

Barriers to the open government data agenda: taking a multi-level perspective

Abstract: A loose coalition of advocates for Open Government Data (OGD) argue that such data has the potential to have a transformative impact by catalysing innovation across sectors of the economy and by fostering democratic participation and engagement. However, there is limited evidence of the OGD agenda having such a transformative impact to date. This paper applies the Multi-level Perspective (MLP); an approach more typically applied to study transitions to a sustainable society, to explore the nature of the barriers currently faced by the OGD agenda. I argue that such barriers exist in two forms: barriers to the opening of data being incorporated into the daily practices of government organisations (implementation barriers); and, barriers to individuals and organisations creating social and/or economic value through the use of OGD (barriers to use). The empirical results presented in this paper include survey responses measuring the perceptions of UK OGD community members of 33 barriers to the OGD data agenda. These results highlight perceptions that: barriers to the breakthrough of the OGD agenda are widespread and relate to both social and technological factors; barriers relating to the demand for and use of OGD are prevalent; the structures of government and macro-scale institutions act as barriers; and, barriers to mobilising cultural and financial resources are widespread. Furthermore, the results show that there are contentious barriers where perceptions differ across the UK OGD community. Drawing on insight from the MLP I then analyse these results to identify implications for OGD policy and practice. I conclude by highlighting the initial steps taken in this paper towards establishing a theoretical grounding for the study of barriers to the OGD agenda. Finally, I suggest there is extensive scope for further research applying the MLP, and other closely related theories from the field of science and technology studies, in studies of OGD.

1 Introduction

Amongst policy-makers and practitioners there is growing interest in the concept of Open Government Data (OGD). Those promoting and exploring the potential value of OGD argue that opening up access to government data will have a transformative and system wide impact. For example, the UK Cabinet Office White Paper on Open Data identifies data as “the 21st century’s new raw material” with the potential to improve government and public services and to catalyse

“innovation and enterprise that spurs social and economic growth” (UK Cabinet Office, 2012b: 5). Whilst open data policy in the USA is characterised by the argument that making government data “accessible, discoverable, and usable by the public can help fuel entrepreneurship, innovation, and scientific discovery - all of which improve Americans' lives and contribute significantly to job creation” (Executive Office of The President - Office of Management and Budget, 2013: 5).

In contrast to the narratives emphasising the transformative potential of OGD, evidence that articulates and highlights the impact of OGD initiatives remains relatively limited. Zuiderwijk and Jannssen (2014: 11) suggest that to date “open data policies have resulted in limited transformation of the government”. Whilst McClean (2011: 1) goes further to argue that expectations of OGD having a transformative impact are unrealistic and that such expectations arise from a “pervasive tendency to focus on supply-side issues, coupled with a systematic lack of attention to how the data would be used once it was released”. However, empirical studies are beginning to emerge (Davies and Bawa, 2012) that paint a more mixed picture of the impact OGD initiatives. In a survey of 138 Swedish Information and Communication Technology (ICT) entrepreneurs Lakomaa and Kallberg (2013) find that OGD is central to the business model of 43% of respondents and conclude that OGD is an important enabler of innovation and entrepreneurial activity within the ICT sector. Furthermore, in an evaluation of an open data portal developed by the government of the City of Chicago (data.cityofchicago.org), Kassen (2013) identifies five citizen-initiated projects making use of the portal, and concludes that at a local level OGD can act as a catalyst for citizen engagement in democratic processes. However, an evaluation of a Dutch health service OGD initiative, seeking to improve customer decision making and promote transparency, concludes that the “impact on choice behavior, choice awareness and empowerment is rather small” (Ossebaard, Gemert-Pijnen and Seydel, 2012). In addition to such academic research, proponents of OGD are also seeking to identify evidence of the impact of OGD in order to justify investment in OGD initiatives. In one highly publicised example, analysis of newly available UK drug prescription open data has highlighted the potential for efficiency savings of £200 million p.a. (Open Data Institute, 2012), although to date the savings identified have not been realised, and it is unclear if and how they might be.

So against this background of transformative narratives and limited evidence of impact, OGD advocates and critics alike wait on clear evidence of the outcomes of the social, political and economic resources invested in the OGD agenda. Pending the emergence of such evidence, I adopt the assumption that the OGD agenda does indeed have the potential to have a transformative impact. Furthermore, by framing the ongoing development of the OGD agenda as an innovation process, I suggest that the agenda could follow a pathway from: emerging as a novel concept full of

promise; then completing a break-through into the mainstream; before having the transformative impacts. Furthermore, I then argue that the OGD has yet to complete a breakthrough into the mainstream and that such a breakthrough would see both: the opening of data being incorporated into the daily practices of government organisations; and the widespread creation of social and economic value through the use of OGD by a diverse range of actors across society.

In this paper I focus on the barriers that currently prevent the OGD agenda from completing a break-through into the mainstream including both: the barriers to the opening of data being incorporated into the daily practices of government organisations (implementation barriers); and the barriers to individuals and organisations creating social and/or economic value through the use of OGD (barriers to use). I draw on a theoretical framework, the Multi-Level Perspective (MLP) (Geels, 2002; Geels, 2005b), more typically used to develop an understanding of transformative socio-technical innovation in a sustainability context. Choosing this framework provides a relatively simple model for analysing innovation and change in large and complex systems which include both the supply of and demand for products or services (Smith, Voß and Grin, 2010).

In this paper I seek to make three contributions to the academic literature on OGD. First, I present the results of an exploratory survey seeking to address the question - where do members of the UK OGD community perceive that implementation barriers and barriers to use exist? Secondly, I analyse the survey results seeking to address the question – what are the potential implications of these perceptions for policy and practice? Finally, I apply the MLP seeking to address the question – what might a theoretical grounding for the study of barriers to the OGD agenda look like? The next section of this paper provides background to the research presented including an outline of the MLP and an overview of the development of the OGD agenda. I then set out the research method, followed by the results of the survey and draw on insight from the MLP in a discussion of these results. Finally I reflect upon the research process and bring the paper to a conclusion by highlighting opportunities for future work.

2 Background

2.1 The multi-level perspective

In this paper I seek to develop a theoretical grounding for the study of barriers to the OGD agenda by applying the multi-level perspective (Geels, 2002; Geels, 2005b; Rip and Kemp, 1998). This theoretical framework has been developed within the field of science and technology studies, and is

used to develop insight into the dynamics of transformative change in complex socio-technical systems. Here transformative change is considered to be the processes of transition from one dominate socio-technical paradigm to another. The MLP has been applied to develop insights into historical and envisioned cases of transformative change - most extensively in the transport and energy sectors, and often in studies of sustainability orientated innovations (Markard and Truffer, 2008). For example, the MLP has been used to explore transformative change in the transport system, analysing the historical transition from horse-drawn carriages to automobiles (Geels, 2002). Additionally the MLP has been used to envision pathways for transformative change from current carbon intensive energy systems to future decarbonised energy systems (Foxon, Hammond, Leach et al., 2013; Foxon, Hammond and Pearson, 2010).

