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*Mediated Health:*  
Socio-technical Practices of Providing  
and Using Online Health Information

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## Mediated Health

# Socio-technical Practices of Providing and Using Online Health Information

### **Astrid Mager**

*While most of the existing research about online health information (OHI) focuses exclusively on either the provider or the user side of communication circuits, this paper aims to integrate and discuss both sides and their mediated relation to one another. Drawing on Actor-Network Theory it conceptualizes the provision and use of OHI as socio-technical. It questions concretely how website providers position their websites and information, how users browse through the web and assemble information and interrogates the various concepts of OHI these different practices imply. It further asks how search engines and Google in particular come to play such a dominant role in the way health-related web information is provided and used. The paper concludes by evaluating the implications of the findings in regard to debates about the quality of OHI and the way web information is distributed and acquired on a broader scale at the present day.*

## Introduction

Medical information has been described as no longer being bound to medical institutions, but as having “escaped” into society at large by means of media and most notably new media (Nettleton, 2004). The internet in particular has become an important location where health-related information is circulated and accessed today. The web as a health information source has consequently been put at the centre of the social scientific research agenda. A remarkable body of research has been concentrating on the role online health information (OHI) plays in medical practices. Apart from a few critical voices (Henwood et al., 2003) the web has widely been described as a tool of empowerment that strengthens patients (Fox and Rainie, 2000; Hardey, 1999). However, controversy arises regarding discussions of the diversity and quality of the information available online. While some scholars celebrate the plurality of the information ranging from expert to non-expert knowledge (Hardey, 1999; Nettleton, 2004; Loader et al., 2002), others cast into doubt its quality against the background of medical criteria formulating warnings against misinformation (Eysenbach et al., 2002). As a solution to the problem medical professionals and policy makers alike have made demands for standardized quality labelling such as “Health on the Net” (HON)<sup>1</sup> (European Commission, 2002; Eysenbach et al., 2002). These labels certify websites as trustworthy when corresponding to medically defined standards and hence try to direct users to the “right” information. However these quality labels are hardly effective when it comes down to the actions of the end-user as a number of studies have shown (Eysenbach and Köhler, 2002).

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<sup>1</sup> HON, URL (consulted October 2008): <http://www.hon.ch/>.

One reason for this trend is that the idea of qualifying the source of a website does not correspond well to practices of using the web. Users have their own strategies for searching, selecting and evaluating health information and these are closely related to the way they usually browse through the web (Adams et al., 2006). This indicates that the focus of research should be shifted away from pre-defined concepts of "good" and "bad" quality towards actual information-gathering practices. Clearly, practices of acquiring and assessing OHI in turn can only be understood in relation to the way information is provided and distributed on the web. Search engines play a central role in these practices (Fallows, Rainie and Mudd, 2004). It has been shown that not all medical accounts are equally distributed in search engine results, but rather that certain representations are more dominant than others (Seale, 2005). This calls for new research investigating the relations of production of OHI taking technical specificities of the technology such as hyperlinks and search engines into consideration. Technology needs to be drawn into the story when trying to understand how OHI is carried out in practices.

This paper faces this challenge by investigating socio-technical practices of providing and using OHI. It conceptualizes the provision and use of the information as socio-technical because social and technical aspects are seen as equally important in these information practices. An analytical tool serving this goal is Actor-Network Theory (ANT) (Latour, 2005; Law and Hassard, 1999). ANT enables the researcher to symmetrically analyse human and non-human actors including website providers, users, their ideas and concepts, links, search engines, algorithms, keywords, pieces of text and other actors involved in the enactment of OHI. This perspective allows for an understanding of OHI "in the making", which sheds light on a new facet of discussions around health-related web information and its quality. Furthermore, while most of the literature on OHI exclusively focuses on the provider or on the user side, this paper attempts to discuss both sides and their mediated relation within one analytical framework.

