Implementation Gap and Organisational Obstacles when Applying Information Communication Technology Innovations in Spatial Planning Practice

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Abstract

The requirements for local-based evidences in policy-integration and public involvement have created a demand for ICT innovations in spatial planning. Therefore, technology implementation opportunities have emerged from the potential of matching new Web 2.0 applications and geo-semantic internet services with a standing demand on gathering and exchanging knowledge in current planning practices, in order to support a better informed policy making. In a wider policy context, promoting such technical innovations in public sectors is also carrying an expectation of shifting spatial-decision-making from a traditional top-down approach to collaborative localism governance with stronger stakeholders' role. However, technology diffusions in public institutions are still difficult, and the use of new ICTs is limited. This paper summarises some empirical works of trying to implement a prototype tool in planning institutions in Manchester, UK, which reveals an implementation gap between technology development and adoption from a case study. The experiences learnt show some organisational obstacles and dilemmas in implementation process when applying technical innovations for improving planning-decision-making.

1. Introduction

The development of ICTs, such as the Internet and more innovative uses of it, has provided a new infrastructure to facilitate social interaction, inter-personal communication and dialogue to achieve collective goals with common concerns (Healey, 2006). Consequentially, the spatial planning system, as a major institutional motivation for environmental change and social development, is not immune from such change. The question for research now is how 'informationalism' influences spatial planning processes and how the use of new technologies reshapes planning decision-making in practical situations.

There are few successful implementations of new technological innovations in planning-support tasks in practice. At system development stage, this was claimed due to a mismatch between technology supply and demand (Geertman, 2002). On the technology supply side, tools do not really fit the changing needs of the planning profession. While on the demand side, there is the problem of a lack of awareness about the technologies available (Geertman and Stillwell, 2004; Vonk, 2006). At implementation stage, Vonk *et al*. (2005) identified what they term 'diffusion bottlenecks' within planning departments which are blocking the widespread use of technological innovations, which has multiple levels of human, organizational, institutional, and technical factors. Obstacles in the diffusion process as much as the instrumental quality of a tool influence the success of a ICTs tool development. The question of why planning practitioners have never fully embraced the diversity of methods, techniques and models developed in planning support tools (Geertman and Stillwell, 2004) can possibly find some explanations through an investigation into the diffusion process in institutions. However, only a few researches of tools development have extended their writing to experiences of implementation (Brommelstroet and Schrijnen, 2010; Vonk et al., 2007). Therefore, our knowledge about how to secure a fully acceptance of a tool in a real planning situation is still limited.

To investigate the potential implementation process of technology diffusion, this paper summarise some empirical results from a prototype implantation in a case study, which reflections on some systematic and organisational barriers encountered. The prototype, which used dynamic web codes and web-map interface to create an online planning public participation platform, is developed and introduced to a planning bureau in Manchester, which is briefly introduced in section 2. This experience brought up my reflections on gaps and obstacles in general technical innovations

implementation in public sectors. The discussion about the non-technical aspects in the process in section3 is expected to contribute some insights on how to secure a full acceptance and the smooth diffusion when applying ICT tools in spatial planning practice. Section 4 and Section 5 extends the writing to a discussion of recommendations for tool developments as well as implements in future.

