The Role of e-Participation and Open Data in Evidence-Based Policy Decision Making in Local Government

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Short Title: Role of e-Participation and Open Data in Policy Making

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Abstract

The relationships between policies, their values and outcomes are often difficult for citizens and policy makers to assess due to the complex nature of the policy lifecycle. With the opening of data by public administrations there is now a greater opportunity for transparency, accountability and evidence-based decision making in the policy making process. In representative democracies, citizens rely on their elected representatives and local administrations to take policy decisions that address societal challenges and add value to their local communities. Citizens now have the opportunity to assess the impact and values of the policies introduced by their elected representatives and hold them accountable by utilising historical open data that is publicly available. Using a qualitative case study in a UK Local Government Authority, this paper examines how e-participation platforms and the use of open data can facilitate more factual, evidence based and transparent policy decision making and evaluation. From a theoretical stance, this paper contributes to the policy lifecycle and e-participation literature. The paper also offers valuable insights to public administrations on how open data can be utilised for evidence-based policy decision making and evaluation.

Keywords: Policy Making, Open Data, Local Government Authority, e- Participation, Information and communications technology (ICT)

1. Introduction

Public sector policy making has come under increasing scrutiny in recent years due to top-down decision-making processes adopted by elected government representatives and the lack of associated transparency or evidence of value created through implemented policies (Howlett, 2014). In most representative democracies, public officials are elected by citizens on the basis of values, goals and policies put forward by these candidates during political campaigns. To hold their elected official accountable citizens need better means to evaluate the impact of public policies introduced by the representatives on the basis of empirical facts and evidence. For example, citizens should be in a position to reflect on questions such as, 'are we better off than we were three years ago?', 'are the policies making a real difference to individuals or the community?' Such questions become relevant when citizens are faced with the important choice of who to elect into public office. In this respect, there is a need for the availability of appropriate tools that can facilitate the evaluation of policy decisions made in the past by as well as present and future.

With the increasing focus on online web platforms and social media channels, governments are urged to make the policy decision-making process more transparent and a collaborative effort with all stakeholders (citizens, local businesses, NGO, charities, community groups etc.) (Sivarajah et al., 2015; Janssen et al., 2012; Bertot et al., 2010). However, the tools to facilitate this process are only beginning to emerge and most are in development stage. Moreover, a number of factors currently make it very difficult for citizens and policy makers to reach well-informed opinions about the effectiveness of policies. Given the nature of the social and economic problems that public policies have to address, having complete information about the current conditions is almost impossible, particularly when many factors

are unquantifiable, let alone forecasting the effects of a particular policy intervention. Multiple stakeholders and observers will have competing interests, and political preferences, making objective assessment of prior and subsequent circumstances challenging (Rosewell and Ormerod, 2012). The policy-making task is to find a way forward that is likely to improve the situation overall, which is politically and publicly acceptable, affordable and achievable: there is no "right" answer. It is an iterative and discursive process involving negotiation and management of interests and expectations (Howlett, 2009).

Such issues are further compounded when attempts are made to engage citizens in the policy making process using e-participation platforms. One of the challenges faced includes demonstrating clear benefits and value for citizens to participate in the policy making process (De Liddo and Shum, 2014). In addition, the Internet has made not only a wealth of information readily available, but also misinformation and intentionally propagated falsehoods from questionable sources. It is becoming increasingly difficult to come to a common understanding of the facts, based on reliable and trustworthy evidence and sources. Ideally policy debates should be able to focus on negotiating political compromises balancing competing interests, goals and values, on the basis of a common understanding of the facts. Yet, due to governments making more policy-related data open, all stakeholders now have a common, if still incomplete, information base to participate in policy decision making.

The research question this paper seeks to address is how can public open data and e-participation be leveraged for evidence-based policy decision making in local government? This paper therefore introduces a novel and innovative approach for more factual, evidence-based and accountable policy analysis and evaluation that is based on open public data, data

visualisation techniques, fuzzy cognitive maps (FCMs) and argumentation technology (i.e. e-Participation tool/platform). The approach is inspired by the Policy Compass project (funded under the European Commission's 7th Framework programme under the Theme ICT-2013.5.4 - ICT for Governance and Policy Modelling) that aims to make better use of open public data resources so as to enable both citizens and policy makers to create, apply, annotate, share and discuss progress metrics and causal models of policies. By doing so, the Policy Compass project aims to encourage and empower stakeholders to participate in the policy decision making process. The Policy Compass concept will make use of Europe's increasing amount of public sector open and structured data resources to develop and integrate tools allowing users to for example (a) construct graphs and charts visualising metrics, (b) construct causal models with an easy-to-use visual tool for FCM and (c) summarise and visualise the debates in the form of argument maps and conduct structured surveys about the policy issues. This paper reflects on the Policy Compass project and examines how open data and collaborative policy decision making that is being piloted through the project in Cambridgeshire County Council (CCC), a UK Local Government Authority (referred to hereafter as CCC).