The analysis is based on an empirical case study that investigated the provision and use of information about chronic diseases in the Austrian context. The study employed different research methods to get a grasp on website providers' and users' practices and narratives as well as technical elements involved in their doing. The central question the analysis posed was "how do website providers and users differently practice and conceptualize OHI?" The study concretely asked how website providers position their websites and information, how users find their way through the web and assemble information and what various concepts of OHI these different practices imply. It further asked how search engines came to play such a dominant role in the way OHI is provided and used. The resulting paper starts out with a critical review of debates circulating between notions of the web as an empowerment tool for patients and the web as a source of misinformation and harm. This is followed by a brief discussion of the "information politics" the web embodies shaping the delivery of information specifically focussing on links and search engines. The paper concludes by examining the implications of the findings regarding debates about the quality of OHI and the way web information is provided, distributed and used on a broader scale today.

## Online health information: Empowerment or danger?

Research about OHI has been divided between those contributions framing web information as potentially empowering, and others seeing it as potentially harmful to patients. Two debates in particular are relevant regarding the argumentation of this paper. Firstly, the distribution and identity of the many voices offering OHI are discussed especially with regard to empowering potential. Secondly, the quality of the information available and how users evaluate its trustworthiness is debated.

A number of scholars have framed the web as encouraging pluralistic approaches to health information challenging traditional knowledge hierarchies (Hardey, 1999; Nettleton, 2004). Nettleton (2004) has argued that new media enables a radical juxtaposition of diverse types of knowledge. In this context the web has widely been discussed as facilitating access to the production of health information. Patients, in particular, as new producers of knowledge have been put at the centre of attention. Having analyzed a diabetes self-help network Loader et al. concluded that virtual self-help groups are valuable sites “where discursive learning about one’s condition can be undertaken on a more equal basis” (Loader et al., 2002: 64). Gillett (2003) has argued that the web provides the possibility of challenging dominant media representations and providing alternative accounts of diseases such as HIV/ AIDS. Research having focused on particular websites or support groups may thus be seen as strengthening the ideal of the web as pluralizing medical accounts and dissolving hierarchies between expert and experiential knowledge. Considering the way OHI is distributed on the web, this imaginary ideal has nonetheless been challenged. Seale (2005) has investigated how medical representations of cancer are distributed in search engine results. His analysis has shown that net-savvy mainstream websites such as major cancer charities better succeed in gaining presence in search engine rankings, arguably at the expense of counter-cultural voices. One reason is that professionally maintained websites better managed to use links and search engine algorithms for their purposes. It is thus necessary to understand which strategies website providers employ to distribute their information online and which rationales accompany their doing.

As a consequence of the wide variety of OHI, the quality of the information has been debated. The quality issue has been framed as particularly important in the medical context “because misinformation could be a matter of life or death” as Eysenbach and Diepgen put it (Eysenbach and Diepgen, 1998: 1). This implies a leaning towards the risk discourse particularly dominant in the medical and policy realm. A broad range of studies has explored the quality of specific information offers on the basis of standardized medical criteria concluding that much medical information lacks in accuracy and completeness (Eysenbach et al., 2002). As a consequence, medical professionals and policy makers have called for quality criteria for websites (European Commission, 2002; Eysenbach et al., 2002). In the European context the quality label “Health on the Net” (HON) serves as a prominent example. By giving authority to certain websites, while denying it to others, the end-user should ostensibly be directed to evidence-based information defined by medical experts. But these quality labels hardly succeed because users barely acknowledge the source of the website let alone its quality status when surfing the web (Eysenbach and Köhler, 2002). Eysenbach and Köhler (2002) thus concluded that users have rather “sub-optimal” search techniques.

As in this argument much of the debate about OHI embodies a strong hierarchy between approved orthodox and insecure alternative information and attempts are made to reify traditional knowledge hierarchies with the help of standardized quality criteria. However, it seems that the web and social practices surrounding it are quite resistant to these attempts. One reason is that lay people have their own strategies of making sense of scientific knowledge not necessarily corresponding to experts' visions, as scholars in the field of science studies have argued (Wynne, 1992; Lambert and Rose, 1996). They have shown that lay people interpret and re-contextualize scientific knowledge by locating it within their own social contexts and experiences. Hence, these authors conceptualize lay people as epistemic actors in their own right (Jasanoff, 2005). In the context of OHI it has been shown that users' interpretations of medical information are deeply rooted in the way users practice the web (Adams et al., 2006, Wyatt, 2005). Adams et al. (2006) have shown that users piece together information from different websites. Instead of checking the source of a website, they evaluate information by comparing it with other pieces of information. The authors have thus argued that reliability is not a "yes-or-no kind of attribute" (Adams et al., 2006: 109), but that "the reliability of information for the patient becomes intertwined in the search process" (Adams et al., 2006: 111). Starting points such as search engines or particular portals therefore need to be taken into consideration because they are an integral part of the end-users' search and evaluation practices, according to the authors. Compared to the dominant orthodox view, this line of argument shows that further research regarding users' practices that includes considering technical specificities of the web is needed when trying to understand users' epistemic practices.