2. Methodology

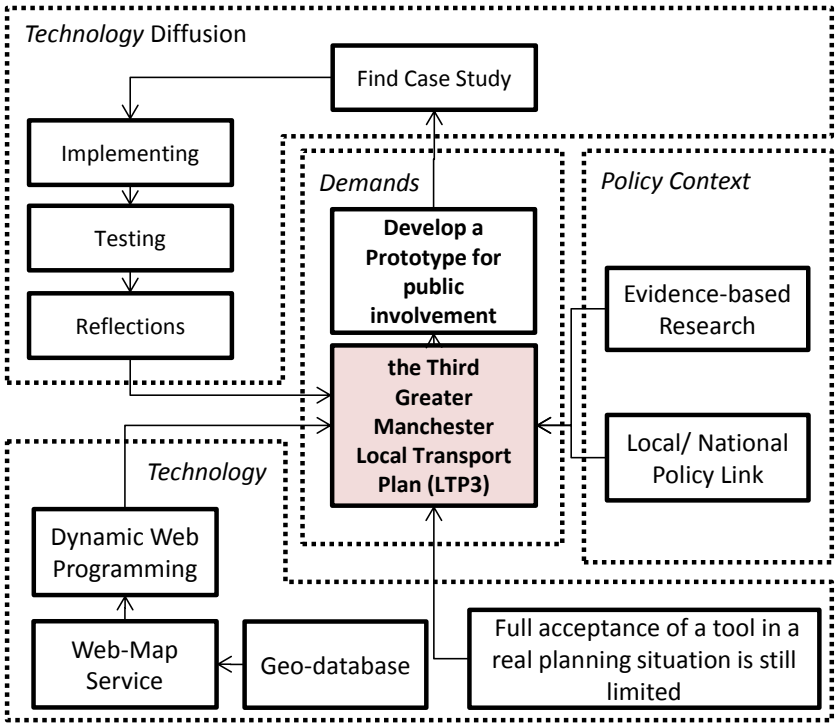

Fig. 1. Research framework

The research framework of this work was to complete a full Rapid System Modelling (RSM) cycle (Kraushaar and Shirland, 1985), which includes technology and policy studies, planning demands investigation, prototype design, development, testing, implementing and reflecting (see Figure 1).

First, this research chose some trendy ICT technologies (i.e. geo-database, web-map service, and dynamic web programming technics) and linked them with planning tasks. It combines various APIs that utilize resources from some big web-service providers (googlemaps API, Yahoo etc.) with the open-sourced web-map-server that overlaps user contents to create an online interface. Dynamic web programming was used to enable user-server interactions through webpages in order to dynamically collect user inputs. Second, it developed understanding about the state-of-the-art in their possible implementation based on the UK's spatial planning policy context that is featured by "Evidence-based Research" and "Local/ National Policy Link". The former emphasises on policy outcome studies based on technical measurement and local storytelling to inform policy-making, where data visualisation and analysis technologies could be contributing. And the latter is to keep local initiatives align with higher level policy guidance and to share priorities between local agencies, in which a good evaluation, monitoring and multi-agent involvement technologies are generally welcomed.

To find case implement opportunities, we approached Greater Manchester Public Transport Executive (GMPTE)/Greater Manchester Integrated Transport Authority (GMITA). Their strategic and practical roles in the transport policy making, planning and management in Greater Manchester make this an ideal case for investigating tool implementation for real planning practise. Also, during the time of reseach, GMPTE and GMITA were conducting the making of the Third Greater Manchester Local Transport Plan (LTP3). As a legislative document required by the UK planning system, LTP3 was requested as a guidance of local transport authority, which aims at nailing down key actions for the forthcoming five years and mapping out a long-term vision for the next fifteen years. This provided an opportunity to find potential implementation cases for the prototype in a real situation; also the making of LTP3 provided a platform to investigate how technology support performs in a cross-institution, multi-level spatial planning issue.

To match with main objective of LTP3, our prototype took 'sustainable transport' as the topic. A system named "Collaborative Planning Support System: A Case of Accessibility Planning in Manchester" was produced at the **URL: http://www.ppgis.manchester.ac.uk/tpss/**.

Knowing the data-processing requirements and public involvement demands discovered through pilot interviews, the prototype system was introduced to the GMPTE/GMITA as a Web Based Tool for Knowledge Communication. A brief introduction introduced the tool to be capable of

providing online information dissemination and communication functions (see Figured 2). The system functions were repacked into two categories: Sharing Information and Involving the Public. The Sharing Information module contains functions for mapping public data, visualising modelling results, and sharing instant news. It was aimed at providing a web-based data integration, in which transport-related data were presented in a geographic interface. The Involving the Public module contains an online-comments-collecting function and an everyday-travelling-behaviours-survey application, which was designed to obtain both site specific comments from local residents and everyday travel behaviours.

