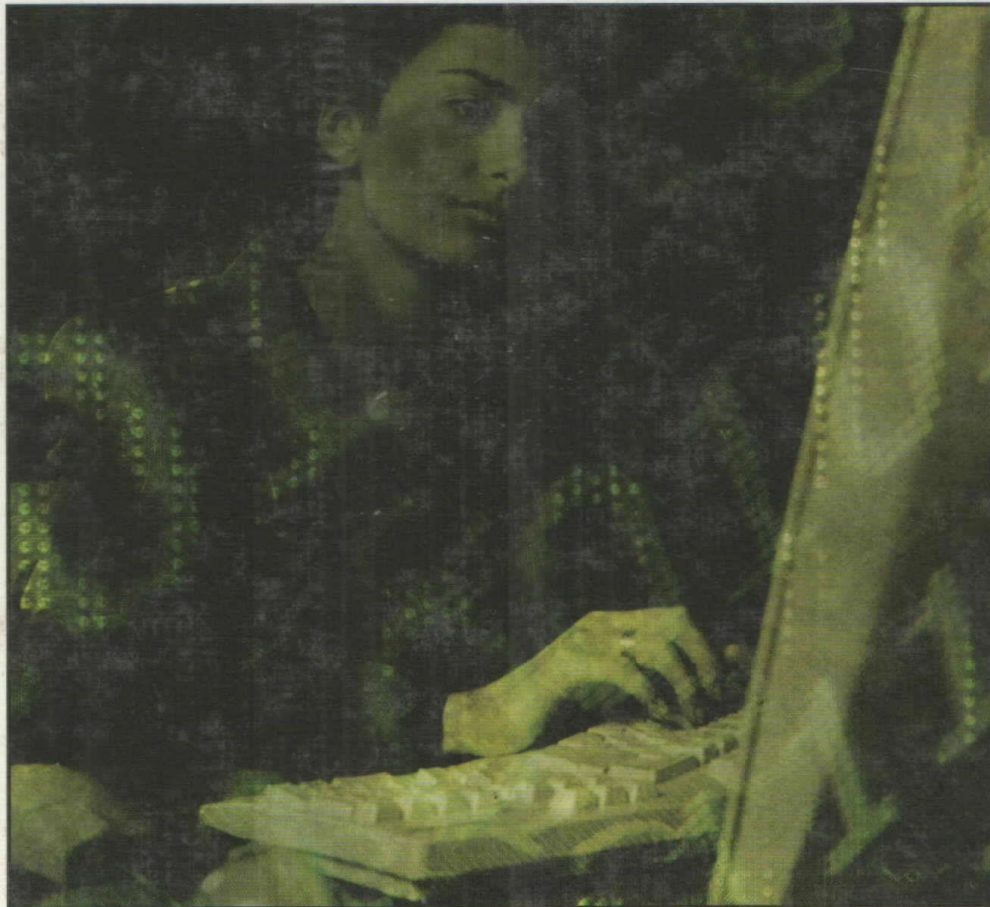


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MANAGEMENT PRACTICES IN HIGH-TECH ENVIRONMENTS



Dariusz Jemielniak & Jerzy Kociatkiewicz

Chapter XIV

Critical Insights into NHS Information Systems Deployment

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ABSTRACT

This chapter discusses a systems methodology called strategic assumption surfacing and testing (SAST) that was used to understand the design and deployment of information systems in the healthcare context. It is based on the experiences of conducting SAST with a group of healthcare professionals, working in the National Health Service (NHS) in England. This application of SAST in the NHS setting highlighted deep politico-cultural concerns in the organizational setting, and it helped towards the conception of a normative inclusive approach for health informatics design and deployment. This approach introduces the understanding that the development of information systems in healthcare is a complex agenda, the success of which demands the active involvement of all stakeholders through all the key stages of the process. Critical perspectives on SAST have also been considered and the assumptions fostered towards arriving at the conclusions, have been highlighted.

INTRODUCTION

The responsibility of provision of healthcare services in England rests with the National Health Service (NHS). The NHS is the largest employer in Europe with an annual budget set to exceed

£92 billion in 2007/08 (Department of Health, 2005). In October 2002, the NHS launched the National Programme for Information Technology (NPfIT) with the objective to create an integrated healthcare information system (IS) supported by information technology (IT). NPfIT has an an-

anticipated investment of over £6.2 billion (Health Informatics Community, 2004). However, there has been tremendous scepticism amongst key stakeholders regarding the success of NPfIT due to its lack of consultation with end users. The fundamentally top-down policy-led approach to the design and implementation of NPfIT and its lack of adherence to effective IS project principles have come under much spotlight as contributing to the feared failure of the project (Ballard, 2006).

This chapter argues that effective deployment of healthcare IS can be achieved by considering the interaction between a diverse range of factors within the organizational setting. This kind of an approach is inherent in the systems philosophy of management thought. Systems thinking has influenced a range of methodologies and techniques that facilitate stakeholder participation, boundary critique, and inclusive decision-making. Boundary critique (Midgley, Munlo, & Brown, 1998) is the idea that one's understanding of the world is bounded by the position and worldview they occupy. Therefore, the more one's boundaries are critiqued, the more informed and inclusive do understanding and perspective become. Strategic assumption surfacing and testing (SAST) is one such methodology that has been discussed in this chapter. Experiences from a SAST exercise with a group of NHS professionals and its resultant normative approach to health informatics has been illustrated.

HEALTH INFORMATICS AND THE SYSTEMS APPROACH

The NHS model of healthcare information system is epitomized in its NPfIT project, which in turn makes the promise to re-create the NHS as a high-tech environment. NPfIT aspires to deliver an integrated healthcare system for the NHS in England with its core in effective IS. The main elements of NPfIT are as follows:

- **NHS Care Record Service:** This is the central database of patients that will be available to authorized clinicians in the country, whenever and wherever required.
- **Choose and Book:** This is the electronic booking service whereby general practitioners (GPs) and other primary care staff are able to make hospital bookings at the convenience of their patients' date, time, and place.
- **Electronic Transfer of Prescriptions:** This service seeks to electronically link up the prescribers and dispensers of medicines in England. The objective is the connection between all GPs, community pharmacies and other dispensers.
- **Picture Archiving and Communication Service:** This enables medical images like X-Rays and scans to be stored electronically that can be viewed by clinicians in their video screens or computers. This is expected to eradicate hard films for recording radiographic medical images.
- **NHSmail:** This is the national e-mail and directory service that will be provided free of charge to NHS staff.
- **NHS Network (N3) Broadband:** This is the fast and reliable broadband service that will support the whole system. It is claimed to deliver the robust demands that will be made by the new system to deliver all the above services.