## Information politics and the delivery of web information

Contributions from new media studies are of key importance in further fleshing out the political dimension of the provision and use of OHI. A number of scholars have shown that the web has inscribed power relations and hierarchies that crucially influence the distribution of web information (Elmer, 2002; Rogers, 2004). Rogers has called the form of politics behind the delivery of web information "back-end information politics" (Rogers, 2004: 3). When it comes to information politics linking strategies and search engine politics have been centrally discussed.

Berners-Lee (2000), the inventor of the world wide web, has originally envisioned the web as an inclusive information network without borders, hierarchies or limits. However, recent work in network theory has shown that the web embodies strong hierarchies between well-interlinked hubs and weakly connected websites (Barabási, 2003). Scholars have started to map and analyse power relations focussing on the connectivity between websites (Park and Thelwall, 2006; Rogers and Ben-David 2008; Rogers and Marres, 2000). Rogers and Marres (2000) have analysed which websites are dominant in the representation of climate change on the web and what their positions are on the issues. In their analysis they conceptualize hyperlinks as recommendations to relevant actors in the field constituting issue networks. But link connections may also be read as social networks. Park and Thelwall (2006) have analysed link connections as an indicator of social relations between Asian and European Universities. Having found out that Universities of larger and richer countries tend to be better interlinked they have concluded that offline power relations are transferred to the

web. These examples show that links do not have a single meaning. Emphasis thus needs to be put on actors' underlying motivations and strategies constituting linkage patterns (Beaulieu and Simakova, 2006).

Due to their widespread use search engines and Google in particular have become central in discussions around information politics. Google has widely been framed as an information monopolists crucially determining how web information is presented and used these days (Battelle, 2005). Especially its proprietary algorithm that defines the order of search results has been critically discussed in this respect. The PageRank algorithm uses the number and quality of links a website gets as an indicator of the value of a website (Brin and Page, 1998). While the company claims to use "the collective intelligence of the web to determine a page's importance" (Google<sup>2</sup>), critics have argued that the algorithm produces a bias towards large, well-connected and commercial sites (Elmer, 2006; Introna and Nissenbaum, 2000). As they systematically give presence to bigger websites at the expense of smaller ones, Introna and Nissenbaum (2000) described search engines as political actors, because they run counter the democratic ideal of the web. As users mainly remain within the first 10-20 hits, search engines have further been framed as creating competition between websites for the "top ten seats" (Introna and Nissenbaum, 2000: 174). Further, search engines crucially influence how information is represented online. Elmer has argued that the "web browser-search engine couplet represents a disentangled web, where pages are taken out of their hyperlinked networks, and placed into keyword-subject indexes or linear rankings of individual pages" (Elmer, 2006: 10). Search engines hence not only determine the order of web information, but also the shape web information takes. What this means in terms of its use needs to be further investigated.

## Research question and methodological set-up

The central question guiding the following analysis is "how do website providers and users practice and conceptualize OHI and what role do technical elements play in their doing?". It specifically interrogates how website providers position their information online and how they conceptualize their information offer in relation to other information available on the web. It further analyses how users search for and assemble information for their purposes and how they perceive web information as a whole. In the study different research methods have been used to symmetrically analyse social and technical actors involved in these practices.

To grasp the provider-side, hyperlink network depictions have been developed with the software Issuecrawler<sup>3</sup> to identify communities of well-connected websites in the issue areas of Diabetes, Rheumatism, Asthma and Eczema with a specific focus on the Austrian web space. On the basis of these link networks and in combination with top search engine results for the chosen diseases seven dominant websites with a focus on diabetes have been selected for a deeper analysis. To cover the diversity of health information circulated online the chosen websites ranged from non-profit or-

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<sup>2</sup> Google, URL (consulted October 2008) <http://www.google.com/corporate/tech.html>.