2. Academic and Practical Context for the Study

2.1. Introduction

In this paper we describe an approach that brings together four themes — open data, the policy-making process, data visualization and participatory decision-making — all of which have been studied and reported on extensively. Each has primarily been covered by different disciplines, as illustrated by the references we cite below. We do not propose to present a

comprehensive literature review of these, which would be far too great an undertaking, but to trace their development within three strands that converge to the focus of our study. In this way we illustrate how this paper is a cross-disciplinary contribution to the literature in the listed fields.

2.2. Role of Open Data in the Policy Context

In this study we are focusing on the use of open data in choosing between and evaluating decisions on allocating public resources (Clarke and Margetts, 2014). Data sets underpin any form of analysis or evaluation of policy options (or for that matter, post-implementation evaluation, which will use similar techniques) and their use has grown in parallel with the technical capability to process them (Lampathaki et al., 2010). Economic analysis, econometric modelling, operational research and statistical analysis have for many decades supported the appraisal of policy decision options (see for example the HM Treasury Green Book (HM Treasury, 2003). Bobrow (1970) and Walker (1982) describe the emergence of computer-based modelling of policy options moving through the use of decision support tools on mainframe computers in time-sharing bureaux towards personal computers giving interactive access to models and data. Walker emphasises the importance of up-to-date and relevant data, and presciently says that he believes "that these developments have profound implications for the use of models in the policy process".

The collection and maintenance of data for use in policy models has however historically been labour-intensive, hence expensive (Walker, 1982). In practice, the public sector has emerged as the primary collector and provider of data for policy purposes, having the need, the resources and the political will (Brooks et al., 2014; Zuiderwijk and Janssen, 2014).

Public sector data has for a long time been available to some extent (not always: for example, data from publicly-funded research (Kolman, 2014) to public bodies and other organisations for use in policy appraisal and modelling tools, albeit with costs and restrictions. In particular, restrictive licensing and charging for reuse or public sector data was standard until challenged by the concept of "open data", defined by Phillipp Mueller (2014) as "a philosophy and practice requiring that certain data be freely available to everyone, without restrictions from copyright, patents or other mechanisms of control".

Citing the dual motivations of transparency of government and the economic potential of the reuse of data, politicians adopted "open data" as a practice for their governments. These political moves to improve availability and ease of reuse (through open licensing, machine-readability and technical standards) has removed many barriers to exploitation of public sector data (Fitzgerald et al., 2013; Zuiderwijk et al., 2014). President Barack Obama issued a Memorandum on Transparency and Open Government Directive in January 2009 (Orszag, 2009), and in May 2010 incoming UK Prime Minister David Cameron set out plans for opening up government data (Gov.uk, 2010, although the web site data.gov.uk was in place earlier that year under the previous government). The European Commission published a Communication on Open Data (European Commission, 2014) in 2011, and in the same year the USA, UK and initially six other countries were signatories to the Open Government Declaration (Open Government Partnership, 2014).

One of the unforeseen effects of the open data movement has been to make more data easily accessible to other actors in the policy space, including researchers, think-tanks, and most significantly, other parts of the public sector and governmental systems (ITAPA, 2014) —

including local governments who now have access to centrally-collected data. The issue is whether they have the tools to use it effectively in policy development (Brooks et al., 2014; Puron-Cid et al., 2012), and that is the question we address in this paper.

We can thus infer that, while it is a recent phenomenon with few empirical evaluation of cases to be found in literature, open data is potentially an enabler for civic engagement in policy-making at both central and local level (Kassen, 2013). However, in regard to such engagement with policy-making processes, a lack of understanding of those processes and their "rules of engagement" can be a significant barrier to broad public participation (Epstein et al., 2014). Understanding the process is thus a prerequisite for developers of tools to assist both citizens' participation and policy makers, and using open data (Lampathaki et al., 2010).

2.3. Describing the policy process

A public policy is an intent by a government to change an aspect of the society, economy or territory over which it governs (Howlett, 2009). To move from intent to effect requires a process to design and implement that policy (Linder and Peters, 1990). Were the policy-making process a simple sequence of steps with clear outputs that affected the policy decision in recognisable ways, it would be easy for citizens to understand when and how they might contribute, for them to evaluate decisions at particular stages, and relatively easy to provide the means to do so. However, the reality of making public policy has been shown to be anything but straightforward and easy to describe, as the following review shows.

Attempts to produce normative policy process description trace back to the 1980s at least and continue into the 2000s. Most concluded that a policy has a life cycle comprising a number of

definable stages, but the number and nature of those stages varies in the literature. Early models exhibited a simple linearity such as Agenda – Formulate – Implement – Budget – Evaluate (Jones, 1984), or a finer-grained one of Agenda Setting – Issue Filtration – Issue Definition – Forecasting – Options Analysis – Objective Setting – Monitoring – Maintenance/Succession/Termination (Ryder, 1996). Government publications in the early 2000s move from a start-to-finish model to a circular one, linking the final stage back to the first as an input. In Australia, Bridgeman and Davis (2000) present the most detailed: Identify Issues – Policy Analysis – Policy Instruments – Consultation – Co-ordination – Decision – Implementation – Evaluation. In the UK, the Government's "Green Book" (HM Treasury, 2003) has a "ROAMEF" cycle: Rationale – Objectives – Appraisal – [Implementation] – Monitoring – Evaluation – Feedback. However, an earlier UK document (Cabinet Office, 1999) has a simpler cycle (understanding the problem – developing solutions – putting solutions into effect – testing success and making it stick) but goes on to prefer a descriptive rather than normative model based on "features, themes and competences". It argues that in practice policy making rarely follows a neat sequence of steps and is a complex activity frequently buffeted by external forces.