From the multi-level perspective, complex socio-technical systems are conceptualised as 3 level structures (as shown in Figure 1) (Rip and Kemp, 1998).

- The *niche* level provides sheltered environments in which innovations, such as the OGD agenda, can develop outside the mainstream.
- The *socio-technical regime* level consists of the rules and current practices which established and now maintain the prevailing socio-technical system. In this research the regime of interest is the public data regime consisting of the rules, practices and technological interdependencies which maintain current approaches to creating, storing, sharing, using and reusing government data.
- The *landscape* level consists of the structures, rules (normative and explicit) and artefacts that are deeply embedded in the fabric of a society including political values, systems and institutions, economic paradigms and socio-cultural values.

Within such multi-level structures both innovation and system stability emerge from the dynamic interactions of social and technical factors taking place within and between each level (Geels, 2002; Rip and Kemp, 1998). Innovations leading to transformative change develop along a pathway mediated by these interactions including the four following stages (Geels and Schot, 2007).

1. an innovation emerges as a novel socio-technical configuration.
2. social and technological aspects of the innovation co-evolve within niches.
3. the innovation breaks-through into the regime and adjustments occur in the regime.
4. the new regime, incorporating the innovation, influences the landscape having transformative impacts.

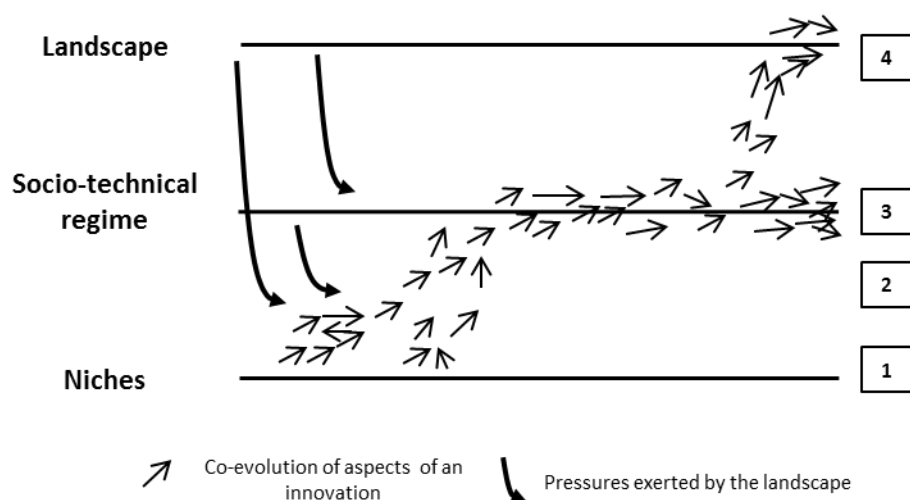


Figure 1: The Multi-Level Perspective - adapted from Geels and Schot (2007)

2.2 Development of the open government data agenda from the multi-level perspective

So how far along the four stage pathway towards having transformative impacts is the OGD agenda? In this section I outline the pathway of the OGD agenda to date arguing that the OGD agenda is yet to complete a breakthrough into the public data regime.

The emergence of open government data agenda

In this paper I consider the OGD agenda to consist of purposeful efforts to create social and economic value through the creation, storage, sharing, use and re-use of OGD. Furthermore this value is likely to be manifested in form of: new or enhanced citizen services developed by actors outside government (Longo, 2011); greater democratic participation as members of civil society engage in data-driven policy analysis (Longo, 2011); greater government transparency and accountability (Longo, 2011); and, innovation orientated to both addressing social needs and exploiting emergent business opportunities. When the OGD agenda emerged during the mid 2000s “the cry for opening up public sector data” was not new (Janssen, 2011: 446), rather the value of opening up data had been discussed since the late 1980s and formed part of the established freedom of information agenda. The OGD agenda was novel though in placing an emphasis on government transparency and accountability and the use of web technologies to access government data. Initially the agenda was supported by a small network of actors motivated by their visions (Geels and Schot, 2007) of how OGD could improve government and society. Bates (2013) identifies

that these networks drew together a mixture of activists focused on enhancing government transparency and democratic processes, researchers seeking an application for Semantic Web technologies, and small and medium size enterprises.

Co-evolution of social and technological aspects of the open government data agenda

In the decade since its emergence in the UK the OGD agenda has developed through the efforts of OGD activists and has been shaped by exogenous factors. From the MLP these ongoing processes can be conceptualised as the co-evolution of interconnected social and technological aspects (Geels, 2002) of the agenda. Below I provide illustrative examples of aspects of the OGD agenda that have co-evolved.

Initially much of the activity under the OGD agenda focussed on the supply of OGD, and indeed there has been considerable success in the development of a national open data portal that makes data available from across central government (UK Cabinet Office, 2013). There has also been considerable activity in local government leading to the release of “30 million items of open data covering every Local Authority in England” (Open Data Communities, 2014). The open release of government data at national and local scales has required changes to both ICT systems and social structures (e.g. policies, processes and relationships within government). There have also been efforts to demonstrate the value of linked data technologies in supporting the discovery and integration of OGD - e.g. the release of UK bathing water quality as linked data (The Environment Agency, 2014). There have also been increasing levels of activity with innovative organisations and individuals across the private and non-profit sectors and civil society developing applications that seek to create social and/or economic value from OGD. Private sector organisations have been developing new ICT services, underpinned by OGD, and are seeking to develop business models that enable profit to be generated from these services. For example, Placr has aggregated disparate sources of transport data, including OGD, to develop a business model based on the provision of transport data as a service (Placr, 2014). Organisations are also seeking to better address social needs and empower citizens through the development of services underpinned by OGD. For example, City Farmers, a community interest company, seeks to strengthen community relations using OGD to enable citizens to identify urban spaces for growing food (City Farmers 2013). More recently, driven by the recognition that more social learning around how OGD can be used is needed, a new institution the Open Data Institute (Open Data Institute, 2014) has been established to bring together actors from Government and potential data users. However, concerns remain

around the levels of demand for OGD and the extent to which such data is used (Zuiderwijk and Janssen, 2014).

The development of the OGD agenda has also been shaped by established interests and institutions within the public data regime. For example, the OGD agenda has been employed to further the neoliberal capitalist interests of actors seeking to bring about further marketization of public services and exploit government activity to generate financial profit (Bates, 2012). The influence of established commercial interests within the regime is also evident in the case of the open release of detailed drug prescription data. The National Health Service (NHS) held a consultation on the open release of this data in 2008 in response to requests for access by the pharmaceutical industry, and decided to continue to restrict access to the data due to concerns around “the potential for misinterpretation, misuse, and the identification of individual patients or prescribers” (The Information Centre for Health and Social Care, 2008: 3). However three years later this decision was reversed and the data was made openly available for reuse, despite persisting concerns around the pharmaceutical industry using the data to target, market and promote their drugs (The Information Centre for Health and Social Care, 2011).