<sup>3</sup> Issuecrawler.net by the Govcom.org Foundation, Amsterdam, URL (consulted October 2008): [http://www.govcom.org/Issuecrawler\\_instructions.htm](http://www.govcom.org/Issuecrawler_instructions.htm).

ganisations to commercial websites. Further, a kind of hybrid, a website provided by a diabetic sharing his expertise, while living from the website at the same time was chosen. The websites have been analysed and interviews with the site providers have been carried out in 2006 and 2007. The seven interview partners included three members of self-help groups dealing with diabetes and rheumatism, a general practitioner specialized in diabetes, a diabetic providing a semi-commercial website, a director of a general health portal, and a PR manager of a pharmaceutical company producing insulin and diabetes-related devices. The providers have been interviewed about their websites and ways of positioning them on the web.

To grasp the user-side online search experiments and successive qualitative interviews have been carried out in 2006 and 2007. Altogether 41 participants were recruited via bulk mail to do a web search on a chronic disease. The users varied in gender, age, educational background and internet skills to cover the variety of people searching for OHI. The participants were individually invited to do a search on diabetes, rheumatism, asthma or eczema, which were randomly distributed amongst the participants. The participants had no prior experience with the disease. Each of the participants was given a fictive scenario stating that s/he just came back from the doctor with a diagnosis of diabetes for example and some additional information about the disease<sup>4</sup>. The search of the participants lasted for about one hour and was stored as film and log file. Directly after the search the participants were interviewed about their search strategies and the information they found. Further, similarities and differences between this particular search and previous web searches the participants did on other health-related issues were discussed.

The hyperlink networks, websites and search films were all systematically analysed. The interview material was fully transcribed, categorised with the qualitative research software *ATLAS.ti*<sup>5</sup> and analysed following a Grounded Theory approach (Glaser and Strauss, 1968).

### Why Actor-Network Theory?

ANT offers the possibility to symmetrically combine technical and social elements within one explanatory structure (Latour, 2005; Law and Hassard, 1999). It has been described as a material-semiotic approach that conceptualizes social reality as an effect of a network of "materially and discursively heterogeneous relations that pro-

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<sup>4</sup> These search experiments enabled the researcher to get an understanding of the way users browse through, assemble and evaluate web information when doing a longer web search on a health-related issue. They also imply certain limitations: First of all, the idea of doing a longer web search after having gotten a (fictitious) diagnosis was imposed on the participants by giving them about one hour of search time. Secondly, although having addressed different dimensions of the disease the information given may partly have determined the search that followed. Finally, the participants neither experienced the encounter with the doctor by themselves, nor did they feel symptoms of the diseases. Hence the levels of urgency and specificity in information seeking identified in studies on information seeking models (Johnson, 1997) were lacking, which may have influenced their search strategies. In the successive interviews the hypothetical search situation was compared to real health searches the participants previously did to contextualize the material gained in the search experiments and prevent too biased results.

<sup>5</sup> ATLAS.ti Scientific Software Development GmbH, URL (consulted October 2008): <http://www.atlas.com>.

duce and reshuffle all kinds of actors including objects, subjects, human beings, machines, [...]” (Law, 2007). Following ANT, OHI as the central object of my analysis may be interpreted as enacted in a network of heterogeneous entities including website providers, users, their ideas and perceptions, websites, links, Google, automated algorithms, keywords, textual elements and bits and pieces of text just to mention a few of the various elements involved. A central argument in ANT is that the identity of each of the elements is not given, but rather enacted and stabilized by relational effects of the network (Law, 2000). Actors hence do not have a pre-defined identity, but their identity is dynamically made and re-made by the actor-network around them. This does not, however, imply that all of the actors in the network are of equal importance. Rather, certain actors may better succeed in gaining centrality than others. To grasp this, Callon (1986) has introduced the notion of translation. He has described how certain actors acquire centrality by becoming “obligatory passage points” through translating the others’ interests into their own. Obligatory passage points succeed in causing other actors to arrange with them to reach their individual goals (Callon, 1986). Successful translation also implies that the identity of the actors involved are shifted and transformed. Obligatory passage points may thus be seen as central nodes of translation and transformation as I will show by discussing Google as an obligatory passage point.

