The Contribution of Sociotechnical Systems Thinking to the Effective Adoption of e-Government and the Enhancement of Democracy

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Abstract: This paper reports a study which reviewed the literature and explored the approaches adopted by a small sample of local government bodies engaged in implementing e-Government. The findings suggest that the e-Government implementation process underway in the UK does not embody the principles of widening democracy and increasing social inclusion. The empirical data reveal limited citizen engagement the design, development or implementation process. The paper discusses the potential contribution to be made by adopting a sociotechnical systems approach in which citizens engage with IT professionals and information/service providers to identify needs, to test options and to achieve shared goals of e-Government.

Keywords: Implementation of e-Government; Sociotechnical systems; vision of e-Government

1. Introduction

There is a perception amongst politicians and governments in many countries that the population has become more and more "disenchanted with the traditional institutions of representative government, detached from political parties, and disillusioned with older forms of civic engagement and participation" (Norris et al. 1999) Digital technologies are being regarded as the panacea to many of the problems which underlie this apparent civic disengagement, and the UK Government, in common with many others across the globe, is seeking to enhance service delivery and to increase the participation of citizens in society through the use of digital technologies. The use of information and communication technologies and strategies by democratic actors (government, elected officials, the media, political organizations, citizens/voters) within political and governance processes of local communities, nations and the international stage has been termed e-democracy (Clift 2004). The component sub-systems of e-democracy include e-Government (i.e. the provision of central and local government services and related information electronically), e-voting and e-participation (i.e. the use of digital technologies to enhance opportunities for consultation and dialogue between citizens and government).

These systems and their associated processes, like many systems and processes, are inherently 'sociotechnical' in nature, i.e. they involve people interacting with technology to deliver outcomes not achievable by either the technology or the people working alone. However many large-scale change initiatives involving technology tend to focus solely on the design and development of the technology, rather than designing in an holistic way the composite system of which the technology is only one component – albeit a major one. There is a substantial body of evidence which suggests that this one-sided approach to design is one of the main reasons why new systems fail to achieve their expected benefits (e.g. OTA 1993a & 1993b, Dutton et al. 1994, National Audit Office 1999; Bourn 2000).

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This paper reports the emerging findings of an initial scoping study to investigate the extent to which e-Government in the UK is being developed as a sociotechnical system. It explores the contribution which sociotechnical systems thinking can make to the effective adoption of e-Government and considers the implications for the enhancement of e-democracy. The study was conducted by the e-democracy study team of the British Computer Society Sociotechnical Group. There are three components to the investigation in progress:

- A review of research into e-Government, with particular emphasis on local e-Government in the UK.
- A study of policy implementation in a number of very different local authorities in the UK
  - Perceptions of local government Councillors and staff;
  - Examination of the websites of a sample of local authorities in disparate geographical locations across England.
- A study of the way temporary special interest groups use the internet to mobilise activists and interact with those in authority[1]

2. e-Government the international landscape

A recent, annual survey (Accenture 2003) of the e-Government initiatives of 22 countries indicates that leadership in the international landscape has not changed significantly from previous years' studies, (Accenture 2002, 2001) with Canada, Singapore and the United States continuing to occupy the top three places of 22 countries surveyed. **Figure 1** shows the maturity level of 22 of the developed countries throughout the world. From the figure we can see that Canada is the most mature, the UK in 8th place and South Africa being the least mature of the countries surveyed.

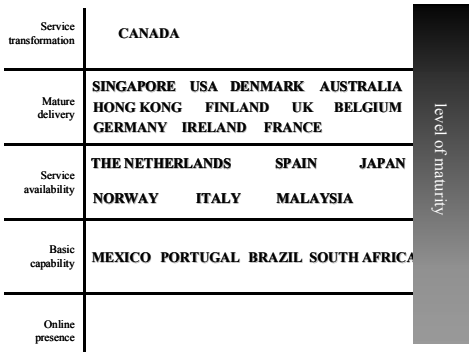

Figure 1: Countries' progress toward e-Government maturity through a series of plateaus

According to the survey (Accenture 2003), Canada's success lies in the flexibility of her Government On-Line (GOL) strategy, underpinned by 'fundamental e-Government principles of clear vision, user involvement, good targets and departmental and jurisdictional integration' (p.50). Sociotechnical aspects of the strategy include the redesign of governance and management systems to accommodate new models of service delivery and the requirements of users.

