

Computer support for document management in the Danish central government

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Abstract. Document management systems are generally assumed to hold a potential for delegating the recording and retrieval of documents to professionals such as civil servants and for supporting the coordination and control of work, so-called workflow management. This study investigates the use and organizational impact of document management systems in the Danish central government. The currently used systems unfold around the recording of incoming and outgoing paper mail and have typically not been accompanied by organizational changes. Rather, document management tends to remain an appendix to the primary work and be delegated to a specialized organizational unit. Several factors contribute to the present document management practices: for example it takes an extraordinary effort to achieve the benefits, and few institutions are forced to pursue them. Furthermore, document and workflow management is applied most extensively in an institution with certain mass production characteristics, and the systems do not address needs specific to the civil servants.

1. Introduction

People handle their personal documents in ways that are coupled very closely to their primary work, for instance, piles on the desk are used as reminders of things to do (Malone, 1983; Hertzum, 1993). Contrary to this, organizations typically separate document management from the primary work (Bearman and Hedstrom, 1993; Waters and Nagelhout, 1994). Document management tends to be an appendix to the primary work, not a constituent of central importance to its coordination and quality. However, a closer coupling with the primary work is suggested as a much needed, quality-ensuring revolution of governmental document management (Waters and Nagelhout, 1994), and it is asserted that current technology makes it a practical proposition to combine document management with workflow management (Butler Cox Foundation, 1989).

This study investigates the introduction of document management systems in the Danish central government which over the last 25 years has attempted to rationalize its document management. The central government institutions are under an obligation to take care that citizens on request get access to documents made or received by the institutions and to periodically hand over their closed cases to the Danish National Archives to preserve material from the public administration for future research. The

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document management systems currently in use reflect these obligations, i.e., they unfold around the recording of incoming and outgoing paper mail. Traditionally, this recording has been the responsibility of a specialized organizational unit, the document management unit, and current systems are directed toward these units. However, it is generally assumed that document management systems make it possible to delegate document management to secretaries and civil servants, an assumption vivified by the extensive closing down of specialized typing units after the introduction of text processing systems.

The purpose of this study is to describe and seek explanations for the effects of document management systems on document management practices in the Danish central government. Special attention is paid to the organizational impact of the systems and the strategies governing their introduction. The study involves case studies of two very different institutions which have recently acquired document management systems (Section 2); a historical account of the early, state subsidized efforts to provide the Danish central government with one standardized document management system (Section 3); a survey of the present use of document management systems in the central government institutions, based on a questionnaire (Section 4); and a discussion confronting the present practice with the perceived potential (Section 5).

2. Case studies

The case studies which were performed by graduate students describe the introduction and impact of document management systems in two Danish central government institutions. The first institution, studied by Gimsing and Lisberg (1993), is the Emergency Management Agency which has acquired a standard document management system to support the persons already involved in document management. The second institution, studied by Jacobsen et al. (1993), is the Work Injury Office which has a comprehensive system integrated with text processing, tailored to the institution, and accompanied by thorough organizational changes. The former case study is based on six interviews (three civil servants, two specialists in document management, and one manager), the latter on five interviews (two civil servants, two secretaries, and the head of the IT-function) and an internal report with the answers from a questionnaire on job quality.

2.1. The Emergency Management Agency

The Emergency Management Agency (EMA) makes plans and organizes activities for, among other things, the protection of the civilian population and their properties in times of such disasters as war and leaks from nuclear power plants. Previously the Civil Emergency Planning Agency and the National Fire Inspectorate dealt with most of these tasks, but they became the responsibility of EMA when it was established in January 1993 as an affiliation of the Ministry of the Interior. EMA has 140 employees divided onto 11 offices and is, as it will appear in Section 4, in many ways a typical example of how document management systems have been introduced in the Danish central government.

2.1.1. The purpose

Before the computer-based document management system was acquired, EMA had a manual system that worked well. The computer-based system was acquired to automate the manual system, facilitate retrieval, and ease the production of certain lists, for example a list with the civil servants' current cases. The system has not been accompanied by organizational changes, specifically it has affected only the document management staff. Presumably, the major reason for retaining status quo has been the widespread satisfaction with the previous manual system. Management has seen no reason to redistribute the document management tasks or add new tasks increasing the scope of document management. The persons interviewed doubt that the system has made document management more efficient; besides, the work load of one of the persons occupied with document management has increased after the system has been introduced because she acts as teacher and troubleshooter for the other users.

2.1.2. The system

The document management system, which was acquired in January 1991, is a standard version of Scanjour. Though Scanjour allows considerable tailoring of the data to be entered when a document is recorded and of the ways in which these data are validated and utilized, EMA has not requested appreciable modifications. Incoming and outgoing mail is recorded by manually extracting information such as date, sender, and receiver and either adding the document to an existing case or making it the beginning of a new one. When a new case is created it is also assigned a couple of keywords. The mail itself exists in hard copy only and is kept in case files. On this basis, cases can be identified by querying the system, and then the case file can be obtained from the civil servant currently having it or from the archive by means of the reference number. The system can also generate certain lists and be set to call attention to a case at a given date, but it is not integrated with other systems, and the possibility of having several programs resident simultaneously and jump back and forth between them is not utilized. Thus, to access the document management system while writing a letter the text processing system must be closed down and the document management system started, used, and closed down, before the text processing system can be restarted and work resumed.

2.1.3. Work practice

EMA has no specialized document management unit, instead each office employs a person in charge of document management. Several civil servants believe that document management would become more efficient and of higher quality if a specialized document management unit was established. The document management staff fears that a specialized unit would isolate them from the rest of the institution and thereby degrade their jobs. Currently, all but one of these persons perform other tasks besides document management.

