IT Systems Implementation: Research Findings from the Public Sector

Leslie P. Willcocks, *City University Business School*
Annabelle L. Mark, *South Bank Polytechnic*

Abstract: The National Health Service has embarked upon major initiatives to bring in management and financial information systems capable of relating resource usage to cost and to underpin better management and effective delivery of health care. This paper identifies a range of weaknesses and impending problem areas in implementation practice. Recent research evidence from several NHS regions is utilized to support the detailed case made for changes in how computer-based projects are developed, managed and implemented within the organization. It is suggested that the evidence and analysis would seem to have implications for all those studying, experiencing, or anticipating computerization.

Introduction

There have been a number of key initiatives in the UK National Health Service of the 1980s. A search for better information was begun by the 1982–84 Korner Reports. These tried to introduce a common framework into data sets and practices across the NHS. The Griffiths Report (NHS Management Inquiry, 1983) acted upon governmental demands for better management by proposing the appointment of general managers at every level of the NHS, from the Department of Health down to the individual unit or hospital. More recently the Resource Management Initiative (RMI) entailed a fresh generation of projects to involve doctors and nurses in using financial and other management information to achieve more efficient and effective use of resources (DHSS, 1986). Finally, in January 1989 the Government's White Paper 'Working for Patients' detailed major changes including the delegation of responsibility to more local levels, the creation of self-governing NHS hospital trusts, general practitioners becoming budget-holders, stricter audit of quality of service and value for money, and an internal market for hospital services (Department of Health, 1989). By mid-1989 all these on-going initiatives had become highly dependent upon the effective delivery of information technology (IT) to the organization.

What becomes significant in the three interrelated areas underlying these initiatives, namely information, management and information technology, is the degree to which the plans arrived at to deliver on policy decisions receive effective implementation. Frequently what are termed 'implementation problems' are in fact the results of inadequacies in policy and planning themselves. As one example in the NHS the Korner data sets being implemented through IT embody models of management and of the organization that precede, and often fail to come to terms with, post-Griffiths prescriptions and realities. While such points need to be made, however, many of the policy decisions and plans have to be lived with, and implementation practice remains an area where emergent, possibly different policies can and do develop, and where interested parties may even perceive that this should be the case. One consequence for the NHS, as in many a public sector initiative, may be that policy intentions become distorted, or lost from view altogether, on the long path to outcomes.

The central concern of this paper is to highlight (a) how IT is in danger of failing to deliver on information for managerial or much other purpose; (b) how this flows from weaknesses in general IT implementation practice in the NHS and (c) where improvements in implementation practice could be made. We utilize our own research findings from several NHS regions to support our arguments. The implementation and use of IT in the NHS could decline into a vast data collection exercise that cannot be operationalized into effective management intelligence, or be seen as relevant to patient care. The analysis that follows would seem to have considerable implications not only for researchers

and public sector managers but for all organizations anticipating or undergoing advanced technological change.

IT implementation: some emerging problems

There is already considerable evidence from outside the NHS that the main problem in implementing IT projects throughout the 1980s has been the under-estimation of the time taken to get a new installation off the ground (Kearney, 1984; Kearney, 1987; Price Waterhouse, 1987). A 1987 survey confirms this finding (Kobler Unit, 1987). It further supports Strassman's earlier North American evidence that this problem is closely followed by the difficulties of getting the original definition right for the software required, and of recruiting and retraining high quality staff (Strassman, 1985). It would be a considerable surprise if the NHS did not encounter some, if not all, of these difficulties in its own IT projects, and indeed our preliminary evidence from surveying, and interviewing some of, over 150 computer-related staff is that this is emerging strongly from IT implementation across the NHS in the late-1980s. However, the NHS has been experiencing a range of additional general problems with regard to IT implementation.

In hindsight the fast pace and substantial volume of change demanded by government from the 'management' and 'information' initiatives have in themselves created extensive IT implementation problems. Furthermore, from 1986, many interest groups within the NHS have increasingly questioned the high priority, expenditure and relevance of the IT vehicle of these two initiatives in the light of the primary activity of the NHS of delivering patient care, together with the tight budgetary constraints operating elsewhere in the service. IT is demon-strating few short-term benefits (if it ever can) and has become increasingly identified with a rush, first to 'implement Korner', and then subsequently the Resource Management Initiative as ends in them-selves. The fact that many interested parties are thus questioning the credibility of IT does not help its implementation and the achievement of managerial and information targets. It may be that, even by early 1988, the time had come in the NHS for a period of consolidation and reflection; since then, however, as signalled by the 1989 White Paper, the urgency from the centre seems to have increased, not abated. Indeed even the White Paper itself admits that its deadlines for the delivery of the IT-based Resource Management Initiative represents 'an ambitious timetable' (Department of Health, 1989, page 16, para 2.16).

One fundamental weakness in implementation practice has come from the treatment of the management and information policies as 'initiatives' and events, rather than evolutionary processes that would grow along with the organization and thus promote organizational learning on IT. There may be many reasons for this, including centrally imposed deadlines and a lack of identification with the emergent aims by some influential interest groups. However, a key influence has been the assignment of finite tasks and targets for general managers through the annual performance review and short-term programmes. Unfortunately one major outcome is that the need to deliver results short term in the NHS is cutting through more appropriate time scales and activities for IT implementation.

