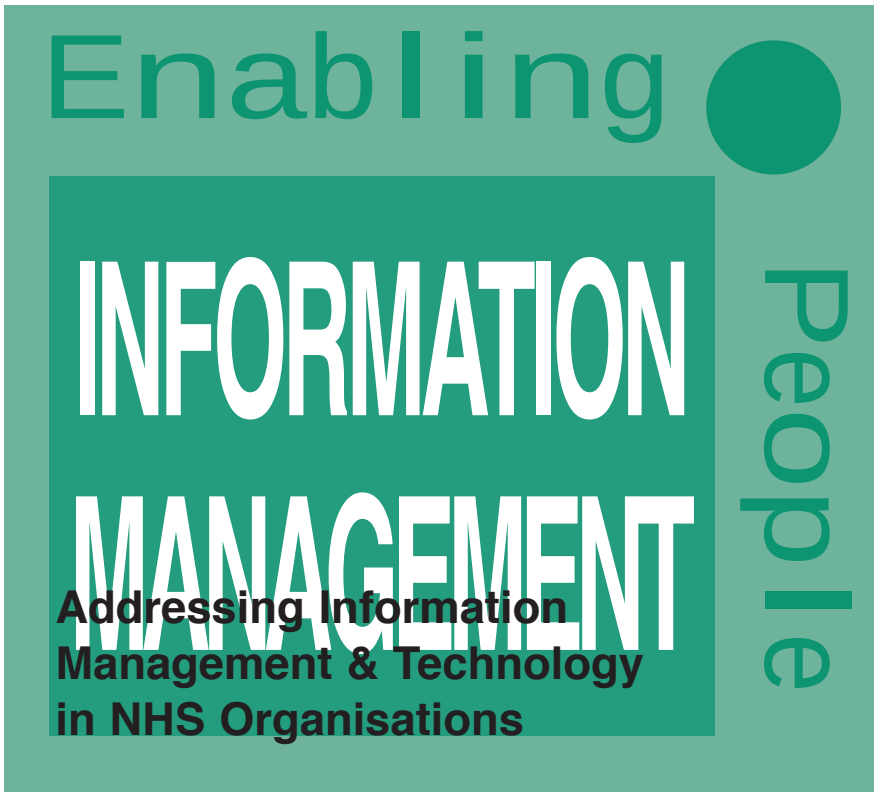
GOOD PRACTICE

Guidance for NHS Board Members



NHS
Executive

The Enabling People Programme

This guidance is aimed at all NHS Board members, in particular non-executive directors, who together with the executive management share the responsibility for ensuring that all aspects of their organisation, including information management and IT, work together to deliver high quality, cost-effective patient care and services.

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Foreword

Information, with its associated technology, is one of the most important resources in the National Health Service. It is also one of the least well understood. Inevitably, the drive for improved patient care is linked to better value from information, and the efficient management of information and its supporting technology is an important part of the responsibility of those accountable for public funds. It is often less clear how this responsibility should be discharged.

The Worshipful Company of Information Technologists has among its objectives, the promotion of the art and science of Information Technology and the encouragement of this by means of professional and social discourse. From its unique and multidisciplinary membership, it created a Medicine and Health Panel, which identified a need to provide advisory guidance to help NHS Trust and Health Authority Boards manage their responsibility for Information Management and Technology.

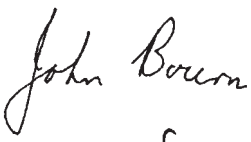
Consultation between the NHS Executive, the Worshipful Company, the National Audit Office, the Audit Commission, and the British Computer Society revealed a commonly held view that this was something that was required. A Working Group was put together, composed of representatives from each organisation, and charged with producing guidance on good practice to be a ready source of regular reference. However, it is not a document that necessarily represents the official policy or views of the Worshipful Company or any of the other signatory organisations.

It is now with great pleasure that together we commend this document to you, which we hope to review from time to time. We trust that it will help you carry out the demanding task of managing efficiently your information and its supporting technology.

Signed:

David Mann
Master, The Worshipful Company
of Information Technologists

Frank Burns
Head of IM&T, NHS Executive



Sir John Bourn KCB
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Contents

Annexes

1. Introduction

1.1. Her Majesty's Government has published three White Papers for the NHS respectively in England, in Scotland and in Wales, and these have been followed by the publication of a revised NHS strategy for information, *Information for Health*[1].

1.2. Notwithstanding these developments, there are already many implementation programmes for Information Management & Technology (IM&T) underway in Trusts, Health Authorities and the Primary Care sector, and the development and modernisation of the Health Service is inextricably linked and dependent on the effective use of IM&T. This was underlined by the Secretary of State in his address to the nation heralding the launch of the White Paper *The New NHS: modern, dependable*[2] in December 1997 and further by the Prime Minister on the occasion of the NHS 50th Anniversary.

1.3. Information and communication systems will play an ever growing and essential role in supporting the delivery of health care. Those responsible for quality health care and for implementing the emergent health technologies need the support in turn of effective IM&T systems if they are to realise the full benefits.

1.4. The importance of good information and how essential it is in the delivery of high quality services may be illustrated by examples drawn from the studies conducted by the Audit Commission[3&4].

a) Information costs a great deal to collect and process. In 1995, 25% of the time of staff such as doctors and nurses was spent collecting and processing information. This means that approximately 15% of running costs in a typical Acute Hospital are consumed by information-related activity.

b) Poor information management created hidden costs for Trusts, for example in staff time wasted chasing and recording data or appointments/visits that were aborted because of incorrect patient details. In 1997 for a typical Community Trust, this equated to about 10% of total budget, or approximately £4 million.

c) Patient care can be greatly improved by better information. In 1997, the Audit Commission estimated that improving information could save Community Trusts in England and Wales up to £30 million annually through reductions in administrative support. A further £180 million of clinical time could be released to invest in patient care. This represented an average avoidable cost of £200,000, plus £1.2 million in clinical time released in each Trust annually.

d) Significant benefits can be achieved by using IM&T systems to improve upon current paper processes. For one Acute Trust in 1995, using appropriate ward-based computing and information systems meant time spent gathering information for consultant ward rounds was dramatically

reduced from 15 minutes to one minute for each patient, speeding diagnosis and treatment of patients, freeing clinical time and helping to co-ordinate care.

1.5. Such improvements, when achieved, should outweigh the costs of investment, especially improvements in the efficiency of existing processes. However, if information technology is the way forward, the investment needed for new information systems in an average Trust will be significant

1.6. The Boards of NHS organisations are ultimately responsible for many activities entrusted to members of professions (such as clinicians), in which the Board members themselves may not be qualified. The same applies to activities in information management, IT and of the specialist staff who support these functions.

1.7. It is the responsibility of NHS Board members to address IM&T issues because:

a) In general, information systems are required to support and facilitate business activities and processes, rather than to be ends in themselves. This is true whether they support immediate patient care, or facilitate clinical activity or aid the administration of resources.

b) Information systems compete for limited resources, both capital and revenue, on a significant scale.

c) Investments in information systems are capable of spectacular success and disastrous failure, and their history has too many examples of the latter.

d) Information systems have a history of being Information Technology (IT) driven rather than being user requirements or business-led.

e) The IM&T function does not have another body of closely allied professional expertise to provide checks and balances on its activities (unlike, say, a clinical speciality).

This responsibility is not diminished however the IM&T function is provided, e.g. through local Health Informatics Services. Careful management is still required to ensure the advantages of economies of scale are not outweighed by a lack of responsiveness and accountability. In all cases, it is essential that the Board has access to independent advice, either from in-house staff or from wholly independent outsiders.

1.8. This guidance contains the condensed wisdom of a number of individuals, from NHS and other organisations, accumulated over many years' experience of implementing IM&T systems. It is aimed to be helpful for all Board members, including in particular non-executive directors, who together with the executive management share the responsibility for ensuring that all important aspects of the operation of their organisation, including IM&T, work together to deliver high quality cost-effective patient care and services.

2. Using This Guidance

2.1. This document contains a set of seven key questions and recommended actions for NHS Board Members in respect of IM&T developments. In section 3, each of the questions is addressed in more detail.

2.2. The guidance associated with each question, together with additional material contained in the annexes and other reference materials, is not prescriptive. The detail of the answers received to the questions will vary amongst local health care organisations, according to local circumstances and priorities. However, the central theme of the responses should be consistent if organisations are addressing information management and technology issues in an appropriate manner.

2.3. Board members should ask themselves and their colleagues these key questions. The answers they receive may be extremely illuminating.

2.4. The guidance should be read but not then discarded. It should be kept available and should be consulted regularly on a section by section basis to help solve the issues in hand. To make it easier to use, the guidance is laid out to provide the questions considered likely to be a starting point, particularly for non-executive directors new to the subject of IM&T.