Sutton (1999) and Exworthy (2008) also reject the neat sequential models. More recently, Hallsworth et al. (2011) describe policy cycle models as being divorced from reality, preferring instead an iterative approach to policy design. Howlett and Lejano (2013) discuss a resurgent interest in policy design, and Howlett's (2009) own nested, descriptive model shows iterations between choices of policy goals and policy means (instruments). Rosewell and Ormerod (2012) go further in applying complex systems principles in modelling policy analysis based on a network model of connected actors.

The current view is thus that policy-making is not described by a simple model with clear stages, as it is a complex process with many feedback loops. An interactive conversation with various stakeholders can range over all aspects of policy analysis iteratively and progressively (Howlett, 2009) without being locked into one particular phase of an artificial cycle. Therefore to allow citizen participation in an influential way, we posit that a tool that supports an interactive and discursive element in the process is a better fit to reality and more effective than one that provides a single mono-directional input (De Liddo and Shum, 2014) such as commenting in response to a consultation or signing a petition.

2.4. Data visualization and e-participation platforms

Raw open data, while potentially enabling citizens to monitor governments, needs intermediation and interpretation, and if they are to inform policy decisions, then there is a question over the participative, deliberative practices needed to facilitate that (Moss and Coleman, 2013). The use of ICT has long been anticipated to be a significant tool for greater and more effective political participation (Bailey and Ngwenyama, 2011, Komito, 2005, Macintosh and Whyte, 2006; Mossberger et al., 2013, Salmat et al., 2011), but the question here is how to combine the presentation of open data in a meaningful way with an interactive contribution to policy making.

The use of visualization techniques to ease the task for humans in interpreting sets of data has long been studied (Keim, 2002; Liu et al., 2014), but as “big data” have become fashionable in research and in commerce, the application of visualization to them has been considered (Keim et al., 2013; Ren et al., 2014) With the advent of more user-friendly devices at low cost,

such studies have extended to look at the use of wall-sized and 3D displays, and tablets and table-top products with touch-screens (Jansen and Dragicevic, 2013). Once data can be visualized on a shared workspace such as a wall or table top, it becomes feasible for groups to collaborate on analysing them (Wallace et al., 2013).

With a resurgence of interest in e-participation as the open data movement took shape, attention turned to the use of open data analysis to inform policy, in particular the development of platforms and architectures for e-participation (Kalampokis et al., 2011; Shum et al., 2012; Swezey et al., 2012). These are the antecedents of the subject of this paper, within which we have incorporated the ideas of group interaction around data visualizations in the context of discursive and interactive policy option evaluation.

3. Research Methodology

The philosophy of research adapted for this case study draws on the suggestions of Yin (2009), Creswell (2008) and Miles and Huberman (1994) and follows an interpretive qualitative approach. In this respect, the research approach combined the review and synthesis of literature with primary analysis of an established local government authority based in the UK (i.e. Cambridgeshire County Council, CCC). Empirical data was primarily gathered by conducting semi-structured interviews with five local government authority experts (Atkinson and Hammersley, 1994; Myers et al., 1997; Myers 2009). In doing so, their insights into the use of open data and its potential impact on the local authority in the context of stakeholder engagement in policy decision making were also gathered. Table 1 provides the interview participant role in the case study organisation and their respective expertise.

[Insert Table 1 Here]

To complement the interviews, additional data was gathered and included obtaining supporting evidence through informal conversations, policy documents, CCC corporate strategy reports, minutes from meetings and consultancy reports. The materials used and obtained as part of these meetings are outlined in Table 2.

[Insert Table 2 Here]

The use of multiple methods ensured data triangulation, thus contributing towards the reliability and validity of the findings for this study (Yin, 2009). In addition, a case study protocol as asserted by Yin (2009) was developed to increase the reliability of case studies. The case study protocol assisted the data collection (e.g. the field procedures and interview topics) process and provided a guide for the case study report. As part of the research design, an approach similar to that used by Molla et al. (2006) was used for data collection, analysis and checking while conducting the initial exploratory research. The first meetings in CCC were conducted during the early stages of the project in order to understand the policy decision making scenarios that would be used to pilot test the Policy Compass platform. The meetings also allowed CCC to better understand the proposed functionality of the Policy Compass platform and how it can be used to support their policy making processes. The duration of each of these meetings was approximately one hour and thirty minutes, where some interviews were conducted on a 'one-to-one' basis so as to stimulate conversation and break down any barriers that may have existed between the interviewer and interviewee. All

of the abovementioned interviews took place in a meeting room, which was away from the normal office environment with no disruption. The verbal and non-verbal responses of the respondents during the interview were also taken into account as part of the feedback.

While the semi structured interviews and secondary documents formed a major part of the empirical data gathering, several other meetings with CCC experts also took the form of focus groups and consisted of the following:

- Meetings with decision makers at CCC during project meetings to scope and brain-storm the use of open data for policy decision making
- Follow-up virtual meetings with decision makers in CCC to explore and refine potential scenarios where open data can be used for policy decision making
- Focus group meeting with relevant stakeholders and decision makers at CCC to collect feedback from key decision makers regarding the tools, methods and context in which open data can be used for policy decision making.