A further general weakness is in funding IT development and implementation. While IT has been relatively 'resource-rich' in NHS terms, IT project expenditure continually follows the NHS practice of being separated into capital and revenue. This creates inflexibilities in funding as noted by the House of Commons Social Services Committee (1988) who recommended that: 'Health authorities should have greater freedom to move resources between revenue and capital' (para. 218). In IT projects hardware, software and technical costs have tended to become subsumed under capital expenditure, but other large additional (often hidden) costs — for example proper training, and keeping and recruiting key IT staff — tend to fall under much smaller revenue budgets, and are left to be dealt with at more local levels out of existing budgets, or pass from consideration altogether.

Not surprisingly financial pressures frequently lead to neglect of these important aspects of imple-mentation. This process can be seen at work in the Resource Management Initiative. One NHS Management Board estimates the 260 hospitals affected require £114 million capital and £52 million revenue a year for seven years (Mills, 1989). However, it is not clear how any of these sums will fund training programmes and pay incentives to attract key IT, finance and medical records staff, let alone provide inducements to existing staff to carry out implementation work in addition to their normal duties. A range of further costs may present them-selves. For example, as RMI proceeds there are likely to be diverse solutions because no two hospitals organize themselves in the same way. Furthermore there has been little progress in rationalizing even manual-record structures and procedures (Clarkson, 1989). As interfaces at numerous levels are found to be incompatible, all this will inevitably increase costs. The new question then becomes whether sufficient additional funding will be made available, whether to capital or revenue,

to underwrite an effective implementation.

From the point of view of implementing information systems that are primarily management information systems, or designed to produce management information as a spin-off from other activities, all these developments produce a particularly difficult set of problems. Information creates a number of dilemmas for organizations. As Bourn (1987) argues, in the NHS not all interested parties necessarily identify with the achievement of specifically managerial objectives, and collection of data for mainly managerial purposes. Furthermore, as Willcocks and Mason (1987) show through a range of case studies, the status of IT as a resource, its creation as a social product whether by technicians, managers or other users, its cost and human resource implications and its ability to create winners and losers — these raise additional organizational problems for large-scale implementation and operation of computer-based systems.

In the NHS these factors could create a range of political issues surrounding the implementation and subsequent operation of computer-based information systems, and from our own (admittedly limited) questionnaire and interview evidence from five London districts this seems to be the case (see also the evidence from North West Thames Region discussed below). Thus the politics of computerization present a further set of implementation activities for NHS general and project managers. However while the need for such activities and related skills has often been acknowledged within the NHS, in practice the need has not always been addressed at managerial levels appropriate to the tasks, as noted for example in Körner implementation by the DHSS Bromsgrove and Redditch Health Authority (1985). This theme will receive more detailed treatment below.

Implementation in the regions

Some feel for these and other emerging problems can be given from our 1986–89 research in following through nine computer projects in one region in the south of England. This research consisted of participant observation during a three-year period, document analysis, questionnaire survey work and follow-up interviews of major participants in the processes of computerization.

For this region (see Figure 1) those responsible for computerization tended to find the strategic framework for information management being produced at national level by the NHS Information Advisory Group as inpractical, remote from, and largely irrelevant to their needs. One computer director remarked that 'it's like people who don't have council houses and you're talking about castles.' The long-term regional strategic objective was similar to that stated by many other regions during this period — to obtain comprehensive and integrated IT applications operating in districts on computers generally located in districts. However, to meet immediate information needs, the regional strategy document countenanced the immediate implementation of 'first generation' systems provided they were 'useful, reliable and pay for themselves in terms of benefits'.

Although the whole thrust of the stated regional strategy has been toward district computing — in terms of computer location, control of IT, and district determination of Regional priorities — in practice, for many reasons, IT priorities, decisions and the determination as to which systems were actually implemented have largely remained in the hands of regional bodies. A common reason for this throughout 1986 was that either general managers at District level had not been appointed or that, as recent appointees, they had enough to do without embarking on computer projects in an area of which they often had little experience. Many groups were also reluctant to contemplate the further reorganization and activity implied by computerization against a backdrop of already overstretched resources and a variety of other pressures operating at District and hospital level (see Figure 1). A further factor was considerable scepticism about the ability of new computer systems to deliver on their specific local information needs. Sometimes this scepticism derived from bitter experience with the imperfections of existing computer systems; sometimes it came, as in the case of a reliable (though eight-year-old) Patient Administration System in one hospital, from an attitude of 'better the devil you know, than the one you do not'.