2.5. Individuals should dip into the main part of this document in order to understand the principles and details better. The annexes should be used as sources of reference when specific situations arise.

3. Seeking Answers To Key Questions

3.1. The following section sets out a series of seven key questions, to provide a starting point for NHS Board members to examine IM&T issues related to their health care organisation, and its obligations in the local and national context. It encourages Board members to ask:

3.2. The guidance is intended to encourage the direction of effort towards an end goal consistent with the organisation's longer-term vision and business, and to increase the chances for successful system implementations and service provision to be maximised.

3.3. It is suggested that Board members ensure they are satisfied that adequate answers can be provided to each of the questions:

i. as a means of assessing the local status of IM&T
ii. to obtain a clearer understanding of the potential for using IM&T to improve the commissioning and provision of health care
iii. to promote more effective and efficient health care through the application of IM&T
iv. to ensure resources are used wisely and effectively on projects conducted to professional standards.

If satisfactory responses are available, then the action required at local level, as set out in section 6 of the new strategy, *Information for Health*[1], will be much more straight forward to implement.

a) What is the overall core policy for IM&T within our organisation, in terms of:

i. its key objectives and priorities

ii. the provision of better patient care

iii. the relationship between the policy and that for meeting identified clinical need and other business objectives of the organisation

iv. the mechanisms used to ensure policy is reviewed and approved on a regular basis

3.4. In this document, we are making the following distinction between Policy and Strategy:

Policy: The principles upon which any measures or course of action are based.

Strategy: A method, plan or stratagem to achieve some goal.

3.5. At this point, the issue of Policy is considered, which should be formulated and agreed by the members of the Board. The following guidance proposes a set of general principles that could be considered when formulating IM&T policy, providing areas for consideration and further thought, and upon which information and related systems could be established.

a) Person-based health records should provide the primary building block for healthcare information systems, to support the delivery of quality care to patients.

Analysis of the underlying processes of healthcare, and of people's state of health, leads to the conclusion that healthcare information systems should be based on individual health records used by health care professionals.

There is a priority need and considerable scope to improve the quality of clinical record management over the whole of the NHS. The continuing reliance on paper processes perpetuates poor accuracy and inadequate inter-professional and inter-agency co-ordination in the care of individual patients.

The inaccessibility of summary personal health records, which arises from a combination of organisational fragmentation and paper record management, is also a serious impediment to effective epidemiological and clinical effectiveness analysis.

b) Information about health of individuals and populations, and about disease prevention, is necessary.

Proposals in the Our Healthier Nation[5] initiative recognise the need to improve the ability to monitor the state of people's health, in order to evaluate the health benefit of policies and programmes in terms of health gain. Although these issues are mainly a concern for Health Authorities, GPs and Primary Care Groups, NHS Trust information systems should be capable of capturing, analysing and reporting on data that contributes to the success of such policies and programmes in achieving targets for health gain. The development of outcomes and health status is an important influence on the nature of such systems.

c) Appropriate levels of security and confidentiality for all personal health information must be respected.

"*Preserving the confidentiality of personal health information must be a live issue for everyone*" (Chief Medical Officer)

One condition for the sharing of information on patients is the assurance that it will not be lost, corrupted or subject to unauthorised use.

At the request of the Chief Medical Officer, in December 1997 the Caldicott Committee produced a report[6] on the review of patient identifiable information. Recommendations on implementing the report include the appointment of a senior clinical "Guardian" who will be responsible for ensuring the local use of patient identifiable information is effectively governed by appropriate protocols. Final guidance on the Guardian's role will be published by the end of 1998.

Statutory duties in the area of security and confidentiality are set out within the Data Protection Act 1998, the legislation to implement the EU Data Protection Directive (95/46/EC) and which is effective in the UK from 24 October 1998.

d) Information systems should support change and must be accompanied by appropriate staff development and training.

The use of information systems is an integral aspect of change management. One of the most important features of any health care system is that person-based information must be kept secure and confidential, whilst nevertheless allowing health care and other professionals with legitimate needs to access parts of it, often across organisational boundaries.

It is vital to ensure that information systems facilitate change. Key areas where this change should be supported include:

i. developing the commissioning of health care and inter-agency working,
ii. the changing role of traditional NHS organisations and
iii. the increasingly important role of primary care professionals, in prevention and community care, and as the "gate keepers" to secondary care.

e) Information systems should support defined health care objectives, and positive steps should be taken to identify and achieve benefits.

Investments in information systems must be justified in terms of local objectives, local collaborative strategies and national initiatives. Accepted standards of cost / benefit appraisal and post-implementation evaluation are required, as the benefits of IM&T will not follow from simply installing the systems; it is always necessary to manage the achievement of benefits, and expected outcomes.

f) Information systems should support the processes of providing high quality, cost effective health services.

Support for operational patient care processes and clinical professionals are basic requirements for the provision of healthcare. While better information systems are needed to support organisational change, the most important rationale for investment in healthcare systems will be their contribution to the quality and cost effectiveness of direct patient care. 85 per cent of an acute hospital's resources are spent on clinical services; systems must support and impact on these key processes.

g) Management information should be produced, wherever possible, as a by-product of operational systems.

Information needs to be gathered to review and audit clinical practice, in order to identify and monitor effective healthcare interventions. However, the information used for tactical and strategic management purposes will always have to be treated with an amount of suspicion until information systems use operational activity as the basis for its derivation.

h) Generally, data should be entered into systems once, but with appropriate verification, and shared (within the bounds of confidentiality) amongst appropriate professionals.

Much of the information required to treat patients is the same for many groups of healthcare staff. Multiple entry of data is costly, time consuming and leads to errors and omissions. For example, an analysis at one combined acute and community Trust showed the same data being recorded repeatedly for one patient: name 19 times, address 10 times, date of birth 8 times, GP details 5 times, diagnosis 8 times, ward 5 times.

i) Each item of information should have a defined person responsible for ensuring that it is up to date, accurate and within the bounds of confidentiality for others to share.

Each user should feel a sense of ownership for the information they create, while being prepared to share it with other authorised users. If information sharing is to take place but nobody takes responsibility for the information in a system, it will become inaccurate and not worth sharing. Appropriate data quality assurance methods need to be used to ensure the validity of information.

j) Standards need to be implemented that enable the exchange of information between NHS information systems and with related systems in the local community.

Information sharing requires the ability of systems, regardless of supplier, to pass meaningful data from one system to another. Without the use of agreed standards, information exchange will never be efficient or effective. Standards need to be agreed for areas such as clinical language, contracting, results reporting, referrals etc., and will enable both manual and automated information systems to operate more effectively.

Integration of information across the systems operated by one organisation will enable the total management of resources and activities within that organisation. The integration across organisational boundaries, e.g. between GPs, hospitals and social services is critical, to allow a fuller view to be taken of individual patient needs and the options for meeting them.

NHS standards already exist and using these is vital in NHS-wide communication. Without this notion, local communities could develop local standards which then effectively sabotage wider communication.

k) Staff training and development should be provided to realise and deliver the benefits expected from the implementation of information systems.

At all levels throughout the NHS, the appreciation of systems and the value of good information remains poor, a situation that is exacerbated by a lack of awareness at senior levels. Executive and non-executive directors are, generally, unaware of good and best practice in the application of IT systems.

It is essential that senior clinicians and managers, who must develop their skills and understanding in these areas, give a lead. If not, NHS organisations will waste valuable resources on information and its provision.

l) Appropriate IM&T staffing levels should be provided to support the implementation and use of systems.

In common with other sectors of business and industry, there is a skills shortage in information management and IT throughout the NHS. Senior executives should ensure that their plans are matched by appropriate numbers of qualified staff.

3.6. Principles such as these should be the basis for IM&T policy found in any health care organisation, but they must be established and owned locally.

3.7. NHS Board members should satisfy themselves that:

Actions For Board Members

i. A policy for IM&T exists within their organisation;
ii. It was developed and continues to be based on sound principles and organisational need;
iii. It is owned by the whole Board and has been implemented throughout the organisation.

b) What is our current strategy for IM&T, in terms of:

i. Direct support for our defined IM&T policy and key principles?

ii. The sources, use, sharing and management of information as well as the technology that delivers it?

iii. The impact and effect of existing systems

iv. Ensuring ownership and support for the strategy throughout the organisation?

v. The mechanisms used to review the strategy?

vi. The links with other strategies upon which the organisation depends?

vii. The organisation's realistic level of competence and capability to introduce and manage change.

3.8. In the previous section, Strategy was defined as a method, plan or stratagem to achieve some goal, i.e. to implement Policy. However, it is fundamental that the strategy for any one particular aspect of a business should support and be balanced with those for other key areas.