The abovementioned meetings helped create an understanding of what information is needed and how the information is processed to deliver the desired outcomes through the policy making processes, in the field trial scenario examined at CCC. The aim of these focus groups was to gather the local stakeholders' opinion on the policy scenario that will be piloted. This study adopted a qualitative thematic data analysis technique where the process of data analysis involved examining the meaning of peoples' words and actions in the case of interviews (e.g. Ramanath, 2009). In effect, data analysis and synthesis was an iterative process as concepts emerged and common themes were identified and formed into a coherent

analysis (Corbin and Strauss, 2008). The outcomes of these focus groups and meetings are discussed as part of the following case study discussion section.

4. Case Study Background: CCC Adult Learning Fund Allocation Process

The case study for this research was set in a large local government authority (referred to as CCC) based in the South East of England which had to respond to the UK Government policy on community learning (which is focused on assisting skills development within the local community) on a regular basis. For this purpose, the government allocates financial resources to the council through a Community Learning Fund that is managed by the national Skills Funding Agency (SFA). CCC responds to this public policy by assigning a Community Learning Trust (CLT) Fund which is used to distribute resources to local training agencies that specialise in adult learning. The CLT aims to commission, deliver and support learning in ways that contribute directly to objectives such as (a) bringing together people from all backgrounds, cultures and income groups, including people who can/cannot afford to pay, (b) devolving planning and accountability to neighbourhood/parish level, with local people involved in decisions about the learning offered, (c) supporting the wide use of online information and learning resources and finally (d) minimising overheads, bureaucracy and administration.

To achieve the above objectives, the CLT is defined within the CCC Adult Learning and Skills Strategy. The skills strategy is implemented through different action plans according to local priorities in four different districts surrounding the CCC region. Each district has a Community Learning and Skills (CLAS) partnership which identify local priorities for

funding. The priorities for each district are identified annually by Partnership members using a range of information such as Department for Business, Innovation and Skills (DBIS) policy, SFA funding rules, CCC skills strategy, data on deprivation and unemployment, current availability of provision, the economic assessment, historical provision, local knowledge of stakeholders, facilities etc. This process is identified in the action plan as a local needs analysis. Funding decisions are made based on scorecards, which are marked by proposal evaluators.

Currently each council has a partnership (comprising for example a community of training providers, schools, NGOs, the job centre) that has an allocation of funding, and an application process in place through which VCSO providers can bid for funding to deliver a project to meet the identified priorities. Figure 1 depicts the organisation structure and all the stakeholders involved in the CALF allocation decision making.

[Insert Figure 1 Here]

The overall priorities defined in the strategy document at county level are used together with local priorities based on needs in each four districts. The Skills Strategy was initially influenced by the Community Learning and Skills Partnerships who propose the priorities for their areas which are then passed on to the Learning and Skills Board who subsequently come up with the strategy. This is primarily a bottom up approach which has evolved into a two way exercise. The strategy document serves as the blue print for the CLAS action plans, but the priorities are largely driven by the local CLAS level needs. Example of priorities / criteria

considered when allocating funding and deciding learning / training needs for people in the CCC area include the following:

[Insert Table 3 Here]

The problems with the current process for CLT funding include the lack of 'learner voice' in this decision making and local Learner Advisory Panels (LAP) are being developed to address this issue. Also, the priority-setting in a local district is still conducted based on qualitative opinion of participants despite the existence of quantitative data, due to the lack of analytic tools. In general, the evaluators of proposals are lacking tools to conduct a direct impact analysis of the proposals to establish how they contribute to the local priorities and skills strategy.

5. Case Study Analysis and Discussion: Policy Compass and Local Government Decision Making

In CCC, Policy Compass is to be trialled as part of the policy process centred around the new Skills Strategy for the CCC area leading up to 2020, a major policy decision process for the County. The vision for the Skills Strategy is to improve the skills of young people and adults across the CCC region. The challenges for the future regarding the Skills Strategy are envisaged as follows. Firstly, the County's performance in improving skills to meet the needs of business improved before the recession and this has demonstrated an ability which CCC can build on. The percentage of the working population gaining qualification at different

levels increased and this needs to be accelerated to improve the CCC region's competitive position in the global economy. Secondly, alongside this, since the recession and subsequent cuts in publicly funded programmes linked to skills, a number of indicators point to future concerns. In this respect, the Policy Compass platform will be exploited to facilitate engagement with citizens in the CCC area and to examine its impact on addressing the above concerns through a collaborative and more informed policy decision making.

At present, the operation for identifying priorities is carried out by using some local indicators to identify broad areas of need but CCC do not have the tools to carry out comparative analysis or to investigate cause and effect relationships. The local partnership members meet quarterly to discuss and recognise priority levels taking into consideration the past performance. The intention of these meeting is to agree amongst members which priorities will be set to high and which to low. The Policy Compass platform will encourage these partnership members as well as local citizens to participate in a more collaborative manner allowing the sharing of opinions and views before important decisions are made. Members of the public will be invited to start an argumentation thread to discuss local priorities. These discussions which will therefore take place online which will assist in categorising the priority levels for fund allocations.