At Regional level the prime movers tended to be the Scientific Officer, systems specialists, and clinicians who sat on the relevant committees. Not surprisingly the direction of computerization at hospital level tended to follow their perceptions of, and priorities in, IT needs. In following through two implementation projects in the Radiology and Pathology departments of one hospital we found very little direct involvement in systems development by future users from the departments, little training provided by the systems suppliers beyond basic instruction and hands-on experience, and systems design and delivery largely in the hands of consultant systems specialists within time-scales established by Region. One radiologist remarked that they would be better off developing a tailor-made system rather than trying to customize a

National Health Service

National policy group

● Information systems

● MIS

Regional body (RITA)

● 'Policy'

● 'Plans'

● 'Strategy'

— — — — — — — — — — — — — — — **Districts** — — — — — — — — — — — — — — —

Systems:

● Radiology

● Pathology

● PAS

● MIS and MI spinoffs

More clients

Efficiency issues

Longer waiting lists

High unionization
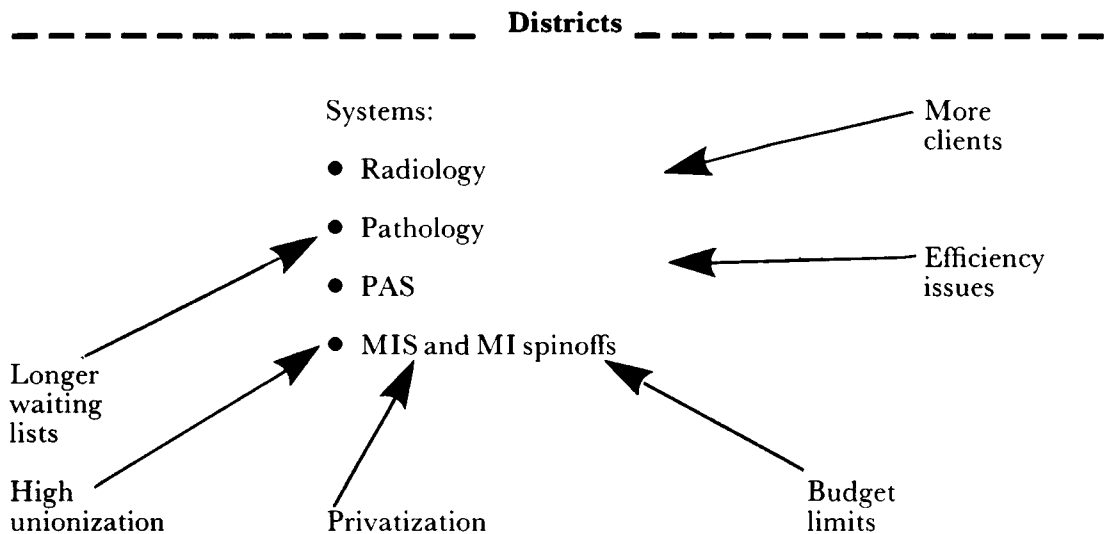
Privatization

Budget limits

Figure 1. IT from strategy to implementation.

packaged developed for a North American hospital, as was happening here. She drew a contrast between the present development and a radiology computer system, designed by radiologists and custom-built for a Glasgow hospital. It proved to be very user-oriented and, though 15 years old, was still an eminently reliable and useful system. Such a comment gives some insight into the dissatisfaction that can be engendered when one of the current Regional 'strategic' approaches become imple-

mented at local level.

One major weakness with the Regional strategy under review was that it was in reality a list of applications and computer projects. It confused strategy with applications. The true strategy questions — for example what the hardware/ software environment would look like across the region, whether there will be District mainframes, what would be run on those mainframes, which systems should be at District level and which at

Region, where the skilled IT staff would be obtained from, whether the key people should be at District or at Regional computer centres — were rarely asked
up to early 1988, let alone addressed. This weakness, driven by the rush to implement Körner, and to be seen in the mid-1980s climate to be 'doing something about IT', tended to filter through into implementing a mosaic of poorly matched IT projects being imposed upon, or partially displacing, existing, largely unrelated computer-based systems. It is upon this inheritance that further computerization, including the Resource Management Initiative, has to be built. In the face of such computer development, we often encountered in user departments at local levels within the Region a hardly surprising dissatisfaction with, puzzlement at, and scepticism about, computerization generally and also about the new initiatives emerging from the 1989 White Paper proposals.

As in other Regions, this Region only began to have a strategic vision of IT in its reference to 'second generation' comprehensive, IT applications operating and located in Districts. Interestingly, such developments are invariably posited for the 1990s rather than the 1980s. Even so, as discussed by Sweeney and Mason (1987), there is remarkable unanimity across all Regions and Districts as to the benefits of such a strategic direction, and rising awareness of the need for integrated hospital information systems (see also Faulkner et al., 1987). The question to be asked is why they have so rarely been implemented before. One reason may be lack of technical feasibility, though Sweeney and Mason (1987) probably display a more accurate picture on that score:

> The lack of development in NHS hospital computing over the last ten years has become apparent with the wide-spread implementation of patient administration systems in District General Hospitals. The systems currently being installed (between 1987–1989) are considerably less advanced than were the leading ones in the 1970s (page 102).

