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The Tools of Networked Individuals: Parallel Patterns and Strategies for Governmental and Research Institutions¹

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Abstract

Discussion of the role of the Internet in government and research tends to be 'institution-centric' in that e-Government and e-Research initiatives are both anchored in top-down strategies to provide information resources to citizens or researchers by place-based institutions, including governments and universities. In both institutional arenas, the diffusion of these services has been limited to small albeit growing proportions of their target audiences. In contrast, individuals with access to the Internet have taken bottom-up initiatives to obtain information and services from the space of flows of the Internet in ways that reach beyond the boundaries of both governmental and research institutions, but in ways that could compete with but also enhance existing institutions, such as by making them more accountable to their respective constituencies. Institutional actors in government and research need to more explicitly recognize and strategically adapt to the practices and tools taken up by networked individuals, such as by creating e-infrastructures that -- like the Internet -- enable rather than constrain bottom-up innovation.

Introduction

Are innovations in the use of the Internet and related information and communication technologies (ICTs) in government and research achieving their intended objectives? Are they resulting in unintended consequences, for better or worse? Many initiatives in e-Governmentⁱ and e-Researchⁱⁱ are based on visions of how institutions and their constituencies will use advanced ICT innovations, such as the Internet and Grid. While governments and research institutions need more empirical research about the ways in which citizens and researchers, respectively, use the Internet and related ICTs, it is only recently that use has become sufficiently widespread and well implemented that it has been possible to discern clear patterns of use and impact. This paper draws on early empirical research to discern these developing patterns, and to use these insights to inform

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strategies for improving the role ICTs can play in providing information and services across institutional sectors.

Empirically, this paper focuses primarily on evidence about how citizens use e-Government services in the Britain. While going into less detail, we compare these findings with work underway on how researchers use e-Research services. Based on these comparative findings, we argue that there are parallel patterns of Internet use in government and research that could point towards more successful strategies for both the e-Government and e-Research sectors. To see these patterns, however, it is first useful to develop a distinction between networked institutions and networked individuals.

Networked Institutions versus Networked Individuals

Government use of the Internet has been focused on initiatives to enhance existing structures of government. Across Europe, e-Government initiatives since 2000 have shifted from a focus on putting government information onlineⁱⁱⁱ to placing a greater emphasis on the development of applications that enable citizens to obtain services online (Lips et al 2006; Margetts 2006; Hood and Margetts 2007). While this shift is often viewed as a move toward more 'citizen-centric services' they remain institution-centric in that they are being designed to maintain and enhance the centrality of government in providing public services to citizens. They focus on the 'tools of government' (Hood and Margetts 2007) that might make it easier and speedier for citizens to go to their government for information or services, and keep government in the centre of activity. However, they are less focused on the tools of citizens.

Likewise, e-Research initiatives have focused on using advanced Internet and Grid technologies to support the role of existing research institutions, such as university computing facilities, and libraries. Super computer centres, campus Grids, institutional archives and repositories, and other major computing initiatives, such as digital libraries within universities, seek generally to maintain and enhance the role of the university in providing informational, computational and networking resources for their users – students, staff and faculty researchers.

Of course, it is important that institutional actors think strategically about how they can employ the Internet and related ICTs to support their traditional roles as well as create new ways to extend the quality or scope of their activities. In fact, since the 1970s, many have argued that information and communication technologies (ICTs), such as the Internet, are adopted, designed and implemented to follow and reinforce existing structures of power and influence in government and society at large (Danziger, et al 1982). However, the Internet does not only provide an opportunity to reinforce existing institutions. It enables the empowerment of what might be called 'networked individuals'^{iv} among

citizens vis-à-vis government, and among researchers vis-à-vis universities and other academic institutions (Dutton 2007).

In contrast to the thrust of institution-centric strategies, the growing use of the Internet and related ICTs are enabling networked individuals to reconfigure access to alternative sources of information, people and other resources. Such use enables networked individuals to move across, undermine and go beyond the boundaries of existing institutions, thereby opening new ways of increasing the accountability of politicians, press, experts and other loci of power and influence, what might be called a 'Fifth Estate' (Dutton 2007). These are neither personal nor institutional networks, but networked individuals that reflect many attributes of Manuel Castells' (1996) conception of a 'network society' and which are similar to what have been called 'Internet-enabled networks' (Hamel 2007).

This paper argues that an institutional focus has led to research giving too little attention to the tools of networked individuals in government, research and other institutional arenas. We show this first in the case of patterns of e-Government in the UK, focusing on survey research evidence, and then move to discuss related research that suggests how there are parallels in e-Research. Governments and research institutions might therefore be more alert to cross-cutting patterns of Internet and ICT use that are enabling citizens and researchers – in very similar ways -- to go beyond and complement if not substitute for more traditional institutional sources of information and services.