The document management staff receives incoming mail and forwards it to the head of the office who decides whether it belongs to an existing case or gives rise to a new one. Then it is handed over to a civil servant. Outgoing mail is delivered to the document management staff, and they forward a copy to the head of the office who looks it over to maintain awareness and spot shortcomings. When a case is closed it

should be marked as such in the system; however, in at least one office this has not been done during the three years the system has existed.

All civil servants have access to the system and some are interested in learning how to use it. However, as the system has been acquired to support the document management staff, only few facilities are of interest to the civil servants, primarily retrieval. The civil servants interviewed are fully aware of this but do not express wishes for additional facilities, rather one of them withdraws from the system. He cares little about the keywords and other information in the system because he maintains a personal list of his own cases in a text processing document. To obtain a case he searches this list to retrieve the reference number and then asks the document management staff for the case file.

The managers do not actively support the document management system and apparently believe that document management is done as accurately as practically possible. Especially, no one has been given authority to direct the use of the document management system, and management seems unaware that the person who has informally assumed this role is unable to get through with her directives.

In summary, EMA has succeeded in automating the previous, manual system, and it has not attempted to go further – the document management system makes up a recording system and is virtually unused as an information system. Nothing indicates that the primary work suffers from this, but it is safe to say that more could be gained from the acquired system. However, the possibilities available to EMA differ from those brought to the fore below because the nature of work is different in the second institution studied.

2.2. The Work Injury Office

The Work Injury Office (WIO) treats work injury notices, i.e., decides whether they are work injuries in the legal sense and, if so, the damages to be paid. Until July 1989 WIO was part of the National Social Security Office, but as the number of work injuries increased rapidly through the 1980s it was decided to assign this area its own office. WIO is affiliated to the Ministry of Social Affairs, it has 230 employees and receives more than 40,000 work injury notices a year.

2.2.1. The purpose

Previously, WIO had a functionally divided work organization where the cases were passed from person to person an average of 64 times before completion. This work organization was a tremendous bottleneck and necessitated a specialized unit where 20–25 persons were occupied with locating lost cases (Mulvad, 1994). On one occasion a single work injury notice gave rise to two cases running in parallel but resulting in different outcomes, an incident that brought WIO into the limelight of the press. In addition, WIO was within an ace of being privatized. Thus, from management's point of view the document management system has been a vehicle for utterly needed, thorough organizational changes with the main effect of reducing both the vertical and the horizontal division of labour. To achieve this WIO has consciously utilized that masses of notices are treated in a fairly standardized way, though with individual outcomes. This resemblance with mass production has motivated the development of a comprehensive system intended to be the pivot around which work

unfolds. The document management system should enable each civil servant to handle all aspects of all cases and each secretary to perform all secretarial tasks. A major consequence of this intention has been to close down both the document management unit and the typing unit employing 30–35 typists.

In 1985 WIO acquired its first document management system, SJS, to support the document management unit. However, SJS did not meet the demands of WIO and within a year a working group was established to lay down the demands for the present system. The introduction of this new system was divided into two stages: in February 1991 the system, a version of Scanjour, was installed and taken into use by the document management unit. In October 1992 the organizational changes were carried through, after WIO had spent a year and a half extending Scanjour and tailoring it to the institution.

2.2.2. The system

When a work injury notice arrives it is assigned a reference number, a case is created, and several fields of information are manually extracted from the notice and recorded, for instance the injured person's civil registration number, employer, and insurance company. From this point on the system keeps track of the treatment and status of the case. Subsequent incoming mail is added to the case by being recorded in the system and physically placed in the case file. To avoid typing of the lengthy reference numbers, the case file has a bar code containing it. When mail arrives the corresponding case file is retrieved, the bar code is read with an electronic scanner, and the new document is recorded as part of the case.

Outgoing mail is based on standard letters generated automatically from prewritten text and the case-specific information recorded in the document management system. Approximately 6000 standard letters have been set up to cover all situations arising during the treatment of the cases, for instance asking for various kinds of information and announcing the decisions. When a letter is generated the system presents a list with the information obtained from the document management system and inserted into the letter. At this point the letter can be printed directly or brought up in a text processing system for adjustments. Frequently, the same letter is to be sent to several receivers, for instance the injured person as well as his or her insurance company. This is achieved simply by requesting that the insurance company receives a copy. The system automatically retrieves the name and address of the insurance company, inserts these data into the receiver field of the letter in place of those of the injured person, and prints a second copy of the letter. To avoid trouble caused by people moving, addresses are not stored in the system but obtained from the Central Population Register when needed.

2.2.3. Work practice

The secretaries' work involves constant use of the document management system; it is not uncommon that a secretary spends five hours a day in front of the screen. In several cases, this is reflected in the organization of their desks: two piles dominate; one to the left of the screen with documents awaiting processing, and one to the right of the screen with the processed documents. The secretaries mostly record documents, prepare the physical case files, and, under the civil servants' supervision, adjust standard letters to gather information about the cases. For some secretaries this is a

richer job than the one they had before, for others it is a more limited one.

The civil servants, usually, need the case file with the physical documents when working on a case. If the information needed to settle a case is not present when they take it up for treatment, the case file is returned to the secretary with a request to obtain the missing information. Otherwise, the civil servant settles the case. It is on this occasion the civil servants use the system, for retrieval of various kinds of information pertinent to the cases and for writing the decisions. When a notice is rejected, WIO is under an obligation to provide grounds for the rejection. To support this the system includes a library of standard grounds that may be used directly or tailored to the specific case. When a notice is acknowledged, a module in the system allows the civil servant to calculate the damages to be paid. Previously, this calculation was the responsibility of a specialized unit.

The managers use the system to locate bottlenecks in the institution and to measure the productivity of the departments, in terms of number of cases closed. Thus, the system is used actively as a managerial tool. Recently, this side of the system has been reinforced by the introduction of a bonus to the departments with the highest productivity.