The previous developments, if implemented as planned, are set to pose the NHS as a truly high-tech organization with state-of-the-art IS support.

NPfIT and Related Challenges

Despite record levels of investments in NPfIT, there is considerable scepticism within the NHS and beyond that the project is heading towards failure. The Institute of Public Policy Research

warned “that the program could be undermined by a failure to consult properly with medical professionals, a dearth of IT skills within the healthcare service and poor understanding of exactly what the health benefits are supposed to be” (Sherriff, 2004). Research and expert opinion suggest that core activities like clinical engagement, staff training, and system compatibility may have been compromised in the design and deployment of NPfIT. Gillies (2000) similarly notes that the primary reason why IT has not been a success in the NHS is that “IT has been technology driven not information driven” (p. 16). There are various factors resulting in this situation. Important ones among these may include the sheer size of the NHS, which posits tremendous challenges, management-clinician conflict where both perceive each other’s roles as differing in common grounds, and underestimation on the complexity that IS projects have to deal with. For success in a project like NPfIT, clinical engagement and user commitment are paramount, along with the appreciation that different factors do not operate in isolation, but in interaction with one another. This kind of an understanding is the focus of the systems approach, which is discussed in more detail below.

The Systems Approach

Systems thinking is the philosophy in management thought that encourages holistic understanding. It supports the idea that organizations are constituted with elements that are in interaction with one another, and this interaction gives rise to the

character and nature of the system (Jackson, 2003). Hence, emphasis is shifted from individual elements to the interrelationships between elements. Systems thinking encourages boundaries to be approached with criticality, and that boundaries can always adapt as a result of its interaction with its environment. Hence, a systems approach argues for the “sweeping-in” of immediate and non-immediate factors that influence the behavior of complex systems (Churchman, 1968). It therefore lends an inclusive and participatory perspective in the decision making process. As Hammond (2002) illustrates in Table 1, a systems approach has considerable implications for organizational planning and decision-making – those that are indicated in the left hand column; these ideas are in contrast to the ones in the right hand column:

Systems thinking can be of tremendous value in the design and deployment of IS. This is pertinent to the implications of considering the human, technological, and contextual factors in the conception and design of organizational IS. A systems approach can enable the understanding that IS of the present day are dominantly technology enabled human activity systems within specific contexts. Xu comments: “Systems science has been considered the basis of information systems. A wealth of research in information systems in the framework of systems science has produced an astonishing array of theoretical results and empirical insights, and a large suite of tools and methods” (Xu, 2000, p. 105).

The systems approach has influenced a wide array of methodologies and techniques to foster stakeholder involvement and facilitate participa-

Table 1. Social implications of systems theory: Contrasting views (Hammond, 2002, p. 431)

Participatory decision-making processes	Hierarchical decision-making processes
Self-organization	Externally imposed order and control
Free will, creativity, spontaneity	Determinism
Democracy	Technocracy

tive decision making in complex situations. One of such methodologies is SAST. SAST has been discussed below in theory and practice in the context of IS design for the NHS. SAST has been selected as an appropriate methodology in the current context as it facilitates decision making when there are two groups with distinctly opposing viewpoints. In this case, these are the management-led approach and the service provider-led approach in healthcare IS. This has been discussed in more detail below.

STRATEGIC ASSUMPTION SURFACING AND TESTING (SAST)

SAST is a methodology that was developed by Mason and Mitroff (1981) to enable managers to deal with complex situations in modern organizations. Mason et al. prefer to call complex problem situations “wicked problems” where issues are multidimensional, interconnected, and uncertain. Wicked problems that arise in these situations have social, political and organizational ramifications. Their understanding was governed by the idea that “in tackling wicked problems, problem structuring assumes greater importance than problem-solving using conventional techniques” (Jackson, 2003, p. 137). This leads to the understanding that unless the formulation and structuring of problems are addressed effectively in the beginning, we may end up tackling the wrong problems. SAST is therefore designed to formulate and explicate assumptions that people harbor in organizations.

SAST has been greatly informed by the following ideas of Rosenhead (1987), as described by Jackson (2003):

- A satisficing rather than optimizing rationale
- An acceptance of conflict over goals
- Different objectives measured in their own terms

- The employment of transparent methods that clarify conflict and facilitate negotiation
- The use of analysis to support judgement with no aspiration to replace it
- The treatment of human elements as active subjects
- Problem formulation on the basis of a bottom-up process
- Decision taken as far down the hierarchy as there is expertise to resolve them
- The acceptance of uncertainty as an inherent characteristic of the future and a consequent emphasis on keeping options open (p. 138).

Influenced by the philosophy of Churchman (1968)⁸, Mason et al. embarked on a systems project that would accept the existence of a variety of worldviews, or *Weltanschauungen*, as an unavoidable prospect and embrace divergent subjectivity as a strength. Further, all worldviews are restrictive and a holistic perspective can only be achieved by synthesis of a variety of worldviews. A systems mindset would encourage one to question and formulate one's own assumptions and worldviews, and critically debate the same with opposing assumptions and worldviews (Churchman, 1968; Mason et al., 1981). Borrowing from Hegel, SAST is driven by the understanding that in any organization there would be a dominant set of worldviews--*thesis*, an opposing set of worldviews, *antithesis*, and there is always a possibility for the opposing worldviews to enter a state of constructive debate, and arrive at a higher level of understanding, *synthesis* (Jackson, 2003). This is however a never ending process, and the synthesis would always give rise to opposing set of beliefs. What is important for Mason et al. is that the worldviews and beliefs are derived from deep rooted assumptions that people hold in their minds. Management decisions are in turn dependent on these assumptions and beliefs. However, an effective organization is one that is

able to formulate these assumptions and counter assumptions amongst its members and learn how it can behave differently from the knowledge that emerge. As Jackson notes:

An organization only really begins to learn when its most cherished assumptions are challenged by counterassumptions. Assumptions underpinning existing policies and procedures should therefore be unearthed and alternatives put forward based on counterassumptions. (p. 141).

