ICT tools in central government:
Scope, effects and driving forces

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This paper describes the scope and use of different ICT tools in the Norwegian central government by focusing on both e-government and features of e-democracy; and the perceived effects of ICT on economy, service quality, transparency, coordination, political and administrative control and user participation. It also aims at explaining the influence of ICT tools on variations in such perceived effects relative to other factors influencing decision-making behaviour in the central civil service, such as structural features, demography and administrative culture. The major findings are, first, that government-to-government tools are the most widespread and that e-democracy tools have received little attention. Second, the effects are strongest regarding better public services, increased transparency and internal coordination and administrative control and weakest when it comes to coordination with local government and political control. Third, the most important set of explanatory variables are the use of ICT tools, but also structural features such as administrative level and tasks makes a difference as well as demographic features (age) and cultural features such as having an efficiency oriented culture.

Sammendrag

Dette notatet beskriver utbredelse og bruk av ulike IKT verktøy i norsk sentraladministrasjon. Det fokuseres på «e-government» og «e-domocracy» og på opplevde effekter av IKT på økonomi, kvalitet, åpenhet, samordning, politisk og administrativ kontroll og brukermedvirkning. Notatet tar også sikte på å forklare betydningen av ulike IKT verktøy på effektoppfattelser i forhold til andre faktorer som strukturelle trekk, demografiske kjennetegn og trekk ved forvaltningskulturen. Hovedfunnene er for det første at interne IKT verktøy er mest utbredt og at «e-democracy» tiltak har fått liten oppmerksomhet. For det andre er de største opplevde effekten knyttet til bedre offentlige tjenester, økt åpenhet og bedre intern samordning og administrativ kontroll. De ansatte rapporterer svakere effekter når det gjelder samordning med kommunale myndigheter og bedre politisk styring. De viktigste faktorene for å forstå variasjoner i effektoppfattelser er knyttet til bruk av ulike IKT verktøy, men også strukturelle trekk som forvaltningsnivå og oppgaver spiller en rolle. Det er også effekter av demografiske trekk som alder og kulturelle trekk knyttet til effektivitetsorientering.

Introduction

Since the 1990s Information and Communications Technology (ICT) has changed the way government works and how government bodies and civil servants interact with each other and with citizens. Government is said to have entered the digital age (Hood and Margetts 2007). The subject of information technology in government and its implications for public administration, for governance and for democracy have received increasing attention from researchers in political science and public administration (Frissen et al. 1992, Garson 2000, Snellen et al. 1998, La Porte et al. 2002). ICT affects relationships within the civil service, between civil servants and political and administrative leaders, and with citizens (Snellen 2002). In spite of the importance of ICT it is more or less ignored in studies of public management reforms (see e.g. Pollitt and Bouckaert 2004).

It is, however, a growing trend to integrate ICT into public administration (Kernaghan and Gunraj 2004) and to link to the study of ICT to public sector reforms by introducing concepts such as 'digital government' (Dunleavy and Margetts 2000) and 'digital state' (Borins et al. 2006). In this article we assess the effects of ICT relative to other relevant factors, like formal organizational forms, on performance within the civil service and more broad systemic performance. The main focus is on the use and effects of ICT tools, and a central issue is the relationship between ICT and the formal organization factors (Fountain 2001). ICT tools represent new forms of coordination, control and communication, and we attempt to understand how information technology affects the coordination, autonomy and control of complex public organizations as well as their relationship with political executives, users and citizens. E-government is expected to improve the functioning of public administration and its relationship with the public. It may also potentially facilitate cross-agency cooperation on complex problems and enhance customer focus in services (OECD 2003, 2005). The problem, however, is that it might be difficult in practice to live up to these promises, for e-government often faces implementation problems and is hard to manage (Pollitt 2003, Heeks 2006).

Two fundamentally different perspectives on the effects of ICT in government may be contrasted (Hood 2006). One is the more radical transformation vision of the emergence of an entirely new form of state – the «virtual state»– in which ICT infuses every level of government and produces more fragmented, decentralized and non-hierarchical structures and processes (Frissen 1998, Garson 2006). Jane E. Fountain (2001) claims that we are entering a situation in which government is organized increasingly in terms of virtual organizations whose structure and capacity depend on the Internet and the world-wide web. The other perspective is a more sceptical «dynamic conservatism» approach, which argues for a combination of flexibility and robustness, allowing underlying social relationships to be preserved as new ICT tools are adopted (Holliday 2001). According to this approach, ICT tends to reinforces the existing power structures of organizations (Garson 2006). Organizations tend to apply new ICT systems to existing structures in ways that may enhance efficiency and capacity

but that otherwise maintain the status quo and leave deeper structures and processes intact (Fountain 2001:19). There is an incremental nature of ICT change in public sector and important variations in ICT use across policy areas (Hudson 1999). E-government is mainly about supplementing traditional ways of delivering government information and services, not replacing them (Coursey and Norris 2008). It can be understood as the result of organizational adaptations on the interface between modern technology and established organizational forms (Tranvik 2007).

ICT tools may also be considered in terms of both NPM and post-NPM features and are supposed to enhance joined-up-government as well as service delivery, whereby it is their coordination potential that is emphasized. On the one hand it is claimed that an emerging post-NPM agenda that addresses the challenges of reintegration of services, «whole-of-government» approaches to policymaking and digitalization of administrative operations has «digital-era governance» at its core. The slogan is «New Public Management is Dead – Long Live Digital-Era Government», and the new ICT is seen as an alternative to NPM with potential to put back together many of the elements of government that NPM separated (Dunleavy et al. 2006). On the other hand, with its focus on service delivery to customers, public–private cooperation and efficiency, e-government also fits the NPM movement well (Eliassen and Sitter 2008). The introduction of new ICT tools has obviously increased internal virtuality through the autonomization of administrative functions, but ICT tools have also enhanced virtual inter-organizational networks, and the interface between citizens and government organizations has changed (Margetts 2005).