In summary, the work in WIO has been transformed. The routine parts of work have been automated to the point where they can be performed by secretaries and civil servants rather than by specialized units, and more resources have become available for the individual treatment of the cases. As a consequence the number of civil servants has increased by 10%, while the secretarial staff has been reduced correspondingly (Mulvad, 1994). In general, the attitude toward the system is positive, but the organizational changes with their collective effect of removing the experts seem to be much criticized. Some civil servants claim that the expertise has disappeared with the experts – everybody knows a little about everything, but that is not always enough. Despite the critique the system has succeeded, both in serving as a vehicle for the reorganization of WIO and in improving the efficiency and quality of document management.

3. The history

In 1968 the Council of Administration issued guidelines (Administrationsrådet, 1968) that drew attention to the document management of the Danish central government and suggested a rationalization of it. The explicitly stated motivation was that though the number of documents had multiplied since Denmark became a democracy in 1849, document management practice was essentially unchanged. It was estimated that 10% of the administrative staff in the central government institutions were occupied with document management. Though the guidelines do not mention computers with a single word, the subsequent efforts to support document management with computers had the guidelines as their point of origin.

It was not until June 1975 that the possibility of computer support for document management was considered worthy of investigation. The initiative came from the two main actors in the early computerization of the Danish central government, the Ministry of Finance represented by the Department of Administration (the successor of the Council of Administration) and the publicly owned software house Datacen-

tralen. A steering committee was established with three representatives from the Department of Administration, two from Datacentralen, and one from the Danish National Archives which must approve document management systems before they may be used in the public administration. In their report these persons summarize the main purposes of computer-based document management systems (Administrationsdepartementet and Datacentralen, 1978):

- to ensure improved quality in the treatment of the cases through improved possibilities for procuring relevant information on ongoing and resting cases;
- to ensure faster treatment of the cases and thereby reduce waiting time and accumulation of cases;
- to ensure better managerial control with case progress and thereby a better utilization of resources;
- to save working hours for civil servants as well as document management staff through reduced searching times, elimination of supporting registers, production of statistics etc.'

The idea underlying the initiative of the Department of Administration and Datacentralen was to develop a document management system for the typical central government institution. During the initial phase of the project this led to a narrow understanding of document management in the sense that it was taken to be independent of the peculiarities of the institutions. On this basis the subsequent analysis phase which involved studies in three central government institutions confirmed the standard nature of document management. Then a prototype was developed and field tested in a division of the Ministry of Education for four months in 1977. This test resulted in a number of suggestions for major modifications but also demonstrated notable advantages of computer-supported document management, for example that documents need only be registered once, rather than in every register providing access to the documents. The advantages were estimated to amount to a 20–30% reduction in the time spent on document management (Administrationsdepartementet and Datacentralen, 1978).

In October 1978 Datacentralen issued a description (Datacentralen, 1978) of the final, though not yet developed, system. As part of an arrangement to support the Danish industry, Datacentralen should implement the system on hardware from the Danish manufacturer Regnecentralen (Lindgreen, 1982). In March 1980 the Department of Administration issued a circular (Administrationsdepartementet, 1980) in which the expenses to acquire the necessary Regnecentralen minicomputer and the system itself were estimated to 750,000–1,500,000 DKK (£87,000–174,000). The system was named SJS (an abbreviation of both 'the Standard Journalization System' and 'the State's Journalization System'), and the circular gave this name weight by stating that:

'In order to advance a desirable standardization of the document management of the central government it is at the same time requested that introduction of computer-based document management in central government institutions takes place only after preceding approval by the Department of Administration.'

This, in effect, made SJS the only document management system available to the central government institutions. Furthermore, the circular announced that the Department of Administration had been granted 8 million DKK (£926,000) to buy document management systems to institutions interested. The following year, 1981, additional

13.2 million DKK (£1,527,000) were granted, and this way 12 institutions got SJS free of charge (Hjorth and Tørring, 1989).

To begin with, SJS was offered to five institutions selected by the Department of Administration based on their displayed interest in SJS and certain factors concerning the size and nature of their document management units (Christensen and Stald, 1982). SJS was scheduled to be operational in these institutions by January 1981, but this deadline was only met in two institutions; in the three others it was exceeded by a full year. On initiative from the Department of Administration a technology assessment project conducted by the Copenhagen Business School was performed in the five institutions (Clausen et al., 1981). While the Department of the Budget was content with SJS and the way it was introduced (Finansministeriet, 1984), the general outcome of the project was harsh criticism (see for example IFA, 1983).

Later SJS was ported to more common hardware but it never got into widespread use, and in the mid-1980s the Department of Administration stopped the direct support of it. At this time other document management systems had been developed and started to appear in central government institutions.

4. The situation today

The present computer support for document management in the Danish central government has been assessed through a questionnaire submitted to all central government institutions with chiefly administrative functions. These 141 institutions include the ministries and many of their subordinate institutions but exclude institutions with a chiefly performing function, e.g., research and educational institutions. The questionnaire and a reminder to the institutions exceeding the initial deadline were submitted in autumn 1993. In response, 119 institutions (84%) completed and returned the questionnaire. Afterwards the size of the institutions was obtained from the Budget (Finansministeriet, 1993; and, in a few cases, Finansministeriet, 1991), and the institutions were split into three categories: small institutions with less than 10 man-years; medium institutions with between 10 and 100 man-years; and large institutions with more than 100 man-years. In total over 20,000 man-years are assigned to the responding institutions.

The questionnaires evidence that computer support for document management is a rather recent phenomenon, see Figure 1. At the end of 1993, 84 institutions had a document management system and 35 institutions managed their documents manually. Though the first system was acquired in 1978 by the Fiscal High Court, it was not until 1990 document management systems got into widespread use in the Danish central government.