Constructive criticism and investigative debate is central to the previous philosophy. This philosophy is essential for “wicked problems” in complex organizations where not only there are a variety of opposing assumptions and beliefs, but also a tendency to subjugate the assumptions of the weak and the underdogs. SAST has therefore been designed to be participative, adversarial, integrative, and managerial mind supporting (Jackson, 2003). Decision-making process ought to involve different stakeholders with different assumptions and different ideas about how problems should be addressed. Hence, the situation should be adversarial, apart from being participative. Further, there ought to be the opportunity to bring together divergent views to a higher level of integrative understanding from which decision makers can gain deeper insights into wicked problems. Hence, this methodology has the potential to make a real contribution in the practical and operational level. The methodology of SAST follows four stages (discussed in detail in the next section): group formation, assumption surfacing, dialectic debate, and synthesis. The following is an account of SAST in action in the high-tech NHS environment.

A SAST exercise was conducted with a group of NHS professionals in June 2006. The purpose was to examine if the dominant and opposing viewpoints in the context of IS in the NHS can be brought together in synthesis. This was intended to inform the design of a route-map for IS in the

context of UK public sector healthcare. This exercise was supported and funded by the NHS North and East Yorkshire and Northern Lincolnshire Network of Cardiac Care (NEYNLMCN).^b The following discussion follows the methodology of SAST and the insights it generated in the exercise.

Group Formation

Group formation is the first stage where participants are divided into two distinct groups. The effort should be to “maximize convergence of perspectives” (Jackson, 2003) within each group and “maximize divergence of perspectives” between the groups. The result is two groups of opposing viewpoints with each group consisting of relatively like minded people.

There were eight participants in the exercise: one consultant clinician, one general practice manager, two nurses, one information support officer, one clerical staff, one service improvement facilitator, and one service improvement manager. The conflicting idea that was prevalent in the group was the design and deployment strategy of NPfIT and how a new health informatics strategy could be conceived and implemented. Certain participants believed that the prevalent top-down approach to the current NHS IS strategy was working and making progress. This was the dominant perspective overtly cherished by the NHS management. They believed that the new NPfIT system could be used for improvement in patient care and for the monitoring of clinicians’ performance. They were of the opinion that there had been considerable consultation with frontline service providers before NPfIT was implemented. This represented the viewpoint of the management-led approach to health informatics. At the same time, there were other participants who believed that there had not been appropriate consultation before NPfIT was implemented. This was the opposing viewpoint. They believed that the NHS was wasting its resources in delivering functions that are not

required by patients and the public. They were of the opinion that NPfIT was in a way imposed upon them by the management. This represented the service provider-led approach to healthcare information systems. They advocated that system specification and definition ought to come from frontline service providers like the clinicians, and that administrative staff should also have a say in the system as their role would radically change with the deployment of the new systems.

Considering the overt difference of opinion between the participants, they were divided into the following two groups, based on the approach they favored:

- **Group-1 (management-led approach)**
 - General Practice Manager
 - Service Improvement Facilitator
 - Service Improvement Manager
- **Group-2 (service provider-led approach)**
 - Consultant clinician
 - Nurse 1
 - Nurse 2
 - Clerical member of staff
 - Information support officer

The result was two groups where difference of opinion was maximized between the groups. However, as the following stages will show, this methodology facilitated the opposing groups to structure assumptions, many of which were quite similar instead of being opposing.

Assumption Surfacing

This is the second stage where the aim is to formulate and express key assumptions that members in the groups harbor. As Jackson (2003) notes, this should be done in a “supportive environment,” where the aim should be as “imaginative and creative” as possible.

This stage may be facilitated with three methods: stakeholder analysis, assumption specifica-

tion, and assumption rating. Groups can be asked to conduct a stakeholder analysis to identify who they think the relevant stakeholders in a particular project are, in terms of who the affected parties would be as a result of the implementation of a particular project. Groups may then be asked to specify their assumptions for each of their stakeholders. These specifications should be related to how these would influence the success of the project under consideration. Groups may then be asked to rate their assumptions in a chart rating them against two criteria: importance and certainty. A spokesperson from each group then has to make a presentation about the assumptions.

To facilitate this stage, both the groups were asked to state who they thought the stakeholders were in the implementation of IS in the NHS. The groups brainstormed their views in different rooms and agreed to a list of stakeholders. Following were the results:

- **Group-1 (stakeholders)**
 - Clinical professionals
 - Finance department of NHS
 - General public
 - Government, including the Department of Health (DoH)^c
 - Healthcare IT Leads
 - IT Industry
 - Managers
 - Media
 - Patients
 - Regional and local NHS organizations
- **Group-2 (stakeholders)**
 - Administrative staff
 - Clinicians
 - General public
 - Government including the DoH and the Treasury^d
 - Industry (Pharmaceutical and medical equipment companies)
 - NHS Management
 - Patients

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- Private healthcare providers
- Suppliers (IT services including software and hardware and telecommunications)
- Support staff (e.g. IT staff)
- Universities (Research and epidemiology)^e

The groups were then taken forward to the method of assumption specification, where they had to state what their assumptions were. These assumptions were thought to effect the success of NHS IS strategies, with specific consideration to NPfIT. The responses were as follows:

- **Group-1 (assumptions)**

1. IT industry has vested interest in personal gains.
2. The media wants to portray a negative image and always wants to highlight problems.
3. The media should be more positively engaged by NPfIT.
4. The general public have a one-sided view, as portrayed by the media.
5. The general public has a lack of confidence in NPfIT.
6. The IT industry has a conflict of interest.
7. The general public has a lack of understanding of the aims of NPfIT.
8. The general public believes that money should rather be spent on healthcare and on professionals, than on IT.
9. The government expects too much too soon from a complicated project.
10. The government has an unrealistic timeframe for delivery of the project.
11. The government is politically driven and does things that are locally irrelevant.
12. The healthcare sector has a lack of expertise and lack adequate IT staff to deliver the project.