The aim of the article is:

   a)   to describe the scope and use of different ICT systems and tools in the
            Norwegian central government by focusing on both e-government and
            features of e-democracy

   b)   to describe the perceived effects of ICT on economy, service quality,
            transparency, coordination, political and administrative control, and user
            participation

   c)   to explain the influence of ICT tools on variations in such perceived
            effects relative to other factors influencing decision-making behaviour in
            the central civil service.

Our argument is that we do not need completely new ways of analyzing and understanding the new ICT tools of government but that we can apply more general analytical frameworks to understand what is going on (Hood and Heald 2006, Hudson 1999). Barriers and challenges to e-government can be organizational and cultural (Snellen 2005), but also demographical. To explain the use and effects of ICT we will apply an *ICT-reform perspective,* including the use of different e-government and e-democracy ICT systems and tools. This is the main set of independent variables. In addition we will introduce some control variables of a structural, cultural and demographic nature. A *structural perspective* includes variables like different organizational forms (ministry or central agency) or formal position and tasks; a *cultural perspective* adds

features such as efficiency orientation, professional orientation or political orientation; and a *demographic perspective* includes education, age, gender and tenure.

Public managers and executives are the central enactors of ICT technology in government and we will thus focus on the civil servants and their use and perceptions of ICT tools. The data base is an extensive questionnaire that surveyed all civil servants at executive officer level and above in the Norwegian ministries and every third civil servant in the central agencies in 2006.

We will first give a brief account of information technology and institutional change in public administration in general and in the Norwegian context in particular. Second, we will outline our data sources. Third, we will present our theoretical perspectives and derive some hypotheses regarding the effects of ICT tools. Fourth, we will describe the use of different ICT tools among civil servants in ministries and central agencies and the way they perceive the effects of ICT in their daily work. Fifth, we will explain differences in the perceived effects based on the perspectives. Finally, we will discuss the findings in relation to our explanatory perspectives and draw some conclusions.

Information Technology, Institutional Change and the Norwegian Context

E-government is an ambiguous concept that has different meanings. Some apply a broad definition, such as the use of ICT in public administration (Heeks 2006, Holmburg and Snellen 2007) or «processes both inside and between political bodies and public bureaucracies, with businesses, citizens and civic society, at different layers of government: local, regional, national as well as international» (Snellen 2005:399). Then the concept come close to the umbrella term 'digital government' that comprises all use of information and telecommunication technologies in the public sector (Garson 2006). Others use a somewhat narrower definition like «electronic delivery of government information and services, 24 hours a day 7 days a week» (Coursey and Norris 2008) or 'provision of governmental services by electronic means' (Garson 2006). The OECD (2003a) defines e-government as «The use of information and communications technology, and particularly the Internet, as a tool to achieve better government».

There is also a distinction between e-government and e-democracy, in which the latter concept covers specific topics such as online voting as well as citizens' participation in the public policy process and decision-making via ICT tools. E-democracy is about using ICT as a tool to enhance citizens' involvement in public policy-making (OECD 2003b). E-democracy thus covers selected aspects of e-government that focus on ICT as an important channel for citizens to influence public bodies, while e-government is related to how digital technology changes the organization of public administration (Tranvik 2007). We will mainly use a broad concept of e-government and also distinguish between e-government and e-democracy.

Three themes have been central in the theoretical discussion about the relationship between public administration and ICT (Snellen 2005). These are: technological determinism, the organizational implications of ICT and the policy implications of ICT. In this article we will mainly concentrate on the organizational implications of ICT. ICT may transform coordination within and between government bodies but also

administrative discretion and control as well as transparency (Bovens and Zouridis 2002).

We will address the internal organizational implications within the governmental apparatus, but also take a look at the external organizational implications regarding government's relationship with users and citizens. Generally, ICT has three roles in relation to the function of public administration: Supporting the economy and enhancing efficiency and control of policy implementation; supporting public service delivery; and supporting democracy (Snellen 2005). We will address all three.

The Norwegian Context[1]

Norway has actively used ICT in the public sector for a long time now, and it has provided an important tool for achieving gains in government efficiency, for improving the quality of public services and for modernizing government. There is a high level of Internet penetration of Norwegian society. In recent years, Norway has made progress in adapting government to the use of the Internet as suggested by its rank in 6th place in the e-Europe benchmarking exercise measuring the availability of online services (OECD 2006), and it is among the top ten in the e-government readiness index (UN 2005).

In Norway the structure of responsibility for e-government reflects the decentralized structure of government and its limited role as an e-government coordinator. Central government responsibility for ICT development and co-ordination has varied over time and has been allocated to different government organizations. Several government actors performing different policy-related functions share responsibility for e-government implementation. Since 2004, the Ministry of Government Administration and Reform has had a full mandate for ICT coordination in the public sector, and in 2008 an agency was established for government administrative development and ICT. But in general, leadership of e-government is very decentralized. The OECD survey of Norway indicates budgetary constraints as the single most important barrier to the use of ICT in government (OECD 2006). There are also many examples of ICT reforms in public sector agencies that has been difficult to implement or that has become much more expensive than originally planned.

The main driver of ICT use in Norway has been efficiency, achieved through automation of administrative processes. E-government is seen as an instrument for providing better quality services, reducing complexity and increasing the user-orientation of the public sector. Norway's early application of ICT to back office functions of government (e.g. financial and public record and payroll systems) has brought changes and benefits in terms of back office management that are now mainstreamed in government. The impact of e-government on knowledge-sharing across government has also been positive, and online frameworks that enhance cross-government collaboration and exchange of experiences have been established. The analytical capacity of central government remains limited, however, and it is unevenly diffused among the agencies.

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[1] This section is based on the OECD report: E-government Studies: Norway. Paris: OECD 2006.