Figure 1 shows when the institutions turned from manual to computer-supported document management. Most institutions have had the same document management system since then, but 18 institutions have replaced it with a second one from another manufacturer. The replacements began around 1990 and have, thus, coincided with the increasing number of institutions acquiring their first system. In 13 cases the replaced system has been SJS. From the outset, SJS was intended to be the only document management system in the Danish central government, but it never achieved this position. Today, 15 different systems are in use, and nine institutions

Number of institutions introducing
document management systems

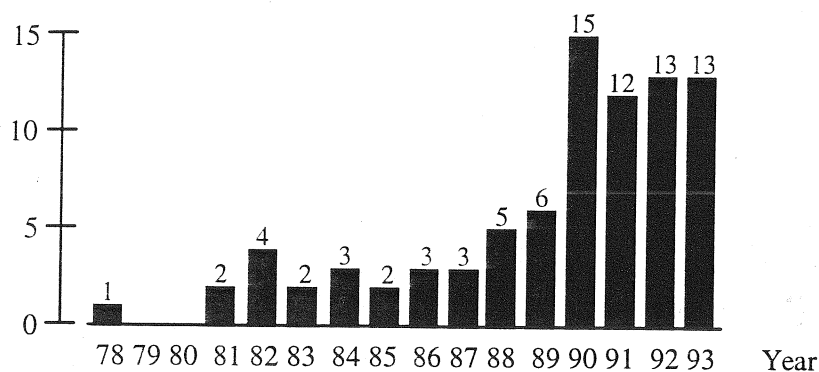


Figure 1. Introduction of computer support for document management

Table 1
Systems in use

Number	System	Made in	Running on
35	Scanjour	Denmark	mini
9	developed internally	Denmark	mini/micro
9	SJS	Denmark	mini
5	Cubus	Denmark	mini/micro
5	DDE-journal	Denmark	mini
5	ND-journal	Norway	mini
3	Jourlog	Denmark	mini
2	BRS/Search + BRS/Jour	USA + Denmark	mini
2	DSI-system	Denmark	micro
2	FICS-journal	Denmark	micro
2	Nord Partner	Denmark	mini
1	Filemaker Pro	USA	micro
1	Navigator	Denmark	micro
1	Omega	Denmark	mini
1	Softsolutions	USA	micro
1	Statsjournal	Denmark	mini
84	Total		

have developed their own system internally, see Table 1. Apparently, the needs, preferences, and economic resources of the institutions differ to an extent far beyond the capabilities of one system. But at the same time one system predominates. Scanjour has, together with Cubus which is a version of Scanjour sold by Datacentralen, 48% of the market.

Like most of the other systems, Scanjour is made in Denmark. Probably, a major reason for the very high ratio of Danish systems is that their manufacturers take the Danish legislation into account and guarantee that document management with their

system fulfills the requirements of the Danish National Archives. For example, it is required that the systems distinguish and support two levels of abstraction, one concerning the actual documents and one concerning the cases to which the documents pertain. Another property shared by most of the systems is that they run on minicomputers and cost accordingly. The average price of the systems is 343,902 DKK (£39,800); however, only 48% of the institutions have reported the price of their system.

The choice of document management system is somewhat affected by the size of the institution, for instance Scanjour's dominance increases with the size of the institution. But except for the systems used in one institution only, no system is used exclusively in institutions from the same size category. The size of the institution has much larger impact on the time of acquisition, see Figure 2. In the large institutions computer support for document management became an issue in the 1980s; in the small and medium institutions this did not happen until approximately a decade later. One explanation for this could be that the need for document management tools increases with the number of people cooperating and the number of cases treated. Another explanation could be that the document management systems available have been biased toward the needs and characteristics of large institutions.

Two-thirds of the institutions returning the questionnaire have a specialized docu-

Number of institutions introducing document management systems

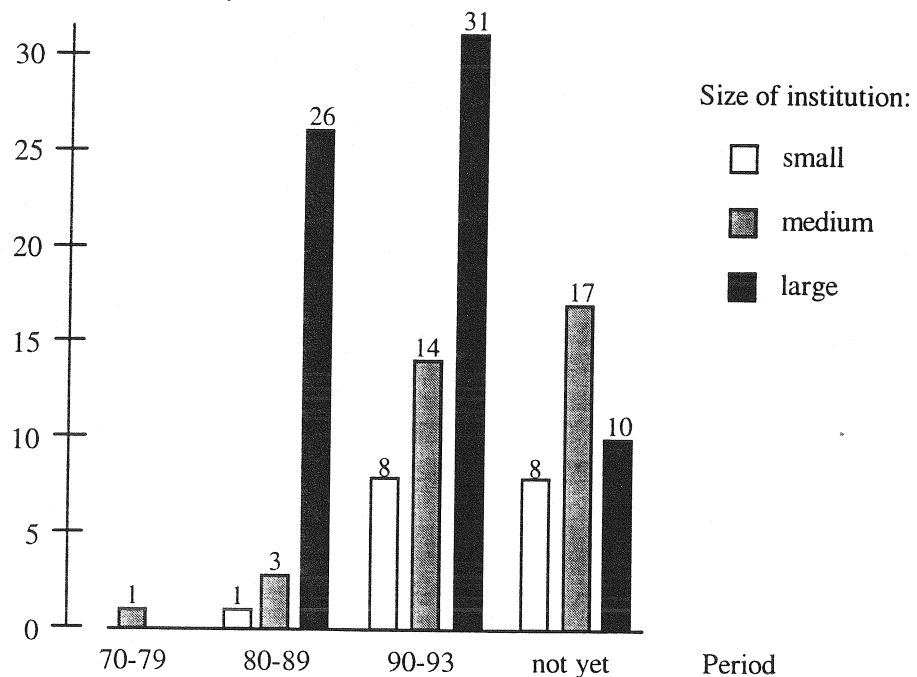


Figure 2. Introduction of computer support for document management, distributed on period and size of institution

ment management unit, and this ratio increases strongly with the size of the institution, see Table 2. The presence of a specialized document management unit does not necessarily imply a complete separation of document management from the primary work, i.e., part of document management may still be the responsibility of secretaries or civil servants. However, it does imply that document management is regarded as a special activity and that certain persons are occupied exclusively with document management. Document management systems are more widespread among institutions with specialized document management units, 78% of these institutions have a system whereas the figure is 58% in institutions without such a unit.