13. The finance department underestimated resources needed for the national and local delivery of the project.
14. Clinicians believe that they have not been consulted.
15. Clinicians have an unrealistic expectation of participation.
16. Clinicians have a fear of their IT skills.
17. Patients are mostly not interested in getting involved.
18. There is lack of training capacity to ensure skills for delivery.

- **Group-2 (assumptions)**

1. NPfIT will go over cost. It is a white elephant.
2. Administrative staff will be resistant to change.
3. Administrative staff has no time to work with the new systems.
4. Clinicians are not computer literate.
5. Clinicians are time limited to work with the new systems.
6. Patients are not computer literate.
7. Clinicians are conservative to accept change.
8. The government is control freak. It wants to control professionals with the information from NPfIT.
9. Clinicians are sceptical about success of NPfIT.
10. Patients want local treatment.
11. Private healthcare services are only interested in profit.
12. Clinicians are sceptical about patient confidentiality in the new system.
13. NHS managers need numbers.
14. Suppliers see NPfIT as an opportunity for profit.
15. Administrative staff will find it difficult to use the new system.
16. The treasury wants to keep costs under control.

17. Patients lack knowledge about the system.
18. The government wants to impose solutions all the time.
19. Universities need to do more research for information and funding.
20. Private healthcare services are always after more NHS work.
21. The government will blame someone else when the system does not work.

The groups then rated their assumptions in a chart against the axes of certainty and importance. A spokesperson from each group then presented their stakeholders, assumptions, and ratings to the other group. At this stage, it was interesting to note that although both the groups were supposed to be opposing in their viewpoints, there were many issues, which were common to both the groups. In addition to this, there were few elements, which both the groups seem to support as the root cause of many of the challenges faced by NPfIT. This is elaborated in more detail in the discussion below focusing on the presentation by each group.

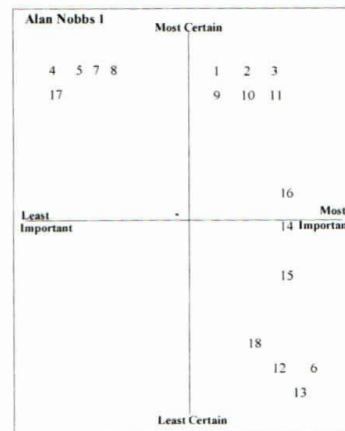
Group-1 Assumptions

Group-1, which favored a management-led approach in healthcare information systems, believed that the IT industry had a vested interest in the implementation of NPfIT. The group however felt that this was a “gross assumption” in their part and they were not certain about it. The group felt that the media had a big role in portraying the NPfIT negatively. The media always highlighted problems rather than adopting a balanced position. This led to increasing scepticism of the project amongst clinicians and the general public. It was the view of group-1 that the media ought to be more “positively engaged” by NPfIT and the wider NHS as it is a “very important” stakeholder for the long term success of the project. This is because the media shapes public opinion. They

also assumed that the general public had a fairly one-sided view about what NPfIT was, influenced purely on what they heard in the media. The public also suffered from a general lack of understanding about the aims and objectives of NPfIT. The public would rather be interested to see money being spent on healthcare *per se* and healthcare professionals, rather than support systems like healthcare IS.

The group thought that the government was to blame for making the project too complicated. This is because the government wanted too much sophistication in too little time. Therefore, the government had a “fairly unrealistic” time frame for delivery of the project. Moreover, it was the view of the group that the project was politically driven rather than being locally relevant to patients and clinicians. Members of group-1 also felt that there was a lack of expertise of IT skills in healthcare to realistically deliver the project. They felt that the finance for delivery of the project was also being underestimated. However, they were not certain about this as this may be the result of media reporting, and the way viewers, including the group itself, were picking up messages from the media. Regarding clinical consultation, the

Chart 1. Assumption rating by group-1



group felt that even it may have been misled by the DoH with the idea that appropriate consultation had taken place. The group was not sure whether or not clinicians were consulted appropriately. At the same time, they also felt that clinicians had an unrealistic expectation about what participation and consultation was supposed to mean, as consultation with every clinician is unrealistic. Fear of IT and skills deficit amongst clinicians was also featured as assumptions that came in the way of the success of NPfIT. Related to this, the group also featured that there was a general lack of appropriate IT training across all levels in the NHS.

Group-2 Assumptions

Group-2 favored a service provider led-approach to health informatics. Members of this group were certain that in spite of phenomenal investments in NPfIT, it was not yielding any of the anticipated benefits. However, at the same time, they also believed that administrative staff, patients, and clinicians may not be sufficiently IT literate to work with the new system. This may also have led to resistance to the change process, creating more challenges for the project. They also believed that patients lacked appropriate knowledge about the system and there was no appropriate initiative made to educate the public about the new system. The group highlighted that there was no realistic planning for training and development of clinical staff.

Group-2 was also critical of some of the objectives of NPfIT. For instance, one of the hallmarks of NPfIT is patient choice, but the group was confident that patients wanted local treatment. This discards one of the most important features of NPfIT itself. Members of this group also had grave concerns about patient confidentiality in the new system. They believed that the new system has been deployed without much consideration of security of access to patient details, which puts confidential patient information at risk.

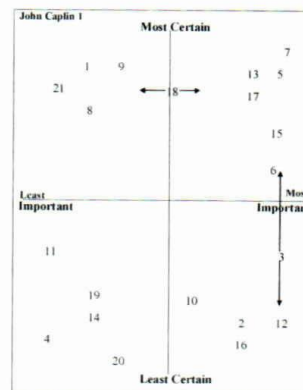
This group also assumed that clinicians were conservative of change and not receptive to the new IS. This was creating grave challenges for the successful implementation of NPfIT. It was the view of this group that in spite of knowing about these challenges, the DoH did not take any specific measures to address them. The DoH rather proceeded with its own plan of deploying a system that would enable itself to have more control over the clinicians and management processes.

The previous insights interestingly shifted the blame from NHS managers to the government itself. This brought group-2 closer with group-1 in some of their viewpoints. The unintended consequence of these insights was that the groups already started to sympathize with each others' position within the organization.