### **Socio-technical practices of providing and using OHI**

In the following, the empirical results are presented along three dimensions. Firstly, strategies website providers employed to position their sites and its information on the web and how they conceptualized OHI will be elaborated. Secondly, strategies users employed to find and assemble health information and how they perceived OHI will be analysed. Thirdly, Google will be discussed as an obligatory passage point mediating between the providers’ and users’ practices and narratives.

### **Website providers’ positioning strategies**

An analysis of the link networks, the websites and the providers’ narrations revealed that all website providers employed links to position their sites on the web in various ways. The link may thus be seen as a central element in the providers’ positioning strategies. It turned out that the providers’ positioning practices are closely related to the different agendas the websites follow. Non-profit organisations expressed the primary aim of informing and helping patients, but also that of recruiting new members or clients via the web in the case of self-help groups or the general practitioner. Providers of commercial websites addressed the economic dimension of the web much more directly. Besides informing patients, they articulated the need to raise their popularity, user traffic and sponsorship contracts to keep the sites and corporations behind the information running.

First of all, the strategy of putting up links to relate specific web information to other sources of information and contextualize the content beyond one’s own site was expressed. Corresponding to the goal of informing patients, links were seen as a way to recommend useful content to users. Having been asked whether he looks through the site he links to, the web administrator of a diabetes self-help group said: “*Of course.*”

(...) *I don't want to associate our empowered patients with quasi-charlatanism somehow. That's something I reject*". This quotation shows that links were seen as virtual pathways directing users to trustworthy information. In this mode of perception the quality of the information is bound to the credibility of the provider, the actor responsible for the content. The quality of the interlinked website further reflects the seriousness of one's own page. The strategy of using links to recommend trustworthy web sources was primarily expressed by providers of non-profit organizations such as self-help groups and the doctor's practice trying to represent their offline identities on the web.

Secondly, links were seen as a way to attract users. Links allowed website providers to give presence to other websites by linking to them and to thereby gain presence by getting a link in return. Talking about the early days of his website the diabetic providing the semi-commercial website explained these link exchanges as follows: "(...) *and you just start to look, what's on the web beyond me. (...) And we said: "Let's associate simply, because if someone finds us, and then you have the link page, well he may then look further, no? And with your site just the opposite."*". This strategy of attracting users may be seen as a collective strategy of gaining presence through mutual support. Especially self-help associations transferred their offline relations to the web in order to gain visibility. In this context links were also seen as pathways channeling users away from websites. That is why big websites such as the general health portal widely denied link exchanges, because they feared running the risk of losing more users than they gain. The director of the health portal added that losing users would equally mean losing appeal to sponsors. While most of the providers hinted at the economic dimension of the website between the lines, the PR agent of a pharmaceutical company openly said: "*Well, the internet, here we have to stick to the truth. It exists because it creates money.*". This shows that collective strategies of gaining visibility end where competition starts.

Finally, the strategy of collecting hyperlinks from other websites as a way to gain visibility in search engine results was expressed. All of the website providers were aware that users predominantly reached their sites most notably via Google. Referring to the competition between websites the providers expressed the need to strategically position their sites in Google's search results. Especially commercially oriented websites articulated a quite elaborate knowledge about Google's PageRank algorithm and how to optimize their sites accordingly. The diabetic providing the semi-commercial website said that he actively tried to allocate links from other websites to climb up Google. As only the number of links counts in this context he collected links from all types of websites including pharmaceutical companies. The director of the general health portal referred to technical support they receive from a professional agency in terms of links, keywords and metakeywords. Having been asked whether he cares about search engine optimization he answered: "*We of course do our homework. We once had a great workshop, where someone who is professionally dealing with these issues advised the editorial and technical department and told them what is important to consider.*". Although all website providers were aware of Google's algorithm the willingness to adapt their websites varied strongly amongst the providers. Providers of commercial sites considered strategies of gaining visibility in search engine results as part of their daily job. Contrary, non-profit organizations widely associated these practices with manipulating their sites and widely rejected this strategy.