While standardization efforts in Norway have fluctuated in terms of focus and intensity, standardization has now emerged as a key priority on the e-government agenda. Frameworks for standards for interoperability and management of some data exist and continue to be developed through inter-agency working groups. The national e-procurement system is solid, but take-up has been lower than expected, despite demonstrated return on investments. Inter-agency collaboration is not considered a major challenge for the implementation of e-government, but few agencies are collaborating beyond the level of information-sharing aimed at establishing a common framework for the delivery of joint services. Much of the collaboration is based on the joint exchange of information contained in individual data registers.

There is no whole-of-government framework for monitoring progress and assessing the impact of e-government initiatives at agency and ministry level. Few organizations within the Norwegian government have such frameworks. Agencies' results and achievements are often included and described in annual reports, but they are de-linked from discussions of targets and goals.

Data sources

There is a lack on consensus regarding what e-government performance is and which factors should be considered to explain variations (Welch, Moon and Wong 2006, Garson 2006). Our method of studying reforms and competence is based on two main elements. First, we focus on the response of individual civil servants in ministries and central agencies by looking at their use of ICT tools. How the individual civil servants perceive the effects of ICT along different dimensions forms the core of our approach. Second, we choose an extensive method to cover a lot of ground. In 2006 we conducted a large survey of all civil servants with at least one year of tenure from executive officers to top civil servants in Norwegian ministries and of every third civil servant in the central agencies. 1516 persons in 49 central agencies answered and the response rate was 59 percent. On average there were 31 respondents from each agency, ranging from 112 in the biggest agency to 1 in the smallest. The response rate in the ministries was 67 percent. 1846 responded in the 17 ministries, ranging from 57 in the Ministry of Oil and Energy to 284 in the Ministry of Foreign Affairs.

Regarding the effects of ICT tools we asked the respondents the following question: «To what degree do you agree that the use of new ICT technology in your daily work has had the following effects». We then listed nine different possible effects:

> Better public services
> Increased transparency
> Better coordination in own policy area
> Better administrative control
> Better coordination across policy areas
> Economic savings
> Increased citizens' participation
> Better coordination with local government
> Better political control

For each of these effects, we asked the civil servants to state to what degree they agreed that this effect had been achieved on a scale from 1 (*agree very much*) to 5 (*disagree very much*). For each effect there was also a response alternative «Not relevant/do not know».

Of the effects, two relate to control – political and administrative control – three are related to administrative coordination (own policy area, across policy area and with local government), one to internal economic effects (savings), one to user-orientation (better public services) and two to the government–citizen relationship (increased transparency and increased citizens' participation).[2]

The main independent variables are use of different ICT tools.[3] We took a broad empirical approach to the question of use of ICT tools, asking the executives the following question: «Are the following ICT tools used in your daily work?» Then we listed the following ten different categories:

> Intranet
> Electronic case treatment/executive work
> Electronic internal records
> ICT-based professional support systems
> Electronic application forms
> Electronic subscriptions to information and news
> ICT-based performance reporting systems
> Digital payment services
> Electronic hearings
> Electronic discussion forum

These ICT measures can be classified into three groups. The first, *government-to-government tools,* is the electronic exchange of information within ministries and central agencies as well as between government organizations vertically and horizontally. These tools include intranet, electronic case treatment/executive work, ICT-based professional support systems, electronic internal records and ICT-based performance reporting systems. The second group is *government-to-users tools*, which facilitate communication between government bodies and the users of public services. The users may be individuals or organizations in the market or in civil society. These tools are mainly aimed at informing the public and include electronic application forms, electronic subscriptions to information and news and digital payment services. The third group is *government-to-citizens tools*, which are e-democracy tools aimed at consulting the public as well as encouraging citizens, interest groups and other stakeholders to participate more in the decision-making process (Pollitt 2003). These tools include electronic discussion forums and electronic hearings.

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[2] Effects on political control are not only related to effects inside the government, but also to the relationship between government and citizens. And transparency is not only related to the government-citizen aspect, but also to the government-user dimension.

[3] For the other control variables see Appendix.

Theoretical Perspectives

There is not an agreed upon empirical theory for understanding the development of ICT tools in public organizations (Garson 2006). The importance of technological, organizational and human factors and whether the environment is constrained or unconstrained differ in different approaches. Thus there is a need for multi-factor explanations of the effects of ICT. Information technology can enable organizational change, while the different structural, demographic and cultural settings in which civil servants work might influence the use of ICT technology and its effects (Fortain 2001, O'Mahony and Barley 1999). Thus similar organizations might use identical information systems in different ways. Organizational factors are likely to affect e-government adoption and performance. We lean towards a strand in the literature known as social shaping of technology (Holmburg and Snellen 2007). In contrast to the ideas of technological determinism, this approach seeks to explain how institutions shape the design and meaning of ICT systems, emphasizing the role of agencies in technological change. ICT technology may shape institutions as well as being shaped by them. Thus the challenge is to reveal how ICT technology is shaped and how much, after being adapted, it affects the way organizations work, compared with the importance of structural, demographic and cultural features. To understand the use and effects of ICT tools we must take the contextual constraints in which they operate into consideration. Dunleavy et al. (2006) discovered large variations across different countries in the capacity to run ICT systems.

We will use four perspectives to examine variety in effects of ICT tools in the Norwegian central civil service. The first perspective is the *ICT-reform perspective*. This perspective proceeds from the notion that there is a connection between the organization and use of ICT tools and the effect of ICT in the civil service, i.e. the ICT use profile will influence the ICT effect profile. This perspective contains both structural and cultural elements. Structurally, different reform waves will entail different ICT tools and will therefore also influence the effects of ICT in different ways, because the structural context they operate in will change.

What relationship can we expect between different ICT tools and different effects? The main thought is that it will vary according to how relevant the tools are for different civil servants, and different ICT tools will have different implications for the different types of effects. If we first take government-to-government tools, we would expect civil servants scoring high on the use of such reforms to also score high on perceived internal effects such as economy, coordination and political/administrative control. Second, we would expect that civil servants scoring high on government-to-user tools would tend to see more effects on service quality. Third, we would expect civil servants scoring high on use of government-to-citizens tools to tend to see more effects on transparency and increased citizen participation.