3.9. The relationship between an organisation's Service/Business Plan and its IM&T strategy is crucial to success. Whilst the regular review of the IM&T strategy is important, it is the Service Plan that should dictate the direction of IM&T. The wider and regular review of the Service Plan is therefore a pre-requisite to a review of IM&T needs.

3.10. There are many models and schools of management thinking which help to illuminate strategic issues relating to IM&T: one approach is that of Strategic Alignment, a concept developed in the early 1990's at the Massachusetts Institute of Technology Sloan Business School[7].

3.11. This approach encourages an alignment of the Business, IM&T and Human Resources strategies, based on a holistic approach to the organisation's information requirements. The result should be that information systems and technology are harnessed more effectively to the business and management needs of the organisation, and through their involvement in the process of its design, staff are able to make the most effective use of the systems.

3.12. In the past, the decision that an NHS organisation implement a new information system has been initiated typically by the IT domain, because of their focus on technology. Clearly, an approach that relies entirely on IT and does not take account of business objectives or human resource factors is not appropriate. A better approach is to take a holistic examination of the organisation's information requirements, in other words a needs-based approach to information systems and technology. Although usually led by IM&T professionals, the decision making process then embraces the business and human resource domains, rather than remaining within the information technology domain alone.

3.13. A brief discussion of Strategic Alignment, together with the steps involved in a needs-led approach to the development of information systems, is included in Annexes 1 & 2.

3.14. It is important to note that we are not advocating a long and unwieldy planning process from which perfectly aligned and elaborately optimised plans arrive after a lengthy series of meetings - such plans are inevitably obsolete before they are adopted. What we are advocating is a strategic environment in which the business, IM&T and human resource aspects of strategic decisions are all considered in a coherent manner.

3.15. NHS Boards should look for evidence of how their health care organisation is taking account of individual and organisational needs in determining their IM&T Strategy, and how this strategy relates to other business domains. More specifically, Boards should ensure that:

Actions for Board Members

i. a clear and comprehensive policy exists for benefiting patient care and public health, whilst meeting the operational needs of the organisation with the use of IM&T;
ii. the arrangements for implementing the strategy are formally endorsed by all parties including the staff involved;
iii. implementation plans are broken down into manageable parts, each with a clear business case incorporating a plan for achieving outcomes and realising benefits;
iv. there is realistic long term funding available;
v. potential risks are identified and measures are in place to manage them;
vi. the lessons from past successes and failures have been learned;
vii. the strategy is reviewed regularly in the light of technological and operational changes.

c) How do we cope with resource limitations?

3.16. In almost any responsible public sector organisation there will always be more claims on resources than resources available. IM&T offers some particular problems in this area:

a) The real costs and timescales of IM&T systems are often poorly estimated or understood.
b) IM&T projects have to be axed (cancelled or substantially reduced in scope) because there is no realistic prospect of delivering benefits at a reasonable cost and timescale.
c) The cost of IM&T hardware falls by c. 35% per year for a given level of performance.
d) The costs of software 'maintenance' (ie correcting errors and making enhancements) are considerable, and can often leave scant resources for development work.

3.17. In dealing with resource limitations the Board needs to:

a) Assess the overall level of capability of IM&T available to the organisation.(see 3.19)
b) Encourage the effective management of IM&T within that capability level.
c) Encourage the progressive development of increased capabilities.
d) Deal appropriately with Board-level issues that arise.

3.18. A 1997 study[8] by McKinsey and Microsoft identified 6 key principles of best practice in companies that make really successful use of IM&T. These can be adapted as follows:

a) Make IM&T a healthcare-driven line activity, not a technology-driven staff function.

Within the agreed strategy, functional heads should be accountable for identifying the requirements, implementation, and realising the benefits of a new application. This requires sensitive collaboration with other professionals, ensuring the needs of others in the organisation are not forgotten. The IM&T function works with them to help specify or develop the applications and "owns" the technology infrastructure. But if things go wrong the functional head should be held responsible.

b) Make IM&T funding decisions like other funding decisions - on the basis of value and risk.

All projects involving IM&T should define clearly the anticipated costs, risks, timescales and healthcare benefits. Where these are unclear, a small-scale test or pilot should be considered. Systematic attempts should be made to learn from successes and failures. Failing projects should be restructured (including being terminated or greatly cut back) and the lessons learned (see 3.21).

c) Drive simplicity and flexibility throughout the technology environment.

The IM&T organisation should be given strong support by the Chief Executive, to define local standards, implement national standards, and enforce both; line managers need to make a genuinely overwhelming case for even a local standard to be overruled. The 'maintenance' costs of multiple standards and incompatible systems can be horrendous. However, there can be trade-offs between simplicity and flexibility - systems that attempt to be all things to all people are usually far too complex and costly anyway.

d) Demand near-term healthcare results from development efforts.

Projects should have regular clear deliverables, normally at least every 90 days. Interim deliverables should as often as possible also give clear healthcare benefit, although this may not always be possible on a large project. Any project that misses its milestones should be considered under 3.21 below.

e) Drive constant year-to-year operational productivity improvements in IM&T.

Active management of cost effectiveness in this area is important, to reduce the extent to which operations and maintenance spending crowd out new development.

f) Build a healthcare-smart IM&T organisation and an IM&T-smart healthcare organisation.

It is hard to over-state either the difficulty or the importance of this task. Almost all organisations need to put a considerable amount of effort into training, dialogue and project work to build deeper mutual understanding between IT people, line management and other professionals. But without this investment the potential benefits of IM&T are most unlikely to be achieved. The head of IM&T should be seen as a healthcare manager first and a technologist second, and should preferably report to the Chief Executive. The IM&T and healthcare organisations should be closely integrated.

3.19. It is essential to make a realistic assessment of the current IM&T capabilities and maturity within the organisation. Adapting the 1997 McKinsey study suggests this framework:

a) Frozen in the Past.

History of low or erratic IM&T spending; mainframe-based application portfolio; long development times; little flexibility.

b) In the abyss.

Many organisations are either falling into, or climbing out of, *'The Abyss'* which is characterised by:

i. Ineffective new development, with IM&T projects rarely hitting their milestones.

ii. Poor focus on healthcare priorities with IM&T projects relating poorly to priority healthcare needs.

iii. Other symptoms include: IM&T spending growing rapidly; operations and maintenance dominate budget; complexity of distributed environment exploding.

A way of assessing an organisation's current position is described opposite.

c) In control.

Spending under control with sensible healthcare-driven priorities; distributed computing environment robust and simple; applications portfolio up to date; new projects managed effectively.

d) Best Practice.

Spending focused on achieving healthcare advantage; highly robust and flexible architecture; organisation skilled at employing technology to support healthcare value.

It is almost impossible to move at once from (a) or (b) to (d).

3.20. If your organisation is in the Abyss, then it is generally necessary to focus resources by restructuring projects (see 3.21 below) and investing in training or other measures to improve your organisation's level of IM&T capability.

Are you "in the Abyss"?

A reasonable assessment can be obtained by plotting, over time:

i. The % of IM&T projects which are hitting their milestones

ii. The percentage of IM&T projects which relate to high priority health care needs.

If these are below 80% you are probably "in the Abyss": the direction of the graphs will give a reasonable indication of where you are heading.

3.21. One of the most important skills for any organisation using IM&T is to manage projects effectively. Where failures have occurred, this could mean either stopping the project or very substantially reducing its scope. If the lessons learned from a project are assimilated, money spent on substantially restructured projects is not wasted. The following points should be considered:

a) Any IM&T project should be monitored regularly (at least every 90 days) to ensure that the projected costs, benefits and timescales are still viable. A project is 'troubled' if: it misses a milestone; if the estimated cost or time remaining to completion does not decrease; if the projected benefits decline significantly; or if expected outcomes appear unrealistic.

b) Any troubled project should be brought under effective control. The causes should be accurately recognised, effective remedial action should be prescribed, responsibility for the recovery allocated to an identified individual, and strict project monitoring applied. All these factors should be embodied in a new or supplementary agreement with the project team or contractors, which should then be rigidly enforced. An independent review may be required. If these conditions are not met, the project should be axed. If a project is 'troubled' twice in a row then it should be axed unless there is overwhelming evidence, backed by an independent review, that it is wiser to reprieve it. Thrice troubled projects should always be axed.

c) When a project is axed it should either be stopped entirely, or an independent assessment should be made of the maximum feasible reduction in its scope. This will inevitably leave unmet healthcare needs compared with the original scope of the project, but there will almost always be more cost-effective ways of meeting these needs than pursuing the original plan. An indication of how these unmet needs could be met by a subsequent project should also be made.

d) Projects are often kept going far too long because of a desire to avoid the management embarrassment associated with axing a project. This is often compounded by the fact that the contractors may have strong interests at stake. Such projects generally have to be axed later, with far greater embarrassment and cost. NHS Boards should ensure that contracts reserve the right to axe the project if it becomes troubled. There should always be an exit strategy; it is essential not to become so dependent on a project's completion that the Board seems to have no option but to continue with unsatisfactory projects.

e) When a project is axed a systematic effort should be made to capture the reasons and the lessons learned. At minimum a written report should be produced.

f) It will often turn out that advances in IT in the time between the original project specification and the decision to axe it allow the major healthcare needs that would have been addressed to be met with substantially better and cheaper technology. It may be to the Board's and the contractor's mutual advantage to agree terms for the assignment of rights in the material which is acceptable as an alternative to discarding everything and seeking legal redress for the breach of contract.