Breakthrough into the public data regime

Breaking through into a socio-technical regime is gradual process (Geels, 2002), and in the case of the OGD agenda I suggest that the breakthrough into the public data regime is in progress but not yet complete. Furthermore, the aspects of the OGD agenda that have broken through have tended to be on the supply side (e.g. establishing OGD policy and portals and releasing key datasets) where the UK is recognised as leader in the release of OGD (Open Knowledge Foundation, 2013). However, I also suggest that on the supply side a completed breakthrough would entail the opening of data (i.e. the creation, storage and maintenance of OGD) becoming part of the day-to-day practices of government (Zuiderwijk and Janssen, 2014). Whilst on the demand-side a breakthrough would entail the widespread creation of social and economic value through the use of OGD by a diverse range of actors across society. Hence, barriers remain both to the opening of data being incorporated into the daily practices of government organisations (implementation barriers) and to individuals and organisations creating social and/or economic value through the use of OGD (barriers to use). In the remainder of the paper I use the term ‘barriers to the OGD agenda’ as shorthand for the aforementioned implementation barriers and barriers to use. Furthermore, these barriers can be conceptualised as the stabilising interactions of the rules, practices and technological

interdependencies (Geels, 2002; Geels, 2005b) that established and now maintain the prevailing approaches to creating, storing, sharing, using and reusing government data.

I now very briefly seek to address the question what do the rules, practices and technological interdependencies that make up the public data regime look like? Explicit rules in the form of government data related legislation mandate certain forms of data sharing and act to promote openness and reduce barriers to the OGD agenda. For example the European Directive on re-use of public sector information (2003/98/EC) has promoted policies for, and the practices of, making public sector data available for re-use (Janssen, 2012). Whilst, other forms of legislation necessarily act to create barriers to the OGD agenda by protecting the privacy of individuals (e.g. the Data Protection Act 2008). The practices of managing government data are embedded within the organisational models of data providers and user, for example the trading fund model makes the sale and licencing of public data central to the financial sustainability of some public bodies (e.g. the Met Office and Ordnance Survey). Whilst, the business models of established private sector users of government data, such as value-added data re-sellers, also emphasise the commercial dimension of government data. Furthermore, there are many technological aspects of public data regime including for example: the legacy government ICT systems that create data and metadata; the processes of managing changes to ICT systems; and, the ICT skills and data literacy of current and potential users of government data across society. The structures of the public data regime are strongly shaped by a broad range of pressures from the landscape from “the historically secretive nature of the U.K. state, to the increasing commercialization of information, prioritization of capitalist interests, and changes in state revenue generation during the neoliberal era” (Bates, 2013: 124). The paradigms of public management reform have also been key influences on the structures of the public data regime. The legacy of reforms shaped by the New Public Management (Dunleavy and Hood, 1994) paradigm - which emphasises the importance of financial incentives, competition and the fragmentation of public bureaucracies - can still be observed in the public data regime (e.g. in the trade funding model discussed above). Whilst more recent reforms shaped by the Digital Era Governance paradigm – “focusing on reintegrating services, providing holistic services for citizens and implementing thoroughgoing digital changes in administration” (Margetts and Dunleavy, 2013: 1) – have also shaped the regime. For example, the UK Government’s moves toward delivering public services as digital by default (UK Cabinet Office, 2012a) have and continue to change the ways in which government data is created and managed.

A further important question arises when considering the potential breakthrough of the OGD agenda – what form might a breakthrough take? I argue that the form a breakthrough takes can be

crudely characterised by the degree to which it lead to social progressive changes across the regime (e.g. enhancing government accountability through civil society's scrutiny of OGD) versus the degree to which it reinforces established structures and interests (e.g. supporting neoliberal narratives on the need for further marketization of public services). Furthermore, I suggest that if the breakthrough is broadly socially progressive, in time the OGD agenda may then influence the landscape level and have a transformative impact across society that includes changes in "attitudes and values, strategies and policies, organizational structures and processes, delivery systems and services" (Haxeltine, Avelino, Wittmayer et al., 2013: 4).

To conclude this section I briefly outline how the MLP is applied in the remainder of this paper: first, to develop a framework for analysing barriers to the OGD agenda; secondly, to interpret the empirical results presented within this paper and identify implications for the policy and practice of OGD; and thirdly, to develop a theoretical grounding for the study of barriers to the OGD agenda.

2.3 Barriers to the open government data agenda

The academic literature directly focused on identifying the barriers to implementing OGD and barriers to using OGD is relatively small but growing (Conradie and Choenni, 2012; Janssen, Charalabidis and Zuiderwijk, 2012; Martin and Clegg, 2012; Zuiderwijk, Janssen, Choenni et al., 2012). Necessarily initial work in this area has focussed on mapping the social and technological barriers to the implementation and use of OGD. Zuiderwijk et al. (2012) present the most comprehensive mapping of 118 socio-technical impediments (i.e. barriers) identified through a review of the academic literature and an empirical study of the perception of barriers of the OGD community. Whilst Conradie and Choenni (2012) applied a participatory action research method to identify process barriers to the release of open data by local governments. The authors identify major barriers including the low priority given to OGD activities and the opacity of data ownership within local government organisations. Furthermore, barriers to the OGD agenda can also be identified in research adopting a critical perspective on the OGD agenda (e.g. Bates, 2012; Bates, 2013; Gurstein, 2011; Janssen, 2012; Longo, 2011), and in studies of OGD initiatives and activities (e.g. Kassen, 2013; Linders, 2013). However despite this progress identifying barriers and developing policy recommendations to overcome these barriers, a theoretical grounding for the study of barriers is yet to be developed.

3 Method

The research method I adopted consisted of three stages: developing a provisional framework for analysing barriers to the OGD Agenda; identifying such barriers in the academic literature and OGD related policy; and, conducting an exploratory survey across the UK OGD community to develop understanding the perceived prevalence of these barriers. Each stage is now described in the three subsections below.

3.1 A provisional framework for analysing barriers to the open government data agenda

In this section I describe the provisional framework used to analyse barriers to the OGD agenda, developed by adapting an established framework for analysing niche-regime interactions in energy systems (Foxon, 2011). In the framework I have attempted to capture the complexity of the interacting factors relating to the barriers, whilst avoiding an attempt to establish a ‘theory of everything’. The framework identifies five key factors – digital technologies, user practices, public management practices, institutions and resources - relevant to the analysis of barriers to the OGD agenda as detailed below.