In 68% of the institutions, the document management system has been introduced without accompanying organizational changes, see Table 3. In the small institutions, it tends to be the secretaries who are in charge of document management, and the system has not changed this situation appreciably. In the medium and large institutions, some organizational changes have been carried out though the majority of the institutions have refrained from it, especially most institutions have retained their specialized document management unit. The most frequent combination of organizational change and specialized document management unit is absence of changes combined with presence of a specialized unit. This combination occurs in 43 out of 84 cases.

The cases in which organizational changes have accompanied the systems are summarized in Table 4. Five institutions have established specialized document management units to handle incoming mail and the creation and closing of cases. The remaining 22 institutions have delegated all or part of document management, primarily retrieval and the recording of outgoing mail, to secretaries and civil servants. The organizational change most frequently reported is to provide the civil servants with the possibility to retrieve data from the system. This change is of a potential,

Table 2

Presence or absence of a specialized document management unit (two institutions, a small and a medium, have not given this information)

Specialized document management unit	Size of institution			Total
	small	medium	large	
yes	3	23	53	79
no	13	11	14	38
Total	16	34	67	117

Table 3

Organizational change in connection with acquisition of document management system

Organizational change	Size of institution			Total
	small	medium	large	
yes	0	9	18	27
no	9	9	39	57
Total	9	18	57	84

Table 4
The organizational changes carried out

Number	Organizational change
5	the document management unit has been established
3	has been closed down
2	has been reduced
1	the secretaries handle creation of cases
1	record incoming mail
2	record outgoing mail
8	the civil servants can retrieve data from the system
2	are responsible for retrieval
2	record their outgoing mail
1	record case transference
27	Total

rather than an actual, nature and illustrates the pace with which changes must often be performed when they concern the work of civil servants or other professionals. Only two institutions report that retrieval has become the civil servants' business. The secretaries can be involved in all parts of document management, but nevertheless the organizational changes have affected this group the least.

5. Discussion

5.1. Perceived potential and present practice

Below it is argued that there is a gap between the perceived potential of document management systems and the present practice of the Danish central government. Quoting a large, empirical study of US local government it is found that '*the expected payoffs from automation have been slow to be realized*' (Northrop et al., 1990).

5.1.1. Related work

The organizational impact of computing is widely discussed (see for example Atwell and Rule, 1984; Kraemer and King, 1986). Previous research have claimed (1) that computerization causes centralization, (2) that computerization causes decentralization, (3) that there is no inherent relationship between computerization and organizational change, and (4) that computerization reflects and reinforces existing structures (George and King, 1991). Part of the reason for these incongruities is that a large number of studies fail to distinguish between decentralization, i.e., distribution of authority, and delegation, i.e., distribution of tasks. By standardizing, e.g., work processes information systems may enable management to both centralize and delegate. With respect to the organizational impact of document management systems, the

literature is dominated by two recurrent scenarios:

- *The electronically communicating organization.* As local area networks proliferate and document management systems are integrated with text processing, the civil servants get online access to vast amounts of recorded information and filing is reduced to little more than a by-product of document creation. This development is often labelled decentralization and accompanied by the assumption that the specialized document management units will be closed down, just as most specialized typing units have been. Instead, document management will become the responsibility of secretaries and civil servants. (See for example Bikson and Frinking, 1993).
- *The electronically coordinating organization.* Document management converges toward workflow management when it is supplemented with facilities for document routing and for monitoring document movement. If the potential for workflow management is exploited, document management systems turn into strategic applications capable of significantly improving productivity by eliminating overhead time spent on coordinating cooperative work. This way document management systems will extend into systems for managing the business processes of which the documents are part. (See for example Butler Cox Foundation, 1989; Davenport and Short, 1990).

In records management it has been proposed that low compliance with existing rules and regulations stems from records management requirements not linking up with the business processes they are supposed to support. Further, it has been proposed that if records management was brought into line with the critical business processes it would probably be unnecessary to enforce compliance since compliance would be beneficial to those involved in the business processes (Waters and Nagelhout, 1994). Since records management and document management are closely coupled in public institutions these proposals contribute to the orientation of document management toward the management of business processes.

Counter to the two scenarios above, numerous empirical studies find that information systems have at best been used to hasten work, not to change it. One reason for this is that in terms of the distribution of power and privileges, information systems have turned out to be powerful means for reinforcing status quo (George and King, 1991; Kraemer, 1991). Thus, those who gain from the introduction of information systems are those already in possession of power and privileges. Another reason for the absence of change is that the strategy governing the introduction of most information systems consists in developing each functional area independently as it becomes possible and desirable to do so (King and Kraemer, 1991). This strategy, known as functional automation, is simple and rather inexpensive but tends to result in a number of incompatible systems that do not produce administrative and managerial benefits. In the literature such benefits are generally considered dependent upon the development and exploitation of a computer infrastructure that cut across functional areas, however strategies with an organization-wide focus are more expensive and more difficult to manage (King and Kraemer, 1991).