3.22. The application of a robust project management methodology by suitably trained and qualified individuals should substantially reduce or negate the need to axe projects. Section 3.45 refers to the use of the methodology recommended for managing NHS projects, but be aware that the mechanistic application of such an approach does not guarantee that those projects will be successfully concluded or will not suffer difficulties.

Actions for Board Members

3.23. NHS Boards should:

i. Encourage a realistic assessment of the IM&T capability available to their organisation.
ii. Encourage the use of a sound methodology to manage projects and help the Chief Executive take the appropriate actions if it is necessary to bring projects under control.
iii. Support the progressive development of the successful use of IM&T.

3.24. It is the Chief Executive who is ultimately responsible and accountable for the IM&T systems used by the organisation. However, Board members, including non-executive directors, have a major support role to ensure good practice is followed.

3.25. Board members might consider the following framework to determine to what extent they and their colleagues are addressing these responsibilities on behalf of their organisation. The list is not definitive, but provides a summary of good practice:

a) Addressing those areas of business activity that are likely to benefit through development of IM&T.
b) Resolving how much, if any, responsibility for decision making the Board devolves to an IM&T Steering Group, incorporating Board members who are already IM&T aware, or who are keen and able to devote time to becoming well informed.
c) Approving the Terms of Reference for an IM&T Steering Group (possibly along the lines of an audit committee as recommended in the Cadbury and Hempel reports on corporate governance).
d) Deciding what is the best IM&T management structure to meet the needs of the organisation, and ensuring the Steering Group establishes close liaison with the IM&T Specialists, the principal users and with any external advisers.
e) Setting out the reporting processes to the Board, including a programme of review meetings, with clearly stated objectives.
f) Approving Terms of Reference (TOR) for reviewing IM&T strategy.
g) Ensuring there is adequate provision of funds, resources, and time for the education and training of all staff.
h) Ensuring that the leadership and key roles of the IM&T function are entrusted to properly qualified professionals.

3.26. Selecting appropriate strategies for change and overseeing their management and implementation places special demands on top management. The tasks that have to be overseen are complex and varied.

3.27. The responsibilities for these tasks go to the heart of an organisation, and the Board and Chief Executive should be committed to their achievement. The tasks require a good understanding of IM&T factors allied to the normal skills and knowledge of top executives. To achieve the necessary blend of competence in the management team, a Chief Executive normally enlists the support of an Executive Director ideally appointed to be responsible solely for IM&T.

3.28. Without lessening the need for the Chief Executive's informed involvement, this individual is responsible ensuring the procurement and co-ordination of resources for IM&T in support of functional activity. However, they also need to have the experience that allows the understanding of organisation direction and boundaries, management structures and the ability to work with other members of corporate management and the management of related organisations to resolve issues.

d) Who has responsibility and accountability for IM&T in terms of:

* strategic planning

* implementation and support

* validation, quality assurance and review

* allocation of resources

i. What are their qualifications and capabilities in these areas?

ii. What is their status within the organisation?

3.29. The days of purely technical leadership of the IM&T function are now over. Appropriate IM&T personnel should be recruited on the basis of their wider experience, as integral members of a change team. Boards need to be aware that there is real benefit in employing strategic "change agents" who are specialists in IM&T and have valuable exposure to matters such as procurement, business re-engineering, contract negotiations, managing change, strategy formulation and finance. This provides a new and powerful means of focusing on service and business need, and the implementation of effective solutions.

3.30. Information management and IT are essential functions within an organisation to meet both its internal and external obligations. Traditionally, the responsibility for their management has often been merged with other functions, e.g. finance. NHS Boards should seriously question this arrangement, as the rate of change in technology and the demand for quality and timely information increases.

3.31. The development aspect of the IM&T function and implementation of strategy is normally undertaken on a project basis. In order to structure and resource a project properly, it is necessary to be clear about the type of project involved, whether:

- In house development
- Development by contractor or external agency
- Standard package acquisition
- IT infrastructure construction

The types of project team composition for various types of project are outlined in Annex 3.

Actions for Board Members

3.32. NHS Board members should ensure that:

i. The responsibilities for IM&T are clearly defined and understood at Board level.
ii. Appropriate levels of accountability for IM&T are clearly defined and understood by relevant individual staff.
iii. The IM&T function is appropriate to the task in both structure and competence.
iv. Relevant staff have appropriate skills and qualifications commensurate with the responsibilities and degree of accountability.
v. The individual with lead responsibility for IM&T has adequate authority, seniority and influence at Board level within the organisation.
vi. The activities of the IM&T function are aligned with the agreed policy and strategy in practice.

3.33. The specification and development of computer-based information systems is normally undertaken using a generic model, the essential elements of which are:

1) **Requirements Analysis** - what the users need from the system

2) **Functional Specification** - what the system must do to meet these requirements

3) **Technical Design** - how the system is to do it (this may sub-divide into more detailed stages)

4) **Creation of Software** (by hand coding or generation)

5) Black Box (Module and Link) **Testing** and White Box (System) Testing (with correction and regression testing)

6) **Acceptance and Implementation**

7) **Operation and Maintenance**

8) **Post Implementation Review.**

3.34. This description is called the "Waterfall Model" because it depicts the elements sequentially. In practice many developments overlap and iterate the elements (e.g. by using early "prototypes" of the proposed system to allow users to refine details of their requirements or tune the user interfaces to their preferences). However, the Waterfall Model is valuable as an illustration of the essential logical elements of any system development.

3.35. The model is based on original bespoke development. In practice many systems are implemented by adopting, and possibly adapting, a standard package or by having multiple packages integrated together. However, the selection of packages, although likely to produce large savings in development effort, is conceptually more complex than bespoke development. Instead of a single logical starting point (the users' perceived requirements) there are two, i.e. the ideal requirements and the facilities possessed by the package(s). Any differences must be identified (in a "Gap Analysis") and be reconciled for each package under consideration, the advantages of adaptation (if any) weighed against the costs, and the optimum fit selected.

3.36. If set against the Waterfall Model, Requirements Analysis remains the organisation's responsibility, the Functional Specification is the complex area of compromise in interaction between the organisation and prospective suppliers, the Technical Design, Creation of Software and Testing stages are the supplier's responsibility, Acceptance is the organisation's, as is the primary responsibility for the remaining stages.

e) How do we manage and control our IM&T in terms of:

i. Applying procedures for specifying, developing, procuring, and implementing systems and services

ii. The way projects are managed

iii. Confirming that IM&T systems deliver real benefits to patients and the organisation

3.37. Acceptance is a key stage. It is the final hurdle before a system is deemed fit to be brought into actual use, not a fault-finding stage of development. Acceptance testing must be rigorous, including the test of exception and error conditions, recovery and fallback measures, and performance. The basis is essentially the agreed functional specification. The inverse of acceptance is rejection; any indulgence granted to a supplier in respect of a system which does not fully pass acceptance should be carefully limited and controlled, and should be without prejudice to the organisation's rights. Any failure requiring rectification should, unless trivial, require the complete acceptance test sequence to be re-run.

3.38. Board members need to be aware of these stages, and should determine the situation in their own organisation, particularly in respect of any in-house development projects for IM&T systems. However, it should be remembered that information systems are not all necessarily computer-based, and these generic stages can also be applied to other solutions.

Procurement Of Systems & Services

3.39. Published guidance for the procurement of IM&T systems and services within the NHS is set out in procedures developed by the NHS Executive and NHS Supplies.[9,10,11] Crucial amongst these is the Capital Investment Manual (CIM), which will be republished in 1999.

3.40. The principal approach to procurement has been developed by NHS Supplies, who produced the POISE methodology (Procurement Of Information Solutions Effectively), now published in its 2nd Edition but also due to be revised in 1999.

3.41. POISE consists of guidelines on best practice together with a standard set of procurement stages and tools. Employed correctly, the POISE guidelines are intended to enable NHS organisations to obtain effective information systems which:

a) support clinical and business objectives
b) will be effective in use
c) will be reliable and resilient
d) represent best value for money
e) meet the requirements for open public procurement

3.42. Input to POISE originates from the local business plan that produces the requirement for the information system. Before the POISE process can begin, there must first be clearly defined clinical / business goals, expected benefits, an IM&T strategy and infrastructure requirements. The output from POISE should be the implementation of a solution that has demonstrable benefits, provides effective information and represents best value for money.

