Auditing the impact of knowledge management on human and technological resources in the UK local government planning process

Auditing the impact of knowledge management on human and technological resources in the UK local government planning process

Nasrullah K. Khilji | n.khilji@cranfield.ac.uk
PEARL-UK, Business Centre, Cranfield University

Stephen A. Roberts | stephen.roberts@uwl.ac.uk
School of Computing and Technology, University of West London

An exploratory study of five UK local planning authorities (Central Bedfordshire Council, Bedford Borough Council, Milton Keynes Council, Luton Borough Council and Northampton Borough Council) is providing the basis for a review of the scope for developing knowledge management in this organizational sector. There has been substantial investment in the ICTs at this level of government and there is now evidence that collateral changes in the organizational and social environment are taking place in the agencies themselves and within the wider public which will enhance the capability of the planning system. These collateral changes can help to add value to the infrastructural investment. Such changes and reforms can help make the planning process efficient, effective and sustainable. An understanding of these processes is the key to developing a sustainable planning system which is not only technically efficient but better able to be effective through improved communication processes and knowledge management.

Initial field studies have inspired the development of a number of models which will then be further tested. A selection of the model structures are introduced in this paper in the content of a number of key research objectives

Keywords

planning authorities in the UK | *knowledge management* | *sustainable planning* | *socio-technical systems*

Background: conditions and challenges

The requirement placed on UK central and local government bodies to be efficient and effective has always been present but perhaps never greater than it is today. The combined pressures of administrative quality, service to citizens and democratic accountability are relentless, and all the more so, when social and economic goals remain ambitious at a time when resources are constrained. The UK planning system is no exception to these trends as equally they are felt in the education sector, the health service and in all manner of institutional social provision.

The planning system (more precisely the physical and spatial planning system) in the UK is well established and all pervasive. It forms part of the institutional infrastructure and its processes impact systematically at many levels across the nation. It is an essential element in economic growth and is part of the move to develop sustainable communities. **Sustainability** in planning is one of the key aspects of the programme of research discussed in this paper. Fitness for purpose, fitness of process, efficiency and effectiveness in resource usage, contributing to a carbon neutral economy, and optimizing social and economic benefits are all aspects of sustainability which can be facilitated through the planning system. There is no alternative to sustainable development and for this reason sustainability is now the key driver of innovation (Nidumolu et al, 2009). The main hypothesis explored through investigation is one in which technology is used to facilitate knowledge management, but it is clear that the organizations themselves will also need to change and adapt in both structure and behaviour so that the full benefits can be achieved. **Knowledge management** represents a progressively more coherent, strategic and purposive effort to extend the base of information management (and its business equivalent in Information Resource Management (IRM) to encompass knowledge in all its forms, aspects and varieties. The totality of knowledge resources may be referred to as intellectual capital and are combined with human, structural and customer capital resources to obtain the maximum benefits from all human knowledge. Its foci include the management of existing knowledge resources through sharing, leveraging, collaborating and learning in order to create new knowledge to provide a basis for innovation and progress and increases in economic, social and cultural welfare (Definition developed by Roberts (2004) and Roberts (2008).

The organization and behaviour of the planning system reflects the prevailing characteristics of large public bureaucracies. These include a strong sense of hierarchy, conservatism in process arrangements, inertia resulting from their size and complexity, an aversion to risk, ambiguities of 'ownership' of process and a culture in which the wider sharing of information and expertise may be impeded. It is clear that these systems have been put under pressure to change over the last three decades but reforms have taken place in response. Organizational reform and technology together provide a potent combination in which the information and communication technologies (ICTs) and new forms of organization can create conditions which favour not only efficiency and effectiveness in organizational settings but which also lead to higher levels of service and value (Brooke, 2000; Dewett and Jones, 2001; Rodrigo and Pachon, 2009). The business world has identified the field of KM (Knowledge Management) as a form of organizational behaviour and process which uses ICTs and social process to obtain positive outcomes. But in order to do this, the organizations themselves often need to be reconfigured. Organizational reform implies not just attention to structures and processes but also a new interpretation and recognition of the value of information and communication themselves as essential ingredients in the process.

The ICTs have provided new scope in the last twenty years for a fundamental reorientation of information and communication processes. A number of writers perceiving the value of measuring intellectual assets recognized the growing importance of organizational knowledge as a competitive asset (Norton and Kaplan, 1996; Edvinsson and Malone, 1997). Management Information Systems provide a comprehensive and integrated coverage of essential new technologies, information system applications and impact on business models and managerial decision making in an exciting and interactive manner (Laudon and Laudon, 2009).

Compared to the private business sector, the local government system has been a relatively slow adopter of the ICTs: following rather than leading. In the last decade, the rate of change has accelerated as the impact of the WWW, Web 2.0 and the social web has grown. The public appetite to use technology sometimes outpaces the institutional capacity to respond and the public has high expectations of the level of service delivered through such technology.

There are signs that a number of key factors are beginning to converge that can provide a catalyst for a phase of development that can be called 'sustainable planning using ICT and knowledge management'. The external factors include new edge technologies, the restructuring of the public sector, the political drive of the 'Big Society', ongoing policy debates and the need for more democratic forms of organization. The internal factors include cost efficiency, cost saving, greater accountability and transparency

The main purpose of this paper is to open up and explore this evolving dynamic and to propose a way to combine IM (Information Management) and KM with a more sustainable and democratic planning process. Empirical research and modelling by the authors is suggestive of how new configurations of resources and structures could be evolved to assist in such renovation and re-profiling.

The discussion fits neatly into the wider debate about public policy and economic strategy in the UK at the moment. The centre (centrally or locally) wishes to provide better quality service, at lower cost, more responsibly, with a stronger connection to the client and citizen. The citizen (the consensus suggests) wants efficiency, accountability, convenience, flexibility, a sense of justice and citizen satisfaction. Citizens desire a feeling of belonging and involvement in their communities that has much to do with access to information, knowledge, communication and process. The planning system really does impact on the life of the citizen personally (as a householder with a building or development proposal), in the local context (as a resident), and more widely in terms of the physical and built environment (experienced in town and country) and in terms of spatial movement by private and public means. In other words citizens pay their taxes and opt in to the 'system' but in return want fair treatment and fair results. This has always been the ideal of relations between government and citizen, but has (truthfully) rarely been achieved or at best only achieved in parts. This is not to suggest that changes to systems will deliver a total result, but there is a good chance that the planning system can use technology to improve its information and knowledge management capability in order to produce a tangible change.