3. Current status of the UK e-Government strategy

In global terms, the UK is classed as a high-ranking e-Government performer (Accenture 2003, p.84). In the UK, e-Government is seen as central to reforming and modernising all public services, and the Government's aim is to make all its services available electronically by 2005 (Cabinet Office 2000 A number of central Government departments (e.g. Inland Revenue, Customs and Excise, and Environment, Food and Rural Affairs) have set goals of improving customer service by 2005 by ensuring 100% of services will be offered electronically, wherever possible through a common government portal, with take-up for key services of at least 50 percent by March 2006 (Accenture 2003, p.84).

The key benefits which are expected to be achieved as a result of the electronic delivery of services are:

- Wider participation/reduced social exclusion;
- Improvements in information sharing between services and agencies;
- Greater variety, choice and convenience of access for customers;

[1] The last of these components is beyond the scope of this paper and will be reported elsewhere

- Improved speed and efficiency of the processes which underpin services.

Delivering effective e-government at the local level is a critical component of the UK Government's e-government strategy. It is hoped that the change will breathe new life into local democracy and transform local services.

The primary delivery method for e-government is the internet. Local e-Government is regarded as an integral part of the overall 'UK Online' programme to realise the benefits of the Internet for all citizens. As part of ensuring service delivery, the UK Government is focusing heavily on broadband technology, spending more than £1 billion over the next four years as part of a £6 billion investment in information technology. However only approximately 50% of homes in the UK have a connection to the internet at present (National Statistics Office 2004) and therefore a variety of other access mechanisms are also being explored and developed. For example, interactive digital television (iDTV) is being promoted by the UK Government as a technology which offers the potential for easy public access to a wide range of Internet-based services through the television set in the home, without the need for a personal computer (Office of the e-Envoy 2003).

To monitor progress towards the goal of making all local government public services electronically accessible by 31/12/05, each local authority in England is required to record its plans and performance in a document entitled 'Implementing Electronic Government' (IEG). The information contained in the IEGs produced by local authorities, together with information contained by regular surveys such as those carried out by the Society of Information Technology Managers (SOCITM 2004). in the public sector, provides a clear picture of the progress which is being made towards achieving local e-government. The most recent report by SOCITM (2004), indicates that all of the local authorities in England and Wales now have an active website. This means that any citizen with access to the internet can now access some information about their own, or any other, local authority. However the regular SOCITM surveys indicate that, while progress is being made towards e-government in electronic service delivery at the local level, it is happening slowly and there are still major obstacles to overcome in delivering accessible services.

Although the UK has been a strong e-Government performer, the biggest concern for the Government is the low number of citizens using online government services (even though about 75 percent of these will be web-enabled by the end of 2003, according to the Government's e-Envoy Andrew Pinder). Other cabinet members have pointed out that only one in 10 UK citizens have used online government services, compared with half of the Canadian population (Accenture 2003 p.85).

Outcomes to date indicate that there has been a strong emphasis on technological aspects of delivery. However it is unclear how the developments so far have addressed the important goals of enhancing democracy, increasing citizen participation and improving the speed and efficiency of the underlying processes. A study was therefore undertaken to investigate the extent to which e-Government in the UK is developing as an effective sociotechnical system.

4. The scoping study

4.1 Rationale for the study

A key driver for the development of e-Government at the local level is the consultation paper from the Office of the Deputy Prime Minister (ODPM), entitled *'e-Government@local, towards a strategy for local government consultation'*. This document states that all local government public services should be electronically accessible by 31/12/05. To monitor progress towards this goal, each local government body is required to record its performance in a document entitled 'Implementing Electronic Government' (IEG). To address the questions "To what extent is e-Government in the UK developing as an effective sociotechnical system ?" and "What are the likely implications for the development of an e-democracy?", a study is in progress to explore the way in which local government is responding to the requirement to design, develop and implement e-Government for

their local community. The study began in Autumn 2003 and is on-going.

4.2 Methodology

4.2.1 Objectives

- To explore perceptions of the IEG development process,
- To conduct website examinations to investigate the impact or influence of the guidance contained in policy documents from the ODPM on local authority website content and functionality.

4.2.2 Sample

A small sample of councils was selected to provide data from highly diverse contexts, see Table 1.

Table 1: Population figures from Census 2001

Council	Local authority type	Area type	Population
A	London Borough	Urban	300,000 +
E	Metropolitan District	Urban	250,000 +
C	Metropolitan District	Urban	200,000 +
B	District	Largely rural	150,000 +
D	District	Urban	100,000 +
F	Parish meeting	Rural	80 +

4.2.3 Data collection methods

- Semi-structured interviews with a small sample of local government Councillors and staff drawn from the selected sample of councils in England
- Examination of the websites of the local authorities sampled.