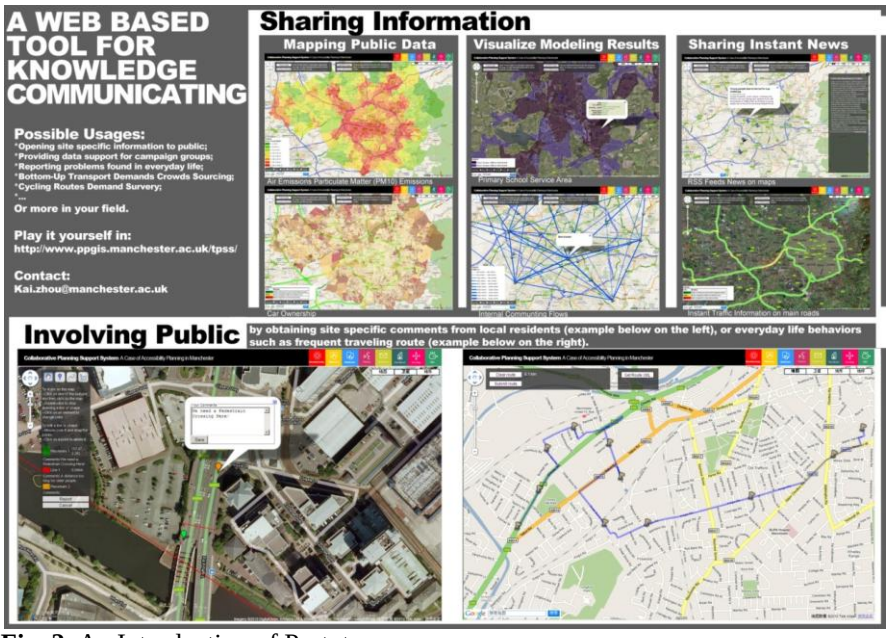

Fig. 2. An Introduction of Prototype

Case implementation of the prototype started with the introduction of the tool to two key departments participating in the making of LTP3 within GMPTE: the Transport Strategy Department (bottom left branch in Figure 3) and the Innovation System Department (bottom right branch in Figure 3). Officers (red boxes in Figure 3) from the two departments were contacted, given a demonstration of the tool developed, and interviewed with a set of questions regarding technological support in their work generally. To further diffuse tool information, contacts were asked to introduce the tool to other colleagues and help to set up further meetings if possible. It was also asked if it would be possible to find a real project to implement

the prototype. Information about the tool was also brought to the managers through many channels (shown as red arrows in Figure 3).

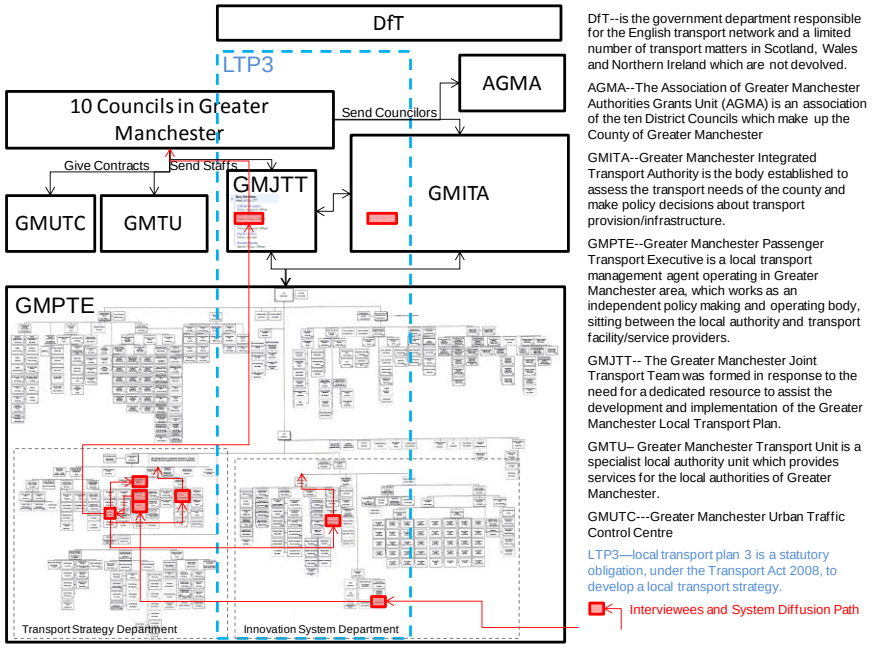

Fig. 2. Interviewees and Diffusion Path in Organization Chart

Meetings were set up to introduce the system tool to the LTP3 team in the GMPTE/GMITA. Some junior and senior managers from innovation system department and transport strategy department were directly involved in the discussion. The introductory leaflets were brought to the higher panel meeting for further attention. After meeting, all interviewees were invited to try the prototype system themselves online. Feedbacks were given directly in the meetings or interviews arranged separately after. The potential uses of the tool in the current system were discussed, together with their major concerns and foreseeable difficulties in operation.