In the light of the preceding general analysis there is potential to be developed and applied. This paper sets out to define the main problems and to present a number of models which a subsequent programme of investigation is actively exploring. The discussion elaborates the main features of a number of models and identifies ways in which the existing system can adapt to the prevailing situation.

The planning system

Local authorities in the UK are powerful bodies that plan the environment of the area they are directly responsible for as well as being accountable to it. The local authorities have a crucial role to ensure that regulations deliver realistic advantages for the local communities. They implement government plans under the statutory framework while recognising various approaches to make these plans workable for sustainable development. Chandler (2001) stated that the local authorities have the capability to co-ordinate many independent functions in accordance with the needs and demands of the public.

These local authorities are not competing with each other but are expected to benchmark themselves in a way which adds to their individuality and independence. There are four levels of government; national, regional, local and community within the United Kingdom's representative democracy. Generally the national government develops new legislation, guides lower levels of government and provides national services, such as defence, foreign policy and social security. The UK devolved authorities (in Wales, Scotland and Northern Ireland and the English regions to a lesser degree) work regionally and with local responsible bodies to deliver key economic, social and cultural services.

UK local government derives its power from a variety of Acts of Parliament. Local authorities are required under law to deliver the functions and services to local communities as prescribed in legislation within the local area of control. Local government is therefore the key player in the regional planning process both as decision maker and also as a planning service provider.

Provision for local government is underpinned by Local Government Acts (Great Britain, 2011). The decision making process takes place in a succession of committees and sub-committees ranging from full council meetings attended by all elected members down to subject or area based committees attended by representative elected members. However, the executive (cabinet) model has become more dominant as dependence on professionals and specialists has grown. The local authorities differ in the size of their workforce and the way they are structured.

The main areas of responsibility for the local authorities include: planning and environment, social services, local economy, education, housing, roads, sports and culture. The local government is also involved in a range of initiatives that are normally delivered in partnership, which are aimed at addressing disadvantage and rebuilding communities as well as issues related to community safety, crime reduction and health promotion.

Partnerships and joint working includes areas such as:

- Public health
- Children's services
- Community care
- Economic development forums
- Social housing (supporting people)
- Environmental protection and improvement
- Transport
- Arts and leisure

Local governmental bodies are organised into a mixture of one-tier and two-tier systems. Some local authorities share services covering a wider area, like police, fire services and public transport. This may be done to avoid splitting up services when Council structures are changed or because Councils are too small to run an effective service on their own (Joint Services, 2011).

The local authority is indeed the government agency closest to the public. Its responsibility not only accommodates the public with a variety of services and basic facilities but it also acts as a development control body in the urban (and rural) development process. The Town and Country Planning Act, has given powers to the local government to act as the local planning authority for sustainable development of the local area.

The role of technology

Since the mid-1990s, UK local government has encouraged the wider use of ICT and these technologies are often considered as the fundamental essence of transformation in the better delivery of public services. ICTs are used to respond to citizens' needs speedily by decentralising public administration and to enhance local governments' ability to oversee key projects (Prybutok et al., 2008).

The rapid growth of awareness in performance improvement has led to the much clearer definition of planning service standards and to the setting of much clearer communication measures across most local authorities' service domains. Planning professionals are coming under increasing pressure. Cuts to their budgets are impacting at a time when management is increasing the demand for ICT to support services as a way to take cost out of other parts of the organisation (SOCITM, 2010).

Angela Smith says, *'nearly 60% of all planning applications in England and Wales are now submitted electronically via the Planning Portal, bringing greater efficiency to the planning process for councils who assess and determine applications, and applicants. Cutting down the number of paper applications has also made a major contribution to reducing the carbon footprint of the planning process by cutting out more than 8,000 tonnes of CO_2 from the 32 million pieces of paper that have been saved'* (Smith, 2005). These developments have been given an added edge by being associated with market viability, compulsory competitiveness, best value, time efficiency and outsourcing initiatives where local authorities have been pressurized to reduce the costs of services while at the same time improving service quality and effectiveness (Worrall et al., 2004).

The use of ICT for sustainable development in UK local government is now a huge business that is rapidly becoming central to the delivery of better services. Time and time again central government has placed pressure on local authorities to enhance the proportion of public services delivered electronically (Raynsford, 2005). There is a clear demand to develop better planning frameworks, which can help the planning teams improve service quality and concurrently to become capable to get effectiveness and efficiency in planning services as well as good value for investment.

Many UK local authority ICT teams belong to the Society of Information Technology Management (SOCITM) founded in 1986. SOCITM provides a widely respected forum for the promotion, use and development of ICT best practice in UK, which is also playing a leading role in the local government ICT transformation. The data analysis and benchmarking discussed in this paper have been developed during field studies conducted in five regional planning departments associated with SOCITM, using the standard planning framework for planning services. The findings are leading to a developing field of pragmatic research about the use of ICT tools in the local government planning system. This is reflected in the literature showing a move from a financial and legal focus towards socio-technological perspectives and is manifest in the emerging models of e-government, e-democracy, e-citizenship and e-administration.

According to Bannister et al. (2001) research has indicated that the existing approaches to managing ICT in local government have not always produced satisfactory results. One of the most striking statistics in public sector ICT is to look at the number of failed ICT projects. Over 70 per cent, according to some sources, of ICT projects fail (Rainey, 2007). The IT systems generally take too long to apply and time and again end users voice their dissatisfaction with the quality and support they receive. Frequently local government IT projects run over budget. These issues are not new but they have continued to be a central challenge for the past two decades. Despite more than twenty years experience local government ICT still needs further improvements and reforms.

Building on practice in five authorities and developing models for knowledge management

A field survey in five South East Midlands local authorities provided data to explore the level of understanding about applications of knowledge management in the planning process. The research participants comprise Bedford Borough Council (BBC), Central Bedfordshire Council (CBC), Luton Borough Council (LBC), Milton Keynes Council (MKC) and Northampton Borough Council (NBC). The survey has been applied within the four areas of the PKOT research model (Model-C) to examine: planning process, knowledge application, organisational culture and technological exploitation. What kind of picture emerges from these? In general they show that there is a clear requirement for better strategies to standardise, simplify and integrate processes and to move to a more open and knowledge sharing system to deliver better planning services. There is a desire for the development of a functionally rich planning processing solution that will help the planning department to become proactive. This has been already identified in the general headline of ‘smartness and sustainability’.