The second perspective is a *structural perspective* (Christensen et al. 2007, Egeberg 2003, Simon 1957). The point of departure is that the structural context of civil servants will influence how they think; perceive ICT effects and act, regardless of whether they use ICT tools or not in their daily work, i.e. there are some structural factors that work more generally. The first variable, the administrative level, differentiates between civil servants

working in ministries and subordinate agencies. Traditionally in Norway ministries are supposed to attend more to law-making, planning, coordination and general policies than agencies, which are more concerned with the implementation of policy, single cases and technical aspects in a specific sector. There has been a strong policy doctrine in Norway over the past 50 years that the ministries should be secretariats for political executives and have policy advice as their main task. One could argue about whether this distinction is all that clear in practice, but it is obvious that there are some differences in this direction. Concerning the relevance of administrative level related to effect of ICT tools, we would expect civil servants in central agencies to score higher on effects related to users and clients since they are closer to them. On the other hand, we would expect civil servants working in ministries to see stronger effects on political/administrative control and coordination, since they are situated at a higher hierarchical level.

The second structural variable is formal position in the civil service hierarchy. The general assumption is that the hierarchical level on which civil servants work will differentiate the perceived ICT effects. We would expect leaders/managers to see more effects on political control, administrative control and coordination, and executive officers to score higher on effects related to users and clients.

The third structural variable used is formal tasks, and we divided this into three types – coordination, staff tasks, and reporting and control. We would expect civil servants formally working with coordinative tasks to score highest on perceived coordination effects of ICT. Civil servants working with staff tasks are also expected to score highest on coordination and those having mainly control and reporting tasks will tend to score highest on administrative control effects.

We will also apply a *demographic perspective* (Lægreid and Olsen 1978, Pfeffer 1983). The logic behind such a perspective is that the background of civil servants is of relevance for how they think and act, also related to the effects of ICT. This may either be related to social background, like gender or education, or to the experience people have gathered during their career in the civil service – i.e. tenure.

The first variable here is age. We would expect older civil servants overall to see fewer effects of ICT tools than younger ones, and older ones to see particularly few effects on control and coordination, while we would expect the younger ones to see more effects of more «modern» measures like savings, service quality, transparency and citizens' participation.

The second demographic variable is tenure, which reflects the experience of different positions and tasks civil servants gather at different stages in an administrative career (Christensen and Lægreid 2009). We would expect the same type of pattern as for age – i.e. the longer the tenure, the fewer perceived effects – and a differentiated pattern concerning types of effects, because they may be more sceptical towards the new ICT tools, which were introduced later in their career.

The third demographic variable is gender. We would expect men to score higher than women on perceived effects of ICT on control and coordinative measures, because men more often have leadership positions, and women to score higher on perceived effects on services, transparency and participation, partly because of being overrepresented at

lower hierarchical levels, but also because they normatively will lean more in the direction of user- and citizen-orientation.

The last groups of demographic variables are three educational variables. Different educational groups may have different normative and content/technical features, and traditionally also different positions and tasks in the civil service. We use three categories of educational background – jurists, social scientists and economists. Social scientists and economists will probably score highest overall on the perceived effects of ICT, partly because of the content of their education and partly because of the tasks and positions they have in the civil service. Social scientists might also be more concerned about political control, transparency and service quality while economists would be more preoccupied with savings. Jurists are the traditional profession in central government, and we would expect them to tend to see fewer overall effects of ICT than other professions.

Finally we also apply a *cultural perspective,* which emphasizes the historical and institutional traditions of political–administrative systems (Selznick 1957). In this perspective, informal norms, identities and the logic of appropriateness are important (March and Olsen 1989), in this case for explaining how civil servants see the effects of ICT tools. Administrative traditions represent «filters» producing different outcomes in different contexts.

As proxies for administrative culture we will use the civil servants' role identities as defined by the importance they attach to different signals or considerations when conducting their daily work. Here we distinguish between political loyalty, professional considerations, efficiency, and the importance of public transparency and public opinion. Our expectation is that civil servants scoring high on political loyalty will tend to see more effects on political control, that those scoring high on professional considerations will see more positive effects on coordination, that civil servants scoring high on efficiency will see more effects on economy, that civil servants scoring high on transparency values will also see effects of ICT tools on transparency, and finally that civil servants paying strong heed to public opinion will score high on perceived effects of ICT on service-quality and citizens' participation.

We will now first describe the use of different ICT tools among the civil servants in ministries and central agencies. Second, we will outline the perceived effects of new ICT technology along the different effect dimensions. Third, we will examine how we might explain the variation in the perceived effects according to use of different ICT tools, and according to structural, demographic and cultural features.

Use of ICT Tools

The most widespread of our ten different ICT tools is intranet (Table 1). This tool is used by almost all civil servants in ministries and central agencies in their daily work. Electronic case treatment and electronic handling of executive work are also used daily by the great majority of officials. On average the civil servants report that they use five of these ten ICT tools.

Table 1 Use of different ICT tools by civil servants in Norwegian ministries and central agencies in their daily work. 2006. Percentage. N=3209

	Use the tool
Intranet	95
Electronic case treatment/executive work	85
Electronic internal records	69
ICT-based professional support systems	61
Electronic application forms	57
Electronic subscriptions to information and news	57
ICT-based performance reporting systems	43
Digital payment services	36
Electronic hearings	20
Electronic discussion forum	11

There are different types of electronic interaction that cover the exchange of information within the government apparatus, between government bodies and the customers or users of public services and between government bodies and citizens that aim to involve citizens in policy processes and public decision making. E-government tools include office automation, internal management information systems, expert systems as well as client-oriented web sites (Heeks 2006). Chadwick and May (2003) distinguish between a managerial, a consultative and a participatory model, and Holmburg and Snellen (2007) operate with government-to-citizens interaction, government-to-government interaction and government-to-voter interaction. For the further analyses we will distinguish, as presented in the theory section, between three ICT tools.