RSM leads the whole prototype development process and served as a system model for learning from real-life experiences to find possible applications for new technologies in planning. We started out by believing successful implementation can be achieved by accurately matching useful innovations with potential practical demands, and smooth tool diffusion is to fully transfer a well-designed tool to planning institutions. In the process, we ended up realizing that to implement a tool in planning department is more than a simple “sell-and-buy-in” process. In our case study, the

multiple levels of human, organizational, institutional, and other non-technical factors that we encountered, in our opinions, have created the supply-demand gaps and systematic obstacles between ICT innovations and planning institutions. We would like to discussion some aspects of that in the following sections, based on our empirical study.

3. Implementation obstacles

Although new technologies are generally welcomed in a public institution, concerns about how to engage IT tools and use it well in an institution remain. Clearly, technologies are not seeing as 'solutions' but 'instruments', from planning professionals' point of view. And it is believed that the critical factor in a good implementation of tool is a better understanding of the actual needs and the wider planning context, big extent of which is untouched in existing researches.

3.1.1. Non-technical issue matters

The way of applying technology is seem as important as (if not more crucial than) the development of a technology itself from their experiences.

> ***"How technology is applied is as important as what it can do" (Interviews IT004, IT005).***

> ***"Technology alone is not the answer but how it is applied- a willingness to constructively engage with the consumer is required" (Interviews IT004, IT005).***

> ***"Technology needs to be a tool that is part of a wide engagement programme and is not a solution itself" (Interviews IT004, IT005).***

It was non-technical issues rather than the instrumental quality that dominated the process of fitting the tool into the practical planning situation. Sometimes, non-technical complexity stopped the tool from being fully accepted and smoothly diffused into the planning institution. This non-technical complexity was described as a combination of effects from the formal settings in institution (like predetermined goals, prescribed roles, authority structure and rules and regulations) and the informal settings of an organization (like informal practices, norms and social relationships among the members) (Chan and Williamson, 1999; Rogers, 1983). Dysfunction in either part could stop a tool from being fully accepted and

smoothly diffused in planning departments. Several non-technical issues were picked out from the case implementation experience in this research.

The first non-technical issue about tool implementation is the contradiction between the limited expectation of planners and the complicated technological support developers want to offer. Technicians see planning support as a process-simulating project, while planners see IT assistance as a tasks-based information providing service. Many computer science specialists, from a traditional Artificial Intelligence (AI) point of view, were/are working on understanding the planning process, by trying to build a generic, static, structural, and step-by step model and represent this machine readable model in a computer system for urban simulation. While planners are hardly convinced by the idea that simulations could replace or fundamentally change the strategic decision-making inside experts' heads, most planning professionals only see IT as useful in certain related tasks and just expect to see new information that a simulation system produced adding up to their own knowledge. Failing to meet such expectations and explain the system specification by its informational contribution from a planner's point of view often leads to a loss of interest in the early stage of implementation. This affects the motivation of planners using technology innovations in the first place, which is even difficult to achieve especially via an informal diffusion pathway.

The second non-technical issue is the wider context of planning and its effects on a tool adoption. Planning in practice is constantly influenced by changing public-policy-making ideology. Prior concerns and pervading pursuits in planning policy are unavoidably steered by the dominating political ethos. To introduce a piece of new tool, basic understanding of the current planning system is needed in order to provide desirable tool functions to meet the up-to-date demands. What happened in the case implementation could support this argument. When the current collaborative planning fashion is largely working on keeping a balance of power between various interests groups, ICTs introduced into a planning institution were expected to produce new evidences or alternatives which could either just serve one particular side of a dialogue or could be used to justify a decision made by compromises. Therefore, implementing a knowledge-exchange prototype needs to understanding the planning knowledge and interactions between stakeholders, so that tool could be used to support such communication as part of the planning practices.

Third, organisational structure and politics within planning institutions somehow limit the acceptance of new technology. In some occasions, technology diffusion starts from upper level, following a top-down direc-

tion, "buy-in" approach. Introducing new tools of working from management level is often seen as an investment in higher efficiency, which also means bringing changes to the human resource arrangement, current work flows, and existing skills. Therefore, it was treated with cautious. While more often, the technology diffusion starts from the bottom operation level in which technologies are involved in daily routines (Vonk et al., 2007). Those technicians were seen as 'gatekeepers' or 'pioneers' in adopting and diffusing new tool in a planning organization (Vonk, 2006). However in practise, their professional supporting positions can hardly influence the decision about whether to adopt a certain tool in the institutions; neither can they solve non-technical issues or avoid organisational obstacles. Thus, to decide to accept a tool needs to pass through many levels of management and go all the way up to the chief managers, to whose job duties technology support is much less relevant. This shows in the experience of case study that, whilst the quality of a tool might impress the audience, but there are always concerns about fully embracing it in the first instance. The final decision on acceptance keeps going up the managerial hierarchy and often gets lost at certain points.

