web*, ed. Richard Rogers (Maastricht: Jan van Eyck Akademie Editions, 2000), 11-23; on the Web as parliament, cf. Roza Tsagarousianou, Damian Tambini and Cathy Brian (eds.), *Cyberdemocracy* (London: Routledge, 1998); on the Web as creative space, cf. George Landow, *Hypertext 2.0* (Baltimore: Johns Hopkins

University Press, 1997); and on the Web as homely space, cf. Christine Hine, *Virtual Ethnography* (London: Sage, 2000).

² See Richard Rogers and Noortje Marres, 'Landscaping Climate Change: A mapping technique for understanding science and technology debates on the World Wide Web', *Public Understanding of Science* 9 (2), (2000), 141-163. The more standard case for meaningful public participation on the Web, with major consequences for government, may be found in numerous government documents in northern European and Scandinavian countries, e.g., Netherlands Scientific Council for Government Policy, *Governments Losing Ground: An exploration of administrative consequences of information and communication technology* 54 (The Hague: Netherlands Scientific Council for Government Policy, 1999).

³ Our use of the term 'issue network' contrasts sharply to that of previous authors, who conceive of 'networks' much like 'communities'. Cf. Hecló's and McFarland's notions in David Ronfeldt and John Arquilla, *The Zapatista Social Netwar in Mexico* (Santa Monica: Rand, 1998).

⁴ For hyperlinking as an act of organisational strategy, see Graphic, Visualization and Usability Center, *10th Internet User Survey* (Georgia Tech, 1998), at http://www.gvu.gatech.edu/user_surveys/survey-199810/graphs/Webmaster/q51.htm.

⁵ Cf. Loet Leydesdorff and Michael Curran, 'Mapping University-Industry-Government Relations on the Internet: The Construction of Indicators for a Knowledge-Based Economy', *Cybermetrics* 4 (1), (2000), at <http://www.cindoc.csic.es/cybermetrics/vol4iss1.html>; and Moses Boudourides, Beatrice Sigrist and Philippos D. Alevizos, 'Webometrics and the Self-Organisation of the European Information Society', paper for the SOEIS project (Brussels: European Commission, 1999), at <http://hyperion.math.upatras.gr/webometrics>.

⁶ See Noortje Marres and Richard Rogers, 'Depluralising the Web, Repluralising Public Debate: The Case of the GM Food Debate on the Web', in Richard Rogers (ed.), *Preferred Placement - Knowledge Politics on the Web*, op cit. note 1, 113-136.

⁷ For example, Shell, a highly relevant actor in the climate change debate, sets up a forum (or surfer 'vent space') on its site where surfers may and do leave highly critical comments, which are sometimes answered by Shell employees, in one kind of participatory debate space. See <http://www.shell.com>.

⁸ For the notion of "becoming a relevant social group" and "achieving relevance," in reaction to W. Bijker's notion in his Social Construction of Technology (SCOT) approach, where groups are defined as relevant *a priori*, see Stuart Blume, 'The Rhetoric and Counter Rhetoric of a "Bionic" Technology', *Science Technology and Human Values* 22 (1997), 31-56; and Wiebe Bijker, *Of Bicycles, Bakelites and Bulbs. Toward a Theory of Sociotechnical Change* (Cambridge, MA; MIT Press, 1999). See also Richard Rogers and Noortje Marres, "French scandals on the Web and on the Streets: Stretching the limits of reported reality, *Manufacture* 1 (1) (2001), forthcoming.

⁹ Cf. David Ronfeldt and John Arquilla, *The Zapatista Social Netwar in Mexico* (Santa Monica: Rand, 1998); and Robin Mansell and Uta Wehn (eds.), *Knowledge Societies: Information Technology for Sustainable Development* (Oxford: Oxford University Press, 1998).

¹⁰ For a basic overview of the study of (non-linear) storylines through hypertext, from a literary studies perspective, see Paul Levinson, *The Soft Edge* (London: Routledge, 1997).

¹¹ See Noortje Marres, 'The Debate on Climate Change on the World Wide Web: A Network Analysis', unpublished ms., 1998; and Rogers, Richard and Ian Morris, 'In

the Bubble: Operating the Internet with Socio-Epistemological Logics', *Science as Culture*, (2001), forthcoming.

¹² Saskia Sassen, *Globalization and its Discontents. Essays on the new Mobility of People and Money* (New York: New Press, 1998).