The outcome of these studies has produced results at two stages for the participating local authorities. At the first stage the study has produced a detailed set of planning frameworks (exploratory models) that provide a comprehensive analysis of data for internal communication channels in the planning department. At the second stage this study produces a comparison and benchmarking analysis to let the participating authorities see how they are responding and performing in relation to their regional counterparts. The five local planning departments’ studies are providing the empirical basis to test and verify the research models (Figure 1 (Model-A) and Figure 2 (Model-B)). The discussion that follows is built around the five main research questions (RQs) reviewed below.

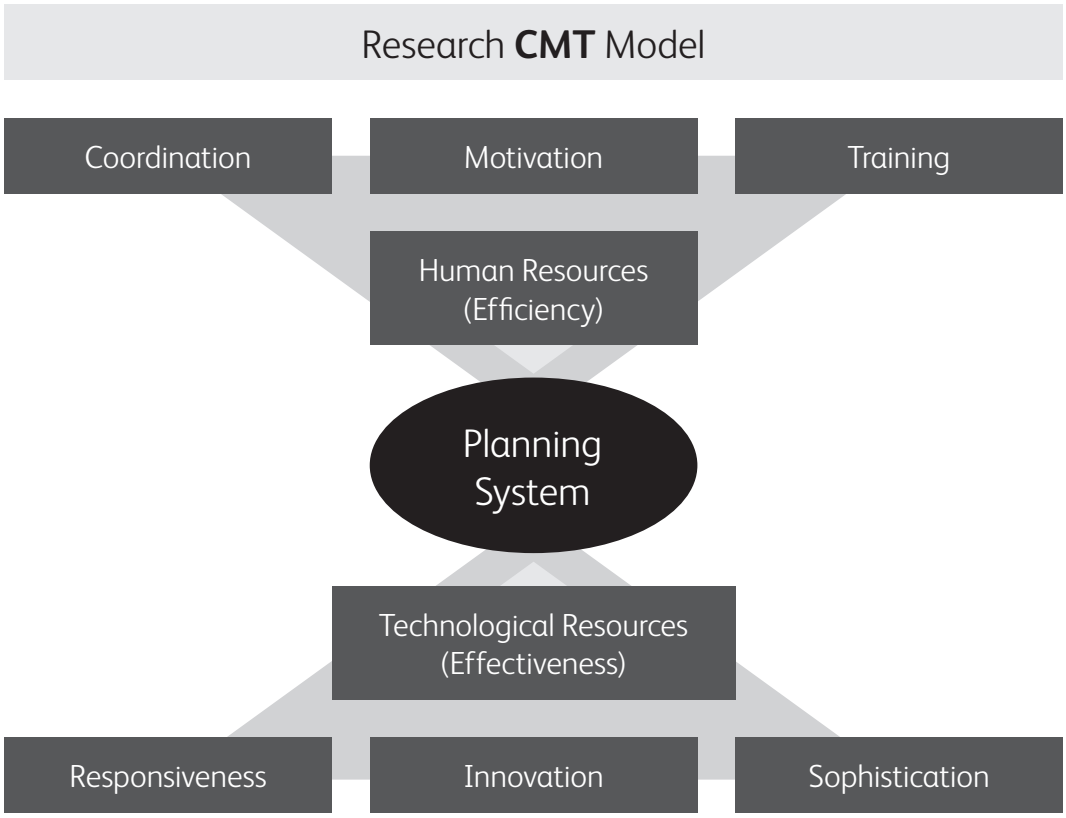

Figure-1: Model-A (CMT Model of Coordination, Motivation and Training)

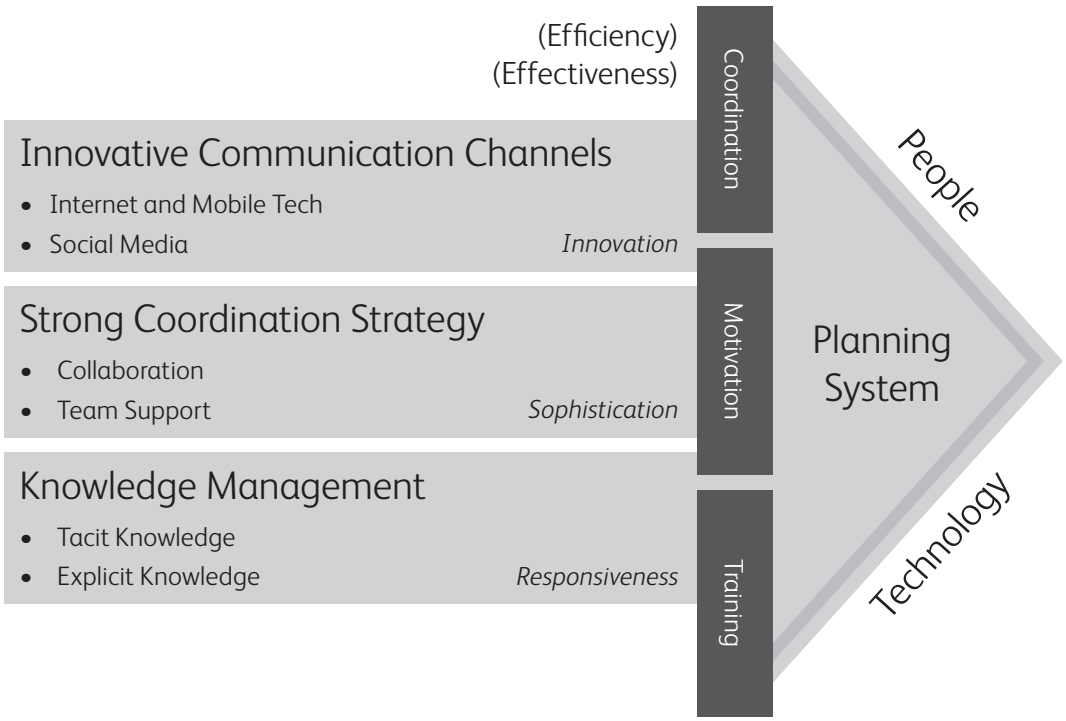

Figure 2: Model-B (2-Es Model for Planning Efficiency and Effectiveness)

To investigate information systems and information management practices of a UK local authority planning department (RQ1)

A conventional study of the project process brings an opportunity to evaluate planning processes on the basis of past experience of planning teams for sharing and managing their expertise. The elements of knowledge management are identified to articulate the ways in which planning team members can be more effective with the integration of technological tools. These planning information management systems play a crucial role to share different kinds of expertise at different levels and they are linking emerging technologies with innovation and integration in local planning authorities.