Goodyear (1988) and Bishop (1988) reaffirmed this continuing backwardness during 1986, at least in relation to clinical activities. Highly pertinent explanatory points emerge from our research in the Region into the lack of progress in the NHS of a technically excellent integrated hospital information system called PROMIS that has been commercially available from the late 1970s.
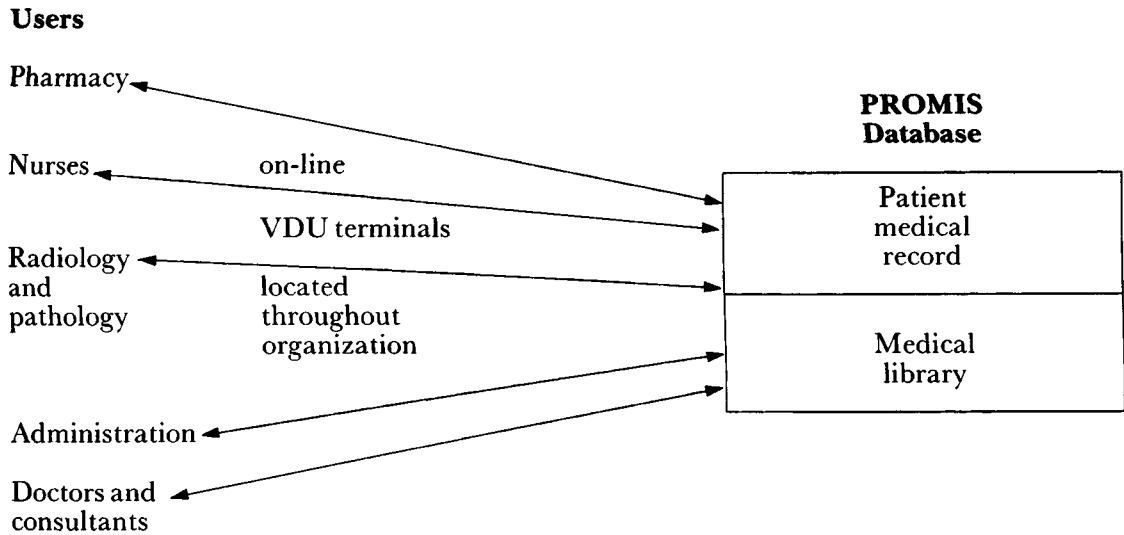
PROMIS in health care

Developed in the USA in the 1970s, PROMIS (Problem-Oriented Medical Information System) encompasses medical record, medical library and administrative functions (see Figure 2). At the centre of the system is a complete on-line computerized medical record for each patient. This can be consulted and updated using passwords from any touch-screen terminal in the hospital. A medical database can also be accessed while the user is interacting with a patient's medical record. This database includes information on medical symptoms, diagnoses and procedures that can be performed — for example laboratory tests. The system can also handle most administrative functions, including patient admissions and discharges, an internal mailing system permitting automatic ordering of treatment by other staff (e.g. drugs, X-ray), collection of charges for billing private patients, a warning system where treatment is overdue, and data presentations for ward management (e.g. to check bed availability). It can also provide management information. What remains remarkable is why such a technically proficient system has been adopted so slowly in the USA and UK.

Some reasons emerged from test trials in a US hospital in Vermont in 1976–77 (Fischer et al., 1980). Here nurses welcomed the system as providing more patient information, and expanding their professional discretion and ability to intervene without physician approval. The system provided full patient records to pharmacists, who could now check prescribed drugs and quantity for correctness against patient symptoms and history, and to radiologists who thus found opportunities for involvement in diagnosis greatly enhanced. Hospital physicians were the one major group to oppose PROMIS, arguing that it was more time-consuming than manual systems, compromised patient care, and disrupted existing staff relations.

In fact PROMIS threatens the sources of power, the legitimacy of action and the strong political positions of most doctors in hierarchically organized hospitals. As far as NHS computerization is concerned the significant feature has been the degree of control doctors have had over the selection and use of systems that, like PROMIS, threaten their interests. Following Child (1986), such control comes from several sources. Their expert knowledge means that their compliance is required in software development. Medical knowledge is continually expanding and is difficult to codify as a database; doctors cope with, and so have a hold over, this uncertain knowledge base. Doctors gain power in having direct responsibility for patients undergoing high personal risk. They also have a strong occupational organization, and, through bodies like the British Medical Association, exercise considerable control over workplace and market conditions. Even more significant for our argument, doctors

Users

Pharmacy

Nurses   on-line

                      VDU terminals

Radiology
and   located
pathology   throughout
                      organization

Administration

Doctors and
consultants

**PROMIS
Database**

Patient medical record
Medical library

Facilities:

Enquire

Record

Update

Receive/send mail

Facilities:

– Diagnosis and procedures

– Mailing system

– Charge collection

– Warning system for overdue treatments

– Ward management

– Display of part/all of patient medical record

Figure 2. PROMIS and health care.

occupy senior formal positions in hospitals and in the institutional decision processes relating to computer technology. These factors provide some explanation of how few computer systems can be introduced into the NHS, without being vetted for their impact on the position of doctors.

They also help to explain why PROMIS failed to be implemented in a large London teaching hospital in 1980, despite the system being championed by eminent members of a Health Department computer research and development committee. The committee had a £3 million annual budget, of which it rarely spent half. PROMIS was available at the relatively cheap price of £2.5 million payable over eight years. The Department of Health rejected the proposal, claiming that the expenditure was too

high in a period of financial stringency. Behind the scenes PROMIS created considerable resistance from many members of the medical profession. Though the Department conceded that it was the best system available, it probably doubted whether it could be managed in successfully. This caused four members of the research and development committee to resign, thus bringing a temporary end to the pressure from PROMIS.