Dialectic Debate

This is the third stage where both the groups are asked to debate the assumptions and viewpoints of each other. Whilst facilitating this stage, consideration should be paid to the following points (Jackson, 2003):

Chart 2. Assumption rating by group-2



- How are the assumptions of the group different?
- Which stakeholders feature most strongly in giving rise to the significant assumptions made by each group?
- Do groups rate assumptions differently?
- What assumptions of other groups does each group find the most troubling with respect to its own proposals? (p. 144)

After a certain period of time for which the debate has proceeded, groups can be offered an opportunity to modify its assumptions. This is called "assumption modification." However, as the following narration of this particular exercise will show, participants from both the groups were already beginning to see common grounds even before the following stage of anticipated consensus.

Group-1, that represented the management-led approach to healthcare information systems, was of the opinion that much of the resistance to NPfIT from clinicians was a generation issue. Members of this group felt that there was no problem with the younger clinicians accepting the new systems and they are more adept in using IT. They therefore felt that probably the problem would solve itself over time when the younger generation of clinicians would replace the older generation. This was however, taken with much contempt by group-2, who advocated that the main issue with NPfIT was its lack of consultation. This was immediately refuted by group-1 who was of the opinion that clinicians have never recognized their initiatives in helping them with service improvement.

As the debate progressed, the groups also began to see some common grounds. For instance, one of the key members of group-1 expressed scepticism of the DoH actually carrying out robust consultation with clinicians and patients about its IS strategies. They thought that they themselves might have been misguided by the DoH. In this regard, group-2 added that no one had actually

ever approached them and asked what they really wanted. They felt that management would always make decisions about NHS reorganization or implementation of new strategies in complete isolation from clinicians. Identifying themselves closer to group-2, group-1 felt that there was always talk of a patient-led NHS, but the NHS never asked patients before it formulated its policies. Most of the consultation process in the NHS were actually "information giving" sessions, rather than consultation sessions, in which patients and the public are just informed about what the NHS was going to implement. When policies fail, management would try and backtrack the consultation process with patients and the public. This insight from group-1 immediately reflected a disparity between the NHS managers and the government, represented by the DoH. This disparity was more pertinent in discussions surrounding the choose-and-book feature of NPfIT, which offers choice of five treatment sites for patients in England. Group-1 felt that this was the "most ridiculous" feature as both patients and clinicians prefer local treatment. This view was immediately accepted by group-2. However, the managers felt that they had to work towards supporting Choose-and-Book as they had to deliver what they had been paid to deliver. Failure to do so would probably see their funding withdrawn. Hence, group-1 was surfacing frustration with their own position in the sense that they were implementing a strategy, some of its features they themselves did not support.

Both groups-1 and -2 expressed concern about the performance of the private companies that were contracted to deploy NPfIT. It was highlighted that there was considerable delay in the deployment of specific features of NPfIT, and some of the features that had been deployed were not functioning as expected, or not functioning at all. At this stage, it may be easy to blame the contracted companies for the fiasco. However, the participants suggested that there was a lack of realism that existed not only in the side of the NHS, but also in the side of the suppliers regard-

ing what could be delivered and in what time scale the same could be delivered. However, at this stage, group-1 was again radical to question whether the contracted companies were failing to deliver due to their incompetence, or because the NHS did not clarify its specifications in the first place. One member of group-1 said: “If we can’t tell them exactly what we want and stick to it, they are bound to go wrong.”

However, it was stated by both the groups that people’s expectations and demands change from time to time, and change is unavoidable. There was some agreement at this stage that IS should have built-in flexibility so that it can be adaptive to changing requirements. Group-1 believed that this can be possible only through true “partnership working” between management, clinicians and the public right from the beginning. Partnership working is about involvement of key stakeholders in the whole process of design and deployment of strategies. Certain comments from group-1 indicated that NHS management itself was operating under the pressures of DoH. This issue becomes more explicit in the discussions that followed.

After a lapse of time, the groups were asked if they would like to change ratings of any of their assumptions or the assumptions themselves. Participants returned to their own groups and spent sometime discussing how their assumptions have been informed and influenced after the debate and discussion. Both the groups decided to change how they rated certain assumptions initially. The following charts show the ratings that were changed.

The groups then discussed their assumptions again and started to consider how the present unwelcome situation in health informatics in the NHS could be addressed. This led to an interest to envisage a normative approach for health informatics that would be able to involve stakeholders in partnership, with the element of learning built into the model so that system flexibility and change is not seen as a challenge, but as an opportunity

Chart 3. Changed assumption rating by group-1

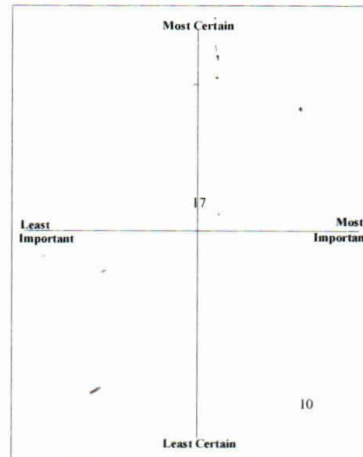
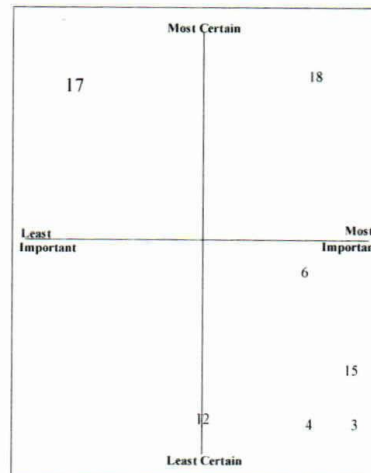


Chart 4. Changed assumption rating by group-2



for the system to evolve. Working toward this approach was the final stage of this exercise.

Synthesis

This is the final stage of SAST where the previous stages are expected to lead to a synthesis of views. This will be the result of modification of assumptions, negotiation, and accommodation of viewpoints. Synthesis is expected to result in a reformed strategy for the organization to adopt. However, if the groups fail to arrive at a synthesis of views, the problematic assumptions and conflicting viewpoints should be taken up for further research and consideration.