3.43. Further details of current POISE may be found in Annexe 5, including a diagram that relates POISE stages to the business case approval process. Details are also provided of the current delegated financial limits, together with a summary of the criteria used for business case approval.

3.44. It should be noted however, that these procedures are only useful when applied by competent staff who understand the underlying tasks.

Project Management

3.45. The methodology recommended by the NHS Executive for managing IM&T projects is PRINCE® [12] (Projects IN Controlled Environments). Originally developed by the CCTA, the central government agency responsible for computing and telecommunications, the methodology has undergone a number of revisions, but remains the accepted standard and is referred to in the criteria for business case approval.

3.46. In its full form, PRINCE can be a daunting tool to use, which led to it being used in several cut-down manifestations or indeed "in name only". The recent development of PRINCE 2 has recognised this, providing a more straightforward methodology to apply. Further details are given in Annexe 6.

Benefits Assessment & Outcome Achievement

3.47. NHS Board members should be certain that the plans for assessing the benefits and achieving the outcomes to be expected from IM&T investments are well thought through and resourced adequately. They should be an integral part of the project implementation plans and remain the responsibility of each organisation, even if procurements are undertaken jointly with other agencies.

3.48. Ideally, identified benefits need:

a) To be quantified using an appropriate measurement unit
b) To be valued, where possible (e.g. in terms of cash saved)
c) To be apportioned across the various business / clinical departments responsible for its realisation
d) To be agreed by those responsible for its realisation

3.49. A baseline measurement ought to be taken before implementation of the IM&T system in order to demonstrate benefits when realised and outcomes when achieved. This data is usually documented in a register or log, and becomes the basis for developing a plan as a management tool identifying, and preferably naming, individuals with responsibility for realising each benefit.

3.50. The plan should also identify how the organisation will integrate the technical IM&T system rollout with human and organisational aspects and achieve the outcomes expected from the investment. It is likely to encompass (but not exclusively):

a) Management of organisational change and changes in personal responsibilities
b) Staff education and training
c) Changes to working practices
d) Changes to the way the organisation communicates with patients, other health care organisations, and it's suppliers.

3.51. For major projects, the Chief Executive will normally take personal responsibility for benefits realisation and ensuring outcomes are achieved by the organisation. However, a specific individual may be appointed, with the responsibility for promoting, verifying and reporting on the realisation of benefits and achievement of outcomes. It may be seen how the plan is a critical component in delivering a successful IM&T investment project.

Private Finance Initiative

3.52. The Private Finance Initiative (PFI) is a means of harnessing private sector expertise and finance to public sector development needs. Key to this is the concept of transferring risk to the private sector where the private sector is best placed to manage that risk e.g. technical obsolescence. PFI is now the usual route for funding IM&T projects, though its use is no longer mandatory (see Finance Directorate Letter FDL(97)26) [13].

Actions for Board Members

3.53. NHS Boards should be satisfied that:

i. The procedures that make up the process of IM&T system and services specification, development, procurement and implementation are appropriate.
ii. The responsibilities of Board members with respect to IM&T system and services procurement are understood.
iii. Appropriate methods and adequate skills exist in the organisation for the management of IM&T projects.
iv. The benefits accruing from any IM&T system or service procurement are real and achievable.

f) What are the management policies and procedures for dealing with the risks associated with IM&T?

3.54. The subject of risk management is considerable. However, Board members should be aware of the measures that their organisation has taken to minimise the effect of risk and the consequences of ignoring the issue.

3.55. There are at least three classes of risk; that the project will fail to be completed either at all, or within an acceptable time, or at an acceptable cost. These are referred to here as **"Project Risks"**. They and available counter measures are discussed in 3.60 below. Another class is the risk that systems actually in use will fail or malfunction, referred to as **"Systems Risks"**; these may be life threatening in a hospital environment. They are discussed in 3.62 below.

3.56. Whilst risk must be considered at an organisational level, it is usually assessed at project level. Here, risk analysis examines both the probability and impact of all substantial internal or external factors affecting the viability of a project. These might include the possibility of an option failing to deliver a benefit, or, in the event of a supplier going out of business, any benefits at all, and it will always look into the risks of implementation cost and time overruns for systems development or service delivery.

3.57. A key feature of risk analysis is that it helps to highlight potential problems which, though unlikely to occur, would be especially damaging if they were to materialise. More importantly, risk analysis leads on to the development of a risk management strategy that seeks to avoid (e.g. "design-out") certain risks, or reduces the probability of risk events occurring, and/or their impact if they do.

3.58. Structured risk analysis should be part of any organisation's overall risk management strategy, but must be an integral part of an IM&T project from the start. It is not something that can be "tagged-on-at- the-end" in order to bring an otherwise poor business case up to scratch.

3.59. The development and submission of an IM&T business case for approval should be a requirement for all IM&T projects, and is an integral part of the POISE process for major procurements (see Annexe 5). For the preparation of an Outline Business Case, it is generally only necessary to undertake a high level risk analysis, sufficient to identify which of the options are most or least risky, and to build a picture of the total risk profile for the project. For the Full Business Case, the risk analysis must be carried out in more depth, and risk management techniques such as sensitivity analysis, be fully developed for the preferred option, demonstrating how those risks can be controlled effectively.

3.60. Some of the most common types of risks specific to IM&T projects include the following;

a) The possibility of a new or bespoke system not working as anticipated
b) A system being dependent on some other extraneous factor
c) Cost and time overruns
d) The ability of staff to cope with change and deliver the anticipated benefits.

3.61. Many projects fail because of inadequate attention to the change process and Boards should assure themselves that the right change environment has been created. Key to this will be the skills of the staff, but the pace of change can often be a risk that goes without any attention. The drive for success and the project management methodologies that encourage this can often leave important factors that facilitate the change process to one side. Change is about attitudes and often these attitudes need change in preparation for further change.

3.62. The discussion so far has concentrated on what might be called "project" risks associated with information systems. It is important also to consider the "system" risks that could arise as a consequence of the project risks materialising. Such risks are, of course, very much dependent upon local circumstances, but may include:

a) Inability to provide treatment to or information about individual patients
b) Inability to process payments or maintain contract information
c) Inability to maintain vital communications services
d) Becoming dependent on a system before it is properly proven to be correct and reliable.

3.63. There have been several recent examples where such risks have materialised, sometimes with unfortunate and disastrous consequences. Ultimately, it is the Board that is responsible for ensuring these things do not happen.

3.64. In all of the above, the Private Finance Initiative will be one of the tools for managing risk, by transferring appropriate risk to the private sector. For example, non-delivery of service, cost and time overruns, and technical obsolescence are usually appropriate for transfer. Ensuring value for money is a Board responsibility; good use of PFI is a means of delivering value for money.

Actions for Board Members

3.65. NHS Board members should be satisfied that:

i. An organisation-wide risk management strategy is in place, which includes the methods and procedures to handle IM&T-related issues.
ii. Risk assessment is part of every IM&T project.
iii. There are clear lines of responsibility and accountability for risk assessment.

3.66. Members of NHS Boards, particularly non-executive Directors, may not have a thorough or up to date understanding of all the issues associated with Information Management and Technology. However, it is hoped that the contents of previous sections in this document have highlighted the responsibilities placed on NHS Boards and illustrated how important it is for their members to address IM&T matters.

3.67. Today, most people are aware that information technology development is advancing at an increasing pace. But it is important to have a broad grasp of these developments, in order to understand the opportunities they offer and how individuals and healthcare organisations may exploit them.

3.68. Perhaps the most accessible sources of information available to NHS Board members are the IM&T Specialists employed by their own organisation. Unfortunately, there has tended to be an inadequate dialogue between IM&T Specialists and their colleagues in the past, but they are often in the best position to advise on healthcare related IM&T.

3.69. A Trust or other healthcare organisation will normally have IM&T awareness, development and training programmes available to all staff, including Board members, senior executives, clinicians, medical staff, and all levels of manager. Indeed it is a responsibility of the Board to confirm that such programmes are available to staff in support of the organisation's IM&T strategy.

3.70. A question that perhaps should be asked is:

"How often in the last year have you or your Board colleagues visited other healthcare organisations, or attended events such as conferences, to help improve your understanding of IM&T issues?".

The largest healthcare computing conference in Europe is held annually in the UK, usually in March. All the major healthcare IM&T suppliers support it, and delegates may attend a variety of presentations and workshops, from NHS organisations as well as academic institutions, devoted entirely to healthcare IM&T.