## Actor-centred information epistemology: How providers conceptualize OHI

Talking to website providers about their positioning strategies revealed that a specific concept of OHI is implicit in their practices. All website providers had their own site and its content in the focus of attention. They presented themselves on the homepage and provided categories of various kinds. They framed their sites as coherent information packages with an inner logic to make it attractive for users. In this concept each sub-page appeared to be embedded in and contextualized by the overall information structure. Further, they perceived themselves as responsible for the content of the information package. This implied that the quality of the website is clearly bound to the provider and its image. Talking about the usefulness of quality seals the director of the health portal said: *"But it is still a matter of belief. I think in the end it is good if a name and a face is committed to the site. (...) Someone has been held responsible."* This quotation illustrates that the provider of the website was seen as a relevant authority guaranteeing the quality of the information.

On the basis of the concept of their own sites providers framed other websites similarly as enclosed entities having a certain identity. Being asked how she generally perceives the health information available on the web, the general practitioner answered: *"Well not so bad as it is often talked down. I think, it is fairly apparent how good the information is. Also because of these standard websites that have been established, netdoktor.at and .de and these sites."* Other website providers similarly referred to particular websites when reflecting about OHI in general. They articulated a clear understanding of the websites acting in the same issue area and which image they attach to them. The perceived identity and quality of the websites also played a crucial role in the way they interlinked their sites as described above. Website providers usually linked to the homepage of the website welcoming the user and disclosing its identity. This allowed for interconnecting web content, while keeping the boundaries between websites and their identities visible and secure.

In this way website providers tended to conceptualize OHI as composed of websites understood as coherent information packages linked to a specific actor. The quality of the information was seen as inextricably connected to the identity of the actor providing it. This was also mirrored in the way website providers interrelated their information packages with other information offers through links perceived as recommendation to trustworthy web sources. Website providers may thus be seen as having an actor-centred information epistemology.

## Users' search strategies

In the experiments and interviews with users it turned out that they hardly employed links to browse through the web because links were widely perceived as chaotic, misleading and time consuming. Rather, all of the participants having searched for a chronic disease employed Google making it a central actor in their practices. As the users widely clicked through the result list from top down they predominantly reached big websites such as general health portals and Wikipedia.org that were well-connected and displayed at the top of the results. In comparison, smaller websites

such as sites from self-help groups were ranked further down. This shows that websites getting links predominantly from their own community were outpaced by websites getting links from a broad range of sites as a result of covering all kinds of diseases and other issues. The crucial question however is why users employed Google and which strategies were embedded in their doing?

First of all, the strategy of using Google to thematically order the messy flood of health information was articulated by participants. Typing keywords in the input box enabled users to structure the information along their interests. Nearly all of the participants started by typing the name of the disease in the search engine thereby channelling them first and foremost to big websites. During the search process the participants specified their keywords and reached smaller and more specific websites. A female bookseller having searched for asthma described this process as follows: *“And then you can specify by combining different search terms, also using the functions plus and minus. Well, I think one has developed strategies how to reduce this complexity, well, complexity is the wrong word. How to take out of the immense quantity of information the things that you can maybe use.”* The choice of keywords hence played a crucial role regarding the virtual routes users took through the web. Consequently, participants actively changing and combining keywords – mainly younger and more experienced web users – were more likely to reach specific information such as alternative medicine than those participants that stuck with the same keywords throughout.

Secondly, Google was seen as initial point creating a feeling of order and security. The hierarchical order of search results was enjoyed because it provided the possibility of easily working through the information. It enabled to follow a linear order and to return to this order at any time. A school girl having searched for eczema articulated it like this: *„The first initial point was Google, then some sites and always back to Google and looking what comes next.”* Google thus appeared to be a home base that people could always go back to in case of trouble. The widely shared search strategy may best be described as “going back and forth” to Google. While some people argued that they go through the result list from top down because thinking that the best websites are placed on top, others argued that they go from top down out of pragmatic reasons. Participants further enjoyed that Google allows for selecting websites on the basis of headlines, small portions of text embedding the keyword and the address of the site. This allowed for an easy comparison between various pieces of information and facilitated to combine and evaluate different health information.

Although heavily relying on Google when navigating through the web, Google finally turned into a black box when participants talked about the way the search engine functions. Contrary to website providers, hardly anybody of the participants knew how Google technically works and ranks its results. Some further added that they would not understand it anyway or that they were not interested. Comparing the internet to a car, a middle-aged investment advisor said: *“What is happening in the background does not really concern me.”* This shows that they generally understood the search engine as a neutral tool pre-sorting web information for them.