In the exercise under consideration, the final stage was concentrated on both groups working towards overcoming their differences and envisaging a normative approach for public sector health informatics. This stage facilitated the groups to be critical of their own boundaries and perspectives. It implied the groups "sweeping in" the viewpoints of the opposing group and conceives a more inclusive approach towards healthcare IS. All insights in the discussion to follow have been the result of a synthesis of ideas of both the groups, and represent an approach conceived by the participants supported by the facilitator.

This approach to health informatics in the NHS ought to follow the following stages.

Needs Assessment

The conception of ideas for new IS emerges only from the need of such ideas to improve the operational situation. In the healthcare sector needs may be realized at the level of healthcare service delivery for the improvement of services and enhanced effectiveness in care delivery. If systems are introduced without any need these can be a dangerous toll on organizational resources and efforts. Once needs are realized, they have to be assessed to see if there is actually a requirement to introduce new IS or can those

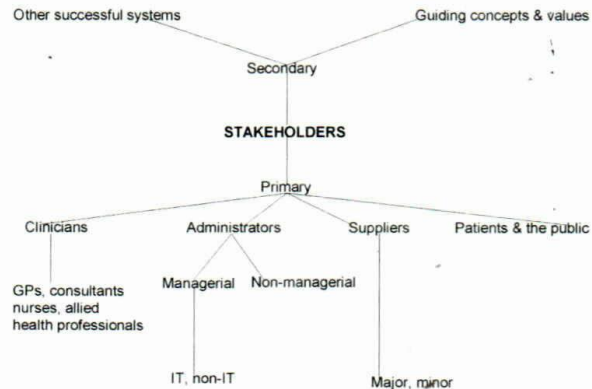
needs be met with existing facilities. Once needs are assessed and there is an agreement that new IS is a requirement, should service providers and management conceive of the new technology. If new systems are introduced without any need, they may come as a management-led initiative to cater to management needs. This can lead to members of an organization feeling imposed by new systems and not being committed to what has been introduced. Therefore, the conception of any new system is the realization and assessment of needs by members of the organization.

Stakeholder Analysis

Once management is convinced that there is a need for the introduction of new IS, there ought to be an understanding of who the stakeholders are in the new project. A thorough stakeholder analysis should be initiated to identify all those people who would be involved in the project or would be affected by it. Therefore, it goes beyond just the people who would use the system. A set of primary and secondary stakeholders were compiled. This list was by no means meant to be exhaustive. For a health informatics project in the NHS, stakeholders would include what is detailed in Figure 1.

In the previous map, stakeholders are categorized into primary and secondary stakeholders. It was the view of the groups that other successful systems should be noted as secondary stakeholders. These are systems from where learning can be gained for the development of the new IS. This is because designing a system from scratch may lead to lack of realism in what can be achieved and how the system can be designed. This may further lead to lack of direction posing considerable challenges in the deployment of the system. Other successful systems would be specifically from the healthcare sector, but not confined geographically to the area for which the system is designed for. Insights may be drawn from successful systems in other countries. The guiding

Figure 1. Stakeholder map for information systems in the NHS



concepts and values that influence the new system and that which would be influenced by the new system have also been considered as stakeholder values. Primary stakeholders include clinicians, administrators, suppliers and patients and the public, who would be immediately effected by the new system (See Figure 1).

There should be a prime initiative to understand how the stakeholders should be involved in partnership right from the beginning. This should move beyond just information giving about the project, and there ought to be true consultation and partnership working from the beginning.

System Specification

Needs assessment and stakeholder analysis may lead to the specification of what is actually desired from the system. This involves understanding of what the vision of the system is, what the vision of the organization is, and what can be realistically delivered. In a healthcare organization the vision may be to improve the quality of care; this will be supported by a whole gamut of technological activities and features. However, everything may not be possible to be delivered in a realistic sense.

This was feared to have happened with NPfIT, in which the planners demanded too much within a limited time span. System specification should therefore be realistic and should be aligned with the organizational culture (discussed in more depth in the next stage). In another sense, this may also be called the stage of feasibility study to examine whether the whole idea is feasible or not. At this stage there may also be the requirement to go back to the first stage of needs assessment if there arise any scepticism about the success of the specified system.

It has to be realized that IS is integral to the process of healthcare service delivery. Therefore it has to be noted that the specified system is not treated as just one more piece of IT, but that which supports effective healthcare delivery underpinned by a systemic approach.

Context Analysis

Every organization is different. Design and implementation of any IS has to be suited to its context including the core business, the people and its culture.

The core business of the NHS include collating and dealing with confidential patient informa-

tion. This entails that the nature of information that would be dealt with by the system is highly sensitive and confidential. This is a significant and decisive factor in the design of new systems. Any IS should regard confidentiality of patient information and safety of patients as its top priority. For instance, the NHS Care Record Service, in NPfIT, would record information for the whole population of England registered in the system. This sort of information is unlike of anything that can be found in other businesses. Security services and access criteria to manage and maintain this information is specific to the healthcare context. If the system has to be developed effectively, it has to take the specific nature of this information into consideration.

In terms of people, the NHS employs highly qualified professionals. It has to be noted that these professionals cannot be forced by management to adopt an IS that the management wants. Any IS would have to prove its potential functionality and benefits to the professionals and patients. This is best achieved when professionals are directive of the design of the system. This takes us back to the first point of needs assessment, the primary impetus for the development of new IS. Due to the nature of work, it is the professionals who would normally recognize the need of new IS. Therefore, the participation and active involvement of professionals is paramount.

Organizational culture is important because any change not respecting culture may face stiff opposition to the change process. Organizational culture will include existing levels of receptivity of IT amongst staff, and also myths and stories associated with the same. The NHS finds itself in a unique position within healthcare as well, due to its sheer size and disparate organization. Myths and stories include comments such as one that was featured in the exercise by group-2: "we have not seen a single government IT project in a large scale succeed." This is an example of cultural scepticism of IS projects in the NHS.

These feelings and opinions should be taken into consideration in the design of new IS. Scepticism ought to be understood and addressed in a manner that is culturally sensitive and appropriate to the organization.