However, like many other possible systems for the NHS, PROMIS may be merely struggling to find its political level. Thus PROMIS presupposes the existence or the creation of a health care team that is problem- and patient-oriented, and dependent on shared expertise and information easily accessed by every member of the team. PROMIS has low

acceptability in hospitals and clinics that are hierarchically structured, with more rigid demarcations and traditional relationships between doctors, nurses, ancillary and other professional staff. Two trends may favour systems like PROMIS: first, the increasing move toward training health care practitioners, including doctors, in a more task- and patient-centred approach — systems like PROMIS tend to have much more support among groups already functioning along these lines — and second, the growing, if belated recognition across all interest groups in the NHS of the need for and value of integrated computer-based information systems (Faulkner et al., 1987). However, with the attempted return to hierarchical forms of management, as embodied in the Griffiths Report, such developments may well be frustrated by, or at least be in conflict with, managerial struggles to establish leadership in their organizations.

Implementation and politics

These examples demonstrate some of the IT implementation problems, many of which are, at root, political in nature, being experienced at regional, district and hospital levels within the NHS. A major influence here is the limited power bases that the relatively new general managers have formed, and their overdependence on formal position (authority) even where those managers have been recruited from within the NHS. As a result they have rarely been able to act as a countervailing force against, and indeed most often have to work with, the grain of existing power structures, whether these are of a central versus local dimension, or consist of other powerful groupings and vested interests, in particular clinicians. The result is that whatever the policy is, in practice the needs and priorities of groups like clinicians, or of groups at regional rather than district level, are the first to be embodied in what has actually been successfully implemented so far in the NHS. Dutton and Kraemer (1982) have produced considerable evidence from studying local governments in the USA that, far from disrupting existing power structures in organizations, IT can automate bias. In studying a range of UK organizations Willcocks and Mason (1987) also found that one outcome of IT design and implementation can be to *augment* and reinforce, rather than diminish existing inequalities in organizational power relationships, with a range of organizational participants influenced in direct and indirect ways to anticipate the requirements, and serve the interests of, the organizationally powerful.

One example of the possibility of such a pattern emerging in at least parts of the NHS comes from North West Thames Region. In February 1987 its Regional Information Technology Agency (RITA) reported on achievements over its first year of existence (North West Thames, 1987). An examination of the IT projects implemented by that date reveals them to be in areas and activities that are mainly or substantially clinician-led; that is, serving clinician purposes. These include Pathology and Radiology, Clinical specialities, Child Health (also part of a national old mainframe-based system) and Maternity. It is remarkable how the remaining projects — Payroll Manpower, Finance, Hospital Nurses, Operating Theatres, Accident and Emergency and Telecommunications are, for the most part, neither clinician-led nor, by early 1987, had they passed from the 'report-written' stage into implementation.

An analysis of Körner implementation in this Region reveals a more subtle picture. It should be remembered that the Körner initiative is not clinician-led. The speed of its implementation has been heavily influenced by government setting target dates. By early 1987 in North West Thames region Körner implementation was under way or completed with regard to systems for Patient administration, Personnel systems, Community nurses and health visitors, and Mental handicap activities. Implementation for Pathology, Radiology and Paramedical activities had not yet begun. One interpretation is that clinicians are not only reluctant to support Körner — at least where it involves providing information on clinician activity for managerial purposes — they are also more able and willing than other groups within the NHS to resist its implementation.

There is some evidence for this. One measure of clinician support (or otherwise) for Körner could be the accuracy of the data returns for which their activities are a prime source. Some indications here already show a poorer accuracy of return than from the previously inadequate hospital activity analysis. Following the logic of this argument, it is clear that a major weakness in Körner is political. It fails to take account of, first, the role of clinicians in the NHS, and second, their power to resist the implementation of Management Information Systems whose output may prove critical of clinican activity. Subsequent clinician 'resistance' could take several forms, but one might well be non-participation in Körner data-collection. The payoff here is that if clinicians do not fill in forms and do not participate in the definition of data sets, they can always question the credibility of the Körner information insofar as it covers clinician activities. In such subtle ways can power be utilized to perpetuate power.

IT implementation practice: missing links

The search for legitimacy, feasibility and support required for any policy initiatives to become operationalized has been well described by Hall et al. (1975). Such a search is still in progress in the NHS in relation to the three issues of managerialism, information and information technology. In the process, as we have argued, planned and espoused policy, where it does not favour pre-existing power structures, can either not emerge at all or emerge as considerably and adversely modified in practice. The problem becomes how to tie IT stakeholders into supporting the implementation and subsequent operation of specific systems while achieving, in the case of management for example, managerial objectives. The solutions are not easy but one area requiring attention is the need for more political, less technically-focused approaches to IT implementation. To some extent this has been officially recognized. Thus DHSS (1986) acknowledges that financial information systems cannot succeed if imposed on clinicians and other health care professions, but must be tailored to their needs and they must be educated and advised in IT usage. However, as Perrin (1988) notes, and as we found in our research, these requirements have not yet been fulfilled in the acute sector of the NHS. Interestingly, the structure of service delivery in the community is much less complex than hospitals, with consultant doctors little involved and the leading roles taken by nursing and paramedical professions. These latter groups have tended to be more receptive to management ideas and techniques and more interested than most hospital doctors in using financial information.