Approach and Methods

This theme emerged from comparison of patterns across two very different sets of empirical studies. One explored patterns of Internet and related ICT use in government, the other in academic research.

Patterns of e-Government were examined through data drawn largely from the 2003, 2005 and 2007 Oxford Internet Survey (OxIS), carried out by the Oxford Internet Institute, University of Oxford, which provides authoritative information on Internet use in Britain. The surveys are multistage probability sample surveys of individuals 14 years and older, and are carried out face-to-face. The 2003 survey was carried out in May – June of 2003 with 2030 respondents (a 66% response rate); the 2005 survey was conducted in February 2005 with 2185 respondents (a response rate of 72%); and the 2007 survey was conducted during March and April 2007 with 2350 respondents (a response rate of 77%).

Patterns of e-Research were uncovered through a more exploratory online survey of e-Researchers conducted in early 2008 (Dutton and Meyer 2008; Meyer and Dutton 2008). The survey was conducted by the Oxford e-Social Science team as part of an e-Infrastructure study of the National Centre for e-Social Science (NCeSS) supported by the ESRC. The Web-based survey was completed by 526 respondents drawn from e-mail sent to selected academic

mailing lists and through listservs of relevance to e-Research communities.^v More detail on each study is provided in the following sections of this paper.

The Case of e-Government

The main priority of governments in the early stages of the Internet and World Wide Web was putting services online, with relatively less emphasis paid to the needs of users or trying to improve uptake of services. Such an approach has been criticized in the aftermath of the 'dotcom bubble' and has been highlighted as one of the key reasons for a relatively low level of uptake of e-Government services by citizens and business (eUSer 2005). In response, governments have begun to place an increasing emphasis on ensuring that e-Government services are beneficial for, and used by, citizens. The current e-Government strategy for the UK, *Transformational Government*, highlights the need for efficient and effective services that provide citizens with choice and personalization in their interactions with government. Indeed, a similar user-centric focus has also become apparent in other OECD countries (OECD 2005); and has been reflected in some benchmarking exercises (e.g. Accenture 2004, 2005, European Commission 2007).

In order to gain a picture of citizen use of e-Government services in the UK, we analysed data from the OxIS surveys to explore Internet access and use of services by citizens; and the factors that may be influencing the use and uptake of e-Government. These include: the current level of Internet penetration, the level of demand for e-Government services (Reddick 2004), demographic variables (Howard et al., 2001; Thomas and Streib 2003) and attitudes, such as concerns over privacy (Warkentin et al. 2002; West 2004).

Internet Use and the Use of e-Government in Britain

As can be seen in Table 1, in 2007, 67% of people in Britain were Internet users, accessing the Internet either from home, work, school or college, a public library or an Internet café; as compared to 61% in 2005 and 59% in 2003. Alongside this increase in Internet use, broadband diffusion has escalated from 19% of households with Internet access in 2003 to 85% in 2007.

In comparison with other European nations, the UK fares well. According to figures from Eurostat, in 2007, 75% of people in the UK were Internet users compared to an EU(27) average of 60%. Broadband diffusion in the UK is also higher than the European average; 85% of households with Internet access at home had a broadband connection in the UK compared to an average of 77% across all 27 member states.^{vi}

Table 2 shows that the usage of e-Government was also increasing over this period but at a slow pace. Overall the percentage of Internet users who carried out at least one e-Government activity from those studied rose from 39% of all

Internet users in 2005 to 46% in 2007. We operationally defined the use of e-Government as carrying out at least one e-Government activity in the past year from among the following activities: finding out information (i.e. about an MP, local councilor or politician, about local council services, about schools, and /or about central government services), contacting government (i.e. emailing an MP and / or a councilor (OxIS, 2005) or “contacting a politician online (OxIS, 2007)) and conducting online transactions (i.e. paying central government tax and / or paying a local tax, fine or service) (see Figure 1).

Table 1. Individuals Use of the Internet in Britain (% of total number of individuals)

Variables	Attributes	2003	2005	2007
Total	All	59	60	67
Age	14-17	92	94	90
	18-24	76	78	86
	25-34	73	69	78
	35-44	73	69	77
	45-54	66	65	78
	55-64	39	53	58
	65-74	25	31	37
	75+	17	20	24
Lifestage	Students	98	97	97
	Employed	67	68	81
	Retired	22	30	31
Income	<£12500	-	29	39
	£12500-£25000	-	58	64
	£25000-£37500	-	70	82
	£37500-£50000	-	84	88
	£50000+	-	84	91
Gender	Male	64	63	70
	Female	55	57	65

OxIS 2003: N=2030 (All respondents); OxIS 2005: N=2185 (All respondents); OxIS 2007: N=2350 (All respondents)

In 2007, the most common activities tended to be those around finding out information (e.g. about local council services (29%) and / or about schools or education (23%),); carrying out online payments was less common – 11% of Internet users had paid a central government tax and 12 % had paid a local tax, fine or service online. Contacting government was far less common, with a mere 2% of Internet users reporting that they had contacted a politician online.