First, we have inter-organizational communication within the government, which we label *government-to-government* tools. We constructed an additive index based on these five tools – intranet, electronic case treatment/executive work, ICT-based professional support systems, electronic internal records and ICT-based performance reporting systems.[4] 24% apply all five tools, 56% use 3–4 tools, 16% use 1–2 tools and only 5% do not use any of these tools.

Second, we have communication between government bodies and the users of public services, which we have labelled *government-to-users* tools. These tools are mainly aimed at informing the public and facilitate services. We constructed an additive index based on these three types of ICT tools – electronic application forms, electronic subscriptions to

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[4] There is a positive correlation between all variables included in the index and a significant correlation between .12 and .40 (.01 level) for 8 of the 10 relations.

information and news, and digital payment services.[5] 15 % use all three tools, 60% use 1–2 tools and 25 % do not use any of the tools.

Third, we have the *government-to-citizens* tools or e-democracy tools. These tools include electronic discussion forums and electronic hearings. The additive index based on these two types of tools reveals that only 5% use both, 20% apply one tool and 75% of the civil servants do not use this kind of e-democracy in their daily work.[6]

These findings show that regarding the ICT tools an internal managerial model of interaction has dominated. ICT tools have to a great extent reconstructed the workplace for civil servants. This is not surprising given the fact that ICT policy has been dominated by e-government issues, while e-democracy questions have received little attention in Norway (Selle and Skard 2007). To some degree they have also been applied to inform users and consumers of public services. Only to a small extent has the democratic potential of the ICT tools been used. E-government in Norway is more about publishing and interacting than about transactions and integration (c.f. Eliassen and Sitter 2008). Thus democratization seems to be the forgotten promise of e-government and there is a need to reintroduce e-democracy (Chadwick 2003).

Effects of ICT Tools

Quite a few civil servants answer «not relevant or do not know» when asked to assess the effects of different ICT tools. This is especially the case regarding external effects on citizen participation, coordination with local government and better political control (see Appendix). Thus along some effect dimensions many employees are uncertain regarding the effect of ICT tools, which is not surprising given the attribution problem that is crucial for many administrative reform tools (Pollitt 1995). For the rest of the analyses we will exclude the «not relevant/do not know» responses.

Table 2 reveals the unfolding of a number of mixed consequences of ICT in public administration (Borins 2006). Civil servants see most effects regarding better public services and increased transparency. ICT has a great potential for better integrated services and service delivery to the public (Borins et al. 2006) and the civil servants to a great extent agree that the quality of public services generally has improved due to introduction of ICT in their daily work. Transparency has been claimed to be a key to better and democratic government (Hood and Heald 2006); in addition improvements in the quality of public services have been a strong mobilizing factor in recent government modernization processes (Øvretveit 2005). Civil servants in central government bodies tend to agree that ICT tools have had a positive effect on both. Using ICT means that the amount of information the government obtains and disseminates becomes greater and more accessible to people, and government processes become more stable and less discretionary and hence more transparent (Margetts 2006).

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[5] There is a positive significant correlation between .13 and .27 (.01-level) for all variables included in the index.

[6] The correlation between electronic hearings and electronic discussion forum is .24 (significant at .01-level)

Table 2. Civil servants' assessment of effects of ICT on their daily work. 2006. Percentage.

	Agree	Mixed	Disagree	N=100%
Better public services	75	20	5	2827
Increased transparency	72	23	6	2860
Better coordination in own policy area	65	27	8	2806
Better administrative control	65	28	7	2696
Better coordination across policy areas	52	36	12	2418
Economic savings	49	38	13	2618
Increased citizens' participation	47	36	17	1868
Better coordination with local government	39	42	19	1440
Better political control	29	46	25	1841

«Do not know/not relevant» is excluded from the table.

Also internal administrative effects, such as increased coordination within own policy area and increased savings and better administrative control are reported by two out of three civil servants in ministries and central agencies. ICT tools make it easier to manage the control problem in government and it is now moving towards embedded control (Fountain 2001:42). Increased administrative control might imply more ex post control and less ante steering (Lægreid and Ramslien 2007). About half of the civil servants also agree that coordination across policy areas has become better and this imply that ICT both encourages and facilitates collaboration. This is a more positive assessment of the horizontal coordination effects of new ICT tools than found in a case study of the immigration administration (Lægreid and Ramslien 2007). But even if ICT tools enhance internal coordination and communication within and between government agencies, what implications this coordination has for control and autonomy is less clear.

Many also see economic savings as a consequence of new ICT tools in their daily work, but the efficiency gains are obviously smaller than the increase in transparency (Borins 2006). Coordination with local government is, however, still a challenge and this confirms the findings of other studies that have concluded that coordination with local government is weak in the Norwegian central government (Christensen and Lægreid 2008, Fimreite and Lægreid 2008).

Regarding the political effects it seems that the use of ICT tools has not had a significant impact on political control. The civil servants are very ambiguous in their opinion about the effects on ICT tools on political control. 29% agree that political control has improved, while 25% disagree and most have a mixed opinion on this. A positive democratic effect is, however, that many report increased citizens' participation as an effect of new ICT tools. Client orientation seems to be enhanced by ICT. Increased transparency can also be seen as a positive democracy effect.

If we look at the two control measures, we see that the effects on administrative control are much stronger than on political control; something that underlines that ICT

is more a set of administrative instruments, rather than something changing major patterns of political influence in government.

For the coordination effects we constructed an additive index based on the respondents who agree on the questions about the three types of coordination. It has been claimed that ICT tools have an ability to affect coordination (Fountain 2001) and this seems to be the case for the majority of civil servants in Norwegian central government. 14% see positive effects along all three dimensions, 50% see positive effects on 1–2 coordination dimensions and 36% see no positive coordination effects.[7] Thus ICT apparently has inspired and enabled «joined-up-government» initiatives and «whole-of-government» approaches.