Application of a generic IS model for the NHS will not be adequate, but any approach needs to be firmly based in the context itself including core business, people, and culture.

Risk Analysis

System specification may be followed by understanding the nature of risks the IS may face. Risks may be both technical and human. Following are some of the technical risks that may surface:

- Failure of the systems to be delivered on time
- Failure of the technology to deliver what has been aspired to be delivered
- Failure of suppliers to deliver what they have been contracted for
- The system failing to cope with changes in requirements and project specification
- Confidentiality of patient information breaking down
- Rapid change in technology rendering the original systems to be obsolete

In spite of involving stakeholders appropriately, and considering the socio-cultural factors of new IS, there may still be human challenges in the way of implementing successful systems. Following are some of the human risks that may come with an IS project:

- Staff unwilling to use the new system
- Staff incapable to use the new system
- The system clashing with the organizational culture

The analysis of potential risks may even require designers to go back to the first stage of

needs assessment and follow up the rest of the stages. Risk analysis is a crucial stage and if this is not undertaken in a detailed and critical manner, there will always be the fear that in spite of undertaking the rest of the stages effectively, the system may still fail.

Development & Implementation

The previous stages are expected to provide a robust background for the development and implementation of the desired IS. This is more the technical aspect of IS. The challenges here are to select the appropriate contractors and suppliers who will be able to technically deliver what they have been asked to. Success for the technical teams can be achieved with their work in partnership with the rest of the stakeholders.

It may not be appropriate to regard the implemented system as the final solution. Human expectation and system specifications are deemed to change. IS ought to be developed in such a way that changes do not threaten the existing system, but aids in the evolution of existing systems. This is what brings us to the overarching idea of cogenerative learning, discussed below.

Cogenerative Learning

The idea of cogenerative learning is borrowed from Elden and Leven (1991) who talk of the term in the context of action research. They are of the opinion that cogenerative learning is the process where the power relations between the researcher and the research participants dilute, due to the active process the researcher involves the participants in. They note:

The insiders are not simply sources of data or sanctioners of studies and reports but actively help create and codetermine in every phase of the research process--especially in creating new meaning. They are not merely consulted in each phase of knowledge production; they participate

as cocreators. We call this empowering participation. (Elden et al., 1991, p. 133)

In the context of IS implementation, system designers, managers and planners ought to work cogeneratively with system users, "the insiders," to encounter challenges, learn from pitfalls and cherish knowledge. This has to be achieved in partnership and not in isolation between stakeholders. Constant learning ought to be integrated into IS so that the system is able to evolve from one stage to another and technology is designed to be adaptive. Cogenerative learning may be treated as the overarching philosophy. This lends the iterative angle to the IS design approach.

The previous approach has been illustrated in Figure 2.

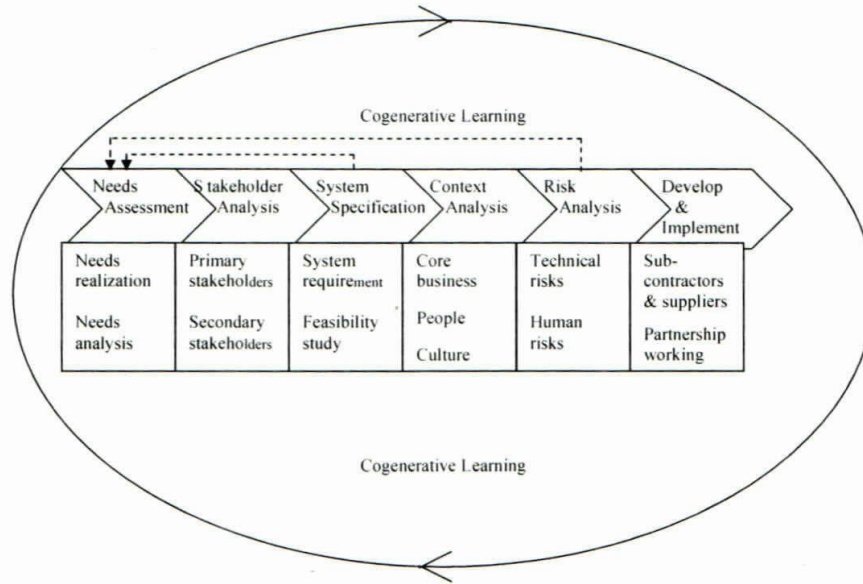
The previous model indicates a normative approach for healthcare IS, as informed by the SAST exercise. The insights that have been discussed in the above paragraphs are pertinent in the context of UK public sector healthcare. These insights were conceived by professionals working in a wide range of roles within the NHS. Hence, these insights and the resultant normative model for healthcare IS are invaluable for health informatics designers and planners in the context under consideration.

WEAKNESSES OF THE APPROACH

The previous discussion attempts to present SAST as an effective approach for the enablement of organizational decision making. However, taking a critical perspective, there may arise several aspects where the effectiveness of SAST can be called into question. This section highlights some of these critical aspects.

First, the methodology starts with the identification of participants into two diametrically opposing groups. However, it is not always necessary that even though participants are divided into two opposing groups, they will need to have

Figure 2. Normative approach to healthcare IS



radically opposing viewpoints. As this exercise shows, although there were two opposing groups, there were numerous instances where members of one group closely identified with the viewpoints from the ‘opposing’ group. The whole idea of maximising divergence of perspectives between the groups may be context dependent. Hence, although SAST aspires to unearth assumptions, it itself starts with an assumption that viewpoints of members from the two groups will always be radically opposing. This introduces a fundamental critique to the whole methodology.

Second, SAST has been portrayed above as an “ideal type” approach for management decision making, which has been aptly applicable in the context of healthcare IS. However, when it comes for the actual implementation of the approach in real life, SAST is best only as an “ideal type” approach. It has the limitation of optimistic simplification. Jackson (2000) notes that the methodology assumes that if the people’s

attitudes change, so will the social system. This indicates to the methodology’s simplistic assumption that social systems are readily adaptable to human systems. However, given the tremendous complexity that gets incorporated into social systems once alterations and new structures are introduced, it may not be very simplistic to alter the same social systems. In the “ideal typical” approach previously taken for the formulation of a health informatics model, SAST has not allowed these challenges to be surfaced.