3.1.2. The "who" questions

Defining appropriate actors is another challenge in tool development and implementation. Technology implementation is a multi-actor task, which is often a process of communicating, coordinating and cooperating among actors from IT experts, planners, policy makers and the public. People from different knowledge backgrounds are speaking different 'languages', having diverse expectations and seeing different priorities. When trying to make changes together, meaningful outcomes are often stuck in uncertainties and misunderstandings about each other's point of view. Defining the actors is one of the key issues that affect the successful development and implementation of a tool in practice. The question of "who should do what" remains unanswered.

The first question of the actor issue is who should start a technological planning support project. The cross-disciplinary nature of tool makes it an area where no single person has the expertise in either urban planning or computer science to initiate and promote it. Current developments were largely led by either academic institutions, which are good for exploring but not adequate to run tool development in the long-term, or soft-system engineers who intend to apply a certain piece of technology in practice. Actors that are familiar with both technology and professional work are

still needed to be found to lead the tool initiatives. The nature of the actors that can successfully initiate and lead a tool development remains unclear.

Who is going to run the system after development, testing and handing over to the actual users is another actor-related question that could block the full acceptance of tool. It should not be taken for granted that all planning authorities currently have the capacity to run a tool or that they are willing to actively build such capacity. In case study, there were initiatives from planning institutions to make use of existing resources to build an internal system for better data integration. However, for strategic decision-making, investigations found that the motivation for planning departments to update themselves so that they could develop and run a tool is still limited (Huang, 2012).

Another actor-related problem, which was not well considered before, is for whom the systems are developed, or "who are the active users of, or target contributors to, a knowledge-exchange-based system". Many tools claim to be designed to support the planning decision maker's strategic thinking. However, interview results show that most senior managers rarely get involved personally in evidence searching and collecting work, such as looking for data, making analyses or collecting documents. They had their data specialist to do all the technical jobs while they are more focusing on the managerial, networking, or decision-making duties, most of which IT or ICT are less engaged. The targeted users issue also applies to the systems developed to involve broader audiences, like stakeholders or the public, in plan-making. The question is whether the system can reach the targeted users and whether those users' contributions meet the developer's expectations.

3.1.3. Dilemma of technical innovation and policy innovation

In another way, the non-technical obstacles when implementing a planning support tool could be interpreted as a dilemma of technical innovation and policy innovation in the planning institutions (or the public sector in general).

There has been a widespread use of ICTs within the public sector for creating e-government or e-governance initiatives cross the European Union for the last 50 years. Compiling with spatial planning fashion, local authorities have been encouraged to pro-actively engage with ICTs to support public management in order to increase the potential for local governments innovations in terms of policy and service delivery initiatives (Margetts et al., 2003). Especially with the growing use of the Internet,

email, and web technologies, ICT systems not only affect back-office processes but condition the relations between government agencies and civil society (Dunleavy et al., 2005). Taking the growing use of GIS in the public sector as an example, the perception of GIS as a high-profile, hi-tech, single-source solution to multiple problems, and the allure of a centralised, all-encompassing database has stimulated the necessary political support and funding for GIS adoption (Harris and Elmes, 1993).

When new technical innovations were promoted to facilitate new policy innovations inside the current system, it is also changing the organisation and organisational culture within the public sector. However, most governmental departments are not fully ready for this. For example, when the GIS technology is able to communicate data across administrative boundaries, it enforces rigorous methods of evaluation in relation to the challenges existing in the institution's organizational and power structures according to prevailing sociological considerations. New organizational structures to support shared GIS databases are obligatory, though they are invariably postponed (Harris and Elmes, 1993).

This also applies to the tool experiences in this research. Most implementation obstacles confronted in practice were not about whether new tools provide methods of getting the new information a planning institution needs, but about whether the organisation can make use of the extra information within current working routines. The cautiousness lies in whether the use of new IT will change the system too much, and how the new ways of working fit into the daily routines that keep the institution running at this moment. It is suggested that the most difficult issue in taking community planning online is institutional rather than technical (Al-Kodmany, 2000).