As can be seen from Figure 1 all the e-Government activities that were focused on information seeking or online transactions have increased slightly since 2005; yet the percentage of Internet users contacting a politician online has fallen. This

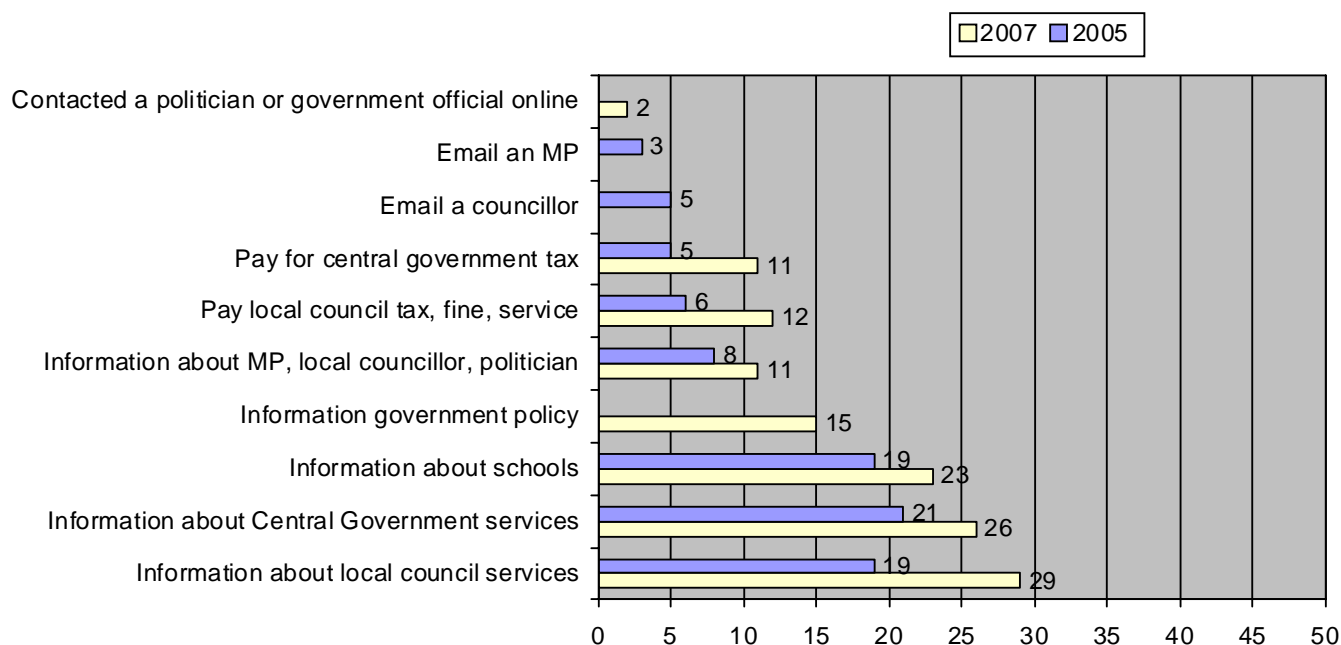
may be due to the slightly different wording of questions asked about this activity in 2005 compared to 2007.

Table 2 Use of e-Government (as % of total number of Internet users)

Variables	Attributes	2005	2007
Percent of Internet Users		39	46
Age	14-17	20	20
	18-24	41	32
	25-34	37	38
	35-44	42	44
	45-54	40	37
	55-64	48	25
	65-74	44	15
	75+	14	8
Gender	Male	40	48
	Female	39	44
Lifestage	Student	29	41
	Employed	40	50
	Retired	43	38
Income	<£12500	30	33
	£12500-£25000	32	39
	£25000-£37500	46	50
	£37500-£50000	34	59
	£50000+	57	61
Education	Basic	29	30
	Further	43	50
	Higher	55	66
Internet Skill	Poor / Bad	15	16
	Fair	32	38
	Good	41	49
	Excellent	53	65
Internet Experience	Novices	20	24
	Middle Range Users	35	39
	Veterans	58	61
Privacy Concerns 1: Personal information about yourself being kept in a file	Agree	40	50
	Disagree	44	43
Privacy Concerns 2: Use of computers is a threat to personal privacy	Agree	41	48
	Disagree	41	49
Privacy Concerns 3: People who go online put their privacy at risk	Agree	40	46
	Neither agree nor disagree	40	44
	Disagree	41	56

OxIS 2003: N=1198 (Internet users); OxIS 2005: N=1309 (Internet users); OxIS 2007: N=1578 (Internet users).