The research survey participants are planning staff members, who are engaged in the planning application process and playing a support services role. The team members interviewed are experienced planners from all five participating planning authorities. Staff interviews were carried out typically between 60-90 minutes long. In these sessions a structured interview with open ended questions was used to allow the participants to record their own experiences about ICTs in the planning process.

All five participating authorities have broadly similar systems. The planning process in these authorities is basically divided into five major phases. Phase one includes the initial inquiry and submission stage where the planning application is submitted to be dealt with by development control in the planning authority. Applications can be submitted by hand, post, email or through the planning portal links on the Council's website. Their preferred method of receiving applications is electronically via the planning portal (www.planningportal.gov.uk). These applications can be processed more readily and easily and may therefore be registered more promptly.

During the second phase of the planning process a submitted application has to go through a process of validation. At this stage various documents submitted are checked to see that they are of an appropriate quality to be forwarded to a planning officer. Application forms are checked to ensure they are filled out correctly, drawings and plans are checked to ensure that the applicant has provided enough information and that everything is accurate and scaled. If the application goes through the checks and is acceptable, it will be validated and passed to an officer and a letter will be sent informing the applicant about this. If this process finds discrepancies or gaps, the application will be made invalid and a letter will be issued to ask for the changes to be made or for additional documentation to be provided. The planning application cannot proceed until it is validated. During this phase, an 'atmosphere' needs to be created which encourages the implementation of new thoughts and ideas into the sustainability of planning and development.

The research participants agreed that whenever an application is received, it is important for them to consult any other relevant departments that may be able to provide the planner with professional advice (Third stage). This includes departments such as Highways who will assess changes to parking, or the Countryside Officer who will ensure no protected species will be affected by the application going ahead. It may also be necessary to consult with external authorities such as Water or Heritage. Authorities who are consulted will have access to the plans and drawings and may also choose to visit the site to make an assessment. The ICT tools are helping them out by playing a crucial role to assist planners' actions efficiently and effectively.

During the consultation and consideration phase the case officer may take pictures of the application site and will make notes on the area using an appropriate GIS tool. The case officer also posts letters through the doors of any properties that may be affected where the applicant seeks new development approval. This letter gives basic details of the application and a map of the proposed development site. The feedback and comments though public consultation (Fourth stage) are summarised in the final report with the recommendation for either approval or refusal (Final stage). All five participating authorities responded that it is equally important for them that any comments which are made on a planning

application will be publicly available and may be published online through their web portals.

The planning process is already available within all the participating planning authorities on a digital platform, while their key planning subsystems are already computer based. These activities of planning application process also fulfil regulatory requirements and quality standards. Planners engaged in the planning processes are confronted with a variety of challenges during the development process where a single planning document needs attention and approval from various units. It is therefore very important to create an integrated ICT environment that supports the aspiration to promote intra- as well as inter-departmental information and knowledge sharing for an effective and efficient planning process.

Assessing the nature of the process model and the parts played by constituent elements (business needs, human resources, information technology and socio-organizational communication) in a UK local authority planning department (RQ2)

To explore the dynamics of knowledge management during the planning process, data was collected from several sources including; interviews, e-mail communication, online forums, and minutes of meetings and observation in the South East Midlands' five participating local authorities' planning departments. The interview participants are normally planning staff engaged in the permission process for the new development or extension decision and form part of the core team responsible for the application's progress. The research is focused on developing an overall understanding of the process of knowledge management between planning teams engaged in the planning application process.

For large organisations like UK local government one of the key activities is to share and manage the resources and expertise of different departments in relation to financial and operational efficiency. The most important focal point in this research survey is therefore to explore how the relevant knowledge is managed among the planning teams and how it is made available to cross functional teams that need it in planning process.

From an analytical perspective, the key challenge among the research participating planning authorities is to demonstrate the value creation potential from a successful technological implementation in order to achieve knowledge management for an integrated and innovative planning process. It is a challenging issue for them to understand how knowledge elements play their part during the planning process directly or indirectly so as to impact on the planners' performance. The field studies observed that strong coordination, high motivation and relevant training are the three fundamental factors to enhancing the efficiency of planning teams and delivering effectiveness from technological tools in the UK Local Authority as illustrated in the CMT-Model (Figure 1, Model-A).

From the field studies it is possible to develop a schematized planning framework, which distinguishes between technological and human process domains for integrating the dynamics of supportive and preventive factors of knowledge management during the planning process. The research findings demonstrate the importance of knowledge sharing as a medium to combine new technologies with existing technologies, to promote and share planners' expertise as well as to assist the local authority strategic aim of improving the planning services in a sustainable manner.

The planning teams engaged in the application process usually have a link contact to the central or core team, which is responsible for the progress monitoring. During the planning process, different team members perform various tasks relating to problems occurring in the process while participating in different behaviours of information exchange and knowledge sharing. With a contemporary study of the existing planning process, it is helpful to have the opportunity to evaluate ongoing activities of the planners' engagement during the planning process, to explore how knowledge is managed between different planning units. To share knowledge between different levels of expertise in different planning units requires a capability

of linking emerging technologies into the innovative planning process for efficiency and effectiveness as shown in the Efficiency and Effectiveness, 2-Es Model (Figure 2, Model-B).

Some of the key benefits achievable from ICT integration for staff efficiency during the planning process are:

1. Pre-project consultation and online information access
2. Online application process and progress tracking
3. Staff coordination to avoid duplication of activities
4. Using e-documents, repositories and online processing
5. Knowledge sharing and access to data and document resources
6. Remote help, guideline, support, consultation and notification
7. Online e-consultation, discussion and an integrated appeals
8. Internet based DMS, complaints and enforcements

Some of the key advantages to attain from the ICTs for technological effectiveness during the planning process are:

1. Innovative communication channels
2. Non-stop 24/7 planning application registration
3. Strong and effective planning co-ordination strategies
4. Sharing, transfer and management of planning knowledge
5. Integrated ICTs management
6. An embedded and fully integrated GIS tool
7. Social interaction methodologies for community participation
8. Documents management system in digital format

Technological tools play an essential role in enhancing the efficiency and effectiveness of the planning system as can be seen in the comments from various research participants:

Knowledge management in the planning process is not static: on the contrary it develops under dynamic conditions and due to this fact the planning permission process has to see a continuous improvement in management performance and planning procedures. Knowledge is embedded in planning staff. In order to share their expertise and manage this among cross-functional planning teams, innovative communication channels, strong coordination strategy and social networks are required to successfully share and exchange expertise during the planning process. During the planning consultation phase the most important focus is on sustainable development. With suitable ICT tools and web based platforms and with clearly defined models to collect all information about the development project, it will be possible to maximise the sustainability factors we have set out.