Generally, there is a high inter-correlation between the different effect indicators. Pearson r for all variables varies between .38 and .72 and are significant at the .01 level. This means that if the civil servants see positive effects of ICT tools along one dimension they also see positive effects along other dimensions.

Variation in Effects of ICT Tools

We now turn to the question of how to explain the variety in the perceived effects of ICT tools. This section focuses on how the scores on the different independent variables, i.e. our indicators of ICT tools, structural, demographic and cultural features, correlate with the different types of effects. First, we present the bi-variate correlations between each of the independent variables and the dependent variables, and then do a multivariate analysis of the relative importance of the various independent variables for the different types of coordination.

Descriptive analyses

ICT-reforms. Use of ICT tools tends to affect all seven types of effects (Table 3). The civil servants do not seem to make a strong distinction either between different ICT tools or between different types of effects. There is a positive significant correlation between all three types of ICT tools and the different effects. Generally the effects of government-to-government tools seem to be somewhat stronger than the effects of government-to-citizens and e-democracy tools. And the effect of ICT tools on coordination is overall stronger than on the other dependent variables.

Structural features. The significance of formal structure when it comes to explaining variations in perceived effects of ICT are overall weaker than for ICT tools. The structural features seem to have the strongest effect on coordination. There are generally clear differences between civil servants having staff tasks and other civil servants regarding most of the effects of ICT. Administrative level also makes a difference regarding savings, coordination, service quality and citizens' participation. For all these effects officers working in central agencies see more positive impacts than those working in ministries. Position does not have a big impact except for coordination,

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[7] There is a positive correlation between the three coordination dimensions ranging from .60 to .72 (Pearson r, sign at .01-level). We therefore use the additive index as one coordination variable.

which is somewhat surprising given the findings of other studies of decision-making behaviour in government (Christensen and Lægreid 1998).

Tabell 3. Bivariate correlations between effects of ICT and use of ICT tools, structural, demographic and cultural features. Pearson r.

	Savings	Coordination	Adm. control	Quality	Transparency	Political control	Citizen participation
ICT-tools:							
Government-to-government	.11**	.15**	.17**	.13**	.12**	.12**	.10**
Government-to-user	.09**	.17**	.08**	.08**	.08**	.08**	.08**
E-democracy	.07**	.17**	.04*	.08**	.09**	.07**	.09**
Structural features:							
Administrative level	.09**	-.06**	.04	.13**	.04	.01	.08**
Position	-.04	.08**	.00	.00	.01	-.02	.00
Main task: coordination	-.01	.07**	.01	-.01	.02	.01	.00
Main task: staff	.07**	.05**	.09**	.09**	.09**	.07**	.14**
Main task: reporting/control	.03	-.04*	.02	.00	-.03	.02	-.05*
Demographic features:							
Age	-.05*	.03	-.02	-.06**	-.06**	-.03	-.06**
Tenure	-.07**	.03	-.03	-.03	-.04*	-.02	-.02
Gender	-.01	.02	.04	-.01	-.04*	.05*	.02
Jurist	.00	-.08**	-.07**	-.05	-.05*	-.05*	-.02
Economist	-.05*	.00	-.03	-.03	.01	.00	.00
Social Scientist	-.03	.06**	-.02	-.01	.01	-.02	-.02
Cultural features:							
Political loyalty	-.05*	.10**	.00	-.01	.03	.06*	.00
Professional considerations	.06**	.01	.05*	.06**	.04*	.04*	.04
Efficiency	.13**	.07**	.11**	.09**	.07**	.11**	.08**
Public transparency	.04	.08**	.06**	.06**	.14**	.10**	.12**
Public opinion	.02	.13**	.01	.03	.08**	.12**	.14**

**: Significant at .01 level; *: Significant at .05 level

Demographic features. Generally, the effects of demographic features are pretty weak. But there are some effects of demographic features such as age, gender, tenure and education on transparency. Age also has effect on quality, savings and citizens' participation. Among the different professions the strongest differences are between jurists and other professions. Gender also has some effect on political control, while tenure and being an economist have some effect on savings, and being a social scientist has an effect on coordination.

Cultural features. There is a clear effect of cultural features, and overall this is nearly on a par with the significance of ICT tools. Efficiency orientation has an impact on all effect dimensions, and only two independent variables, government-to-government and government-to-users ICT tools, score higher. Except for savings, the transparency-orientation also has overall significance. Public opinion values correlate positively with the democracy effects of ICT tools. Having coordination tasks and political loyalty also seem to influence perceived effects of ICT tools.

Multivariate analyses

We now turn to the question of the relative explanatory power of the different independent variables. The multivariate analyses, summed up in Table 4, generally confirm the pattern revealed in the bivariate analyses. First, the independent variables can only explain a minor part of the total variation in the different effects of ICT tools. Second, the most important explanatory variables overall are use of ICT tools, especially government-to-government tools, followed by structural and cultural features on about the same level, while demographic variables have rather weak explanatory power. There is not any great variety between the seven dependent variables concerning how much the independent variables explain, i.e. they do not differentiate much.

Table 4. Summary of regression analyses by ICT tools, structural, demographic and cultural features affecting effects of ICT tools. Standardized Beta coefficients. Linear regression.