I have adopted the definition of technologies as “configurations that work” (Rip and Kemp, 1998: 331); more specifically, configurations that include tangible artefacts, the skills of technologists and users, and the interfaces of artefacts with the wider technical infrastructure. In this paper I focus on *digital technologies* and the data which they store, manipulate and exchange using discrete representations. *User practices* can be defined as the “routinised, culturally embedded patterns of behaviour” (Foxon, 2011: 2263) of the users of government data including, for example, the processes and procedures of organisations that use of government data and the established business models for commercial exploitation of government data. Similarly *public management practices* can be defined as the “routinised, culturally embedded patterns of behaviour” (Foxon, 2011: 2263) of government organisations including the processes of data and ICT management, and established data related policies. Furthermore, *institutions* can be defined as rules of the game (North, 1990), for example the sets of rules which connect data users and government organisations including data markets and regulatory frameworks for government data. Finally, I apply the sociological theory of Bourdieu (1986), as interpreted by Navarro (2006), to define the *resources* drawn upon by actors shaping the OGD data agenda as including: *social capital* - the networks that connect actors; *cultural capital* - cultural goods and services (e.g. skills, knowledge); *economic capital*

- money and other assets that can be directly and immediately converted to money; *symbolic capital*: the means available on the basis of (perceived) prestige or legitimacy.

3.2 Identifying barriers to the open government data agenda

Initially I identified a set of 58 barriers to the OGD agenda by reviewing the international academic literature¹ and OGD related UK policy documents. In this exploratory review I identified sources based on my experience in OGD related research and practice, and through searches of online databases of academic articles and the World Wide Web; additional sources were then identified by following up references in the texts reviewed. This exploratory approach reflected the purpose of the review, which was to inform the development of the subsequent survey rather than to identify an exhaustive list of barriers. I then identified a further 12 barriers through observation of two UK OGD related events: a workshop, hosted by the UK Cabinet Office Transparency Team, to identify barriers to implementing the OGD agenda in central government and barriers to OGD use (October 2012); and a more general forum, hosted by the UK Government Linked Data Working Group (data.gov.uk, 2012) (September 2012), considering the synergies between the linked data and OGD agendas. These observations did, however, introduce the possibility of a bias toward identifying implementation barriers given the majority of attendees of both events were members of public sector data provider organisations rather than data users.

The preliminary list of 70 barriers identified was too extensive to present within an online survey. So based on my experience in OGD related research and practice, and feedback from a pilot survey² in December 2012, I developed a more concise list of 33 barriers (see Figures 2-4) by aggregating related barriers and removing barriers where the supporting evidence was limited. Based on the feedback from the pilot I also: restructured the survey to present the barriers in smaller groups (rather than a single list); re-worded many of barriers to improve readability; and, identified channels for promoting the opportunity to participate in the survey. I then classified each of the 33 barriers as relating to one or more of the factors identified in provisional analytical framework (outlined in Section 3.1) as follows: digital technologies 14 related barriers (D), user practices 9 related barriers (U), public management practices 20 related barriers (P), institutions 7 related barriers (I) and resources 13 related barriers (R).

¹ This review was conducting in October 2012 prior to the publication of the Zuiderwijk et al. (2012)

² The seven responses from members of the UK OGD community to the pilot survey are not included in the results section of this paper.

3.3 Conducting an exploratory survey

Adopting an exploratory and interpretivistic research approach, I conducted a web-based survey (January - March 2013) with the objective of gathering data on perceptions held by members of the UK OGD community of the barriers to the OGD agenda. The survey consisted of two sections: first, questions establishing the participant's background including country of residence and the sector or sectors within which they were currently working; secondly questions seeking to elicit the participant's perceptions of barriers to the OGD agenda. In the second section participants were presented with 33 potential barriers to the OGD agenda (as identified in the literature and policy review) and asked to indicate the extent to which they agreed or disagreed with each statement? Responses were recorded on a 6 point Likert scale³.

An opportunistic sampling approach was used and survey participants were primarily recruited through online channels. My choice to employ this approach was influenced by two factors: first, the membership of the OGD community is not currently clearly defined; and secondly, the act of using OGD draws an actor into the existing OGD community, thus, it becomes challenging to define the boundaries of the potential OGD community given that the openness of the data leads to use by unanticipated actors. The opportunity to participate in the survey was promoted through the following online channels: OGD related mailing lists including the mailing lists of the Open Knowledge Foundation and regional open data groups such as Open Data Manchester; Twitter using the #opendata hashtag and requesting retweets from prominent community members; emails to data teams within central and local government; and through OGD related LinkedIn groups including the Open Data Foundation and Open Data & Public Sector Information Reuse groups. To a lesser extent the opportunity to participate was also promoted via my personal contacts in the OGD community and their networks.

This paper reports the 135 survey responses from members of the UK OGD community, with the survey participants drawn from across society as follows: academic 23, public sector 65, non-profit / civil society 15, private sector 25 and cross-sector⁴ 7. As discussed above, the nature of the OGD community is unclear so it is difficult to comment on how representative the sample is. I do however make two observations: first, the public sector (i.e. OGD providers) provides the largest group of participants reflecting the historical focus of the OGD community on making data open; secondly, given the relatively small size of the UK academic sector, compared to the public, private and non-

³ The Likert scale included the following options: strongly disagree; disagree; unsure; agree; strongly agree; no comment.

⁴ Participants were invited to indicate the sectors they were employed in; where participants indicated more than one sector they were classified as cross sector.

profit sectors, the perspectives of academics may well be overrepresented. However I included responses from the sector on the grounds that academics can be users of OGD or activists seeking to advance the OGD agenda (or indeed both).

Before moving on to present the results of the survey, I conclude this section by identifying some of the main limitations of the research method employed. The recruitment of survey participants targeted OGD advocates introducing a potential source of bias as advocates are likely to take a generally positive perspective of the OGD agenda. Also the survey explored the perceptions of barriers, rather than exploring the barriers individuals had directly experienced. Hence the results of the survey were potentially influenced by individuals responding to survey questions on the basis of things they had heard e.g. discourses that have developed within the OGD community but which may not necessarily be well grounded in fact. Furthermore, focussing solely on barriers could have created a negative mind-set amongst participants, potentially leading participants to perceive barriers they might otherwise not have perceived.

4 Results

The results of the survey (see Figures 2-4) show a strong tendency for members of the community to agree that the statements presented were indeed barriers to the OGD agenda. The mean of the Likert scale responses across the 33 barriers gives an indication of this tendency⁵ showing: 55% agreeing, 26% unsure or not commenting, with 20% of participants disagreeing. Underlying this tendency, the barriers fall into two groups: 21 relatively uncontentious barriers (where 50% or more of participants agree with the barrier); and, 12 more contentious barriers (where more than 50% of participants either disagree with, are unsure about or did not comment on the barrier). In order to emphasise the contentious nature of some barriers I have presented the survey results using a three point scale, rather than the six point scale used in the survey, aggregating as follows: agree includes both 'agree' and 'strongly agree' survey responses; disagree includes both 'disagree' and 'strongly disagree'; and unsure or no comment includes 'unsure' and 'no comment' responses. [Table 1](#) shows the numbers of uncontentious and contentious barriers related to each factor within the analytical framework.

⁵ I tested the internal consistency of the set of survey responses using Cronbach's Alpha test ($\alpha = 0.888$) to ensure that the survey responses across the 33 barriers were closely related enough to combine when calculating mean responses.