In the case implementation, when discussing about gathering public comments from online-map-interface, an interviewee mentioned that it is more important to find a way to make use of this extra information within the current system than the information itself. This shows the difficulty of integrating extra data gathered through new technologies into the current running of the organization. This is the real reason that makes managers hesitate to use new approaches. With concerns like that, the decision to use a technology was often only made at quite a high level with a lot of considerations, and then passed down to executive level.

> ***"Of course, we don't want to raise more expectations from the use of this tool. It is quite natural that people reporting a problem assume that it will be solved soon" (Interview IT002).***

Consequently, the typical responses of a manager when facing the introduction of new innovations are, as shown in this case, "***resist in the first instance", "surprise when watching the demonstration", and "step back into conservative afterwards*" (Interview IT006).** A new tool was treated with great caution when introduced. The quality of technology might impress audiences, but there are always concerns about whether to fully embrace it in the first instance. The final decision on acceptance of the tool keeps going up the power ladder and often gets lost in miscommunication.

To break this bottleneck, we should learn more about how local knowledge is really assimilated in planning practices and decision-making (Rantanen and Kahila, 2009). It is all about how newly-available, bottom-up, accumulated information could feed into a formally run, top-down, planning decision-making process. Failure to solve this problem might leave a general uncertainty in the public sector that prevents it fully embracing of new tools. Such uncertainty is sometimes expressed as the scepticism of elected representatives and professionals about whether the public would make useful contributions (Han and Peng, 2003). Sometimes, the uncertainty was phrased as concerns over "raising the public's expectation too high", or worries about failing to operate the system well.

3.1.4. Go further bottom-up?

It was suggested by some interviewees from local authorities that the local knowledge collecting tool should have been implemented from a further bottom level upwards. As an alternative way of making use of a system about reporting transport-related problems, transport authority officers pointed out that this tool for crowd-sourcing local opinions from the general public could be more useful to certain transport campaign groups. For example, the travelling routes input interface in the prototype tool could be potentially useful for cycling groups in Manchester to create their own database of the most demanded cycling lanes in the city. With such data as evidence, they "***can persuade the local transport strategy maker to put more attentions and investments of a cycling lane on the locations shown***" (Interview, IT003).

This not only provides a kindly suggestion in the case study, but also opens up considerations about a new possible user group of planning support practice. Non-government sectors, such as community groups, campaign associations, and public affairs activists, could be able to become better involved in the planning decision-making with the support of a tool. Their roles in plan-making are as important as those of public organizations and the private sector, while their requirements for better informa-

tion-gathering and analysis are currently under-estimated. With more advanced technology in hand, they might make a difference in contributing to collaborative planning practices. This new direction could be another good case study area for tool implementation in the future, and it could be interesting to find out how activist and voluntary groups, or NGOs make use of the new technologies that are available for them.

4. Conclusion

Non-technical issues and actor-defining together form the organisational obstacles which prevent the full acceptance and successful diffusion of the tool in a planning institution. Fundamentally, such organisational obstacles were the consequences of a dilemma of technical innovation and policy innovation in planning departments or the public sector in general. The experiences learnt show that:

1) The contradiction between the limited expectations of the planners and the complex technological facilities that the developers offer affected the motivation to take up innovations in the first place;

2) The wider context of planning decision-making, i.e. the changing ideology of public policy-making, affects the acceptance of ICT innovations in practice,

3) The organisational structure and politics within planning institutions can also limit the diffusion of innovations.

4) The actors (i.e. initiator, developers and targeted users) in technology implementation are often not clearly defined, which causes uncertainties and misunderstandings in the process.

5) Furthermore, there is a dilemma in that using ICT innovations to facilitate policy innovations also means unexpected changes in daily routine or organisational culture, which most governmental departments are not fully ready and willing to accept.

5. Recommendations

To summarise the reflections and discussions above, there are some recommendations for tool developments in future that arise from the research findings, which could bring new insights and improvements to tool development.

1) Planning and technology can be bridged with an understanding of a mutual interest in the exchanging and sharing of knowledge. The IT use cases need to be found in supporting multi-level and multi-agent knowledge communication in plan-making routines in the current context.

2) Using a task-based planning support design approach to produce a useful toolkit with a clearly defined purpose. The developers should focus on the meaning of a tool for planner users when applying an interesting technology.

3) Defining appropriate actors and partnership in the tool development and implementation process is a key issue for successful experience.

4) Institutionalise the tool development and implementation process in a planning authority to minimise resistance created by non-technical issues and organizational obstacles.

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