Figure 1 e-Government use in 2005 and 2007



OxIS 2005: N=1309 (Internet users); OxIS 2007 N= 1578 (Internet users)

From examining data from Eurostat, a similar pattern can be found across Europe, where information seeking is the most common form of e-Government activity. When compared with the EU, e-Government use by UK Internet users is the same as the EU(27) average. In 2007, 46% of Internet users in the UK obtained information from public authorities websites as compared to an average across the EU(27) of 47%; 31% of Internet users in the UK said they downloaded official forms from public authority websites as compared to an EU(27) average of 31%; and 25% of Internet users in the UK used the Internet to send completed forms to public authorities as compared to an EU(27) average of 22%

However, while the use of e-Government is gaining over time the level of e-Government usage in the UK is low compared to other similar on-line activities. For example, in the OxIS 2007 survey 90% of Internet users reported looking up product information on the Internet; 79% of users reported buying something online; and 53% of Internet users engaged in online banking (Dutton and Helsper 2007). Data from Eurostat indicates a similar pattern overall in the EU(27). In 2007 86% of Internet users in the UK used the Internet in the last 3 months for finding information about goods and services compared to an EU(27) average of

81%. 64 % of Internet users in the UK used the Internet in the last 3 months for using services related to travel and accommodation compared to an EU(27) average of 53% and 45% of Internet users in the UK used the Internet in the last 3 months for Internet banking compared to an EU(27) average of 44%. Why does e-Government lag?

Factors Influencing Use of e-Government

Before we address this question directly, it is useful to understand the factors that shape the levels of Internet and e-Government use by individuals. Here we examine the importance of demographics, level of Internet skills, level of Internet experience and concerns about privacy and data protection.

In Britain, similar to the rest of Europe, social inequalities in Internet use remain (see Table 1). Internet use is more common for those who are better off, younger or who have a higher level of education. Similarly, social inequalities also impact on the use of e-Government services. For example, data from the OxIS 2007 survey demonstrates that 61% of Internet users whose income was over £50000 per annum have carried out at least one e-Government activity compared to only 33% of those Internet users whose income is below £12500. Furthermore, 66% of Internet users who have experiences of higher education have carried out at least one e-Government activity compared to only 30% of those who have a basic education (see Table 2).

In the OxIS surveys participants were asked to rate their level of Internet skill on a scale from bad to excellent. Individuals' perception of their skill level has remained fairly constant from 2003 to 2007 and is positively related to use of e-Government. In OxIS 2003 60% of Internet users rated themselves as good or excellent and 8% rated themselves as bad or poor; in the OxIS 2005 survey 66% of Internet users rated themselves as good or excellent and 4% rated themselves as bad or poor; and in the 2007 OxIS survey 62% of Internet users rated themselves as good or excellent and 5% rated themselves as bad or poor. Of those Internet users who rated themselves as bad or poor in 2007, 16% carried out at least one e-Government activity in the past year; compared to 65% of those who rated their Internet ability as excellent (see Table 2).

The use of e-Government is also shaped by one's level of Internet experience (Dutton and Shepherd 2003, 2006). The level of a person's experience with the Internet is defined operationally as the amount of time a person reports to have been using the Internet. In OxIS 2005, 67% of Internet users were "middle range" users, that is, Internet users who had been using the Internet for more than 1 but less than 5 years; 25% were "veterans", that is, had been using the Internet for over 5 years; with the remaining 8% defined as "novices", that is, people who had been using the Internet for less than a year. Unsurprisingly, the number of veterans identified in the 2007 OxIS survey has increased; 41% of users are classified as veterans, 47% as "middle range" users and the remaining 12% are

novices. As can be seen in Table 2, greater Internet experience is positively related to e-Government use: in the 2007 OxlS 24% of novice users had carried out at least one e-Government activity compared to 39% of middle range users and 61% of veterans.

Concerns about privacy are often cited as an important factor that may influence use of e-Government. Indeed, the UK population is concerned about privacy and the use of computers. For example, in OxlS 2005 49% of all respondents thought that “the present use of computers is an actual threat to personal privacy in this country”, rising to 66% in 2007. Further, in 2005 54% of Internet users agreed or strongly agreed that “people who go online put their privacy at risk” which rose to 81% in 2007. In 2005, 17% of lapsed users had stopped using the Internet due to concerns about privacy and this rose to 21% in 2007.