Table 1: Number of contentious and uncontentious barriers related to factors in the analytical framework

Barriers related to:	Uncontentious barriers	Contentious barriers
Digital technology	8	6
User practice	7	2
Public management practice	12	8
Institutions	5	2
Resources	9	4

The set of uncontentious barriers related to *digital technologies* and data emphasises perceived challenges around mobilising the resources required to supply and use OGD. For example, the financial resources required to create the IT systems that underpin the supply of OGD (Barrier 16) and the cultural resources such as the skills, expertise and knowledge required to supply (Barrier 30) and use (Barriers 19, 26) OGD. The technical challenges of supplying and using OGD also proved uncontentious including overcoming the limited interoperability between government ICT systems (Barrier 15) and interpreting and using interfaces to OGD (Barriers 28, 24). Whilst the barriers which raised questions around fundamental assumptions embedded within the OGD agenda unsurprisingly proved more contentious, including questions raised around the value and quality of government data (Barriers 1, 7, 10).

The set of uncontentious barriers relating to *user practices*, intersects with the set of uncontentious barriers relating to digital technologies (discussed immediately above), and also emphasises the concerns of the OGD community around the limited demand for OGD (Barrier 18). The more contentious set of barriers show divergent perspectives on the challenges of creating social and economic value through the use of OGD. Opinion of the community was split on if commercial use of OGD acts to crowd out more social or environmentally motivated uses of OGD (Barrier 6); whilst, the concerns of potential OGD users around the viability of business models underpinned by OGD (Barrier 5) also proved contentious.

The set of uncontentious barriers relating to *public management practices* show that in general members of the OGD community perceive barriers to the OGD agenda in the form of the structures of the government (Barriers 14, 16, 17, 27, 31, 33), including the risk adverse culture of government (Barrier 31) and the lack of a coherent vision for funding OGD initiatives (Barrier 27). A second strong theme was the perception that there are challenges in mobilising the financial resources required to open up government data (Barriers 23, 25, 27, 32). Whilst the set of contentious barriers suggests that some members of the OGD community perceive that individuals and groups within government are sympathetic to the OGD agenda. For example, suggestions that individuals and groups within

government viewed government data as likely to be misused or unsuitable for open release (Barriers 9, 10) proved contentious.

The set of uncontentious barriers relating to *institutions* shows that in general members of the OGD community perceive barriers to the OGD agenda in the form of the macro-scale 'rules of the game' including: the divergent interests of government and private sector data users (Barrier 21), the established legal frameworks (Barrier 33) and the challenges of balancing privacy concerns with the public interest when opening up data (Barrier 22). Whilst barriers relating to the smaller scale rules, for example at the interface between data providers and users (Barriers 2, 5) proved more contentious. Finally, the sets of uncontentious and contentious barriers relating to *resources* have been addressed in the results presented above and so are not reiterated.

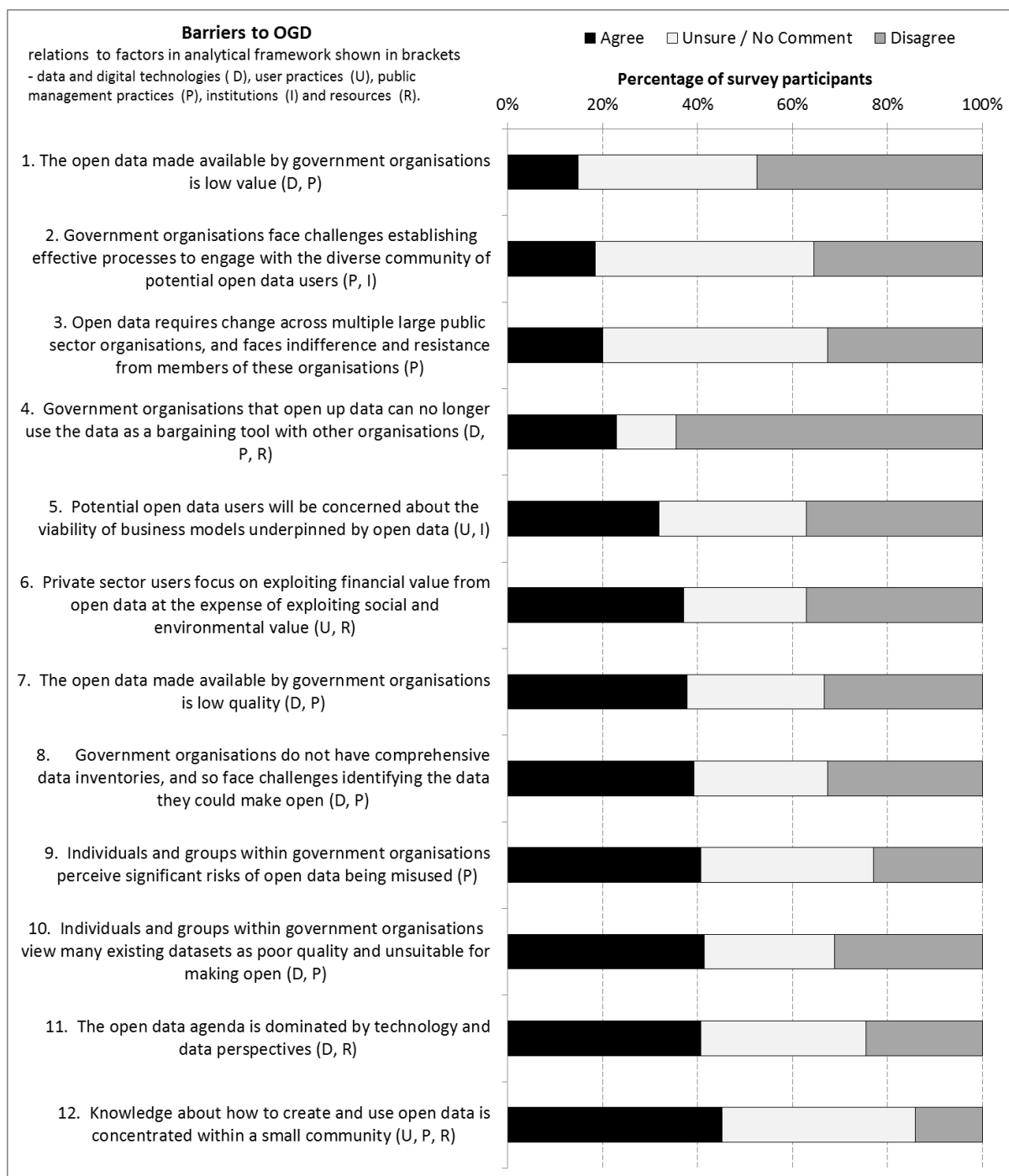


Figure 2: Perceptions of the UK OGD community of barriers to the OGD agenda (contentious barriers)