		Savings	Coordination	Adm. control	Quality	Transparency	Pol. Control	Citizen Participation
ICT-tools	Government-to-government	.09**	.06**	.15**	.10**	.09**	.08**	.07*
	Government-to-users	.06**	.05	.02	.05*	.03	.01	.03
	E-democracy	.03	.09**.	-.02	.05*	.06**	.02	.04
Structural features:	Administrative level	.07**	-.04	-	.11**	-	-	.08**
	Position Main task: coordination	-	.01	-	-	-	-	-
		-	.06**	-	-	-	-	-
	Main task: staff	.06**	.05**	.06**	.08**	.08**	.06**	.11**
	Main tasks: reporting/control	-	.01	-	-	-	-	-.04
Demographic features:	Age	-.05*	.00	-	-.09**	-.09**	-	-.08**
	Tenure	-.07*	-	-	-	.02	-	-
	Gender	-	-	-	-	-.02	-.05	-
	Jurists	-	-.06**	.04*	-	.05*	.03	-
	Economist	-.06**	-	-	-	-	-	-
	Social scientist	-	.04	-	-	-	-	-
Cultural features:	Political loyalty	-.04	.04	-	-	.-	.05*	-
	Professional considerations	.04*	-	.03	.04	.01	.02	-
	Efficiency	.10**	.03	.07**	.07**	.02	.08**	.04**
	Public transparency	-	.01	.02	.03	.12**	.02	.06
	Public opinion	-	-.07**	-	-	.03	.08**	.11**
	R2	.06	.05	.04	.06	.05	.05	.06
	Adjusted R2	.05	.05	.04	.05	.05	.04	.06
	F	12.666	10.363	11.095	11.962	9.883	6.366	11.295
	Sign.	.000	.000	.000	.000	.000	.000	.000

**: Significant at .01 level; *: Significant at .05 level. Only variables that have significant bivariate effects are included in the regression analyses.

Among the ICT tools as independent variables the correlations with the dependent variables are overall positive, meaning that more use of ICT tools is seen as furthering most of the effects listed. The government-to-government tools show overall the strongest effects on the dependent variables, and among them the effects on administrative control score highest. The effects of government-to-users and e-democracy tools are less wide-spread and weaker.

Second, structural features also make a difference. Having main tasks related to staff functions seems be significant for all types of ICT effects, with the relatively strongest effects on citizens' participation. Also civil servants with coordination tasks report a positive effect of ICT on coordination, while there is no significant effect of having control and reporting as main tasks. There is also an effect of administrative level, meaning that people working in central agencies report a stronger positive effect of ICT on savings, service quality and citizens' participation. There is, however, no significant effect of formal position in the hierarchy.

Third, among the demographic variables age is the most important one for explaining variety. Younger civil servants see more effects on quality and citizens' participation, savings and transparency. There are also a few results related to higher education. Jurists see fewer effects on coordination than other educational groups, while economists see less effect on savings, both somewhat surprising.

Fourth, cultural features have some effects. Efficiency orientation is the single most significant variable, after government-to-government tools, for explaining variety in perceived effects. Except for coordination and transparency, civil servants with a strong efficiency orientation tend to see more positive effects of ICT tools than other employees. But there are also single significant positive relationships between having a strong political loyalty orientation and seeing effects on political control, between having a strong public transparency orientation and seeing effects on transparency, between having a strong public opinion orientation and seeing positive effects on coordination, political control and citizens' participation.

Discussion

Table 5 sums up the main expectations based on the four perspectives, both concerning general expectations and expectations about differentiating among the dependent variables, and compare them with the main results of the data analysis. Overall, most of our expectations, whether general or differentiated, seem to be fulfilled concerning the ICT tools related to the ICT reform perspective. Using government-to-government tools is the most significant set of independent variables to explain variations in perceived effects, something that tells us that these tools are the most frequently used and that this probably helps civil servants to see the effects of their use.

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Table 5. Main expectations and results.

	General expectation	Differentiation	Main results
ICT tools:			
Government-to-government	Much use – scores high on perceived effects	Most on savings, coordination and control	- Yes on general expectation - Mostly yes on differentiation
Government-to-users	Same expectation	Most on service quality	- Yes, but weak on general expectation - Yes on quality, but also on savings
E-democracy	Same expectation	Most on transparency and citizen participation	- Yes, but weak on general expectation - Yes on transparency, but more on coordination
Structure:			
Administrative level	None	- Ministries more on control and coordination - Agencies more on quality	- No for ministries - Yes on agencies and quality, but also on savings and participation
Position	None	Leaders/managers more on control and coordination Executive officers more on quality	No No
Coordination tasks	None	More on coordination	Yes
Staff tasks	None	Coordination	Yes, but more on all others
Control/ reporting tasks	None	Administrative control	No
Demography:			
Age	Older scores lowest in general	- Older less on control and coordination - Younger more on savings, quality, transparency and participation	- Mostly yes on general expectation - Yes on differentiation for younger
Tenure	Long tenure scores lowest on effects	Same pattern as age	- No on general expectation - Yes on savings for low tenure
Gender	None	- Men more on control and coordination -Women more on quality, transparency and participation	None
Jurists	Less overall	None	No on general pattern
Economists	High overall	Most on savings	No overall, no on savings

	General expectation	Differentiation	Main results
ICT tools:			
Social scientists	High overall	Most on political control, service and transparency	No in general and no on differentiation
Culture			
Political loyalty	None	Political control	Yes
Professional considerations	None	Coordination	No
Efficiency	None	Savings	Yes on savings, but also on most others
Public transparency	None	Transparency	Yes
Public opinion	None	Quality, participation	Yes on participation, but also on political control and coordination

Government-to-user tools and e-democracy tools are used less and they are less important, but still significant for perceived effects. The fact that our differentiation expectations are also mostly fulfilled shows quite clearly that the ICT tools have differentiated effects, not only general. Civil servants have more knowledge and experience concerning certain specialized ICT tools, and therefore perceive more of their effects.

Our expectations concerning the structural variables get mixed support. Civil servants working in agencies seem overall to perceive more effects than civil servants in ministries, something that may indicate that ICT-related effects are more relevant in entities that have more technical tasks and activities.