### **Issue-centred information epistemology: How users conceptualize OHI**

Discussing search strategies with the users revealed a very different information epistemology in comparison to the providers. Users had their interests in tight focus. They generally tried to gain an overview of the disease at first. Later, they tried to find specific information such as nutrition and sports or particular medication in relation to the disease. Having been asked how she perceived her search on Diabetes a young woman said: *"First of all I put "diabetes mellitus" in the input field, then "type 2 diabetes", then "diabetes and sports", then different sports, "diabetes and martial arts", then "diabetes and kids" and "diabetes and hereditary", because I wanted to look if I can hand it down."* This quotation exemplifies that she described her journey through the web by naming topics and keywords that structured her search. Instead of websites or website providers, the majority of the participants referred to their interests when talking about OHI.

On the basis of their interests they browsed and perceived the web information. Basically climbing down the Google results while looking at textual elements embedding their keywords the source of the website quickly lost its importance. One participant straightforwardly said that the address *"actually does not make a difference. It's rather about hearing different opinions at first and if I would find contradictions, I would maybe start to think about who says what."* Apart from websites familiar to the users the address of the website was hardly recognized by the majority of the participants. Only in cases of contradictions actor-oriented considerations turned out to be relevant on a secondary level. As the users widely entered websites on a particular sub-page Google proposed, the providers of the sites were not necessarily revealed to the user on the sites themselves. These are reasons why users hardly remembered which websites they actually visited. Reasoning about a particular site a woman working as risk manager said: *"Although I cannot really tell which link it actually was, because you rarely remember the site address. One rather remembers that one has put a combination of keywords into Google and that the site appeared on the third position."* This quotation shows how central Google was in the users' information practices. This finding has wider consequences. Rather than the source of the website (as promoted by orthodox policies) other evaluation mechanisms were primarily employed to assess web information. Using multiple websites at once allowed for a comparison between different types of information. Recurring information becomes more and more trustworthy in the course of the search process as a couple of participants articulated. Hence it was not the website provider that guaranteed the quality of the information, but rather the fit with other pieces of information available online. The usefulness of the information in terms of users' needs and interests played a role in these evaluation processes as well.

Hence users tended to conceptualize OHI as an information flood made up of disconnected bits and pieces of information. Along their interests and Google's transformation of these issues in keyword indexes they created their own stories dissolving boundaries between websites and their providers. The quality and validity of the information was primarily seen as solidifying in the process of assembling a coherent story through repetition and non-contradiction. Users may thus be seen as having an issue-centred information epistemology.

### Google as an obligatory passage point

Throughout the course of this study it has become apparent that website providers and users practiced and conceptualized OHI in very different ways. Besides all these differences, they had one thing in common. Google played a central role in their actions. From an ANT perspective Google may be seen as an obligatory passage point being enacted and stabilized in both providers' and users' practices. Website providers adapted their linking strategies to Google's algorithm and users primarily used web information provided by Google. However the search engine should not only be seen as passively enacted by both actor groups, but rather as actively mediating and translating between them.

Website providers had the primary goal of positioning their information to advantage and attract users. They generally tried to reach this goal by interlinking their sites for various reasons. Having realized that users widely employ Google to browse the web providers have been attracted by Google in terms of gaining visibility if admittedly to differing extents. Google uses hyperlink networks to identify websites dealing with a specific search term and ranks the identified websites according to the number of links a website receives. Especially commercially oriented website providers have thus started to allocate extra links to climb up the results and gain a "top ten seat". The search engine displays sub-pages dealing with the particular keyword in a linear list. It presents the sites with textual elements comprising the keyword. This representation allowed users to browse and order web information along their interests with the selection of keywords, their primary goal. It further enabled the screening of web information by looking at the way keywords are embedded in the passages of text displayed. Google may thus be seen as translating the providers' logic of linking and goals attached to it into the end-users' logic of searching and their involvement of their interests.