Thus it becomes crucial to understand a particular organization's political structure and how different types and levels of computerization will relate to political activity. The development of such understanding needs to be the first step in planning and implementing computer-based systems in any organization. It becomes especially relevant in an organization as 'political' as the NHS, for which Mangham's (1979) words seem particularly appropriate:

> In circumstances in which people share power, differ about what must be done, and where these differences are of some consequence, decisions and actions will be the result of a political process.

A political perspective implies the possibility of resistance and the need to gain organizational acceptance for computerization. Resistance should not be seen merely as a problem to be solved so that the original system can then be installed as intended. Resistance can be used more positively in systems development. In fact it provides a good clue

as to what is going wrong and what can be done about it. The narrow determination to see a certain systems design up and running will inhibit useful analysis of resistance — as is all too typical of dominant systems design practices in both the private and public sectors. Instead, resistance needs to be viewed in relation to the general results and outcomes required from a computer system. This is where a political contingencies management approach comes in; that is, being prepared to adapt the system to the political circumstances prevailing, while also being willing and able to operate in and change those circumstances. As Markus (1983) puts it:

> If the implementor can divorce the need to see a system up and working from the need to achieve a particular result, then several degrees of freedom exist.

As one example in the NHS the frequent lack of involvement of all likely users of the system in forming objectives, selecting equipment and software, and in the design of systems, too often has the outcome of lack of identification with the specifically managerial purposes of much data collection that follows the Körner recommendations. People who collect data of little use to themselves, but that might serve managerial purposes in assessing their performances, are unlikely to have a high degree of commitment to IT implementation, or to their data collection tasks and IT tools, when systems are up and running. What is needed here is a much wider definition of who are to be the users of a given system. These people then need to be involved more meaningfully in decision making, systems design and development that are likely to affect their working lives, or, if they are patients, their health care.

Wright and Rhodes (1985) report a case that illustrates many of the points made in this section. They found that successful implementation of a computerized system depended on a 'crisis' that called into question the quality of patient care — an issue to which the professional elements in the NHS are particularly sensitive. Thus in a high security mental hospital a series of allegations of maltreatment of patients led to subsequent dismissal or imprisonment of a number of nurses. An inquiry identified problems in the way in which nurses were allocated to wards and the possible need for a computer-based system of work allocation. Despite cutting through many existing political arrangements, the new IT system proved to be acceptable in practice for a number of years.

A key point here is that the IT application was perceived by those affected by and involved in its operation as 'concerned with real activity at the point where the organization does its job and cares

for patients' (Wright and Rhodes, 1985, page 140). Successful implementation depended on this factor and crisis conditions creating an atmosphere conducive to the acceptance of change. Additionally, for Wright and Rhodes, line authority is required, particularly for the introduction of integrated systems that cut across a number of interest groups. They found it significant that this successful system implementation involved the nursing profession, with its traditional, well-defined authority structure. Verguillas et al. (1984) also showed this to be an important factor in the introduction of a Standard Nursing Information Package (SNIPPET) into the North Western Regional Health Authority in 1984. Wright and Rhodes also found that a leader or agent of change was needed to push through and maintain the momentum of change; and that in a political system like the NHS collaboration between change agents and users, and the active support of senior management, must be encouraged to reduce resistance to change. Much of this is supported by Stocking (1985). In her NHS case studies she found change dependent on power, not rational decision making. The idea had local appeal, did not cause conflict, was adaptable, required few resources and was associated with powerful champions. However, much of this could not be seen to be operating for NHS IT projects. In an extension of Wright and Rhodes' point (see above) she found that in practice one of the strongest pressures to accept IT innovation was a kind of 'desperation' syndrome (Stocking, 1985, page 65).

These findings are from case study work and may or may not be generalizable across the NHS. However, one general point that arises, also linked to the need to develop more political approaches to IT implementation in the NHS, is the way in which implementation is too often identified quite narrowly with the installation of the technical system. But in the words of Keen (1984):

> Implementation is not just the installation of a technical system in an organization, but the institutionalization of its use in the ongoing context of jobs, formal and informal structures, and personal and group processes. Installation does not guarantee institutionalization.

In the NHS, the over-technical focus in most computerization projects seems to derive from a number of factors: as an inheritance from traditional (and still dominant) systems design practice; a shortage of skills in computer project management leading to projects being driven essentially by systems specialists whose strengths and preferences do not lie in analysing behaviour and organizational context; the widespread use in projects of private sector consultancy and computer firms who under-

standably are rarely at home with the behaviours and politics produced by an organization so complex as the NHS. Finally the time-scales for implementation tend to take over, as has happened in the implementation of Körner, and technical delivery receives priority, and indeed may exclude altogether, the behavioural processes of managing change. However, the management of the politics and behavioural aspects of computerization need much more attention than they are receiving at the moment in the NHS if systems are not only to be proficient technically, but also receive productive, efficient and preferred use in practice.