Identifying the extent to which the internal management of data and information contribute to the effective management of knowledge within the planning department (RQ3)

From the initial findings a number of questions about innovative techniques are considered. For example: how should the planners work together as a team; how do they define their resources; how to allocate and assign their work packages and responsibilities within the planning department and how to track the planning staff performance.

The major challenge to resolve this issue is tacit knowledge articulation. Planning staff need to understand each other and use a common medium of communication during the planning permission process. It is also important here to explore how knowledge is provided and shared when it is required and how hard it is to make it communicable between different planning teams. The success of knowledge management activities relies on how ICT tools are integrated to share information within planning teams who seek specific knowledge to perform their job.

Interview: BBC 1.3	To make the planning system effective and work more efficiently, we always encourage our staff to communicate with all applicants and agents electronically, wherever possible in planning processes.
Interview: CBC 2.3	Better results are achieved in the planning process with the use of web portal for online application processing and IT tools – UNIform, Plantech, e-consultation, DMS, GIS, CRM, digitised knowledge transfer source, Word, Excel, Power point, Project management tools, Component matrix Process Technical Specifications, Council Websites, Blogs, SMS, Email, Phone and Fax etc.
Interview: LBC 3.1	Planning application process is strongly aligned to the department set standard through in-house processes, to secure project quality regarding technical specifications and strict budget control; this creates a constraint for intensive knowledge sharing.
Interview: MKC 4.1	This is highlighted here to actively encourage e-communications for all team members as it removes unnecessary repetition and duplicate activities that helps in saving time and bring efficiencies with better effect on the planning service delivery.

Table 1: Statements from Research Interviews

The planning system is the key activity in UK local government that links emerging technologies with existing processes to develop internally improved planning process management. From new and improved processes an integrated technological advancement is generated. This is not a simple matter of integrating different ICT tools and their applications together: it requires the sharing and transfer of knowledge between different planning teams. The following statements and quotations elaborate the impact of internal information management systems within the planning department to support knowledge management in planning system (Table 2):

The planning information management systems for sustainable local government in the South East Midlands support the key objectives to improve the management performance and service delivery. To enhance the existing planning process structure and to secure functionality in an improved process involves many resources, procedural and technological disciplines. There are two major challenges for the new fully integrated online process. The first is the new process implementation to fulfil the criteria of the successful technological integration for knowledge sharing to secure the required efficiency and effectiveness. The second one is to allocate the right resources and to identify the expertise required to create and share new knowledge during the planning process. The effective presence of the planning information system is crucial to share the knowledge management as mentioned by planning officers in their interviews.

Interview: CBC 2.1	The planning teams need each individual's expertise to share procedural expertise versus documentation information, so the exchange of expertise is strongly based on communication of information, usually between all involved team members. It is usually not easy to implement the knowledge management into the planning process by itself. It is required to learn the implementation and trust in the information management and expertise sharing. Additionally, if one can read through a technical specification and as a next step it comes to the application, one immediately can also face several questions. Again it is needed here to have innovative communication to share the knowledge provided, even if it exists in explicit form.
Interview: MKC 4.2	Planners are sticking too much to their own field of expertise and for this reason others' expertise is hardly understood during the process. Only intensive discussions help to understand the value of expertise that comes out of several planning disciplines.
Interview: BBC 1.2	During the project, planners get more used to the information management system to exchange ideas and views, which can help to improve the knowledge sharing between planning teams. Social media networks are also emerging, planners know each other even though they are located in different locations.

Table 2: Statements from Research Interviews

Interview: LBC 3.1	As soon as we have an established information link between planning teams, an organised approach to collect and transfer knowledge is easily created. People belonging to different planning units are not familiar, so it can be challenging to know who to ask during the planning process. Sometimes we even have difficulty in identifying where the expertise resides in our own planning unit. But what I really want to say is an 'information management system' needs an organised process, right media and clear identification of the right person to ask is the key to managing and sharing planning specific knowledge.
Interview: CBC 2.2	Further programming for information management in IDOX Acolaid planning system to allow the display of more tasks to be completed by planning officers, i.e. internal consultation reminders. The facility to offer more email alerts to consultees, councillors and neighbours i.e. presently send automatic email alert when an application is registered to relevant councillor but alerts do not occur when decision is made.
Interview: NBC 5.1	One thing that I have tripped over is that from conversations with colleagues and planning agents, a large number of LGA departments actually have all the tools they need to do a decent streamlined cost effective service, but they are not switched on, or configured correctly for internal information systems.

Table 3: Statements from Research Interviews

Decision making in the planning process involves multiple social groups and various stakeholders within and outside the organizations. For example, despite the claims of some prominent technologies such as business process re-engineering and pervasive business intelligence these cannot simply be introduced into the local government by its top executives. These measures require both top-down and bottom-up communication as these are highly sensitive actions and depend on knowledge, skills and commitment of multiple groups and stakeholders at the same time. Planning process perspectives on innovation expand the structural prospects by examining the more cognitive, social, dynamic and political issues, through which new ideas are developed, communicated, disseminated and implemented over time in the planning system.

Studying the links between the internal information and knowledge environment with the external knowledge environments of key stakeholders (RQ4)

The planning information system in simplest form is how planning authorities plan, communicate and work with each other within the legislation and prevailing policy. It is also helping the stakeholders to know how they contribute towards sustainability development plans, as well as the important role anyone can play in the prosperity of region. This research investigates the role of technological tools for managing and sharing planning expertise within the local authorities' planning permission process and then describes the role of ICTs (i.e. Planning Web Portal and Geographical Information System) integration for knowledge management. However, various challenges such as uncertain terminologies, lack of motivation to share expertise, lack of coordination, knowledge gap in identifying the expertise between the planners, no formal policy for managing knowledge and some planners' lack of willingness to employ innovative tools for structuring knowledge are explored as challenges, which hamper the effective management of knowledge within the planning authorities.

The findings from this research study make it possible to develop a conceptual framework for the internal and external planning information and knowledge domains. The research hypothesis is derived from the Takeuchi and Nonaka (1995) SECI-Model about knowledge management. For the planning information system this model is about integrating the explicit and tacit planning knowledge domains to bridge the knowledge gap. The model shows why knowledge management builds on socialisation, externalization, combination and internalisation, and suggests how these activities facilitate in expanding the explicit planning domain, thus reducing the uncertainty and increasing the cohesion of planning activities. This means that the information and communication technologies involved in the planning process have to be blended with the human and social aspects. The technological and human resources combination has the potential to improve the planning process.