3.71. To complement these sources of advice and information, Board members may also wish to talk directly to systems suppliers, use external consultants or simply read the computing press. Each of these sources will be able to provide a view on the opportunities presented by current information management and technology.

g) How do we ensure we are exploiting the opportunities presented by current information technology and from where does the Board get its advice and guidance to support its key decisions on IM&T issues?

4. Summary Of Recommended Actions For NHS Board Members

What NHS Board Members Need to Know

4.1. The management of information and technology in the National Health Service involves more than managing computer systems. It includes the management of all information systems, whether paper-based (such as medical case notes) or electronic. Even more than systems, it includes the whole aspect of collecting, coding, storing, communicating and using information, which is so important to the operation of the Health Service and its provision of care to patients.

4.2. Although each NHS organisation is likely to have a nominated person with responsibility for IM&T, the responsibility for the proper conducting of the organisation's IM&T rests with the Board of the organisation as a whole. This responsibility covers:

- the development and maintenance of the organisation's IM&T policy and strategy, ensuring consistency with national policy
- the approval of major programmes and projects involving IM&T, and the mechanisms for their funding, monitoring and control
- ensuring that the direction of IM&T programmes and projects are in the hands of fully competent and accountable staff, working to appropriate terms of reference and under the direction of an appropriate executive board
- the realisation of benefits and achievement of organisational outcomes from investments in IM&T programmes and projects.

4.3. The principles underpinning the proper management of IM&T are the same in health as they are in commerce or government. However, the complexities of health care provision and management mean that certain elements need to be emphasised. All Board members need to appreciate that:

- benefits come from the use of IM&T solutions, not simply from installing them
- implementing IM&T solutions requires long term commitments:
  (a) financially, and
  (b) by users (both clinical and managerial)
- even if some IM&T services are sourced externally (i.e. bought in), the need for skilled and capable IM&T management remains within the organisation.

What NHS Board Members Need to do

4.4. The members of NHS Boards need to satisfy themselves:

- that an overall IM&T policy and strategy exists for their organisation, and that it is being implemented and maintained
- that the IM&T policy and strategy was - and continues to be - developed on sound principles and business needs, encompassing support for clinical practice and care of the patients
- that the delegated responsibilities and accountabilities for IM&T are clearly defined and understood
- that the IM&T function is appropriately structured, skilled, resourced and authoritative, and that it is aligned within the management structure of the organisation
- that they are aware of the process of specification, development, procurement, and implementation of IM&T systems and services, and their own responsibilities within the process
- that the benefits accruing from any IM&T investment are real, the outcomes are achievable and that the risks inherent in any IM&T investment are realistically assessed.

The Concept Of Strategic Alignment

Annexe 1

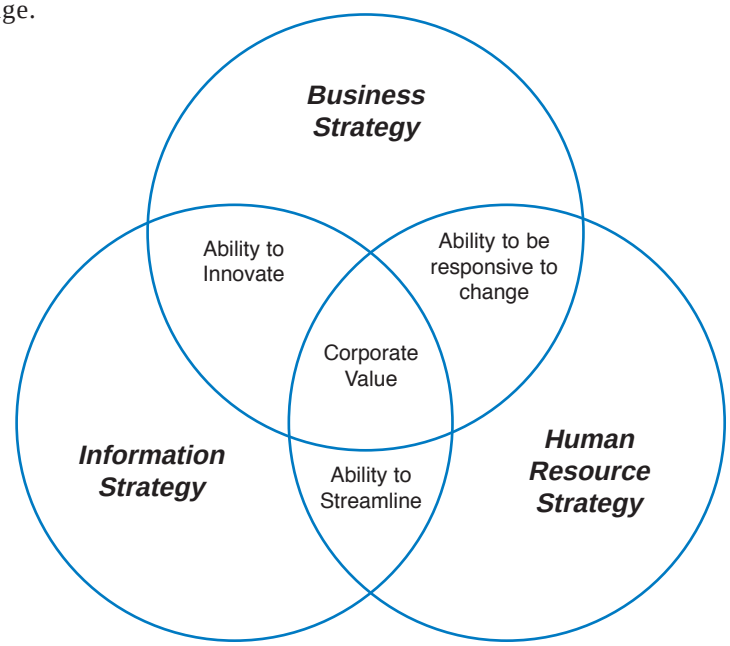
1. Over the past decade the business environment, including healthcare, has been turbulent - and it looks as though this will continue for the foreseeable future:

   - Increased competition is coming from further afield;
   - Consumers have become more aware of their ability to influence choices;
   - Technology is developing at an ever increasing rate;
   - Fax machines, computer links and the Internet have made communications virtually instantaneous;
   - More businesses are operating outside their original environment;
   - Volatile financial markets across the world cause instability.

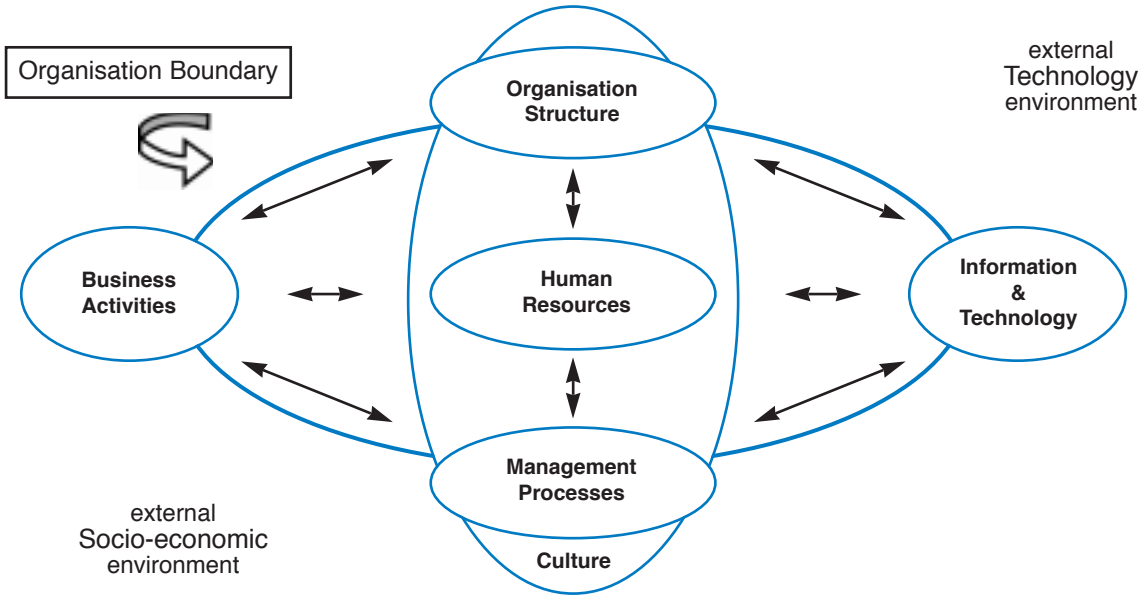
2. At the beginning of the 1990's, the Massachusetts Institute of Technology with its Sloan School of Management produced a study[7] - Management in the 90's. It concluded that organisations that survive and develop in the face of these difficulties are those with strategies that give them advantage over competitors, or allow creative innovation in products, services and the ways they are delivered to consumers; in other words, 'Strategic Alignment'.

3. The key element in these successful organisations has been the effective planning and integration of their strategies for business activity, human resources and for information management, systems and supporting technology. When an organisation's strategies are in harmony, enhanced corporate value is produced, i.e. the value or benefits to the organisation that are greater than the sum of the individual parts. If any misalignment exists, the corporate value and benefits will be affected.

4. This concept is illustrated in the following diagram. This shows that if any of the circles representing the three strategies shifts in relation to one another, indicating the relative integration of strategy, there will be a consequent affect on the ability of the organisation to streamline, innovate or respond to change.



5. The process is related to a conceptual framework. On one side of this is the organisation's business domain - their services or products and the ways they are delivered - and how they introduce changes to these.



On the other side of the framework are the information systems, their management framework, IM&T specialist staff and supporting technology. In the middle of the framework sits the human resources domain reflecting the culture within the organisation - the way it is structured, its employees and the jobs they do, together with the management processes of the organisation.

Finally, the organisation has to be able to respond to environmental factors such as changes in social, economic and technological conditions.

6. Organisations that are able to integrate and plan across all these domains are able to:

- Accrue the most benefit from their investment in information systems and technology,
- Apply them to their business and human resource needs,
- Train and equip their staff so that they make best use of information systems and technology, and
- Always be ready to respond to change.

A Needs-led Approach To Information Systems Design

Annexe 2

There are five main steps involved in a needs-led approach to information systems design.