Later, during the Fuzzy Cognitive Maps (FCMs) modelling, the policy maker can then invite public members (i.e. citizens) to discuss the strength of relationships between concepts. Cognitive maps were proposed by Axelrod (1976) to represent social scientific knowledge and a fuzzy version of the cognitive maps were first introduced by Kosko (1986). FCMs have been widely used to model and simulate policies and their effects. An FCM is a directed

graph with nodes representing variables and weighted, directed arcs between the nodes representing causal relationships and their strength (Kosko, 1986). In this study context, FCMs allow policy makers to quantify the impact of independent variables that can be modified by policies (e.g. tax rates) on dependent variables reflecting policy goals (tax revenues, income inequality).Also they can be invited to enumerate possible concepts for developing FCM model that will analyse the impact for the proposed funding calls. An FCM editor tool will be integrated onto the Policy Compass platform in order to help the decision maker evaluate the effect with a friendly graphical interface to view the priorities in different districts. To support this, an e-participation tool such as Adhocracy may be used along with FCM editor tool. Adhocracy is a web based software tool which facilitates cooperative policy drafting, proposal discussion and decision in distributed groups. The quantification of concepts and cause-effect relationship between concepts sometimes requires consensus from a group of experts and/or citizens if there is no open data available for the quantification. Such consensus making tasks were usually done through off-line meetings or questionnaires/surveys which require more resources than an online discussion tool like Adhocracy. In Policy Compass, a modeller of FCM will be able to launch an Adhocracy session in the middle of editing of a concept or cause-effect relationship from the model editor to create a discussion session. In addition, Policy Compass platform will also facilitate aggregating opinions on policy issues, to formulate a common position in a party or interest group, using delegated voting via the e-participation platform Adhocracy. The software Adhocracy is designed as a cooperative tool for text editing, discourse, delegation and voting, which allows decision making with a high number of participants. Another strategy for stimulating citizen involvement and engagement in Policy Compass platform is the potential of sharing and debating prosperity graphs and FCM causal models via popular social media

platforms, such as Facebook, Google+ and Twitter. Given that the advent of web-based tools has created a more vivid environment and the popularity of social media has set a new context for the concept of e-participation, this feature helps broader citizen participation in policy analysis.

The Policy Compass platform will be used to define what the CLT priorities should be in each District. As a starting point, the following metrics and examples of policy documents and open data that are available at CCC as highlighted in Table 4 will be considered for use in Policy Compass.

[Insert Table 4 Here]

The prosperity index with regards to community learning, skills, deprivation and unemployment, current availability of learning provision, historical data, local knowledge of stakeholders, facilities etc. is expected to provide the decision makers with quantitative data and a comparison with other districts to identify priorities in the local district for CLT funding. In the current decision making process, this information is not consolidated and only available to the policy decision makers on an ad hoc basis. In contrast, Policy Compass will provide the decision makers with a user-friendly graphical interface for analysing different indices in comparison with multiple regions within the district. The use of open data will enable the decision makers to clearly examine the evidence and impact of past policy decisions and allocation of funds on the community and/or region. Also, the policy model based on a FCM is expected to allow the proposal evaluators to conduct impact analysis to show how much impact a proposal can make to the local priorities and skills strategy of the

council. The following figure 2 is an example FCM of the policy model for the proposed CCC decision making process.

[Insert Figure 2 Here]

Figure 2 shows causal relationships among major factors with regard to the funding decision making. The factors that are presented in the right-hand side of the model represent the strategic objectives which can be improved through the funding decision. The list of qualitative factors next to the variables including personalized learning, digital literacy, social renewal and so on represent variables that directly affect the strategic objectives. The variables in the left-hand side are binary factors which indicate how the funding decision on each proposal will affect other quantitative and qualitative factors of the model. From the FCM, funding decision on each proposal affects strategic objectives through step by step causality propagation. The quantified numbers on arrows indicate how strong the causality is between two factors. In an FCM, each factor needs to be assigned with quantified fuzzy values representing current state of real world. For example, “personalised learning” can be assigned with 1 for “high”, 0 for “medium”, and -1 for “low”. The quantification of factors is usually conducted by obtaining qualitative opinion of experts through interviews, questionnaire survey or similar techniques. However, the existence of open data on the Internet can make the quantification task fact-based therefore more objective. In Policy Compass, each factor in an FCM can be linked to prosperity indicator which is defined based on open data on the Internet. Therefore, the fuzzy values of qualitative variables can be directly linked to the data and a simulation can be performed to measure impacts of a policy change. For example, funding proposal 1 may increase the number of programme specialised

to IT beginner and the ratio of disadvantage learners in a district. Any change on the two factors will next make impact to other factors and the chain of impact measurement is conducted through an FCM evaluation.