Third, the SAST approach does not pay due attention to the influence of power relations in the environment in which the exercise takes place. It presumes that in the dialectical debate stage every participant in the teams will present arguments and defend their own stands equally competently to arrive at an understanding. However, if participants come from a different set of hierarchy in the organization, certain members may be reserved about their participation. In the current

case study, debating on the situation and arriving at a consensus in spite of radically opposing viewpoints was certainly possible. However, under what conditions this was made possible is also to be scrutinized. This stems from the feedback that was received after the exercise was conducted. One of the participants said that her inputs and vocal arguments were possible because she already knew the rest of the participants very well and felt comfortable to share her opinion; however if the group were different, her involvement could have been very different. A similar feedback was shared by another participant as well. Hence, the whole dimension of power and repression in the overtly consensual atmosphere needs to be considered. This may introduce a Foucauldian dimension of power into the methodology, which SAST very clearly does not consider.

Fourth, arrival at consensus in this particular exercise should not give the impression that consensus is a definite outcome of SAST. There may be cases where no consensus is arrived even after extensive deliberation, and that differences widen instead. This can happen due to a variety of reasons including lack of enthusiasm of participants, power relations or simply because the methodology is not situated for that particular context. DP Dash (Dash, date not available) cites his experience of an instance where he applied SAST with two opposing groups, but could not reach a consensus. As he notes "Despite attempts at assumption negotiation and modification, it proved impossible to arrive at any overall synthesis during the final stage of the methodological process" (Dash, date not available). However, the whole idea of consensus is overplayed in the methodology and it gives an impression that a single or repeated deliberation of SAST will certainly lead to a consensus of opinion. Therefore, the idea of consensus at the end of SAST should be regarded with some criticality and it should be recognized that consensus is context and situation dependent.

CONCLUSION

Application of SAST in the context under consideration yielded interesting conclusions for IS design and deployment in the high-tech NHS environment, and for the methodology itself. These conclusions have been summarized in the next three levels.

Methodological

- The application of SAST was found to be a successful intervention strategy in the conflict situation of IS development in healthcare. SAST not only helped bringing the two opposing groups to a level of agreement, but it also identified the common grounds that both the groups had, but did not receive an opportunity to articulate prior to the exercise. Therefore, methodologically, SAST was found to be a useful tool in context under consideration. The systems approach was able to effectively consider a range of socio-technical factors in the design and deployment of healthcare IS.
- It was understood from the feedback that the effectiveness of SAST can be context and situation dependent. The impression that the methodology offers regarding the universal arrival at consensus at the end should be regarded with certain scepticism and consensus and for that matter the progress of the methodology is dependent on the kind of participants, the agenda, and the power relations between participants.

Organizational

- There was a new light on the often perceived conflict between management and clinicians in the NHS. It was understood that management itself had to operate within the pressures of the government. It was agreed in the exercise that many of the strategies adopted

with respect to IS were not management led, but government led. Management itself did not agree with some of these strategies, but had to support these as they had no choice. This insight shed new light on how decisions were made in the high-tech NHS environment. This also carries great ramifications on organizational development factors in the context under consideration.

- It was the view of the groups that some of the decisions taken by the DoH were meant to meet political ends, rather than for the best interest of the NHS. As the groups suggested, NHS management itself may have been misled in many instances by the DoH with regard to the inclusiveness and robustness of planning for IS strategies. This portrays the NHS as organizationally fragmented and politically secretive.

Operational

- Healthcare IS is best supported by robust needs analysis, stakeholder analysis, feasibility study (system specification), context analysis, and risk analysis, before systems are designed and deployed.
- IS ought to be designed not as fixed solutions, but as systems that are capable to change and transform. This is specifically pertinent for healthcare due to its multi-dimensional and complex nature. Healthcare IS should be designed as complex adaptive systems, which is able to adapt to complexity and change in the wider environment. This character should be built into healthcare IS projects.

The previous conclusions carry pertinent implications for the design and deployment of healthcare IS. Introduction of new IS in a high-tech environment is not straight forward, but it has to be sensitive to a diverse range of factors. If this is neglected, the chances for success of the

new IS may be compromised. A systems approach is vital in cases where issues are divergent and complexity is a rule rather than an exception. Application of systems methodologies like the one discussed in this chapter can be of immense benefit in understanding these issues and enabling variety to be addressed with variety for greater success in complex projects. It may be appropriate to conclude with the following quotation:

In information systems development, it is necessary to systematically view information systems as a socio-technical system and develop information systems using a wide spectrum of technologies, which is superimposed over the complex socio-technical interactions. Systems science provides the basis for taking such a broader view of information systems (Checkland, 1981, 1988; McLeod, 1995, Sommerville, 1996 in Xu, 2000, p. 106).

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ENDNOTES

- ^a Churchman's (1968) fundamental idea is that every worldview is terribly restricted and to make sensible decisions for lasting beneficial effects, one needs to "sweep in" a variety of opposing perspectives and worldviews. He advocated that whilst it is not possible to know everything, it is indeed beneficial to understand the implications of the lack of comprehensive knowledge. Therefore, self criticality in theory and practice was central to the work of Churchman and his philosophy.
- ^b NEYNLMCN is responsible for design and deployment of service improvement strategies for cardiac care in the North and East Yorkshire and Northern Lincolnshire region of England. This is headed by Alan Nobbs with a core team of four staff and representation from a range of service providing professionals.
- ^c In the UK, the responsibility of the provision of health and social care welfare is under the Department of Health (DoH) and Social Security. DoH was formed in 1966 as a result of a merger between the Ministry of Health and the Ministry of Social Security. DoH is answerable to Parliament for the strategic control and direction of the NHS and social services. DoH is therefore the apex government body for healthcare matters in the UK (Source: Department of Health).
- ^d The Treasury is the United Kingdom's economics and finance ministry. It is re-

responsible for formulating and implementing the Government's financial and economic policy (Source: HM Treasury).

- Epidemiology is the scientific study of factors affecting the health and illness of

individuals and populations, and serves as the foundation and logic of interventions made in the interest of public health and preventive medicine (Source: Wikipedia online dictionary).