Regarding document management systems, Butler Cox Foundation (1989) offers an explanation for the dominance of functional automation by drawing a parallel to the introduction of text processing systems. In the early days of text processing, many

text processing systems were installed by line managers because the computer departments did not consider text processing as part of their brief. Today, many document management systems are acquired by line managers because computer departments consider the management of paper documents as being outside their area of responsibility. However, the need to make text processing an integral element of the overall systems strategy has now been recognized, and problems have often been encountered.

5.1.2. State of affairs in the Danish central government

In the Danish central government efforts to rationalize document management were initiated in 1968, and since 1975 computer-based document management systems have been central to these efforts. The wider potential of the systems has been discussed at least since Datacentralen announced its vision about 'The Administrative Office of the Future', see Flindt (1981) for a description, but throughout the development of SJS, document management was perceived as an isolated activity, probably in an attempt to catch the common aspects across many institutions. By the end of 1993, more than ten years later, 94% of the central government institutions have installed microcomputer networks (Finansministeriet, 1994), but document management practice is still in sharp contrast to both of the scenarios above:

- Only a couple of institutions file outgoing mail electronically, and scanning of incoming mail is hardly found at all, i.e., document management is management of paper documents.
- More than half of the different document management systems in use do not provide integration with text processing, and the systems that do are mainly the microcomputer-based ones acquired by only a couple of institutions. Thus, most institutions have not integrated document management with text processing.
- Only a few institutions have closed down their document management unit. It is the exception, rather than the rule, that the civil servants search the document management system themselves.
- WIO is the only institution in which management uses the document management system to coordinate and monitor work.

In general, the organizational changes that have accompanied the introduction of document management systems in the Danish central government accord with those found in previous empirical studies of information systems (for example Robey, 1981; Northrop et al., 1990). The organizational impact has been limited and biased toward centralized control:

First, the most frequent organizational impact of document management systems is absence of organizational change. This is the case in 57 of the 84 institutions that have acquired a document management system. With EMA as one example, the acquisition has been considered an event affecting only the document management staff. The system is primarily seen as a recording system without implications for the distribution of tasks and power, and it is only to a small extent seen as an information system of value to civil servants and management. Three of four institutions following this strategy, which is clearly that of functional automation, maintain a specialized document management unit. In most cases, the organizational changes performed in the remaining institutions are by-products of functional automation, not evidence of a

different strategy.

Second, the institutions delegating all or part of their document management mostly maintain centralized control over the core of it. In 22 of the 84 institutions with a document management system, it has been accompanied by delegation of certain document management tasks to secretaries or civil servants. However, the document management unit has only been closed down in three of the 16 institutions that had one prior to the acquisition of the system. Thus, more than half of the institutions that delegate part of their document management (13 of 22) maintain centralized control through a specialized unit. WIO is one of the institutions without a document management unit and illustrates that even fully delegated document management need not be the same as decentralized document management. This is apparent from management's use of the system for managing workflow, measuring productivity, and awarding bonuses.

Third, several institutions take explicit action to centralize document management. In five of the 84 institutions with a document management system, it has been accompanied by the establishment of a specialized document management unit. Thus, the number of institutions that have established a document management unit more than equals the number of institutions in which the document management system has been seen as the opportunity to close down such a unit.

The prevailing tendency has three characteristics: First, document management is concerned with documents, not business processes. Quoting Bearman and Hedstrom (1993), '[...] existing archival methods have as their object records that have been created rather than functions and activities that need to be documented'. Second, the institutions maintain centralized control over the core of document management, i.e., the filing activities. Third, to the extent that anything is changed, the institutions delegate a number of the activities involved in utilizing the recorded information, e.g., retrieval.

5.2. Explanations

The evolution, adoption, and exploitation of document management systems has turned out to be a lengthy process. Below it is argued that from the point of view of the day-to-day work this is hardly surprising and that more strategic considerations have seldom affected the process significantly.

5.2.1. Change and the day-to-day work

The relationship between people, tools, and tasks is central to understanding the current work setting and the difficulties involved in transcending and rethinking it given new possibilities. As pointed out by Naur (1965) either of the three elements people, tools, and tasks can be understood only in the context provided by the two others. Tasks exist only insofar as they are recognized by people and only relative to understood tools. Thus, knowledge about new tools may lead to a new perception of the tasks and lack of this knowledge precludes the new perception. At the same time, tools exist only insofar as they are recognized by people and only relative to understood tasks. Thus, people's current work setting constitutes a perspective that directs their attention to certain tools and makes them blind toward the potential of others. This means that the acquisition and organizational exploitation of tools such as

document management systems is set apart from the day-to-day work by at least two requirements:

- *Visions.* Visions do not stem from the current work setting but from the ability to see beyond it, an ability which requires the mutual presence of knowledge about the technological possibilities and the task domain. Often, management lacks knowledge about the technological possibilities and is blamed for being insufficiently attentive (see for example Fletcher, 1990; Kraemer, 1991). On the other hand, system manufacturers often lack knowledge about the task domain and, therefore, market systems and visions that fail to convince potential customers.
- *An extraordinary effort.* In the short term the acquisition and organizational implementation of document management systems is rich in expenses, which must be defrayed concurrently with the day-to-day work and often in spite of budget cuts and growing numbers of cases. WIO illustrates that a large investment is required to obtain the benefits, a finding supported by Butler Cox Foundation (1989). The greater part of this investment has been the manpower spent on tailoring the acquired system to the specific needs of WIO.

5.2.2. *Influential factors external to the institutions*

The introduction of document management systems in the central government institutions is an interplay between, on the one hand, externally given possibilities and constraints and, on the other hand, factors internal to the institutions. The external factors include for example appropriations, legal obligations, and available technologies. The internal factors are discussed in the following section.