By integrating all these abovementioned tools into an easy-to-use system, the Policy Compass seeks to make better use of Europe's open public data resources and empower policy-makers and citizens (especially the younger generation) to better assess government policies in the policy analysis and monitoring phases of the policy cycle. The aim is to use only high-quality, trustworthy public data sources by the Policy Compass in a fully transparent and accountable fashion. These data sources should enjoy wide support in civil society, so as to provide a stable bedrock for critical policy deliberations. Interest groups can and should continue to form, put forward and defend their own opinions and theories explaining these facts. Policy Compass will thereby provide a tool for building and sharing FCM-based causal policy models for this purpose. As such, Policy Compass can help to focus policy debates on the essential task of finding acceptable political compromises respecting the diverse interests of stakeholders. A detailed discussion on the architecture and the components of the Policy Compass platform has been reported by Markaki et al., (2014).

In summary, the key expected effect from the use of the Policy Compass platform would be to address the policy decision-making issues surrounding the allocation of adult learning funds by the CCC. The key issues to be tackled and addressed by the platform are summarised as follows: (1) Taking into account the publics' views, by providing an e-participation tool such as Adhocracy as part of the platform to facilitate CCC to gain a richer picture in identifying the funding priorities (2) Helping the decision maker evaluate effects of

different decisions by considering multiple variables at the same time for a given policy scenario, by means of the FCM tool (3) Enabling users to view different funding priorities and the impact of policy decisions associated with skills and adult learning in different districts through FCMs for each district, by means of the graphical interface.

6. Study Contributions and Concluding Comments

Traditionally, policies have been developed by governmental experts with limited forms of stakeholder engagement. In recent times, the development of new technologies and the availability of open data have made it possible and provided opportunities for these experts to transform and advance their policy making practices through the use of new methods for stakeholder engagement. In line with these developments, this paper introduced the concept of Policy Compass, an innovative approach that leverages e-participation tools and open public data to encourage and empower stakeholders to participate in the policy decision making process. Through a qualitative case study enquiry in a UK Local Government Authority, this research has examined how an e-participation platform using open data and data visualisation techniques could facilitate collaborative and evidence based policy decision making. The case of Cambridgeshire County Council (CCC) has highlighted the need for improving the quality and transparency of its existing policy making process by complementing current e-participation practices with innovative tools for simulating and evaluating theories and models underlying policies. As a result, the goal of Policy Compass is to develop and deploy a platform for evidence-based policy making that facilitates stakeholder involvement in local government authorities such as CCC instead of reproducing

needless controversy about policies as most e-participation platforms currently do. Policy compass also seeks to help focus policy debates on the essential task of finding political compromises respecting the diverse interests of stakeholders.

From a theoretical stance, this paper draws and contributes to three strands of literature that are currently significant in a public sector policy decision making context. Firstly, this research has examined how publicly available open data can be exploited to improve policy decision. Secondly, it has highlighted the policy process and how ICT tools can contribute to the policy decision making process. Finally, the paper has reviewed and outlined the role that data visualizations and e-participation platforms can play in enhancing engagement between civil society and local government authorities. By drawing from the three strands of literature and the concepts proposed in the Policy Compass approach, the research has outlined how open data and the use of e-participation platform can foster communication and interaction between politicians and the civil society, simplifying decision making processes, demystifying legislative texts and allowing to effectively visualize arguments and impacts of proposed decisions. In doing so, enabling citizens to reach more informed opinions, on the policy decisions being taken and the way in which the latter affect their lives.

The findings and discussion presented in this study need to be interpreted with the limitation in mind that this paper relied only on a single case study that is still work in progress to draw conclusions. As part of the Policy Compass project, further empirical work will be undertaken in the near future to consult more stakeholder groups and pilot the proposed Policy Compass platform. This work will be motivated towards identifying the other factors which influence policy-making beyond the use of open data in an e-participation context. The

paper would then address one of the so-called myths of open data (i.e. open data will automatically yield result) and show a complex set of interrelated factors which influence policy making beyond open data.

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References

Atkinson, P. and Hammersley, M. (1994) "Ethnography and participant observation" in Handbook of Qualitative Research, NK Denzin and YS Lincoln edn, Sage Publications, Thousand Oaks, CA, USA., pp. 248-261.

Axelrod, R. (1976) Structure of Decision: the Cognitive Maps of Political Elites, Princeton University Press, Princeton, NJ

Bailey, A. and Ngwenyama, O. (2011) "The challenge of e-participation in the digital city: Exploring generational influences among community telecentre users", *Telematics and Informatics*, vol. 28, no. 3, pp. 204-214.

Bertot, J. C., Jaeger, P. T., & Grimes, J. M. (2010). Using ICTs to create a culture of transparency: E-government and social media as openness and anti-corruption tools for societies. *Government Information Quarterly*, 27(3), 264–271.

Bobrow, Davis B. (1970), Computers and a Normative Model of the Policy Process, *Policy Sciences*,1 (1) 123-134.

Bridgman, P. & Davis, G. (2000), *Australian Policy Handbook*, Sydney: Allen & Unwin.

Brooks, L., Henriksen, H. Z., Janssen, M., Papazafeiropoulou, A., & Trutnev, D. (2014). Public sector information systems (PSIS): How ICT can bring innovation into the policy-

making process. In ECIS 2014 Proceedings - 22nd European Conference on Information Systems.

Cabinet Office (1999), *Professional Policy Making for the Twenty First Century*, London: Cabinet Office.