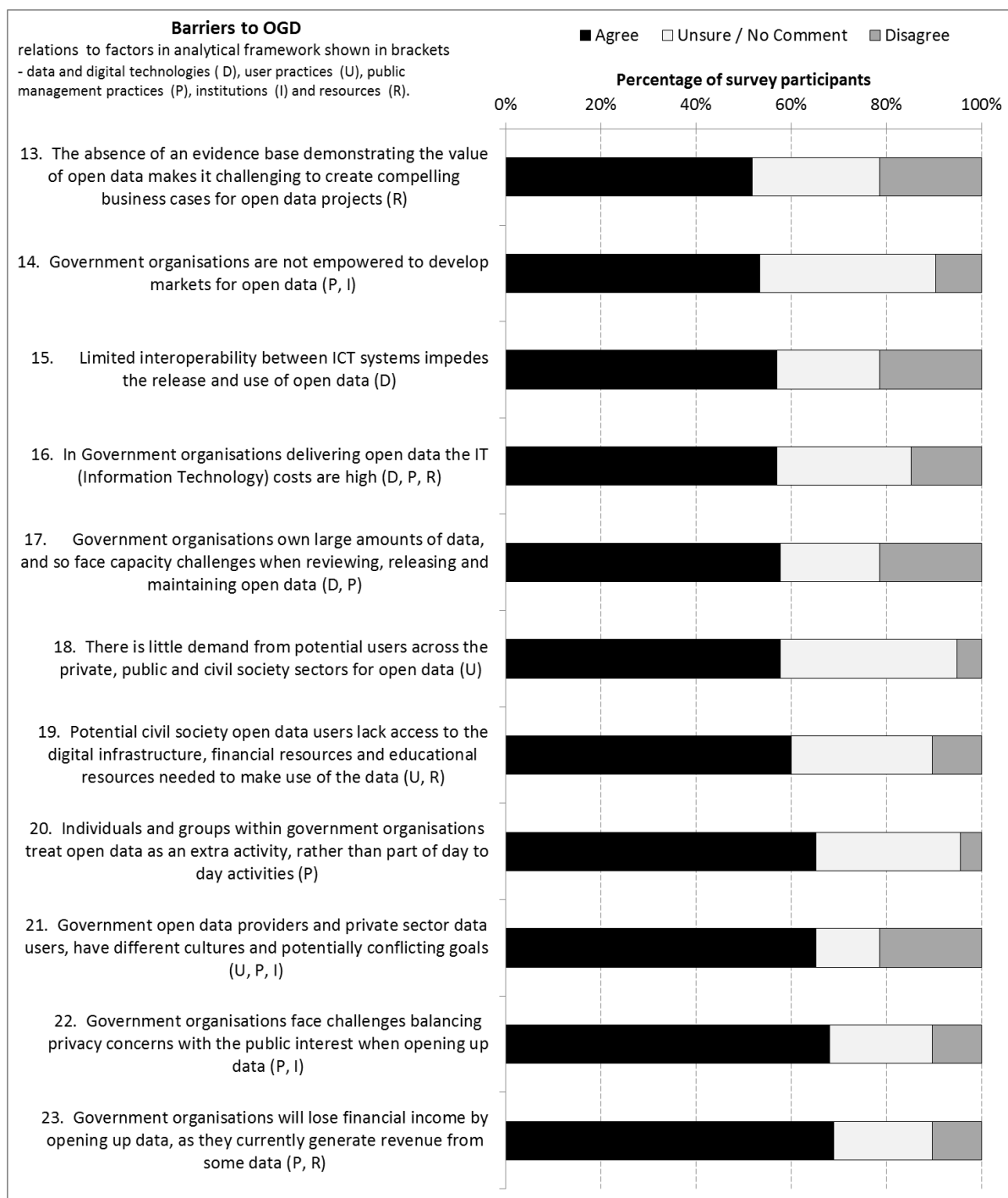


Figure 3: Perceptions of the UK OGD community of barriers to the OGD agenda (uncontentious barriers 1)

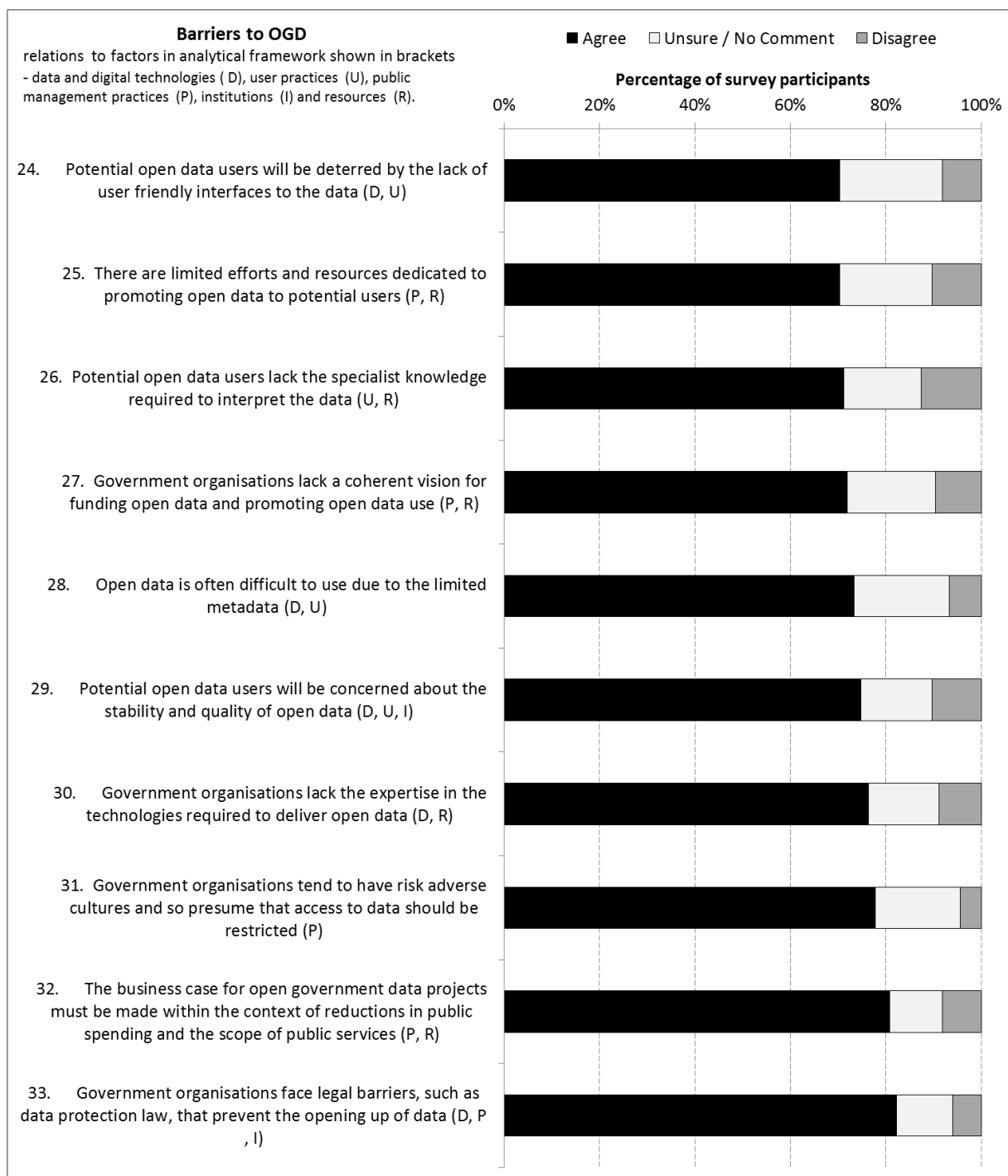


Figure 4: Perceptions of the UK OGD community of barriers to the OGD agenda (uncontentious barriers 2)

5 Discussion

In this discussion section I return to examine and address the three research questions I posed in the introduction section, in light of the survey results.