4.3 Emerging findings

4.3.1 Perceptions of local government Councillors and staff

Given the small sample and relatively early stage of the study, findings are, of course, tentative but raise a number of issues relevant to the successful implementation of e-Government.

- *Perceptions of e-Government* - Interview responses from Councillors and staff indicate generally positive responses from local authorities towards e-Government, which is viewed as supplementing traditional methods to improve customer service and gather opinion. However, interviewees reported uncertainty both about the scope of e-Government as well as about how to use it as a method of improving services. Additionally, some elected Councillors lack awareness of not only the IEG process itself but also the national strategy behind it.
- *Availability and Quality of information on e-Democracy/e-Government* - many interviewees expressed irritation at the large quantity of information they receive from central Government, with one respondent commenting “it’s an industry”. Additionally, the view was expressed that mere completion of the IEG form to demonstrate progress neglects the significant issue associated with the required change in the underlying culture of an organisation. The inference is of too much information and too little meaningful guidance.
- *Skill/Knowledge gaps* - Councillors interviewed at one local authority that had “fallen behind” expressed dissatisfaction at a previous leadership team that had “not given the appropriate priority” to the process required for IEG. This failing was attributed to lack of knowledge and understanding of the implications and significance of e-Government for local authorities. It is clear that e-Government principles are not embedded in local Government processes. Awareness levels of Councillors and staff vary widely - from no awareness at all to highly knowledgeable and well-informed. The need for training has been raised in interviews in most councils involved in the study so far.
- *Engagement with Citizens* - Whilst there is recognition that the most prominent objective of the IEG initiative is related to improving customer service and that electronic methods offer the potential to improve dialogue with citizens, e-democracy (generally expressed as e-voting) is viewed as less important than e-Government. Interviews revealed little evidence of electronic methods being

used in current projects involving consulting and communicating with the public or in communicating and engaging with the local community. Additionally, although an important element of e-Government is perceived to involve consultation with citizens, interviewees reported very limited activity and lack of success where efforts had been made to consult with users about their requirements.

- Interviewees commented on the unsuitability of performance measures required in the IEG form, believing that the use of surveys and related qualitative data collection techniques to monitor customer satisfaction levels should be encouraged. Instead evaluation methods currently used focus on usage levels, such as the number of hits on a website; even an annual survey conducted to assess satisfaction is described as asking 'whether customers have used the e-method', rather than for more qualitative data that may help improve the nature, breadth or quality of service provision, or help increase participation in the democratic process.
- *Limits of penetration of e-Government* - the sample of councils studied included a very small rural parish in order to provide representation of the very bottom tier of government. The parish is at the bottom of the network of departments of central government, local authorities, agencies and quangos, which together provide the infrastructure of public services and regulations provided for the citizen. It is regarded as a local government entity, but because of its small size, its Council is designated as a Parish Meeting, rather than as a Parish Council. It meets twice a year. All those on the electoral roll are invited to the Parish Meetings; a typical meeting will be attended by 10-15 parishioners plus external attendees, comprising representatives from the numerous bodies involved in providing local government.

None of the business of the parish meeting is conducted via the Internet. Evidence so far suggests that only a very small number of parishioners have even heard of the concept of e-Government. To date, the parish has not received any e-Government services, though an increasing amount of information is provided via Websites provided by the different authorities and agencies. This information is not readily accessible by many parishioners as a very substantial proportion of the population do not have any e-Facilities, nor do they use the facilities on offer in internet cafes and parishioners have expressed no interest in having a recently-introduced mobile internet café visit the parish. Even many of those who have home computers tend to use them for leisure activities and private email rather than for connecting to local services or local information.

The recent drive to increase the participation of citizens has led to a variety of initiatives, all of which involve the holding of meetings. Much organisational effort is put into encouraging attendance and participation and still those who attend do not form a group representative of the community as a whole. Electronic communication does not feature in the promotion or enabling of participation.

4.3.2 e-Government and website features

The study first examined one of only 23 (5%) local authority websites to have gained 'transactional' status (described as significantly interactive as opposed to merely 'promotional' by SOCITM (2004)). Here public consultation has taken place to redesign the site and high accessibility standards (to AAA Bobby (Watchfire 2004)) are met. Efforts to interact with citizens include an online feedback form as well as a link that encourages people to become involved in consultation on local issues e.g. through consultancy groups or by taking part in online polls. Paradoxically however, the 'Democracy' section of the site is more informational than interactive, providing information on, for example, the Council's Best Value plan, its community strategy and reports from their standards committee.