Table 3. Logistic regression of use vs nonuse of e-Government

<i>Predictor</i>	<i>95% CI for exp b</i>				
	B	Standard Error	Lower	Exp b	Upper
Education (low / high)	0.953***	0.149	1.939	2.594	3.472
Income (low / high)	0.342*	0.151	1.047	1.407	1.892
Employed (no / yes)	0.467**	0.159	1.168	1.595	2.178
Age (continuous)	0.08	0.05	0.998	1.008	1.018
Gender (M / F)	0.088	0.144	0.824	1.092	1.448
Experience (continuous)	0.688 ***	0.187	1.379	1.991	2.874
Ability (low / high)	0.454 **	0.161	1.149	1.574	2.157
File is kept (no / yes)	0.320	0.199	0.932	1.377	2.034
Computers are a threat (no / yes)	-0.127	0.166	0.637	0.881	1.218
Internet is a privacy risk (no / yes)	0.04	0.168	0.722	1.004	1.396

Where B is the unstandardized beta coefficient and exp b is the odds ratio

* p< 0.05, ** p<0.01, ***p<0.001,

Model χ^2 (10) = 134.916, p<0.001, R²= 0.180 (Nagelkerke), correctly predicted = 66.8%, N = 929

However, the relationship between these privacy concerns and e-Government use are not, as one might expect, a straightforwardly negative one. As can be seen in Table 2, in 2007 the proportion of people who were concerned about privacy and carry out an e-Government activity is similar to those who weren't concerned about privacy. For example, of those Internet users who did believe that the present use of computers is an actual threat to personal privacy in this country 48% had carried out an e-Government activity. Similarly of those Internet users who did believe that information about the person is kept somewhere in a file 50% had carried out an e-Government activity.

In addition to the bivariate analysis above, a logistic regression was conducted in order to examine which of these factors: age, gender, income, education level, employment status, level of Internet skills and experience and concerns about privacy are the most significant when predicting if an Internet user will carry out at least one e-Government activity or not. As can be seen from Table 3, level of education and Internet experience were highly significant ($p < 0.001$), closely followed by whether someone was employed or not and their perceived level of ability using the Internet ($p < 0.01$). Income was also a significant factor ($p < 0.05$). The other factors included in this analysis, that is, age, gender and concerns about privacy were not significant.

In short, those who were more educated, employed, with higher incomes and more experience and skill online were the most likely to use e-Government services, but also the most likely to be using the Internet in general. Networked individuals are therefore able to take advantage of not only e-Government services, but also the Internet as a place to go for information.

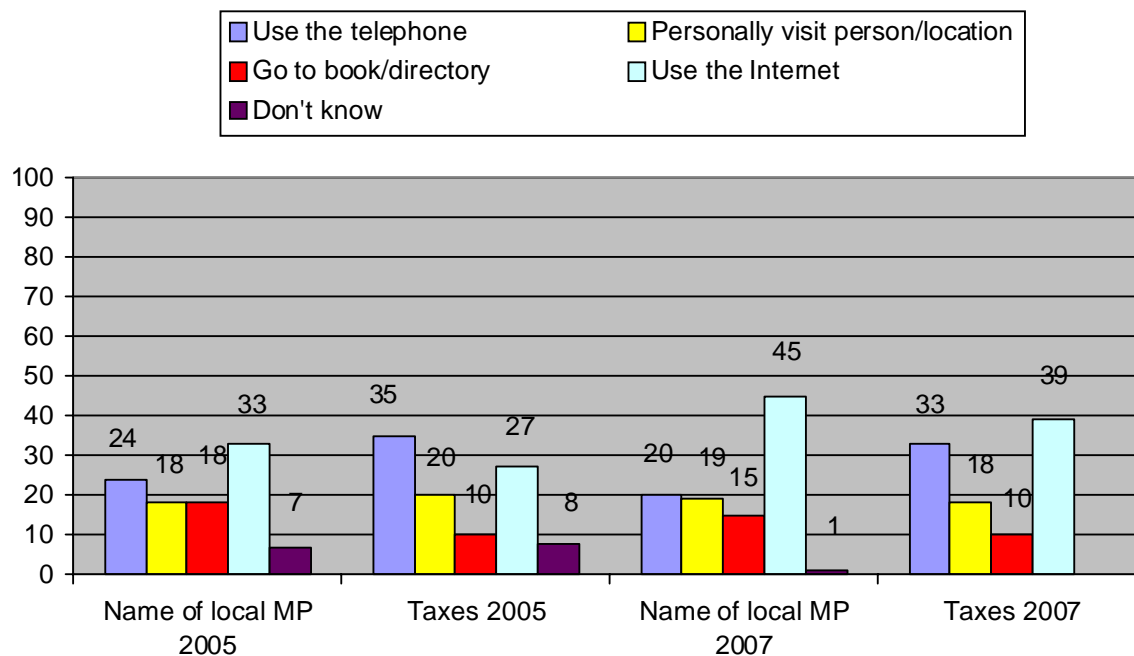
Going to the Internet vs Going to e-Government