First, in WIO and EMA the external factors seem to combine into one paramount condition: the absence or presence of an urgent necessity to do something. In EMA such a condition has been absent and management has refrained from spending a lot of resources on computerization. As in the majority of the central government institutions, the net effect has been dominated by the preservation of status quo. In WIO status quo was not an option because locating lost cases was a major undertaking, because WIO came into the limelight of the press, and because privatization was in the offing. The management of WIO succeeded in implementing a comprehensive document management system around which the institution has been transformed. In this sense both EMA and WIO have provided rational responses to the external factors.

Second, the replacement of electronic documents for their paper originals is currently inhibited by the legal obligations under which document management takes place in the central government. This external factor reduces the incentive of the central government institutions to file their documents electronically. When the institutions hand over their closed cases to the Danish National Archives, the documents must be in hard copy (Finansministeriet, 1994). The reason for this requirement is that the Danish National Archives is reluctant to guarantee that it will be able to either provide access to electronic documents in all sorts of formats or convert the documents to a common format. The National Archives in other countries are faced with similar considerations. For example, the German National Archives are also reluctant to accept electronic records; in The Netherlands a policy for electronic

records is in preparation; and in Sweden and the United States the National Archives receive electronic records (Bikson and Frinking, 1993).

5.2.3. Influential factors internal to the institutions

Three internal factors seem to dominate: the nature of the institution's task, the distribution of power within the institution, and the synergism with text processing.

The nature of work. With respect to the nature of work WIO and EMA are very different. Work in WIO consists in reaching decisions in masses of concrete cases. A task of this nature can be characterized as transaction-based (Butler Cox Foundation, 1989), operational (Bikson and Frinking, 1993), and procedural (Abbott and Sarin, 1994), characteristics that are generally taken to imply that the benefits of document and workflow management are easier to obtain. Work in EMA is more abstract and better characterized as planning or policy formation. To a certain extent, the patterns of access to the recorded information are unpredictable, because they are dependent on changing circumstances over long periods of time. In institutions with these characteristics it is less obvious how much document and workflow management has to offer.

Through full managerial support and resource-demanding extensions of the acquired system WIO has, presumably as the only institution, achieved quality and efficiency gains comparable to the 20–30% estimated during the development of SJS. WIO has successfully incorporated certain ideas from mass production into the treatment of individually different cases. The nucleus of mass production is standardization of work processes, often to the point of automation. WIO has automated selected functions, e.g., the calculation of damages, but the essential achievement has been to standardize the way work is coordinated. All work on a case is registered in the document management system in the form of incoming or outgoing mail, and this way the system clearly indicates who is responsible for taking the next step toward completion of the case, for example whether it awaits external action or a civil servant's attendance. However, the lesson to be learned from WIO also concerns visions: If one could take a look at the old WIO, to what extent would the document management system of the new WIO seem applicable?

In institutions more similar to EMA than to WIO, managers who consider the potential of document and workflow management have few well-documented examples to learn from. One example concerns the support for interpersonal cooperation in the German federal and state governments, whose ministries are distributed geographically between Bonn and Berlin (Hoschka et al., 1994). Workflow management is supported by means of electronic circulation lists attached to the case folders. Thus, a case folder contains a circulation list, essentially a list of the recipients of the case folder, and the documents pertaining to the case. The circulation list specifies the path that the case takes on its way through the organization. Some cases pass through the organization in standardized ways that can be laid down in circulation lists whose contents are predefined and editable only in a limited manner. Other cases require circulation lists that permit redirection by users after the initial, possibly partial, path has been defined. In EMA, recurrent parts of document management follow predefined patterns. A facility to compose circulation lists from procedures specifying such patterns would help ensure that cases pass through the institution as intended, for example that incoming mail and a copy of outgoing mail is forwarded to the head of

the office after being recorded in the document management system.

The distribution of power. Besides the organizational purposes, document management is also a way to procure and exercise power. On the one hand, the predominant balance of power has been reinforced: Management typically holds an easily identifiable unit responsible for performing the document management activities; the civil servants get access to powerful tools the use of which is voluntary; and the actual work is delegated to persons not in a position to refuse. Quality is ensured by employing specialists in document management and by a clear separation of responsibilities. On the other hand, it is also characteristic of the present practice that management has largely refrained from exploiting the new possibilities brought about by document management systems. In the absence of managerial directions the persons directly affected by the systems have tried to use them to consolidate their position. Usually, these persons have been assembled in document management units which they have sought to preserve.

It seems as if managers and document management staff agree on keeping changes at a minimum, a finding which complies with the general observation that tools with a potential to accomplish changes are often used to maintain status quo (Feldman and March, 1981; George and King, 1991). An additional reason for maintaining the document management units might be that document management is linked – mentally as well as physically – to the archive which is most conveniently centralized as long as the documents are in hard copy.

The currently used document management systems reflect an institutional perspective on document management. Documents are recorded to make their retrieval independent of individual employees, to remain accessible over extended periods of time, and – if combined with workflow management – to support the coordination and control of cooperative work. For the civil servants a central document management activity is their handling of the documents they currently use and keep in their offices. This activity is woven into their primary work and seems to constitute a personal perspective on document management, a perspective which is not supported by current systems. While the current systems have been developed with the document management staff in mind and facilities for workflow management are managerial tools, the needs specific to the civil servants are apparently not addressed.