1. **A comprehensive picture of the organisation and its external relationships is needed, which sets out its internal structure and the key external bodies to which it is accountable or works with.**

   For example, in an NHS Trust, there may be the following levels:

   - the strategic level, comprising the Trust Board and executive team of business and clinical directors;
   - the management level, comprising heads of departments and operational managers;
   - the operational level comprising clinical staff and others involved in the delivery of patient care, and their administrative staff.

   The external network consists mainly of:

   - the parts of the NHS Executive to which the Trust is accountable;
   - the local health community with which the Trust works to deliver services;
   - local primary care groups that refer patients to the Trust;
   - local Social Services departments, with which the Trust may provide joint services.

2. **Set out the planned development and key processes for each part of the organisation at each level.**

   Taking the example of a Community NHS Trust, key among its strategic objectives may be increasing services provided to GPs within local Primary Care Groups, developing the range of services it provides (such as speech and language therapy) and improving the liaison with acute hospitals on the discharge of patients.

   Critical activities for managers may be identifying localities with most need and allocating resources accordingly, analysing tasks done and matching these to the skill mix of staff, and having methods in place to plan and monitor the use of resources.

   At the operational level, activities may include developing referral procedures, assessing patients, deciding on treatment and carrying it out, co-ordinating care with other professionals and auditing clinical outcomes.

3. **Identify information and communication needs in terms of what information is needed to carry out the processes identified in Step 2, where it comes from, what is done with it, who receives it, and what sort of information systems and technology will make this happen.**

Taking an example of a General Practice, There may be a strategic objective to increase the provision of physiotherapy services within the Practice.

The partners and practice manager will need information from patients about the kinds of services they need; whether they are satisfied with current services provided by the practice and their use of other agencies; data on the costs of providing such a service within the practice compared to referring patients elsewhere.

4. **Set out the key developments and activities at the strategic, management and operational levels, and the information and communication links between these.**

Returning to the example of our NHS Trust, at the strategic level, the Board and executive team must monitor expenditure and make decisions on finance. For this they depend on financial reporting and departmental budget activities.

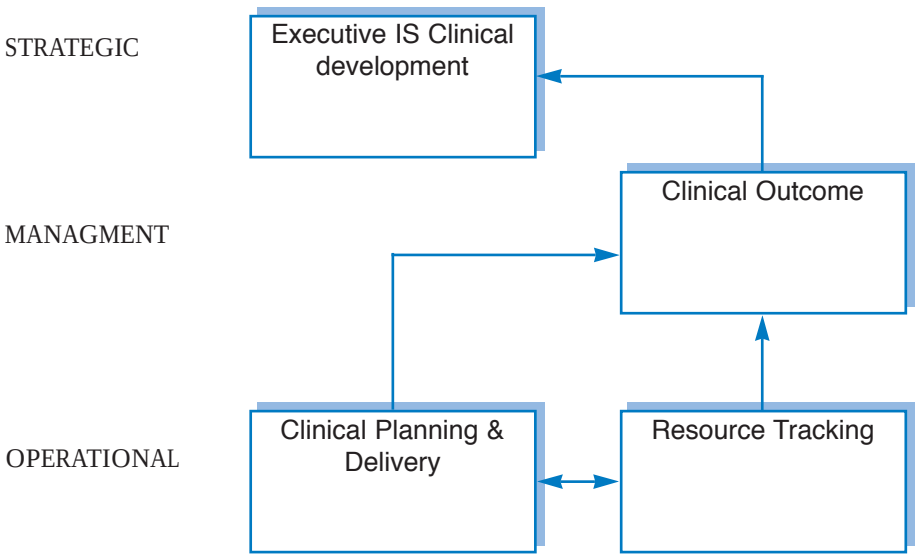
In turn, clinicians and managers need to know how resources are being used in each area of the Trust, how funds are being processed, how supplies are being used, and their costs and payment status.

5. **The full picture of the organisation's activities helps to identify the component parts of the ideal information systems and technology for that organisation.**

So staying with the example of the Trust, it needs to identify, at the operational level, its requirement for a clinical planning and delivery component linked to a resource-tracking component.

This needs to link into another component of the system at management level - monitoring clinical outcomes and audit.

In turn, this component needs to link into a part of the executive information system that supports clinical development and decision making.



Responsibilities And Accountabilities For IM&T

Annexe 3

1. NHS Board Members' Responsibilities:

Board members might consider the following framework and determine to what extent their colleagues are addressing these responsibilities on behalf of their organisation. The list is not exclusive, but provides a summary of good practice:

i. Addressing those areas of activity that are likely to benefit by development of IM&T. These may relate to issues raised in the organisation's business plan, where improvements in information will help to improve the delivery of services.

ii. Deciding what is the best IM&T management structure to meet the needs of the organisation, ensuring that any steering group establishes close liaison with the IM&T specialists, the principal users and with any external advisers. This structure may consist of both an IM&T steering group and a separate IM&T review mechanism. The two functions may be merged together, but if they are the Board may feel it advisable to identify a discrete review mechanism to report back to it on the effectiveness of the steering group and project management arrangements.

iii. Approving the Terms of Reference for an IM&T steering group, possibly using the Cadbury model. (In 1993 the Cadbury Report on Corporate Governance in the Private Sector was published. In April 1994 Codes of Conduct and Accountability were published by the NHS Executive based on this report). These TORs are most likely to include the following:

a) Review and authorise policy and standards.
b) Monitor and progress strategy.
c) Review priorities for implementation and make recommendations.
d) Review project proposals and make recommendations on management, expenditure and strategy.
e) Authorise Terms of Reference for projects, project management and resource arrangements.
f) Receive feedback from Users, particularly Clinical Staff, at regular intervals to ensure continuing User satisfaction and to ensure that there is satisfaction on the part of the Project Implementation Team.
g) Ensure that the more general arrangements for internal communications on the subject of IM&T are in place and are working.
h) Monitoring the progress of authorised projects.

iv. Resolving how much, if any, responsibility for decision making the Board devolves to an IM&T steering group, the purpose being to gain full benefit from an expert body and from the running review process. It is important that the responsibility rests with the appropriate officer. The IM&T steering group will be seeking to satisfy the main Board that the function, through its appointed Director or Manager is operating within the agreed strategy, is delivering the required services and is conducting supporting activities (such as research and planning) in the appropriate manner. It should endeavour to remain impartial and objective in its deliberations.

v. Approving Terms of Reference (TOR) for reviewing the IM&T strategy. These may be expressed in deliberately general terms to provide the maximum flexibility to the team carrying out the review, which may be internal or external. The content of the TOR will be guided by the advice given in this document and by local requirements, but it will be important to ensure that, whilst key items are not left out, it is not a charter for excessive interference. The Board must, ultimately, approve the programme recommended by the review team and supported by the IM&T specialists.

vi. Identifying colleagues who are already IM&T aware, or who are keen and able to devote time to becoming well informed. The NHS Executive encourages, for example, the inclusion of at least one Board Member who has IM&T experience on each NHS Board.

vii. Ensuring there is adequate provision of funds, resources, and time for the education and training of all staff. This may require a planned and pro-active training and staff development programme.

viii. Setting out the reporting processes to the Board, including a programme of review meetings, with clearly stated objectives. This is likely to include the frequency, types of report and who is to deliver them. The frequency of reporting is likely to be affected by the rate of change of the programme, which in turn is likely to influence the number of decisions required. The responsibility that the Board has devolved to the IM&T steering group, as a conduit for IM&T reporting, is also likely to have an effect. As a general principle, operational reports to the Board should be supported by a review team report. The Director/Manager heading up IM&T should report regularly to the Board, possibly through a standing agenda item at each meeting, backed up by the IM&T steering group report and, if there is separate review, the review team report.

2. IM&T Professional Responsibilities:

The principal responsibilities of the IM&T function are:

i. Delivery and maintenance of existing services (probably under Service Level Agreements with user departments).

ii. Provision of professional advice on IM&T policy, strategy and plans and future opportunities.

iii. Management of specific projects to successful completion and measurement of benefits.

3. Projects

Projects tend to be of several different kinds, which impose different management tasks, e.g.;

i. In-house systems developments using mainly NHS staff (comparatively rare).

ii. Development projects, including system integration, by outside contractors.

iii. Acquisition and implementation of standard packages.

iv. Technical IT Infrastructure projects (which usually involve outside suppliers).

Except for the last task, there is a major role to be played by users in determining the system requirements and functionality. The structure of a project team should reflect this by ensuring that users from all the disciplines affected by the prospective systems have properly defined roles and that the appropriate systems analysis skills are deployed to distil the true requirements and incorporate them in the systems. In all cases, the engineering of the systems solutions to meet the requirements in terms of functionality, flexibility, performance and reliability is the responsibility of the IM&T professional staff or their professional advisers (who should be independent of any suppliers and contractors).

Unless they are concerned with purely in house developments, the IM&T staff should possess, or have access to, the skills needed to negotiate technical contracts and to manage the performance of suppliers and contractors in accordance with good information systems engineering practice.