Even given our liberal definition of e-Government use, the use of e-Government services is low in Britain and across Europe. It is lower than other comparable Internet activities. Perhaps people are less often in need of government services. Nevertheless, there is evidence to suggest that citizens are very much open to the Internet as a source of public information and services.

Figure 2 shows that there is a significant (and increasing) proportion of people in Britain who go to the Internet first for government information. For example in 2005, 33% of people would go to the Internet first to find out the name of their local MP and this rose to 45% in 2007. The number of people who would first use the Internet for tax information also increased between 2005 and 2007 from 27% to 39%.

However, just because people go to the Internet first for government information does not necessarily mean they would find the information on a government website. In 2005 and 2007, we asked Britons who use the Internet whether they mainly go to specific pages online, mainly use a search engine, such as Google, or use both about the same. The proportion that say they primarily use a search engine rose from 19 percent 2005 to 57 percent in 2007 (Dutton and Helsper 2007: 66). All evidence suggests that this trend is continuing since 2007, such as with the phenomenal growth of Google and other search engines.

Figure 2 Where would you go first to look for information in 2005 / 2007



OxIS 2005: N=2,185 (All respondents); OxIS 2007: N= 2350 (All respondents)

Indeed, online experiments exploring how UK citizens look for government information online suggest that the majority of people in these experimental trials go to a search engine to locate the information and in a number of cases are likely to find the information they seek on non-government sites (NAO 2007).

This pattern explains an apparent anomaly. Despite the fact that few people go to their government online, they go to the Internet to get information about government and other public services, such as health information. Rather than going to a place, they are going to what Castells (1996) has called 'a space of flows' through the Internet. Individuals are being empowered in ways that they can obtain information without needing to go to a particular place, or a particular institution.

In summary, the slow but steady increase in the proportion of the population who are Internet users and the high level of broadband diffusion in homes are positive trends for e-Government. Broadband access has a positive impact on uptake and use of e-Government services as download times and transactions will be faster and more convenient. As a result, the number of Internet users who are going to the Internet first for government information is increasing – even though they may not be going to their government.

Nevertheless, the value of the Internet as a place to go for public information does not resolve all the issues tied to e-Government. There remain social inequities in Internet use as digital divides persist, and the more highly educated, employed and more well to do, are more likely to use e-Government services compared to those who have fewer or no qualifications, are not in employment and have a lower household income. Those who use government services the most tend to be the groups who have the most limited access and use of the Internet and e-Government (Van Dijk and Hacker, 2003; OECD, 2005).

Given that the usage of e-Government services is low, and reinforces socioeconomic divides, governments should do more to encourage uptake and use. However, they should also consider the fact that citizens are also going online to get information about the public sector, without necessarily going to their government. While this means that the big picture might be more positive than initial counts of e-Government service provision might suggest, it does not overcome the digital divide. Networked individuals have more places to go for information and services through the Internet. So governments are not simply fighting a battle to get people online, they are also competing with a wide world of information providers. This realization should permit governments to reconsider their priorities in deciding what information and services are most critical for their constituents, who can obtain information and services from the space of flows of the Web as well as from their government.

The Case of e-Research

This apparent anomaly is not limited to e-Government. Albeit with less detail, it is useful to compare these patterns from the e-Government sector to findings emerging from a study of e-Research, where there also seems to be limited take-up of innovative e-Research infrastructures, while at the same time there is evidence of great vitality in Internet use by researchers.

The parallel patterns in the e-Research area emerged from our 2008 survey of researchers, which asked individuals about their use of e-Research tools, but also their awareness of various national e-Research initiatives. The need for a survey was driven in part by uncertainties over the take-off of Grid-enabled research initiatives around the world. Many of these initiatives have been inspired by technical innovations such as in Grid-computing, which enables multiple,

distributed computer resources to be used as if it were one machine through the development of advanced 'middleware'. In that sense, they were more supply or technology-driven than demand or user-driven and can in some ways be compared to the early phases of e-Government outlined above.

Put perhaps too simply, experiments anchored in the development of advanced Internet and Grid-computing have sought to identify killer applications or standard services that would generate demand, and attract a wide range of researchers, such as a multi-point video conferencing service, called Access Grid, or through popular Grid-enabled quantitative or qualitative data sets.