The synergism with text processing. The widespread use of document management systems in the early 1990s seems to be spurred by a considerable increase in the adoption of text processing during the preceding years. From 1986 to 1990 the number of central government employees with a computer or terminal at their personal workplace more than quadrupled, and in 1990 approximately 45% of the computer power of central government was used for text processing (Finansministeriet, 1991). Separate figures for the civil servants are not available, but it stands to reason that the introduction of computers into the civil servants' offices has first and foremost been a massive introduction of text processing. The adoption of text processing has established a computer infrastructure where document management systems can be made directly available to the civil servants, a possibility which has increased the interest in document management systems. Also, it is through the text processing system that the document management system of WIO becomes an active part of the civil servants' and secretaries' handling of their cases. Thus, though few institutions have document management systems that provide integration with text processing, text processing

contributes to a conception of document management that extends beyond functional automation and into the primary work of the civil servants.

5.3. Toward generic document management systems

In the period from the early 1960s to the early 1970s the computerization of the Danish central government was controlled by the Department of Administration (including its predecessors) in close cooperation with Datacentralen. The administrative philosophy was characterized by a predominant belief in the virtues of centralization and overall planning (Administrationsdepartementet, 1982; Frøkjær and Korsbæk, 1992). Though developed in 1975–1981, SJS continued this philosophy. SJS was intended to be the first and founding system in a computer environment where numerous, independent systems were made available to the users through a common access mechanism (Lindgreen, 1982). Datacentralen had obvious commercial interests in getting this initial stage of their vision implemented in many institutions. To ensure the essential broad applicability of SJS it was from the outset perceived as a generic system, i.e., a system prepared to meet the needs of different customers through tailoring. However, it soon turned into a standard system where any change had to be made from scratch through modifications of the source code (Lindgreen, 1982). The inadequacy of the standard systems approach was highlighted by SJS being one year late in three of the five institutions where it was initially installed, even though these institutions were selected because the organization of their document management seemed to fit SJS. Further evidence against the standard systems approach is provided by the profound differences between EMA and WIO in terms of the nature and organization of their document management.

It is somewhat ironic that leaving the development of document management systems to the market has brought about a de facto standard, namely Scanjour, that could not be achieved through planning and economic support. The development of Scanjour started in 1983 in cooperation with the first customer (Scanjour, 1992). Since then a total of eight versions have been developed, all implementing the same system concept but on different operating systems and with different development tools. Each new version has been developed on demand from a customer, but with the overriding ambition of making the Scanjour system concept available on a still broader range of platforms. Many customers have demanded capabilities that required extensions of the system concept. In general, these demands have been approached by abstracting away their customer-specific elements, implementing the resulting, generalized extension, and setting this extension up to match the specific customer's needs. Afterwards the extension is intended to spread to the other versions and, thereby, become an extension of the entire system concept, but this is often too resource-demanding.

Scanjour has replaced the standard systems approach of SJS by a generic systems strategy where the customers have participated throughout. Generic systems have received increasing attention lately as an attractive intermediate between standard and tailor-made systems (see for example Bansler and Havn, 1994). Advantages of generic systems include that large portions of analysis, design, coding, and debugging are done only once; that potential customers can visit organizations where the system is already in operation; and that generic systems lend themselves to a prototyping

approach to realizing and meeting customer needs. The disadvantages include a risk that the generic system frames too strongly the customer's thinking about what is needed and a response time overhead due to the more general-purpose solutions utilized to achieve flexibility.

Though large, international software firms seem suited for developing generic systems, only one is represented in the Danish central government with a generic document management system, namely Novell/Wordperfect which owns Softsolutions. Part of the reason for this is that most organization-wide applications in the central government institutions run on minicomputers, an area where tailor-made solutions are much more dominating than in the microcomputer area. However, networks of microcomputers have become commonplace and sometimes replace larger computers, especially in small institutions. Thus, there is an increasing need for document management systems accessible from microcomputers either by being microcomputer applications or by having microcomputer clients coupled with larger servers. The current price of document management systems, 343,902 DKK (£39,800) on the average, seems to make generic microcomputer and client-server solutions an attractive application area.

6. Conclusion

In the Danish central government efforts to rationalize document management have been in progress for 25 years. However, only one third of the acquired document management systems have been accompanied by organizational changes. A number of institutions have delegated some of the activities involved in utilizing the recorded information, but to ensure quality specialized units are usually in charge of the filing activities. Most document management systems are merely used as recording systems acquired to support the document management staff rather than perceived as tools to support work in general. The difficulties of principally rethinking the nature of document management given new possibilities recur in the manufacturers' efforts, from the standard system conceived by the Department of Administration and Datacentralen to the functionality of the currently used systems.

The size of the institutions has significantly affected when document management systems have been acquired. Until 1990 the systems were in effect limited to the large institutions; four years later more than two thirds of the central government institutions had such a system. However, it is the nature of the work and the necessity of radical changes that appear to be the dominant characteristics of the institution that exploits the potential of document management systems to the greatest extent. Work in WIO (the Work Injury Office) consists in reaching decisions in masses of concrete cases, and it has been transformed by workflow management facilities incorporating certain ideas from mass production. But rather than standardizing work processes the document management system keeps track of the status of the cases and thereby standardizes the coordination of work. The net effect has been to move resources from routine tasks to the treatment of the individual cases; thus, rather than deskilling the employees the system has been accompanied by an increase in the number of civil servants.

Most central government institutions seem to have acquired document management

systems for some other reason than supporting their primary work. To support the creation of visions examples are needed that carefully document the experiences and results of varied institutions that have pursued more far-reaching, strategic objectives. Also, it would be a strong – and eventually inevitable – signal if the Danish National Archives start to accept electronic documents when the institutions hand over their archives. It requires an extraordinary effort to accomplish the benefits of document and workflow management. A precondition for giving priority to this effort is that it is considered more important than the insecurity of changing the present work situation and the pressure of the day-to-day work. In weighing these things against each other it might turn out to be crucial that the institutional perspective of current document management systems leaves out the civil servants' handling of the documents they currently use and keep in their offices. Thus, from the civil servants' point of view a significant part of document management is not addressed by current systems.

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