As an extension of this point, a further problem area has been the tendency to over-commit funds on the technical side of IT systems while skimping on the people who will use IT and make it work. Yet people can, or should, be a major cost in IT projects. Thus, from a detailed analysis of the economics of office work, Strassman (1985) found that:

> The largest cost of an information system comes from installing it, not designing it . . . Insist on a comprehensive assesment of the expenses for training, for gaining user acceptance, for organizational learning, and for ongoing support before acquiring any technology. The technical choices should be determined by people costs rather than the other way around.

This vision has been operationalized rarely in the NHS. This is nowhere more obvious than in the lack of resources provided for IT training in so many NHS IT projects, and in the very narrow view that 'hands-on' experience by itself can constitute adequate training. Here financial pressures and traditional systems development and implementation practices frequently combine to drive out good practice. In fact, in complex organizations like the NHS, especially where there are severe shortages in required IT culture and skills, three major need areas can be identified:

1. The creation, through education and development, of a supportive culture for the introduction and operation of IT. Organizational learning for IT should begin at the start of a particular project, if not before, and continue throughout. It should not be a feature merely of the late implementation stage. It should include all those likely to have an interest in, and be affected by, the way the IT system will perform. In particular general managers must develop IT know-how and skills if they are to ensure that IT systems deliver on their purposes.
2. The provision of hands-on training — how IT works, and developing the ability to make it work.
3. The development of the ability in users to use IT to solve *their* problems, and modify if (or get

someone else to make the modification) where it does not.

In the NHS today the first point rarely receives anything other than scant attention, while hands-on training is invariably under-funded, or not enough in itself as a basis for point three to happen.

Post-implementation review

To ascertain the impacts of implementation practice in our main research region, detailed post-implementation reviews were carried out during 1989 on two computer projects. Methods used were interview and questionnaire surveys. We found the systems sub-optimizing because many groups were untrained in IT, and training largely ceased once the systems specialists were off site. Subsequent to implementation it was established that further training would be a local responsibility, and funded from that source, with no additional funding being made available.

One consequence of inadequate user involvement in analysis, design and implementation was that 67 per cent of hospital doctors surveyed disapproved of the new systems. For a new pathology system, 22 out of 24 doctors surveyed felt that it represented no improvement over the previous manual system. In some cases information turnaround was slower (five instead of three days) than under the previous system. Furthermore it emerged that an unpredicted 20 per cent of the new system workload came from community GPs — who had no training or involvement during systems development. This created large inputting problems and false expectations about the systems.

Some technical problems emerged. Systems workloads were 50 per cent above those expected. On one system the workload doubled virtually overnight, and interviewees acknowledged that during development they had failed to estimate workload peaks accurately. Large backlogs of work developed. Software went through different versions but sometimes bugs from earlier versions resurrected themselves. This became critical when work became totally dependent upon the new systems. Parallel running operated for two weeks during changeover but required too much resources and was discontinued. Interviewees pointed out that in future, in the event of a systems malfunction, work could be switched to other hospitals, but this systems capability was not yet available.

Systems development was partial because it was left largely to external consultant specialist staff. These tended to stick to the brief given to them by Region, rather than responding flexibly to local requirements, and, according to unit managers, had some

difficulty adjusting to the NHS climate and the politics of the situation. Furthermore, hospital user representatives participated in systems development while carrying out their normal full-time work with no extra reward or time made available. The dependence on staff goodwill continued hazardously into the implementation phase. When one system went down, no backup system had been put in place, the working of the whole hospital was threatened, and staff goodwill gained system reinstatement. With so little thought given to the human aspects of computerization, a question mark had to be placed against how long such goodwill would continue to support present and future systems running.

These findings serve to underline many of the points made throughout this paper, and represent the consequences of the policies, design development and implementation practices adopted. An additional point can be made. Such review information can be fed back to improve present systems operation, and be applied to avoid similar problems in future computer projects. In this way, though rarely performed in the NHS, post-implementation reviews could provide valuable opportunities for much-needed organizational learning on IT within the organization.

Conclusions

The need for further large-scale financial investment in the NHS generally has received much publicity from many quarters in the 1980s. On the analysis and findings of this paper, however, further capital investment in IT is a necessary but insufficient base from which to develop information system supportive of improved management and better health care. Delivering on the promise of IT is itself a question of better management combined with a much greater priority given to the human aspects of computerization. Thus, if general management is to operate successfully and bring in IT to serve its purposes, it must establish political and cultural support for its objectives and their implementation through identifying and responding to other group and individual objectives in the organization. Also, and relatedly, the managing of IT in health care needs to be profoundly reviewed particularly in terms of the pace, size and complexity of change, sponsoring agents, the realism or otherwise of deadlines, user involvement, types of training, methods of implementation and the relevance of current 'strategic' approaches. These observations would seem to be generalizable across all types of computer projects in the NHS. None of these issues has yet been addressed convincingly and the seriousness of the consequences are only beginning to become

apparent, at least at local levels within the NHS. Historically, public sector managers have been skilled at formulating emergent policy out of their implementation practice. Information technology would seem to provide immense problems but valuable opportunities on that score.