During the research field study it was noted that the socio-technological transformation is a challenging task to accomplish. To deal with a dynamic environment, learning new sets of capabilities becomes essential for the planning department within local government. The embedded knowledge based planning system is practically feasible in local government for both sustainability development and economical viability.

The local government planning system in the South East Midlands has introduced a healthy and friendly social interaction by establishing public-private partnerships. Social policy refers to the activities of government and their authorized agents to meet social needs and solve social problems. Hence learning, by which human knowledge evolves, is the key to the evolution of human society and so planners have to adopt this trait. Staff members interact inside the planning department to provide the right information to the public so that they can learn to work in collaboration with both the parties. From this strategy planning staff and stakeholders learn how to access and generate new knowledge using a very wide range of technological tools for social interaction in the region. Trust and trustworthiness have been identified as important factors in such human behaviour and economic performance.

With innovation in planning information

systems using ICTs, the local authorities are committing to better societies and social life in Britain. The participating councils have plans to give access to people to browse website links with the use of GIS. The new mapping services will show geographic information about their area derived directly from the main information system. Link pages will contain a growing list of information which will allow users to view, enquire and interact with the Council as the mapping system develops. Rights of way officers work with farmers, landowners and local people to make sure that public ways, footpaths, bridleways and byways are clear and properly maintained, so that everyone can enjoy using them. The power of a planning information system comes from the ability to relate different information in a spatial context and to reach a conclusion about this relationship for sustainability development.

The web planning portal is an evolution of the World Wide Web, an Internet based planning source to enable users to process planning applications online. Planning Minister Bob Neill says, *'the one millionth planning application has been processed by the Government's planning resource website, a site that has now delivered savings of approximately £285 million to applicants and Councils'* (2012). The internet based online planning process is now offering a crucial role in processing a planning application for the local authority planning support and control departments.

Assessing the balancing of internal and external interests in the planning system in terms of the actual and potential roles for knowledge management (RQ5)

The planning portal is the government's official planning website. Every local authority in England and Wales accepts planning applications via the planning portal. Planning permission is a process where planners create a shared understanding of how the application should be validated and accepted. During the application submission phase, various options are evaluated for the initial enquiry to better understand, judge and interact between team members to shape new ideas because planners use a variety of ICT tools to manage planning actions. If it is taken into serious consideration that the planning process is relying more and more on information exchange techniques, the importance of knowledge management methods in planning process will further increase in future.

The most valuable asset of today's organization is its intellectual property, which is potentially more valuable than physical resources which are a wasting asset. To manage knowledge for productive outcomes, every organization today needs to do the audit of knowledge management to assure the availability of the right information at the right time in the right place and for the right people to perform their job productively. It is also helpful to audit the existing knowledge assets and system, so as to analyze the existing infrastructure of knowledge. From Model-A and Model-B, the PKOT Model (Model-C) is emerged to illustrate the planning knowledge management system for internal and external communication and knowledge sharing. The PKOT Model is based on four key elements: planning process, knowledge application, organizational culture and technological exploitations as shown in the following graphical illustration (Figure 3 Model-C).

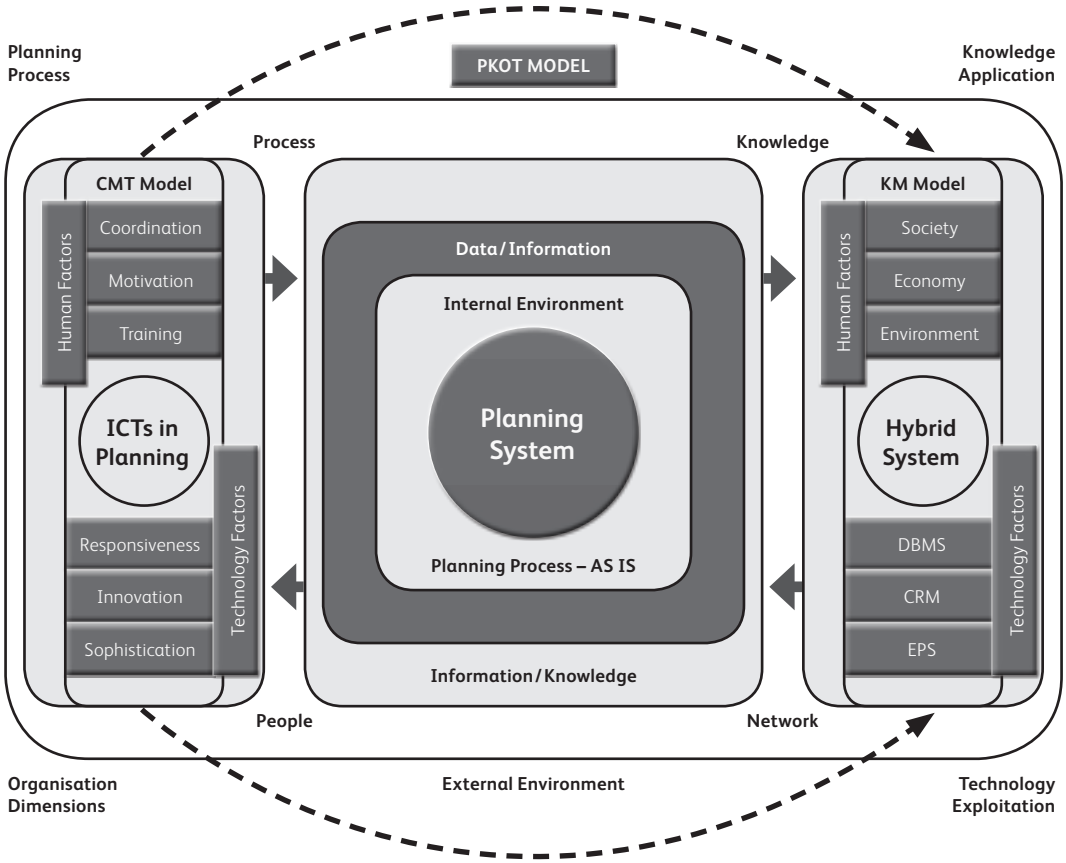

Figure 3: Model-C
(PKOT Model based on Planning, Knowledge, Organisational and Technological Aspects)

The complex planning system tasks are an arrangement of tacit and explicit knowledge management domains. For example, managing the electronic network of planning process data is a daily routine for planning support teams. This process contains an explicit portion of knowledge but also knowledge not implanted in the electronic online process or technical specification as the tacit portion of planning knowledge. For example, knowledge of experience tends to be tacit, metaphysical and subjective, while knowledge of rationality tends to be explicit, physical and objective.