This treatment of the concept of democracy occurs on three other local authority websites examined, where a section on 'democracy' is provided but again the content tends to be offered as information rather than as an invitation to take part in something approaching a democratic process. This was seen too on

one of the websites that SOCITM describes as one of 'the most improved, and which now merits a 'C+' rating'. Although these websites do not provide for democratic interaction online, such sections do give details of how to contact Councillors and provide copies to council minutes, thus offering a range of access routes. This implies interpretation of e-Government as improving business processes and services, rather than online interaction with council members and officials.

However, this interpretation is not a universal one: an alternative approach is adopted by one local authority, which makes one of the most conspicuous aspects of the site an invitation to take part in a consultation online on service delivery as well as on the regeneration of a particular neighbourhood. Despite providing means for participation, this website has not been awarded transactional status in the latest of SOCITM's reports.

There does appear to have been an increase in the number of authorities who are offering transactional services – the SOCITM report refers to an increase from 10 transactional sites in 2003 to 23 in 2004. It is clear that 'transactional' does not necessarily include e-democratic processes of consultation, but it offers an important stepping stone towards that objective. It is also clear that there are sites that are not included in the transactional list, but that do offer an appreciable element of consultation.

Thus some websites are achieving a degree of success in meeting the requirement of the national strategy for local e-Government to allow people to:

- 'Express their views and make decisions on services and plans…
- Debate issues of local importance with (local authorities) - and with each other.' (ODPM 2002, p.15)

4.4 Summary of findings

The findings reported above suggest that progress towards the Government's goals is uneven, with some local authorities taking real steps towards meeting them, but others falling behind and in general making little progress in overcoming the complexity in the structure of service provision. Such findings indicate a lack of 'pull-through' of the ministerial concepts and vision into the current delivery of e-government. From a sociotechnical perspective, there appears to be far more emphasis on technological aspects of delivery than on engaging citizens in identifying real needs and participating in decision-making regarding perceived priorities and methods of service delivery. A concerning consequence is that levels of understanding of user requirements are therefore insufficient to inform service design and delivery. While local authorities have been consulted by Government about the development of e-government strategies and systems, there is little evidence of systematic or widespread participation of other stakeholders, particularly citizens. Citizens are key stakeholders in systems for e-government, yet they appear to be having little input into their creation and development.

One area where Government does recognise the need for stakeholder involvement is in evaluating the design of websites. The Government specifies e.g. (Office of the e-Envoy 2003) for example, that "users" (i.e. stakeholders - not just visitors to the site, but also to other stakeholders such as recipients of output from the system, including support staff, and those providing the local authority services) should be involved in the evaluation of websites. Some evaluation reports have included user reviews e.g.(Accenture 2003), although others such as the SOCITM 2004 report (SOCITM 2004) have adopted a 'mystery shopper' approach to evaluation, where reviewers have role-played different types of stakeholder. Government aspirations for e-government systems which lead to enhanced democracy, through wider participation in the political process and reduced social inclusion, cannot be achieved unless these goals become central to the design, delivery and implementation of e-Government.

The emerging findings are revealing significant challenges faced by local Government in their efforts to implement e-Government. To achieve the vision requires the implementation not just of useful, usable and accessible technical systems (where there is clearly still considerable progress to be made), but of sociotechnical sub-systems, combining

technology, organisational and communication processes which enable and encourage dialogue between the citizen and the local authority. Such mechanisms will facilitate the co-creation of decisions about local issues, with citizen engagement and participation in the process, rather than simple one-way transmission of information from the local authority to the citizen.

The following section summarises the key principles of sociotechnical systems thinking, and shows how they can be applied to inform the development of effective systems for e-Government.

5. Sociotechnical theory and e-Government

Sociotechnical theory has its origins in the work of the Tavistock Institute in London during the 1950s and 1960s (e.g. Trist & Bamforth 1951). The theory states that systems consist of social and organisational elements as well as technical elements, and emphasises that successful systems require the simultaneous configuration of both 'technical' and 'organisational' and 'social' aspects of the system (see figure 2).