Clarke, A., & Margetts, H. (2014). Governments and Citizens Getting to Know Each Other?: Open, Closed, and Big Data in Public Management Reform. Policy & Internet, 6, 393–417. doi:10.1002/1944-2866.poi377

Corbin, J. and Strauss, A. (2008) Basics of Qualitative Research, Third edn, Sage, Thousand Oaks.

Creswell, J. (2008) Research design: Qualitative, quantitative, and mixed methods approaches, Sage, London.

De Liddo, A., & Shum, S. B. (2014). New ways of deliberating online: An empirical comparison of network and threaded interfaces for online discussion. In 14th European Conference on Evolutionary Computation in Combinatorial Optimization (Vol. 8654, pp. 90–101).

Epstein, D., Newhart, M., & Vernon, R. (2014). Not by technology alone: The "analog" aspects of online public engagement in policymaking. Government Information Quarterly, 31, 337–344. doi:10.1016/j.giq.2014.01.001

European Commission, (2014). *Open Data*. [online] Available at: https://ec.europa.eu/digital-agenda/en/open-data-0 [Accessed 1 Dec. 2014].

Exworthy, M. (2008), Policy to tackle the social determinants of health: using conceptual models to understand the policy process, H*ealth Policy Plan*, 23 (5) 318-327.

Fitzgerald, A., Hooper, N., & Cook, J. S. (2013). Implementing open licensing in government open data initiatives. In Proceedings of the 9th International Symposium on Open Collaboration - WikiSym. ACM Press. doi:10.1145/2491055.2491094

Gov.uk (2010). *Letter to government departments on opening up data*. [online] Gov.uk. Available at: https://www.gov.uk/government/news/letter-to-government-departments-on-opening-up-data [Accessed 1 Dec. 2014].

Hallsworth, M., Parker, S., Rutter, J. (2011), *Policy Making in the Real World, Evidence and Analysis*, London: Institute for Government.

Howlett, M. (2009). Governance modes, policy regimes and operational plans: A multi-level nested model of policy instrument choice and policy design. *Policy Sciences*, 42, 73–89. doi:10.1007/s11077-009-9079-1

Howlett, M. (2014), From the ‘old’ to the ‘new’ policy design: design thinking beyond markets and collaborative governance. *Policy Sciences*, 47 (3) 187-207.

Howlett, M. and Lejano, R. P. (2013), Tales from the Crypt: The Rise and Fall (and Rebirth?) of Policy Design. *Administration & Society* 45.

ITAPA, (2014). *Open Data: prečo sú dôležité | Itapa*. [online] Available at: http://www.itapa.sk/4813-en/open-data-preco-su-dolezite/ [Accessed 3 Dec. 2014].

Janssen, M., Charalabidis, Y., & Zuiderwijk, A. (2012). Benefits, adoption barriers and myths of open data and open government. *Information Systems Management*, *29*(4), 258-268.

Jansen, Y., & Dragicevic, P. (2013). An Interaction Model for Visualizations Beyond The Desktop. IEEE Transactions on Visualization and Computer Graphics, 19, 2396–2405. doi:10.1109/tvcg.2013.134

Jones, Charles (1984). *An Introduction to the Study of Public Policy*, Belmont, CA: Wadsworth.

Kalampokis, E., Hausenblas, M., & Tarabanis, K. (2011). Combining Social and Government Open Data for Participatory Decision-Making. Lecture Notes in Computer Science, 36–47. doi:10.1007/978-3-642-23333-3_4

Kassen, M. (2013). A promising phenomenon of open data: A case study of the Chicago open data project. Government Information Quarterly, 30, 508–513. doi:10.1016/j.giq.2013.05.012

Keim, D. A. (2002). Information visualization and visual data mining. IEEE Transactions on Visualization and Computer Graphics, 8, 1–8. doi:10.1109/2945.981847

Keim, D., Qu, H., & Ma, K.-L. (2013). Big-Data Visualization. IEEE Computer Graphics and Applications, 33, 20–21. doi:10.1109/mcg.2013.54

Kolman, J. (2014). Software developed by research vs. Freedom of information in EU (open access and open data). Masaryk University Journal of Law and Technology, 8(2), 183–198.

Komito, L. (2005) "e-participationand Governance: Widening the net", *The Electronic Journal of e-Government*, vol. 3, no. 1, pp. 39-48.

Kosko, B. (1986), Fuzzy cognitive maps, I*nternational Journal of Man-Machine Studies*, Volume 24, Issue 1, Pages 65-75.

Lampathaki, F., Charalabidis, Y., Passas, S., Osimo, D., Bicking, M., Wimmer, M. A., & Askounis, D. (2010). Defining a Taxonomy for Research Areas on ICT for Governance and Policy Modelling. Electronic Government, 61–72. doi:10.1007/978-3-642-14799-9_6

Linder, S. H., & Peters, B. G. (1990). Policy formulation and the challenge of conscious design. Evaluation and Program Planning, 13, 303–311.

Liu, S., Cui, W., Wu, Y., & Liu, M. (2014). A survey on information visualization: recent advances and challenges. The Visual Computer, 30, 1373–1393. doi:10.1007/s00371-013-0892-3

Macintosh, A. and Whyte, A. (2006) "Evaluating How eParticipation Changes Local Democracy", *Proceedings of the eGovernment Workshop 2006*, ed. Z. Ghoneim, Brunel, West London, pp. 1.