We also expected that formal position might explain variety, since this is the single most significant variable in many studies of decision-making behaviour in government (see Egeberg 2003). This is, however, not the case. There are no differences between civil servants on different hierarchical levels concerning the perceived effects of ICT tools. There might be different explanations for this. One is that ICT instruments are seen as less important for decision-making than other forms and tools, like the formal structural ones, since leaders normally score highest on using or perceiving effects of reforms and changes. This explanation might be connected to another one, namely that some ICT tools, primarily government-to-government ones, might be seen as «level-neutral», i.e. potentially something that everyone uses and that others, like the government-to-users or e-government ones, are seen as more distant from the leaders, balancing more the normal bias in use of different steering instruments. For the three types of tasks differentiated, it is mainly staff tasks that seem to be significant for perceived effects, but the effect of having coordination as a main effect is also as expected.

Comparing expectations and results concerning demographic variables yields a mixed picture. As expected, older civil servants would score lowest on most perceived effects. Young civil servants score highest on perceived effects related to savings, quality,

transparency and participation, measures that are mostly related to NPM-inspired reforms. This might show the more general feature that they are modernists and that there is a generational cleavage here, and that this also applies to ICT tools (Christensen and Lægreid 2009). Concerning gender, we expected a differentiated picture, based on a combination of different representation of men and woman on different hierarchical levels, and on different norms and values, but this expectation is not fulfilled. In relation to types of higher education, we expected that economists and social scientists generally would score higher on perceived effects than jurists, but this is not the case; indeed, there is a weak tendency in the opposite direction. The pattern for the jurists is divided and not easy to interpret.

Concerning the cultural factors related to the cultural perspective, the overall expectation was that different cultural value orientations in the roles of the civil servants would differentiate their perceived effects of ICT tools. This was generally confirmed, showing that role orientation makes civil servants focus on corresponding effects of ICT.

Summing up, these findings support the view that e-government represents hybrid systems combining personnel features and organizational structural features (Heeks 2006), but also cultural features. We have to go beyond the narrow concept of information management to understand how e-government work and apply a broader public administration approach that enriches the locus of e-government as well as its focus (Zouridis and Thaens 2002).

The strength of our effect indicators are that they are both output and outcome related as well as input oriented. They are, however, mainly based on subjective internal assessment from the civil servants themselves. To get a more comprehensive assessment such perceived effects have to be supplemented by more external and objective measures.

Conclusion

In this paper we have revealed that ICT tools are widespread in central government organizations, but also that internal e-government tools are more used than external e-democracy tools. We have portrayed a number of mixed consequences of ICT in public administration. The effects of ICT seem to be most significant on public service quality and on transparency, both effects that concern users and citizens and are therefore externally oriented. But there are also strong perceived effects on administrative coordination and control. The coordination effects are both horizontally across policy areas and vertically within own policy area, but to a much lesser degree across administrative levels between central and local government. There is also great uncertainty among the civil servants regarding the effects of ICT on citizen participation and political control. This indicates that there is a long way to go before ICT tools live up to their promises regarding democracy, participation and political accountability, i.e. to fulfil the UN vision of moving from e-government to e-inclusion (UN 2005).

Another interesting implication of this study is that the effects of ICT tools have to be seen in their cultural, structural and demographic context. There is no technological

determinism regarding the relationship between the introduction of ICT tools and how public- sector organization works. The effects of ICT tools are constrained but also enabled by the structural, cultural and demographic setting in which they are implemented. The strongest positive effect seems to be of government-to-government tools that are introduced among young civil servants with staff tasks working in an efficiency-oriented administrative culture.

It is also interesting that ICT tools seem to reduce the effects of hierarchy. There are no variations among managers and executives regarding the perceived effects of different ICT tools. One implication of this might be that the use of different ICT tools in daily work tends to reduce the effect of formal position on the decision-making process in central government organizations and shifts power and dependency within public-sector organizations (Pollitt 2003).

Our conclusion is that ICT tools are not a panacea that can solve all problems of coordination, control and autonomy in ministries and central agencies. Our findings do not concur much with the ideas of technological determinism. Rather we find more similarities with the ideas of dynamic conservatism and a combination of flexibility and robustness. Central government organizations are moving towards a virtual state with elements of less hierarchical structures and increasing use of modern ICT tools, but these tools are added to existing structures and are constrained by administrative culture and demographic features.

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Appendix:

Independent variables:

Government-to-government tools: 0 (not used) to 5 (used all five tools)
Government-to-citizens tools: 0 (not used) to 3 (used all three tools)
E-democracy tools: 0 (not used) to 2 (used both tools)
Administrative level: 1: Ministry, 2: Central Agency
Position: 1: Executive officer 2: Manager/leader
Main task – coordination: 0: No, 1: Yes
Main task – staff: 0: No, 1: Yes
Main task – report/control: 0: No, 1: Yes
Age: 1: under 35 years old; 2: 35–49 years old; 3: 50 years and older
Gender: 1: man, 2: woman
Tenure in central government: 1: 5 years or less; 2: more than 5 years
Jurist: 0: No, 1: Yes
Economist: 0: No, 1: Yes
Social scientist: 0: No, 1: Yes
Political loyalty: 1 (Very unimportant) to 5 (Very important)
Professional considerations: 1 (Very unimportant) to 5 (Very important)
Efficiency: 1 (Very unimportant) to 5 (Very important)
Public transparency: 1 (Very unimportant) to 5 (Very important)
Public Opinion: 1 (Very unimportant) to 5 (Very important)

Dependent variables:

All, but coordination; From 1(Disagree totally) to 5 (Agree totally)
Coordination: 0 (no positive coordination effect) to 3 (positive effect on all three coordination dimensions)

Table A1: Civil servants' assessment of effects of ICT in their daily work. Percentage N (average) = 3115

	Agree	Mixed	Disagree	Not relevant/do not know
Better public services	68	18	4	10
Increased transparency	66	21	5	9
Better coordination in own policy area	58	24	7	12
Better administrative control	57	24	7	13
Better coordination across policy areas	40	28	10	22
Economic savings	39	32	10	18
Increased citizens' participation	29	22	11	40
Better coordination with local government	18	20	9	54
Better political control	18	27	15	41

2008

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