The PKOT Model compares the general planning process information of Councils with their main ICT tools used in planning permission process against each of the research measures for staff performance. The PKOT Model clearly illustrates the technological and human factors combination that leads towards better planning service delivery. It is thus important to get the views of participating Councils regarding the importance of ICTs to achieve effective staff coordination, motivation and training requirements. The participating Councils have responded with positive feedback about the role of ICTs within their internal and external communication channels as illustrated in the Model-C.

Audits of KM in the Planning process

Underscoring the role of knowledge management in the planning process is the basis through which it is possible to control, evaluate and further improve the planning system. This research paper is auditing the impact of knowledge management on human and technological resources and their integration within local authorities. It is

generally supposed to quantify how knowledge management performs its role in the better operation of and service delivery in the planning process. It is imperative to examine what kind and level of knowledge already exists within the planning units and how to identify, share and apply such expertise. Some local authorities plan to use various performance measurements and statistical tools to scale the impact of knowledge management in the planning processes particularly in the context of explicit and tacit domains.

It has been observed during the field study that it is not easy to measure knowledge management that shows an absolute one to one correlation between a knowledge application and the performance improvement outcome. According to the process classification framework report, it is important that assessment metrics are developed for the purpose of continuous improvement in planning activities. It is essential to have a number of tools and resources available to determine the effectiveness and value of knowledge management activities (Lemons, 2011). The auditing of KM in the planning process is graphically illustrated in the following diagram (Figure 4).

The framework of the planning process contains various bundles of activities to be considered in evaluating the impact of knowledge management on human and technological resources in the planning system. One of the significant features to consider while defining the impact of knowledge management in the planning system is whether metrical values can indicate if knowledge is being applied and

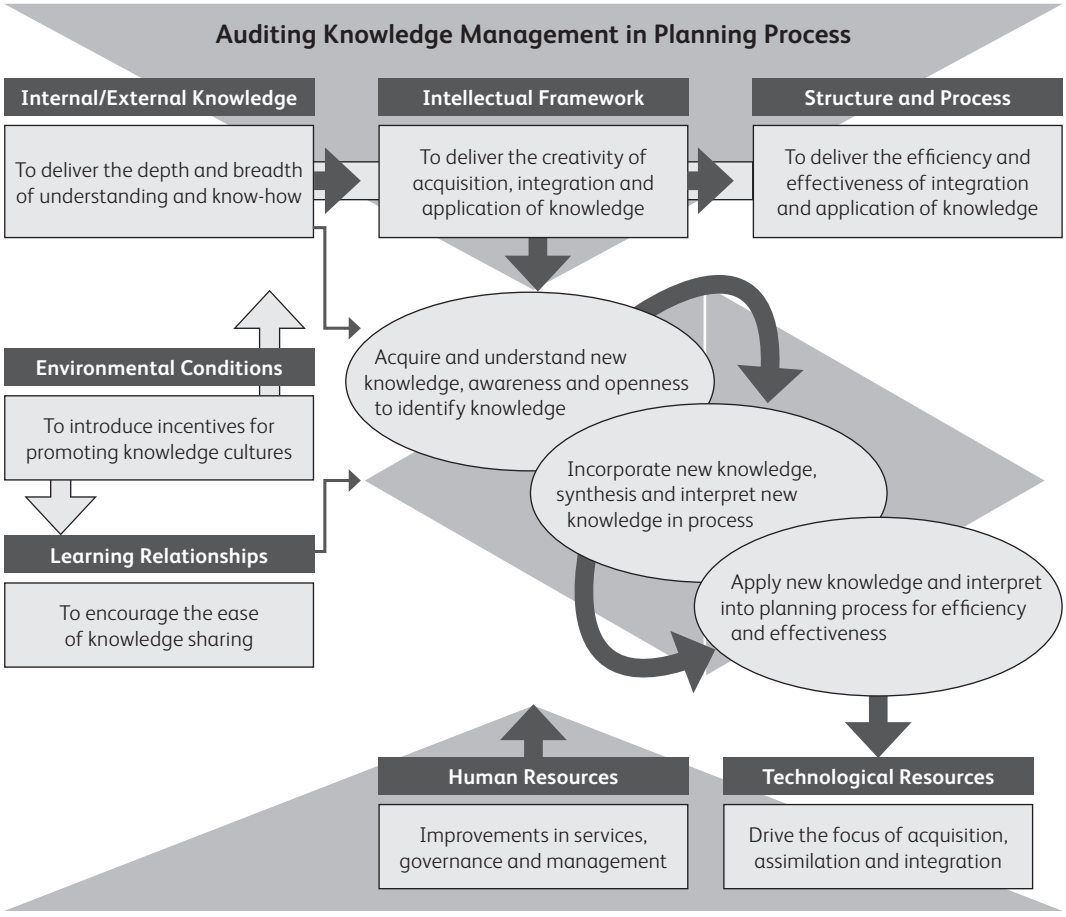

Figure 4: Auditing KM in Planning Permission Process

shared. For example, a statistic for measuring improved capabilities and know-how might be the number attending training sessions internally or externally as well as the number of times a knowledge programme has been accessed by planners and particular expertise is shared, transferred or created between planning teams.

The planners' motivation and a healthy attendance at training sessions indicate that staff members are coordinating to share their knowledge but this may not absolutely confirm that training is actually useful in improving the planning processes. Hoss and Schlussel stated, *'before implementing any knowledge management activities, key metrics must be developed and a baseline should be established, against which performance may be easily measured during and after knowledge application'* (2009).

From the field data analysis, it is evident that the planning permission process undertaken by the local government usually employs a multifaceted method. The field data was helpful in examining the planning system, which requires various levels of assessment for auditing the impact of KM in effective decision making for sustainable development. The levels of assessment are based on three fundamental planning factors: human efficiency, technological effectiveness and process innovation. The audit of KM in the planning process is therefore classified into three levels of assessment that require effective coordination between planning teams to appropriately approve planning applications for sustainability developments as shown in the following table (Table 4).

A knowledge management initiative is an organization's approach to share and manage knowledge in the planning process for sustainable development. The ability to share knowledge across planning staff can successfully contribute to better planning performance as shown in the above illustration (Figure 4). It can be both beneficial and supportive to the planning teams during carrying out their roles particularly in the background of delivering efficient and effective planning services.