Markaki, O., Kokkinakos, P., Koussouris, S., Psarras, J., Lee, H., Löhe, M. and Glikman, Y. (2014). Infusing Innovation in the Policy Analysis and Evaluation Phases of the Policy Cycle:. *International Journal of Electronic Government Research*, 10(3), pp.19-36.

Miles, M.B. and Huberman, A.M. (1994) Qualitative Data Analysis: An Expanded Source Book, 2nd edn, Sage Publications Inc, California,USA.

Moss, G., & Coleman, S. (2013). Deliberative Manoeuvres in the Digital Darkness: e-Democracy Policy in the UK. The British Journal of Politics & International Relations. doi:10.1111/1467-856x.12004

Mossberger, K., Wu, Y. and Crawford, J. (2013) "Connecting citizens and local governments? Social media and interactivity in major U.S. cities", *Government Information Quarterly*, vol. 30, no. 4, pp. 351-358.

Müeller, P. (2014). *Open Statecraft for a Brave New World | Shaping Network Society*. [online] Philippmueller.de. Available at: http://www.philippmueller.de/open-statecraft-for-a-brave-new-world/ [Accessed 1 Dec. 2014].

Myers, B.L., Kappelman, L.A. and Prybutok, V.R. (1997) "A comprehensive model for assessing the quality and productivity of the information system function: towards a theory for information systems assessment", *Information Resources Management Journal*, vol. 10, no. 1, pp. 6-25.

Myers, M.D. (2009) Qualitative Research in Business & Management, SAGE Publications, London.

Open Government Partnership, (2014). *Open Government Declaration*. [online] Available at: http://www.opengovpartnership.org/about/open-government-declaration [Accessed 3 Dec. 2014].

Puron-Cid, G., Gil-Garcia, J. R., & Luna-Reyes, L. F. (2012). IT-enabled policy analysis. In Proceedings of the 13th Annual International Conference on Digital Government Research. ACM Press. doi:10.1145/2307729.2307746

Ramanathan, T. (2009) The role of organisational change management in offshore outsourcing of information technology services: qualitative case studies from a multinational, Universal Publishers, USA.

Ren, L., Du, Y., Ma, S., Zhang, X.-L., & Dai, G.-Z. (2014). Visual analytics towards big data. Journal of Software, 25(9), 1909–1936.

Rosewell, B. and Ormerod, P. (2012), Complexity and Agent Based Models in the Policy Process, *Proceedings of the 2012 Winter Simulation Conference, C. Laroque, J. Himmelspach, R. Pasupathy, O. Rose, and A.M. Uhrmacher, eds.*, IEEE, Red Hook, NY: Curran Associates.

Ryder, D. (1996), The analysis of policy: understanding the process of policy development, *Addiction*, 91 (9) 1265.

Salmat, M.A.B., Hassan, S.B. and Muhammad, M.S.B. (2011) "Electronic Participation in Malaysia", *Journal of e-Government Studies and Best Practices*, vol. 2011, no. 270543, pp. 1-11.

Samuelsan, D., Elder, M., and Evans, J. (1990), A conceptual framework for state policy development, *Infants and Young Children*, 2 (3) 79-86.

Shum, S. B., Aberer, K., Schmidt, A., Bishop, S., Lukowicz, P., Anderson, S., … Helbing, D. (2012). Towards a global participatory platform. Eur. Phys. J. Spec. Top., 214, 109–152. doi:10.1140/epjst/e2012-01690-3

Sivarajah, U., Irani, Z., and Weerakkody, V. (2015). Evaluating the use and impact of Web 2.0 technologies in local government. *Government Information Quarterly*, http://dx.doi.org/10.1016/j.giq.2015.06.004.

Sutton, R. (1999). *The policy process: an overview*. London: Overseas Development Institute.

Swezey, R. M. E., Sano, H., Hirata, N., Shiramatsu, S., Ozono, T., & Shintani, T. (2012). An e-Participation support system for regional communities based on linked open data, classification and clustering. *2012 IEEE 11th International Conference on Cognitive Informatics and Cognitive Computing*. doi:10.1109/icci-cc.2012.6311150

Walker, Warren E. (1982), Models in the Policy Process: Past, Present, and Future, *Interfaces*, 12 (5) 91-100.

Wallace, J. R., Scott, S. D., & MacGregor, C. G. (2013). Collaborative sensemaking on a digital tabletop and personal tablets. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (pp. 3345–3354). ACM Press. doi:10.1145/2470654.2466458

Yin, R.K. (2009) Case Study Research: Design and Methods, Fourth edn, Sage Publications, California.

Zuiderwijk, A., & Janssen, M. (2014). Open data policies, their implementation and impact: A framework for comparison. *Government Information Quarterly*, 31(1), 17-29.

Zuiderwijk, A., Janssen, M., Choenni, S., & Meijer, R. (2014). Design principles for improving the process of publishing open data. *Transforming Government: People, Process and Policy*, 8, 185–204. doi:10.1108/tg-07-2013-0024