Sociotechnical theory is widely regarded as the key to information systems success. The high failure rate of many previous large-scale information systems implementation projects, including many in the public sector (e.g. the UK. Passport Office (NAO, 1999), the London Ambulance Service Despatch System (Finkelstein & Dowell 1996), and current problems within the Child Support Agency) is often associated with a focus on delivering a working technical system without taking into account (and designing in parallel) the necessary social system, or the organisational and social environment in which the technical system must operate.
Cherns (1976), has articulated a set of principles for sociotechnical design, i.e:

- design processes should be compatible with desired design outcomes (i.e. they should be highly participative);
- methods of working should be minimally specified;
- variances in work processes should be handled at source;
- organisational boundaries should not be drawn to impede the sharing of information, learning and knowledge;
- information should support those who need to take action;
- those who need resources should have access to, and authority over them; roles should be multifunctional and multiskilled;
- other systems supporting the focal group should be congruent in their design;
- transitional arrangements between an existing and a new system should be planned and designed in their own right;
- redesign is continuous and requires review and evaluation.

Figure 2: Elements of Sociotechnical systems

A recent report commissioned by the ODPM from the Centre for Urban and Regional Development Studies, University of Newcastle upon Tyne, (November 2003), highlights the implications of Sociotechnical theory for the successful implementation of local e-Government, and identifies four nested 'components' or elements which require simultaneous configuration, management or alignment. These are described below and their relationships illustrated in figure 3:

- The technologies themselves need to be configured. Almost all local authorities now state in their IEG statements that a purely technological approach to implementing e-Government is inadequate. The importance of the need to tailor

technologies to the needs and characteristics of the citizens who will use them is being recognised.

- Virtually all authorities now stress that e-Government also requires a re-configuration or 're-engineering' of business processes. This is widely recognised and is seen by many authorities as the key challenge in implementing e-Government.
- Many authorities have begun to engage with a third layer of change concerned with the detailed working practices of authority and partner staff. The focus on practices is concerned with the content of individual tasks and how they are undertaken. Critically, this is understood to be cultural change and in particular the development of a customer – or citizen-focused perspective among managers and staff in local authorities and their partners; and
- Finally, and perhaps most importantly, for e-Government to achieve its goals, active **participation** of individuals and businesses as customers, interlocutors, clients and citizens needs to be configured. This includes issues of awareness of, and trust in, e-Government systems and services. (ODPM, 2003, p.16)

For complex sociotechnical systems to succeed requires all four nested levels to be configured. (ODPM, 2003).

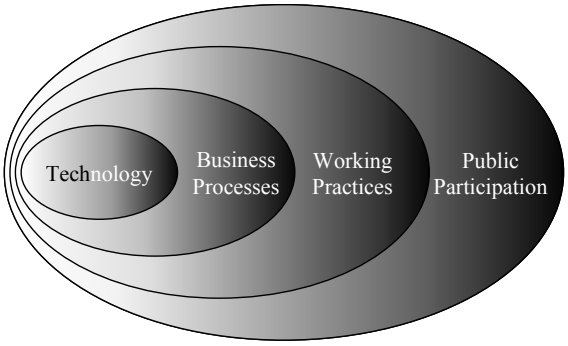

Figure 3: Elements of sociotechnical configuration (ODPM, 2003)

6. Conclusions

Many of these emerging findings are supported by other studies of e-Government. The majority of authorities have established strategies and structures for the implementation of local e-Government (ODPM, 2002, p.43), and all local councils in the UK now have a website (SOCITM, 2004). Local authorities clearly recognise the importance of having strong leadership to drive forward the implementation of e-Government and almost all now have both a senior officer e-champion and an elected member e-champion (ODPM, 2003, p.26). However the most significant efforts have tended to be focused on the provision of *information* rather than *services*, and only a small percentage of councils has yet delivered a full range of services electronically (SOCITM, 2004).

Where "e-enabled" services have been provided, these have not always delivered the intended benefits for citizens. A number of authorities have identified failure to ensure that the users of e-enabled services were aware of the existence of e-enabled services and motivated to use them, and, in particular with web-enabled self-service technologies, had the necessary access to technologies and skills to use them. There have been reports of councils offering e-enabled council tax payments through their websites using a credit card (and for which technology, business processes and back office working practices were working smoothly), only to find that there were virtually no users of the service. The main reason for this was little demand for credit card based council tax payments (those with credit cards already had electronic payment through direct debit, while those not using direct debit were unlikely to have a credit card or regular web access) (ODPM, 2003, p.16). This example serves to highlight the importance of understanding citizens' needs and preferences for ways of accessing information and services.