¹³ 'Freshness' is gauged by the modification dates of web pages, and is a feature of the Alexa toolbar. Among other things, the toolbar retrieves 'files not found' from the Internet archive. See <http://www.alexa.com>; and <http://www.archive.org>.

¹⁴ Whilst not concerned with the Web, Ray Oldenberg's book is often referred to by Web enthusiasts in this context: Ray Oldenberg, *The Great Good Place* (New York: Paragon, 1989).

¹⁵ Noortje Marres and Richard Rogers, 'To Trace or to Rub: Screening the Web Navigation Debate', *Mediamatic*, 9/10 (4/1), (1999), 117-120.

¹⁶ On the manners by which electronic journals appear authoritative (and survive or not), see Rob Kling, 'What is Social Informatics and Why Does it Matter?', *D-Lib Magazine* 5 (1), (1999), at <http://www.dlib.org:80/dlib/january99/kling/01kling.html>. We also have explored automating the process of locating issue networks. The 'De-Pluralising Engine' (aka the 'Net Locator') crawls selected sites and returns co-linked sites; it has been crafted by the Design & Media Research Fellowship, Jan van Eyck Akademie, Maastricht, 1999-2000. The next generation of the co-link machine is to be used for the creation of an Atlas of Globalization Issues, at <http://www.issueatlas.net>.

¹⁷ Reke Albert, Hawoong Jeong and Albert-Laszlo Barabasi, 'The Diameter of the World-Wide Web', *Nature* 401 (6749), (1999), 130-131.

¹⁸ See for example *Pompeii-Herculaneum* (Roma: Vision, 1996).

¹⁹ These problems with the Web are summarised in Richard Rogers, 'The Future of Science & Technology Studies on the Web', *EASST Review* 15 (2), (1996), 25-27.; and Richard Rogers, 'Playing with Search Engines and turning lowly information into knowledge', *Mediamatic* 9 (2/3), (1998), 122-130.

²⁰ The search engine explorative exercise was performed by Alex Bruce Wilke, associative reasoning by Ian Morris, public trust by Noortje Marres, media stories by Stephanie Hankey and the discussion list by Andrés Zelman and Richard Rogers. The overlay work was done by Richard Rogers.

²¹ By contrast, Yahoo has human evaluators for every page submitted to the 'directory'; Yahoo thus should not be confused with a search engine.

²² Neighbourhoods have degrees of separation, which is to say that a site that is two clicks away is 'farther' than a site which is only one click away.

²³ For example, AltaVista and Google both boost ranking based on the amount of links into a site; whereas HotBot and DirectHit boost ranking based on the amount of hits a site receives. See <http://www.searchenginewatch.com> for a basic overview of search engine logics; for a lengthier discussion of search engine logics, and their implications, see Lucas Introna and Helen Nissenbaum, 'The Public Good Vision of the Internet and the Politics of Search Engines', in Richard Rogers (ed.), *Preferred Placement - Knowledge Politics on the Web*, op. cit. note 1, 25-47.

²⁴ DNS refers to the basic identification information about an individual site (e.g., to whom it is registered). The reader will note that the information for two of the four core sites was unattainable at the time of search.

²⁵ On the issue of search engine manipulation, and the drama behind seeking the top ranking, see Richard Rogers, 'Introduction. Towards the Practice of Web

Epistemology', in Richard Rogers (ed.), *Preferred Placement - Knowledge Politics on the Web*, op. cit. note 1, 11-23.

²⁶ As many others before us, we refer here to the future envisaged by one pioneer of 'paths of meaning' through hypertext, Vannevar Bush: "There is a new profession of trail blazers, those who find delight in the task of establishing useful trails through the enormous mass of the common record." Vannevar Bush, 'As We May Think', *Atlantic Monthly* 176 (1), (1945), 107. Cf. Greg Elmer, 'Hypertext on the Web: The Beginnings and Ends of Web Pathology', *Space & Culture*, 10, 2001, forthcoming.

²⁷ The GM Food Debate Map is inserted in Richard Rogers (ed.), *Preferred Placement - Knowledge Politics on the Web*, op. cit. note 1.

²⁸ A taxonomy of rogue web sites (and a 'rogue web site gallery') appear in Richard Rogers (ed.), *Preferred Placement - Knowledge Politics on the Web*, op. cit. note 1.