5.1 Where do members of the UK OGD community perceive that barriers to the OGD agenda exist?

The survey results show that members of the UK OGD community perceive barriers to the breakthrough of the OGD agenda to be widespread and related to both social and technological factors (Key Result 1). By considering the perceptions of barriers in more detail four further key results can be observed: barriers relating to the demand for and use of OGD are perceived as prevalent (Key Result 2); the structures of government and macro-scale institutions are perceived to act as barriers (Key Result 3); barriers to mobilising cultural and financial resources are widely perceived (Key Result 4); and there are contentious barriers where perceptions differ across the OGD community (Key Result 5). See Table 2, below, for the barriers related to each key result.

Table 2: Key results cross-referenced with barrier numbers.

Key results	Barriers numbers (see Figures 2-4)
1. Barriers to the breakthrough of the OGD agenda are perceived to be widespread and related to both social and technological factors	13-33
2. Barriers relating to the demand for and use of OGD are perceived as prevalent	18, 19, 21, 24, 26, 28, 29
3. The structures of government and macro-scale institutions are perceived to act as barriers	14, 16, 17, 21, 22, 27, 31, 33
4. Barriers to mobilising cultural and financial resources are widely perceived	13, 16, 19, 23, 25, 26, 30, 32
5. There are contentious barriers where perceptions differ across the OGD community	1-12

Zuiderwijk et al. (2012) developed the first extensive mapping of (118) socio-technical impediments (i.e. barriers) to OGD: drawing together the barriers identified in the emerging OGD literature and

the more established PSI (Public Sector Information) literature; and, conducting empirical research in the form of workshops and interviews (primarily with academics based in Europe with interests in open data). The key similarities between the results presented in this paper and the results of Zuiderwijk et al. (2012) include: the finding that barriers to the OGD agenda are perceived to be widespread and related to both social and technical factors; and, both implementation barriers and barriers to use are perceived to be prevalent. The key differences in the results arise from the divergent research objectives: Zuiderwijk et al., sought to provide the first extensive mapping of socio-technical barriers to OGD and explicitly avoided drawing country specific conclusions, I on the other hand, have attempted to understand the perceptions of members of the UK OGD community of barriers and to develop a theoretical grounding for the study of barriers to the OGD agenda. This divergence provides Zuiderwijk et al. with the opportunity to explore barriers in detail at the level of the interaction between a data user and the data itself. Whilst in this paper, I have identified barriers at a higher-level of abstraction identifying those relating to the structures of government and macro-scale institutions and the challenges of mobilising cultural and financial resources.

5.2 What are the potential implications of the perceptions of members of the OGD community of barriers for the OGD policy and practice?

Key result 1: barriers are perceived to be widespread and relate to both social and technical factors

From the Multi-Level Perspective, barriers to the breakthrough of OGD agenda should be expected to be widespread given the dynamic complexity of the public data regime. This does not imply that a breakthrough will not take place or that the OGD agenda can only make a limited and incremental impact. Rather, the implication is that a breakthrough may or may not take place, and that any subsequent impacts at the landscape level may or may not be transformative. Indeed breakthroughs and subsequent transformative impacts are only likely to emerge over extended timescales, as in cases of change in other complex socio-technical systems such as transport (Geels, 2005a) and music (Geels, 2007). Furthermore, the proponents of OGD are likely to face many ‘teething problems’ and barriers, as Smith et al. (2010) state the actors developing and promoting innovations:

“need to perform considerable cognitive, institutional, economic and political work: they have to be persuasive to a variety of constituencies on different terms (Hendriks and Grin, 2007; Smith, 2007).”

So I suggest that policy makers and public managers evaluating OGD initiatives should seek to recognise the considerable work undertaken to overcome barriers and the associated learning effects, in addition to the social and economic value created.

Key result 2: barriers relating to the demand for and the use of OGD are perceived as prevalent

The use of data to create social and economic value is of course critical to the OGD agenda completing a breakthrough into the public data regime, as unused data will remain a mere artefact. So it is unsurprising that the survey results show a concern, amongst the UK OGD community, with the current low level of demand for OGD (Barrier 18) and the challenges relating to the practices and resources of current and potential data users (Barriers 19, 21, 24, 26, 28, 29). So I suggest that future OGD related policy developments should adopt a strategic approach to creating and supporting niches (Kemp, Schot and Hoogma, 1998) for OGD use across the public and private sectors and civil society. This in turn could foster the social learning required to explore and then overcome barriers relating to user practice. Indeed there are encouraging signs emerging from the UK Open Data Institute, and aligned global initiatives, of activity to support niches for OGD use.

Key result 3: The structures of government and macro-scale institutions are perceived to act as barriers

Throughout the development of the OGD agenda there has been a strong emphasis on the supply of data, however members of the UK OGD community perceive that major barriers remain particularly in the form of the structures of government (Barriers 14, 16, 17, 27, 31) and established macro-scale institutions including legal frameworks (Barriers 21, 22, 33). However, Geels (2002) emphasises the dynamic nature of the structures that make up the (public data) regime, suggesting that within these structures, 'windows of opportunity' emerge which can enable an innovation to breakthrough. Furthermore, Geels argues that these windows open up as a result of tensions within the structures of the regime, or pressures exerted on the regime by the landscape. Hence I suggest that there is value in the proponents of OGD continuing to seek 'windows of opportunity' opening up a result of both: tensions within the structures of government, for example, restrictions on data sharing between different parts of government where an OGD approach could create efficiency savings; and landscape pressures, for example, climate change mitigation or adaptation initiatives where OGD could act as an enabler.

Key result 4: barriers are widely perceived in the form of challenges mobilising cultural and financial resources

Given the proponents of OGD are seeking to catalyse change across a complex socio-technical system, narratives within the OGD community understandably tend to focus on the benefits of OGD rather than dwelling on the resources required to realise these benefits. However, the survey results show that barriers are widely perceived in the form of challenges mobilising cultural resources (Barriers 19, 26, 30). Hence, I suggest that future OGD policy and practice should seek to enhance the cultural resources of OGD users and providers – for example by establishing and sustaining initiatives to develop the skills and knowledge required to use OGD across civil society. Mobilising financial resources was also perceived to be a challenge by members of the OGD community (Barriers 16, 19, 23, 25, 27, 32), and I suggest that these challenges can be partially addressed if the evidence-base demonstrating the value of OGD can be further developed. However I also argue these challenges are likely to persist whilst the post-financial crisis narrative of public deficit reduction through public spending reduction dominates the political agenda. Furthermore, given we work in a context where increasing funding for OGD initiatives through progressive taxation is not an option, OGD proponents should ponder questions analogous to the following. What are the politics and ethics of calling for investment in OGD initiatives whilst elsewhere spending reductions are leading to the degradation of public services provision to vulnerable and socially excluded individuals?