Compared with e-Government, e-Research is in some respects more mature, and in some respects, relatively new. It is more mature in that while academic institutions have been developing computing services in parallel with government, they were among the earliest developers and users of online computing, and the Internet. Many academics used e-mail and online services at least a decade before their introduction by governments.

However, it is more recent in respect to initiatives in advanced Internet and Grid-services, which many define as central to 'e-Research' initiatives, such as initiatives led by the UK's National e-Science Centre^{vii}, the UK's National e-Social Science programme^{viii}, and the US Office of Cyberinfrastructure^{ix}.

Secondly, the two areas differ with respect to the number and complexity of the different institutional levels that need to be considered. However, in e-Research, as in e-Government, there are multiple levels, which include: the department, the faculty or the division, the university as well as national and international initiatives. Research institutions have begun to talk about 'federated' approaches to computational and network service provision, in ways that seem to be inspired by government levels.

Our survey results are reported in detail elsewhere (Dutton and Meyer 2008; Meyer and Dutton 2008), but it is useful to highlight several general themes that emerged from our findings. Each of these illustrate the parallels across the two sectors.

Limited Awareness – Widespread Use

First, our survey suggested that most academics have a limited awareness of e-Research initiatives (Dutton and Meyer 2008). This was indicated by the responses to our survey, which was targeted to academics, people who might have had an interest. Our survey was able to locate a sizeable number of academics (526) with sufficient interest to complete our questionnaire, but they were a small proportion of the larger population. This is likely to be a consequence of the early stages in the development of e-Research initiatives. We expect awareness to grow in the coming months and years. However, it is

also likely to be a consequence of most academics finding their computing needs met by existing facilities and services.

For example, in academic institutions, many e-Research and related academic computing initiatives are reflected in similar developments outside of the institutional setting, as illustrated in Table 4. Universities provide e-mail and word processing facilities, but students or researchers can, and sometimes do, use outside services, such as commercial albeit free e-mail providers. Many universities are developing institutional repositories, but many academics deposit their working papers in open repositories, such as the Social Science Research Network, or enable access to them via their own Web sites.

Table 4. Illustrations of Alternatives to Networked Academic Institutions

Information / Service	Networked Institutions	Networked Individuals
E-mail, Word Processing	Campus E-Mail, PC Labs and Department Workstations	Commercial e-mail and Web-services via data centres
Computing Services	University Computer Centre, Computer Staff	Web-services, commercial providers, Online and telephone help lines
High-end Computation	University Super Computer Centre; Campus Grid	Grid; Shared Computing Facilities, screen savers; Cloud Services
Books, journals, information	Central and Departmental Libraries; Digital Libraries	Online Collections, decentralized Web, Semantic Web
Working Papers, Publications	Institutional Repositories, Archives	Open Access Repositories, such as Social Science Research Network (SSRN)
Video Conferencing	Access Grid linking University Research Centres	Web-based video conferencing on desktop machines

As one illustration, the Access Grid (AG) is one major e-Research initiative in the UK. Its developers refer to the AG as ‘an ensemble of resources including multi-media large-format displays, presentation and interactive environments, and interfaces to Grid middleware and to visualization environments’.^x Our own projects^{xi} have used the AG successfully, but when we asked researchers around the UK and abroad, only a small percentage had used the AG, and most used a variety of alternative technologies for audio and video conferencing (Meyer and Dutton 2008). Of course, this is an innovation which is only likely to be used by Everett Rogers (2003) called ‘early adopters’ with skilled personnel to assist them, but any innovation needs to be perceived to have a ‘relative advantage’ over these many options.

Secondly, our survey suggested that, particularly in the social sciences, the use of e-research tools was very eclectic, driven by individual, bottom-up innovation, rather than following a top-down standard or killer application. While we found four broad types of researchers, using similar ensembles of methods and approaches, such as qualitative v. quantitative researchers and lone e-researchers v. team players the overall pattern was of great variation across clusters of researchers, and even within clusters. For example, even among researchers conducting qualitative coding, many different applications were used.

Researchers were well networked and able to go to the Internet for software, data and support. They did not need to rely entirely on their university computer centre, or any particular e-Research initiative. In such ways, it is possible to see a parallel with e-Government in that also in e-Research we find a limited take-up of top-down ICT initiatives, while at the same time, the Internet and Web empower networked individuals as much as networked institutions.