Levels of KM Audit (Auditing the impact of KM on Human and Technological Resources)	
Technology Assessment	This level of assessment includes monitoring the usefulness and responsiveness of supporting technological tools.
Process Assessment	Measuring characteristics, for example the effectiveness of lessons learned when processing the next planning projects and how it provides expertise of the extent to which staff are motivated and trained to particularly coordinate and apply a sharing knowledge.
Human Assessment	This level of assessment is concerned with the impact of knowledge management on the initiatives and overall process performed by human expertise with the help of technological tools.

Table: 4 (Levels of KM Audit in the Planning Process with Key Assessments)

Using KM and ICT in the planning system: new methods and new policies

Emerging ICT tools are observed as an appropriate solution to deliver better planning services with efficiency and effectiveness. Local authorities are usually expected to deliver enhanced services with the help of integrated technological tools. It is a debatable argument to verify in this research study whether it is technology or human resources that produce the outstanding results or most likely the combination of both. It is purposeful to explore how hybrid socio-technological systems contribute to the planning process. People are motivated by work that provides growth, recognition, meaning, and good relationships and it is important that they are not entirely constrained by system processes which stifle initiative, creativity and judgment. The researcher has observed from the fieldwork that participants are interested in a flexible and mobile access to information available anywhere in the organization so as to be able to share knowledge while using technology as a supporting tool. It is important to examine how and why people share what they know for effective coordination strategy in planning system.

Technology is not the only solution to connect people: rather it is their human relationships that connect them. Relationships and creativity are always cluttered and naturally uncontrollable because of human dynamics and deeper motivations. Yet to understand the processes at work in KM a primary objective has to be to measure and audit the human and technological features of knowledge management that have significance within the UK local government planning process.

Measuring the impact of knowledge management within local authorities is challenging and it is hard to assess every aspect of knowledge initiatives in a single scale. To track knowledge sharing deployment, activity and value generation across planning process requires applying assessment at the individual, team and organizational levels. The most important characteristic to consider when defining a knowledge management measure is whether the measuring scale indicates if knowledge is being identified, articulated, shared, transferred, managed and applied appropriately.

From data analysis and respondents' statements in the participating authorities, it is apparent that knowledge management auditing in the planning process demands commitment from top management. Planners need to ensure that their planning authority is spending significant resources towards implementing knowledge management initiatives. The research area reviewed in this paper is continuing and will contribute to an assessment of local government management performance. This will depend upon the effective and efficient application of knowledge management initiatives with human and technological resources in the planning system.

References

Bannister, F., Worrall, L., Remenyi, D. and Money, A. (2001) Measuring performance, two models of IT satisfaction. *Southern African Business Review*, 5 (2), p.4-15.

Brooke, C. (2000) A framework for evaluating organizational choice and process redesign issues, *Journal of Information Technology*, vol. 15, p.17-28.

Chandler, J.A. (2001) *Local government today*. Manchester: Manchester University Press.

Dewett, T. and Jones, G.R. (2001) The role of information technology in the organization: a review, model and assessment. *Journal of Management*, vol. 27, p.313-346.

Edvinsson, L. and Malone, M. (1997) *Intellectual capital: realizing your company's true value by finding its hidden brain power*. New York: Harper Collins.

Great Britain. Local Government Act, Promotion of Economic, Social or Environmental Well-being, Local Government UK, 2011. Available at: http://www.legislation.gov.uk/ukpga/2000/22/pdfs/ukpga_20000022_en.pdf

Hoss, R. and Schlussel, A. (2009) How do you measure the knowledge management maturity of your organization? Metrics that assess an organization's KM State, 2009. Available at: wiki.nasa.gov/...//1002597_main_3_1002597mainenus_How_Do_Y... File Format: PDF/Adobe Acrobat – Quick View20 Apr 2009 – 1.

Joint Services, Local Government Structure, Government Citizens Rights, Direct-Gov, 2011. Available at: http://www.direct.gov.uk/en/Governmentcitizensandrights/UKgovernment/Localgovernment/DG_073310

Laudon, K. and Laudon, J. (2009) *Management information systems*. Harlow: Pearson Education Global Edition.

Lemons, D., APQC, senior project manager, knowledge management, 2011. Available at: http://www.apqc.org/knowledge-management

Neill, B. Planning Portal, Department of Communities and Local Government, Planning Portal Hits the Million App Mark, 2012. Available at: http://www.communities.gov.uk/news/planningandbuilding/2092725

Nidumolu, R., Prahalad, C. K., and Rangaswami, M. R. (2009) Why sustainability is now the key driver for innovation. *Harvard Business Review*, September 2009 issue.

Norton, N. and Kaplan, D. (1996) *The balanced scorecard: translating strategy into action*. Boston: Harvard Business School Press.

Prybutok, V., Zhang, X. and Ryan, D. (2008) Evaluating leadership, IT quality and net benefits in an e-government environment. *Information and Management Journal*, 45, p.143-152.

Raynsford, N. (2005) *Delivering efficiency in local services: further guidance for local authorities*, HM Government, 2005. Available at http://www.communities.gov.uk/documents/localgovernment/pdf/134714.pdf

Rainey, T. (2007) *Tameside MBC: exploring how local government can learn to create effective project governance, many public sector ICT projects fail*. Available at http://www.publicservice.co.uk/feature_story.asp?id=7622

Roberts, S.A. (2004) Knowledge management for best practice . In Sandra Oliver ed. *Handbook of corporate communication and public relations : pure and applied*. London: Routledge, p.34-53.

Roberts, S.A. (2008) The knowledge audit: developing the principles and implementation practice. *Aslib Proceedings*, 60 (6) p.583-599.

Rodrigo, J. and Pachon, C. (2009) *Systems practice in the information society*. London: Routledge.

Smith, A. (2005) *Simplification plan: the route to better regulation*, London: Department of Communities and Local Government.

SOCITM (2010) IT trends in local government, Society of Information Technology Management, 2010. Available at http://www.socitm.net/press/article/126/continued_budget_cuts_will_compromise_icts_ability_to_deliver_savings_elsewhere_in_public_service_organisations_says_socitm_itrends_report_2009

Takeuchi, H. and Nonaka, I. (1995) *The knowledge creating company: how Japanese companies create the dynamics of innovation*. New York: Oxford University Press.

Worrall, L., Greenwood, M., and Madgwick, T. (2004) *Continuous performance improvement: a case study of ICT in UK local government*. Wolverhampton: Wolverhampton University Business School.

Acknowledgements

The author would like to acknowledge the assistance of staff in planning departments in each of the five participating authorities who allowed time to be interviewed.