There are also concerns about the impact of e-Government on the 'digital divide' in society between those who have access to digital technologies and those who do not. The problem of increased democratic participation requires that a substantial proportion of the community has direct access to e-Government via the Internet. While local authorities are making efforts to bridge the digital divide, there is a limit to what they can provide in terms of access, and there has to be sufficient interest expressed by citizens for it to be successful.

A digital divide in the community raises two issues. The first is the practical one

that if local authorities provide services via the Internet, they have to maintain dual systems: a conventional system for those not connected and an e-service for those who are, and the cost of maintaining two systems can be prohibitive. The second problem is one of democratic equity. If those who are connected can obtain a more efficient service via e-Government, than those who are not connected, those who have to rely on mobile services or town hall and public library facilities, are disadvantaged.

The focus of local e-Government strategies is generally on service improvement; less attention has been paid to the role of e-Government in democratic participation and economic development. A review of the UK national strategy document (ODPM, 2002) and more specifically the UK Government-sponsored *Local e-Government – process evaluation of the implementation of electronic local government in England* (ODPM, 2003) and other accompanying information from the UK Government website (ODPM, 2004) has shown that although the issue of engaging the user/citizen/customer is discussed within the strategy, there is little evidence or clear guidelines as to how this should be done. Further, there is little evidence of any sustained co-ordination between different authorities or even between the departments set up to move e-Government forward and those delivering services. Clearly there has been progress, but not on a scale commensurate with the objectives of Government.

Evidence from the surveys reported above suggests that the current state of progress in e-Government is a consequence of the complex nature of the sociotechnical system which local government represents. The structure of governance is complex, with roles and responsibilities shared between central government, local authorities operating by means of a hierarchy of authorities, quasi governmental agencies such as the Highway Agency, quangos, such as Housing Associations, charities and private enterprises overlapping and interdependent. The provision of services might thus be shared by a number of very different entities. The delivery of e-Government requires significant technological transformation for many of these organisations, but it also requires significant procedural and cultural change within the organisations involved, by their officers and staff, and by citizens themselves. The timescale for this enormous change programme is extremely ambitious. While many local authorities have already made significant progress in achieving the target they have been set (especially those which are larger and well resourced), it is difficult to see how others will be able to do so. For example, in the small parish reported in the scoping study above, the sheer complexity of the existing structure of local government appears to make un-attainable central Government's objective of a seamless structure, transparent to the citizen, enabled by the use of e-Government.

7. Recommendations

In order to achieve the important e-Government goals of increasing citizen participation and improved speed and efficiency of the underlying processes, the authors argue that mechanisms need to be provided which enable a dialogue between the citizen and the local authority, and which enable the co-creation of decisions rather than simple one-way transmission of information (Olphert and Damodaran, 2004). To deliver this requires the development of sociotchnical sub-systems, combining technology and communication processes which meet the task needs of citizens and the procedural and legal requirements of local government. The principles of e-Government need to be embedded into all local government processes, with clear relationships between services and initiatives and the e-Government agenda. Furthermore, to achieve the cultural and organisational change which is necessary for the benefits of e-Government to be fully realised, resources need to be made available for educating both staff and citizens in the concepts of e-Government. There is a considerable knowledge base available in the research and practitioner literature to inform a relevant and highly effective action programme. Some illustrative examples of recommended actions are listed below.

Actions for the Office of the Deputy Prime Minister and other relevant government departments to consider:

- Commission the development of policies and procedures which are informed by sociotechnical concepts and the findings of sociotechnical studies (e.g. the ODPM Process Evaluation Report 2003).
- Promulgate these evidence-based policies and procedures to local government bodies to support the demanding and complex process of implementing electronic government underway.
- Respond to the need for awareness and education in concepts of e-Government and e-Democracy by providing core educational material which can be tailored at local government level to meet the needs of elected Councillors and of staff.
- Commission research to inform the development of stakeholder participation strategies which achieve the active engagement of different segments of society (for example, older citizens, young people, lower income group) in the democratic process.
- To achieve the fast track delivery of e-Government in line with ambitious targets of the UK Government, apply established best practice in change management to existing implementation strategies.
- Design and develop an innovative national programme to promote awareness and understanding of concepts of e-government and e-democracy among the general public through promoting awareness of the possibilities offered by digital technologies to improve local conditions and enhance their lives.
- Incorporate continuous redesign, review and evaluation to mitigate against further "failed" or "disappointing" e-Government initiatives.

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