References

Bishop, P. (1988) Information management in health care. Paper delivered at the Intermeditech conference 'Toward 2000 – Value for Money in Health Care'. Glasgow.

Bourn, A. (1987) Fighting truth decay in the NHS. *Accountancy*, pp. 120–121.

Child, J. (1986) New technology and the service class. In Purcell et al. (eds.) *The Changing Experience of Employment* pp. 132–155. Macmillan.

Clarkson, D. (1989) Health systems – sick bed test bed. *Datalink*, p.6.

Department of Health (1989) *Working for Patients*. London.

DHSS (1986) *Resource Managment (Management Budgeting) in Health Authorities*. DHSS (HN(86) 34).

DHSS Bromsgrove and Redditch Health Authority (1985). *Lessons from Implementation drawn from One District's Experience of Implementing Körner*. DHSS Information Branch.

Dutton, W. and Kraemer, K. (1982) The automation of bias. In Danziger, J. and Dutton, W. (eds.) *High Technology in American Local Governments* pp. 170–193. Columbia University Press, Columbia.

Faulkner, J., Orr, J., Mosley, J. and Burdett, D. (1987) The road to an integrated hospital information system. *Hospital and Health Services Review* **83**, 2, 57–61.

Fischer, P., Stratmann, W., Lundsgaarde, H. and Steele, D. (1980) User reactions to PROMIS. *Computer Applications in Medical Care*, 3, 1722–1730.

Goodyear, M. (1988) Management Systems in Clinical Practice. Paper delivered at the Intermeditech Conference 'Toward 2000 – Value for Money in Health Care'. Glasgow.

Hall, P., Land, H., Parker, R. and Webb, A. (1975) *Change, Choice and Conflict in Social Policy*. Heinemann, London.

House of Commons Social Services Committee (1988) *The Future of the National Health Service. Fifth Report*. HMSO, London.

Kearney, A. T. (1984) *The Barriers and Opportunities of Information Technology – A Management Perspective*. Institute of Administrative Management, Orpington.

Kearney, A. T. (1987) *Corporate Organisation and Overhead Effectiveness Survey*. Institute of Administrative Management, Orpington.

Keen, P. (1984) VDTs as agents of change. In Bennett, J., Case, D., Sandelin, J. and Smith, M. (eds.) *Visual Display Terminals*. Prentice Hall, London.

Kobler Unit (1987). *Does Information Technology Slow You Down?* Kobler Unit for the Management of Information Technology, London.

Mangham, I. (1979) *The Politics of Organisational Change* Greenwood, London.

Markus, M. (1983) Power, politics and implementation. *Communications of the ACM*, **26,** 6, 430–444.

Mills, I. (1989) Reported in 'Resource management: it's sink or swim'. *The Health Service Journal*, p. 350.

NHS Management Inquiry Report (1983) DHSS, London.

North West Thames (1987) *Computer Link Up Bulletin* **3**, 1–4.

Perrin, J. (1988) *Resource Management in the National Health Service*. Van Nostrand Rheinhold, in association with HSMC, Woking.

Price Waterhouse (1987) *Information Technology Review 1987/88*. Price Waterhouse Publications, London.

Stocking, B. (1985) *Initiative and Inertia, Case Studies in the NHS*. Nuffield Provincial Hospitals Trust, London.

Strassman, P. (1985) *Information Payoff – The Transformation of Work in The Electronic Age*. Macmillan, London.

Sweeney, J. and Mason, A. (1987) Integrated hospital information systems. *Journal of the Royal College of Physicians of London*, **20**, 2, 102–104.

Verguillas, M. et al. (1984) *Standard Nursing Information for Planning, Evaluating and Training (SNIPPET)*. North West Regional Health Authority.

Willcocks, L. and Mason, D. (1987) *Computerising Work: People, Systems Design and Workplace Relations*. Paradigm, London.

Wright, M. and Rhodes, D. (1985) *Managing IT! Exploiting Information Systems for Effective Management*. Frances Pinter, London.

Biographical notes

Leslie Willcocks is Academic Leader for Human Resources Management on the Management MBA, and Deputy Director of the Internal Audit Centre, City University Business School. He worked in accountancy, management consultancy and training for seven years, with Touche Ross and Co. and subsequently several smaller firms. He has worked as adviser and consultant on a variety of private and public sector IT projects. His research interests fall mainly in the area of human aspects of information technology, and he is a founder member of the SOMIT group at City University, embarking on a three-year study of the management of IT. Publications include *Computerising Work: People, Systems Design and Workplace Relations* (Paradigm, 1987), and two books on Systems Analsysis and Design.

Annabelle Mark is Senior Lecturer in Health Services Management, South Bank Polytechnic. Her working experience includes ten years in the National Health Service in planning and management, and latterly as policy adviser in a London-based Regional Health Authority. She has an MSc in Social Policy and Planning from the London School of Economics, and is currently completing a PhD at the LSE on medical education and health planning. Her consultancy work has been mainly in the area of utilizing information technology in health care systems.

Address for correspondence: Leslie Willcocks, SOMIT Group, Information Management Division, City University Business School, Frobisher Crescent, Barbican Centre, London EC2Y 8HB.