The process of translation always implies certain transformations as ANT suggests. First of all, Google may be seen as creating strategic link practices on the provider side. Consequently, not all link pathways are meant to be recommendations and attractive to walk for users. This is why users increasingly turn away from using links towards using Google making it an integral part of their information practices. This in turn may further strengthen strategic linking and the stabilisation of Google as an obligatory passage point. But Google does not only change the order of websites, but also how their information offer is navigated and used. The search engine links to a particular sub-page containing a keyword someone has searched for. Hence, it does not lead to the entry point of the website as defined by providers, but rather takes out the sub-page of the site's hyperlinked networks and overall context (Elmer, 2006). Google may thus be seen as splitting up and de-contextualizing coherent information packages providers have tied. It presents disembodied pieces of information from different websites all corresponding to the same keyword, but not constituting a coherent information order. It opens the possibility of re-contextualizing the information for the users, but in turn also imposes the duty to do so.

## Discussion and conclusion

This paper has investigated socio-technical practices of providing and using OHI dealing with chronic diseases. It has shown that website providers use links to contex-

tualize their information, to attract users and to gain visibility in search engine results. It argued that providers' link practices are closely related to an actor-centred information epistemology. Website providers conceptualized OHI as a configuration of websites understood as coherent information packages configured by specific actors. These information packages related to each other, but clear boundaries between websites were drawn. The paper has further elaborated that users predominantly employed Google to structure the information along their interests, to work through the flood of information and to create a virtual home base giving a feeling of security. Contrary to the providers, the users attached an issue-centred information epistemology to their doing. They perceived OHI as an assemblage of bits and pieces of information to be individually assembled. Information from different websites merged and boundaries between websites were dissolved. The crucial question now is what consequences are derived from these findings regarding major debates about the quality of OHI.

The different information epistemologies providers and users bring to the table imply different concepts of trustworthiness. Providers conceptualize trustworthiness of information as clearly bound to the image of the site and the institution behind it. To them it is the provider who has the responsibility to guarantee the quality of the information. This corresponds to imaginary ideals of medical professionals and policy makers trying to regulate OHI by labelling websites as trustworthy. End-users, however, hardly recognize the provider of the website at all, let alone its identity. Instead of trusting sites as a whole they rather validate pieces of information by recurrence and how they fit into the overall information assemblage they are provided with. Users hence conceptualize trustworthiness not as a pre-given quality a websites has or has not, but rather something to be established in the course of their search practices (Adams et al., 2006).

Given the lack of significance users attribute to the identity of the provider it hardly appears surprising that quality seals awarding single sites have little effect. It shows that quality ratings defined by experts do not work because they ignore lay epistemologies rooted in the users' information practices. This suggests that stakeholders trying to regulate OHI should think about new ways of protecting users from misinformation by taking their lay practices seriously. One step into this direction the HON foundation has taken is to provide a toolbar to download. Users employing Google could check the toolbar in the browser to see if the different websites are certified instead of looking if the quality seal is displayed somewhere on the sites. HON may thus be seen as also paying its reference to Google as an obligatory passage point.

But what are the implications of Google having played out as an obligatory passage point in the analysis? First of all, it shows that Google should not be interpreted as a hegemonic information monopolist endangering the democratic potential of the web as an external factor, but that it needs to be understood as itself enacted and stabilized in social practices. Secondly, it underlines that concerns about information politics do indeed have to be evaluated when reasoning about the plurality of OHI and its empowering potential. Google turned out to evoke strategic link practices on the provider-side (ab)using links to gain visibility in search engine results. On the user-side Google appeared to direct users predominantly to big and commercial websites con-

firming its algorithmic bias (Introna and Nissenbaum, 2000). Finally and most importantly, the analysis has shown that Google's predominance matters not only in terms of information politics, but also in its epistemological implications. It transforms enclosed information packages into bits and pieces of information assembled around keywords. It hence enables users to browse and order the information along the issue-themes they are interested in. This strengthens the idea that control over the information increasingly passes from the providers to the users as Weinberger (2007) has argued. Google's transformation process further implies that the bits and pieces of information are taken out of a bigger context that gets lost on its way to the Google display. Consequently, web information as such appears lexical and disentangled. Hence, users are not only provided with the possibility of individually assembling web information, but also with the duty of re-contextualizing and making sense of it. Especially in the medical context it is thus of key importance to develop a more fine-grained understanding of these practices of sense-making, the skills required in these processes and the hierarchies spawned by unequal access to those skills. A first starting point may be to acknowledge Google not only as a political, but also as an epistemic actor crucially influencing how information is represented and shaped on the web.

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