Key result 5: there are contentious barriers where perceptions differ across the UK OGD community

Some barriers to the OGD agenda are perceived rather differently by individuals across the UK OGD community (Barriers 1-12). These differences could have arisen from differing rates of progress towards a breakthrough for the OGD agenda in different sectors or areas of government or may reflect tensions within the coalition of interests supporting the OGD agenda (Bates, 2013; Tinati, Carr, Halford et al., 2012). Such tensions are likely to be influenced by landscape influences, consider as an illustrative example barrier 6 - 'private sector users focus on exploiting financial value from open government data at the expense of exploiting social and environmental value'. The survey responses to this statement show some members of the community perceive that private sector exploitation of OGD risks undermining social and environmental creation; whilst others perceive

financial exploitation of OGD as either a core part of the agenda or an appropriate means of creating social value. Furthermore these divergent perceptions are created by differences in political values and different perspectives on dominant neoliberal economic paradigm within the OGD community.

The differential rates of progress, diverse perspectives and tensions within the community, discussed above, are potential resources to be tapped throughout the innovation process. As van de Kerkhof and Wieczorek (2005) observe in systemic social and technological change (towards sustainability) processes intended to foster social learning are needed; particularly to enable the development of shared understandings of problems and potential solutions in terms of their nature, scope and impact. Developing this shared understanding in turn requires the participation of actors with diverse perspectives. Hence, I suggest OGD related policy and practice should create further opportunities for social learning which bring together the diverse perspectives that coexist within the OGD community.

5.3 Reflections on the research framework and process

In this paper I have taken the first steps towards developing a theoretical grounding for the study of barriers to the OGD agenda using the MLP. The MLP has acted as a relatively simple model which frames current OGD activity within a wider socio-technical context including both supply and demand side dynamics. Within this model I have developed a new conceptualisation of barriers to the OGD agenda, as the stabilising interactions of the rules, practices and technological interdependencies (Geels, 2002; Geels, 2005b) that established and now maintain the prevailing approaches to creating, storing, sharing, using and reusing government data. Furthermore, the application of the MLP led to the identification of the influence of landscape pressures, including the dominant neoliberal economic paradigm, on perceptions of barriers to the OGD agenda. A further benefit of applying the MLP was the development of a provisional framework to focus the analysis of the survey results on key social and technological factors. Through this analysis new insight into the perceived nature of barriers to the OGD agenda emerged, particularly the perceived challenges presented by government structures and the perceived challenges of mobilising cultural and financial resources. In this paper I have only scratched the surface of the extensive body of knowledge relating to the MLP (Smith et al., 2010), and hence there are extensive opportunities for further research applying the MLP, and other closely related theories, in the study of OGD. For example, empirical research could explore the mechanisms by which OGD is making a breakthrough (Geels, 2002) into the public data regime; helping to address the question why do some aspects of

the OGD agenda remain niche while others have become embedded within the regime? Furthermore, the analytical framework developed in this research could be further developed and adapted for use in future empirical studies of OGD initiatives.

Finally I briefly present my reflections on the research process to identify three key limitations. First, the survey sample is potentially not representative of the UK OGD community, as academic participants may have over-represented, and there are challenges defining the scope of OGD community given that the openness of the data is intended to create a diverse and unexpected community of users. Hence there is an opportunity for future qualitative research into the composition of the OGD community and for more extensive surveys of perceptions of barriers. Secondly, the research presented did not develop understanding of how perceptions of barriers vary across sectors or government departments. This limitation presents considerable opportunities for future research employing a mixed methods approach – including ethnography and qualitative interviews – to explore in depth how different contexts influence perceptions of barriers. Finally, the identification and classification of the barriers was conducted by the sole author of the paper creating a potential bias in the results.

6 Conclusion

Interest in, and the momentum of, the OGD agenda has grown rapidly over the last decade. Yet the impact of OGD initiatives remains limited, when compared to the extensive benefits and transformative potential claimed by the proponents of OGD. More recently, awareness has developed in the research community (Conradie and Choenni, 2012; Janssen et al., 2012; Zuiderwijk et al., 2012) that the OGD agenda faces an extensive range of socio-technical barriers that prevent the agenda from having a greater impact. In this paper I have taken the first steps towards establishing a theoretical grounding for the study of barriers to the OGD agenda by applying the Multi-level Perspective, a theoretical framework from the field of science and technology studies. I have framed the ongoing development of the OGD agenda as an innovation process following a pathway from:

- emergence of the agenda as a novel concept full of promise in the mid-2000s;
- followed by co-evolution of social and technological aspects of the agenda within *niches* (which provide favourable environments outside the mainstream);
- before potentially completing a break-through into the mainstream public data *regime* (consisting of the rules, practices and technological interdependencies which maintain current approaches to creating, storing, sharing, using and reusing government);

- then finally having the transformative impacts anticipated by the proponents of OGD by influencing the broader *landscape* (the exogenous factors, such as political values, that shape niches and the regime).

I have argued that the OGD agenda has yet to complete a breakthrough into the regime and that barriers to such a breakthrough remain in two forms: barriers to the opening of data being incorporated into the daily practices of government organisations (*implementation barriers*); and, barriers to individuals and organisations creating social and/or economic value through the use of OGD (*barriers to use*).

The empirical results presented in this paper included survey responses measuring the perceptions of UK OGD community members of 33 barriers to the OGD data agenda. I then analysed these results and highlighted five key findings. First, barriers to the breakthrough of the OGD agenda are perceived to be widespread and related to both social and technological factors. Secondly, barriers relating to the demand for and use of OGD are perceived as prevalent. Thirdly, the structures of government and macro-scale institutions are perceived to act as barriers. Fourthly, barriers to mobilising cultural and financial resources are widely perceived. Finally, there are contentious barriers where perceptions differ across the OGD community. Based on these findings, I identified implications for OGD policy and practice including the following. Evaluations of OGD initiatives should seek to identify learning effects and effort expended to overcome barriers, in addition to identifying social and economic value created. Future OGD policy developments should adopt a strategic approach to creating and supporting niches for OGD use across society. Furthermore, OGD policy and practice should provide greater opportunities for social learning to explore and understand the more contested and contentious aspects of OGD agenda.

Finally, I suggest that many opportunities exist to build upon and extend the research presented in this paper including both the following: empirically orientated research employing a mixed methods approach to explore in depth how different contexts influence perceptions of barriers; and theoretical orientated research developing further productive connections between the academic field emerging around the study of open government data and the more established field of science and technology studies.

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