Beyond e-Government and e-Research

Indeed, similar practices of networked individuals can be seen in other sectors, such e-Health, where at the same time, national e-Health initiatives seem to be faltering, which people are increasingly using a variety of information sources to learn about how to maintain good health and diagnose or manage illness. In Britain there has been a marked increase in the number of people searching for health information online, rising from 37% of Internet users in 2005 to 68% in 2007 (Dutton and Helsper 2007).

Likewise, the uptake and use of freely available Web 2.0 tools are presenting challenging questions for universities for teaching and learning (Berg et al. 2007). Research in e-Learning has demonstrated that students are increasingly using social networking sites, such as Facebook, blogs, wikis and other tools to support their learning alongside institutionally provided resources (JISC 2007). Not only the boundaries of the classroom, but the boundaries of the university are becoming more porous. A similar pressure is being applied by academics, who are demanding tools to be provided by their institutions, that are flexible enough to be used across the different disciplines, because they can access these tools outside the institutional setting (Eynon 2005).

Summary

In government, there is an adequate 'citizenscape' emerging to support new initiatives in e-Government. Focusing on Britain, we found that the levels and patterns of the use of e-Government services has lagged behind e-commerce and other sectors, but that it is growing and developing in ways that could indeed underpin initiatives in this area. However, the gap between use of the Internet

and use of 'e-Government services' suggests that the major barriers are not simply access to the Internet. Instead, the availability of engaging, easy to use services, and services that meet the needs of the public might increase take-up dramatically.

But more importantly, it may well be that citizens are going online for information instead of going to their government. The same could be the case in Research. Users usually do not go to a particular location, or even a particular place on the Internet, but increasingly rely on search engines to find information or services that could be located anywhere in the world.

This is significant because governments, libraries, newspapers, universities and other institutions are just beginning to realize that an increasing number of people are choosing not to come to them specifically for information and some services, but instead are going to a search engine on the Internet. Citizens and researchers alike might be better able to meet their information requirements in some circumstances through the Internet and its ability to empower networked individuals. Governments and academic institutions can use this phenomenon positively to rethink the services and information that they are most well positioned to provide, and which are better offered by others over the Internet.

In academia, researchers are well networked, but are not migrating quickly to emerging applications of advanced Internet and Grid technologies. It may be too early, and applications might require better interface designs, and higher levels of usability in general. But, as in government, researchers are going online to meet their information requirements through the Internet. For example, one of the more successful e-Research projects in the UK has been 'MyExperiment', which appears to succeed by helping to put a wide selection of research tools into the hands of networked researchers – supporting bottom-up innovation. Universities and research councils can seize this as an opportunity not to do all things, but to focus on developments that academic institutions can uniquely provide, leaving other services to be provided through this new 'space of flows'.

We are not suggesting top down strategies are misguided, but rather to provide a framework that accounts for the needs of individuals based on empirical evidence. E-Government and e-Research initiatives are critical in supporting technical and institutional innovation, but equal attention should be paid supporting the tools of networked individuals. E-Infrastructures, such as the Internet itself, is a set of standards that support bottom-up innovation.

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Notes

ⁱ E-Government is used to refer to the use of the Internet and related ICTs to support government operations and services.

ⁱⁱ E-Research is used broadly in this paper to refer to the use of advanced Internet and Grid technologies to support all phases of research within the sciences and humanities. In the UK, initiatives in these areas have been led by the National e-Science Centre (NeSC), the National Centre for e-Social Science (NCeSS), and the Arts and Humanities e-Science Support Centre (ahessc).

ⁱⁱⁱ In Britain, for example, the Office of the e-Envoy was established to promote the use of the Web by government departments. See: [http://archive.cabinetoffice.gov.uk/e-envoy/ukonline-top/\\$file/ukstrategy.htm](http://archive.cabinetoffice.gov.uk/e-envoy/ukonline-top/$file/ukstrategy.htm)

^{iv} The notion of networked individuals corresponds to the term 'networked individualism' used by Barry Wellman (2001) to break old dichotomies between the individual and place-based communities. I have developed and extended this concept in my work on the Fifth Estate (Dutton 2007).

^v These included the NCeSS mailing lists, and a variety of listservs, such as that of the ESRC and the UK's National Centre for Research Methods. Detailed descriptions of the survey methods and sample are provided by Dutton and Meyer (2008).

^{vi} Based on data from the Eurostat data in 2007.

^{vii} See: <http://www.nesc.ac.uk/>

^{viii} See: <http://www.ncess.ac.uk/> Also, see Halfpenny et al (2008) for a perspective on the development of e-Social Science.

^{ix} See: <http://www.nsf.gov/dir/index.jsp?org=OCI>

^x See: <http://www.accessgrid.org/>

^{xi} These are meetings and events organized around the NCeSS hub and the Oxford e-Social Science node of one ESRC research initiative.