While the professional head of the Project Team should remain in post and be accountable throughout, the constitution of the team will probably vary as a project progresses. During the user requirement definition phase, it may be appropriate to assign representative users to the team and to include a strong emphasis on systems analysis. Thereafter the emphasis will move to more technical matters such as identifying and acquiring solutions, involving the management of contractors (or in house developers), including the operation of change control and the monitoring of contract performance. As

developments approach completion the focus will shift to system acceptance and implementation, at which point the role of users will again become prominent.

The responsibility for selecting the Project Teams is likely to rest initially with the Director or Manager of Information reporting to the Board.

It is essential that the Project Manager should be made responsible for control over the IM&T staff and any external systems suppliers and is held accountable for the outcome.

Whatever structure is put in place, the Chief Executive must be comfortable with the staffing and team arrangements.

Systems Development & Implementation

Annexe 4

The specification, development, procurement and implementation of IM&T systems involves a number of interrelated stages. The sections which follow indicate those important stages of which the Board should be aware, whilst ensuring the IM&T function of the organisation is capable of managing the detail.

1. Requirements Analysis

The action to be taken by the NHS Board will be determined by the size and the complexity of the programme. A crucial decision that will have to be taken early on in the IM&T programme is about executive decisions and IM&T representation at Board level. The IM&T Director/Manager will have to be given executive responsibility for the programme. The level of decision making, for example the decision to progress from one stage to another, must be clearly defined. A careful balance must be struck here and the value of the IM&T Steering and Review processes becomes obvious at this stage. There will be a need for the Board to:

- Set out the terms of reference for the IM&T Steering Group, for the IM&T Review process and for the IM&T Director/Manager, with special reference to the user requirement.

- Support the programme designed to establish the user requirement. This is likely to involve seizing the opportunity to review and improve the paper-based information needs, an action, usually essential, to be carried out before the introduction of any computer-based systems. (Bad processes computerised are likely to produce bad systems. The Audit Commission report For Your Information[3] refers.)

- Approve the Financial and Human Resources and the targets for judging the programme achievement.

- Approve the User Requirement, which may include:

  a) A statement of the User aims for the programme.
  b) An analysis of Users' needs and the benefits to be realised through meeting them. (This should be carried out by professionally trained systems analysts.)
  c) The Priorities for Implementation. There must be satisfaction with the logic of priority selection, clear user support and a readily identified breakdown of responsibility for subsequent action.

- Approve the next and subsequent stages as desired. Items that may have to be considered include:

  a) Financial provision update and approval.
  b) Any changes to the Human Resources allocation. For example in the User, Technical, Quality, Management, Trials Teams and any

other Teams needed to ensure that the programme has the necessary support.

c) Any changes to working practices, responsibilities and organisation structure. It is essential that the human resource implications are fully explored and the necessary training and education is planned for. This will have to be completed for all staff before the system is fielded. Many may need the benefit of training earlier to enable them to take part in the user trials.
d) The need for any external contracting.
e) The need for any prototyping or testing to overcome areas of doubt, either in a technical or a user context, about feasibility of the programme, and in the Component Design Stage, to develop and prove the User interface with the system. (NHS Boards need to be aware of the uses and abuses and distinction between prototypes, parallel runs and pilot operation, which should be included in a Board briefing).

Even where the IM&T facilities have been outsourced, all of the foregoing remains the responsibility of the Board, to ensure that these actions have been properly carried out.

2. Functional Specification

Once the Requirements Analysis has been identified and the priorities for implementation set out, the studies and systems analysis and/or prototyping to identify the system requirement specification can be undertaken. This must be undertaken by professionally trained systems analysts.

The Board, or the IM&T Steering Group, to whom it has given the responsibility, together with any Review Team will be:

- Dependant upon the IM&T Project Team, the Users and any Contractors engaged for the outcome of this stage.

- Able to ascertain that there has been a thorough analysis of the problem by checking on the balance of time spent on:

  a) analysis and effort made to ensure the user and technical representatives of the multidisciplinary team really do understand the problem.
  b) the time spent in software writing. For complex systems the ratio is most unlikely to be less than 40% of the software spend on the analysis and specification of requirements before any software is written.

- Able to question, if the impact of the system has been fully evaluated, how it will bring the desired advantages. Are the expected patient benefits likely to be realised? Will the clinical staff be gaining the benefits anticipated? Are there any other ways of taking advantage of the system to provide additional benefit and greater value for money?

- Able to verify that Acceptance Testing has been planned at the same time and as part of the System Requirement Specification.

If the IM&T services have been outsourced, an external contractor may largely undertake this stage. Even so, sufficient expertise and in-house skills must be maintained to be able to verify that the system specification is correct for its needs and is professionally sound.

3. System Architecture & Design

The NHS Board, the IM&T Steering Group and Review Teams are largely in the hands of the Implementation Teams here. The important issues are identified below:

- In any large implementation, such as a clinical support system, phased implementation is most likely to occur. This helps to:
  a) reduce risk
  b) ensure that the programme is in manageable portions and
  c) ensure that the programme matches resource and financial capabilities.

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5. Testing

The NHS Board, the IM&T Steering Board and Auditors will have to ensure that there is:

- Sufficient time planned into the programme for this to take place. Very often, particularly in the case of Integration into complex systems, this is not the case. If packages have been purchased from suppliers then these are likely to have been integrated and tested by the suppliers themselves, who will offer some assurances about product quality in this respect. Purchasers do need to consider the integration of their systems probably procured from different suppliers. The decision may rest between the use 'in-house' of various integration tools and the commissioning of a supplier to carry out the integration.

- Adequate planning for Verification. This is a crucial activity and the Board must confirm that it is satisfied with the Verification Criteria and Standards. Verification of each Integration is essential, not only when the systems are being linked but also on an on-going basis to ensure that the integration continues to work properly. This will eliminate system-operating errors, such as attributing a set of test results to the wrong patient.

  Even where systems integration and verification have been outsourced to an external supplier, sufficient in-house skills and project management control must be maintained for assessment and audit. This will help to confirm it has been adequately planned and conducted and that the systems will be appropriate to meet needs and potential.

6. Acceptance & Implementation

The NHS Board, the IM&T Steering Group and the External Auditors will have close interest in these parts of the programme.

- Installation

  This will require careful planning to ensure that there is sufficient time for the installation to be completed and any problems to be ironed out. Installation includes education, training and technical support for the users in any new working practices, as well as the commissioning of the hardware, software and telecommunications. The advice of the Director/Project Manager will be most important here.

- Validation

  For most implementations the process of Validation will already have been carried out ,as most NHS systems will have been bought as packages or as managed services from system suppliers.

  For the Validation of in-house or bespoke developed systems (including the integration of systems), there must be a well-understood programme with clear and agreed criteria to be used in this process. It is likely that the results will be made available to the Board, as the system being implemented cannot pass Acceptance if it has not been validated.

Be wary of accepting deals from suppliers to act as guinea pigs or test beds for new system developments, or for the conversion of foreign systems to UK requirements. Such validation may be very long and drawn out and demanding of effort, and may lead to the destruction of confidence in the eventual solution by the users concerned. Most users do not realise the extent of testing that must be undertaken before systems are validated.

- Acceptance

  Acceptance criteria will have been set out in the Contract and/or in the System Specification, and/or in the User Requirement. The basic criteria of Acceptance are to verify conformity to the specification.

  Reliance will be placed during this stage on the Acceptance Teams. These are composed of users and, where appropriate, technical Staff who exercise the System to its fullest extent against a rigorous test programme. The programme is designed to expose any non-conformity or under-performance within the limits of the Specification, so that these can be rectified before Acceptance. Acceptance testing is most important and it must be planned for at the time the Requirement Specification is being put together. It must be carried out to full satisfaction, notwithstanding pressures of tight timescales.

7. Operation & Maintenance

At this stage it will be important to ensure that there is:

- A benefits realisation and outcome achievement strategy being implemented, as set out in the business case. It may be necessary to introduce some additional criteria for determining the benefits, as the financial savings are unlikely to be very significant and it is much more likely that there will be benefits achieved, for example, through;

  - in the effectiveness of the clinical process
  - improvements in productivity by saving time
  - improved clinical practice from better access to information on care delivered and outcomes
  - better organisational processes resulting in enhanced patient benefit.

  The identification of the benefits is frequently not an easy task and it is most important that the necessary level of competent resource is applied here. However, if the implementation of a system arises due to the requirements of national strategy, the benefits of that system should be implicit. It will then be essential to assess and demonstrate how the expected benefits and outcomes are being delivered locally. Benefits and outcomes to be achieved must be established before the Operation of the system begins and wherever possible, the implications of consequent organisational change must be identified and addressed.

- The Board must give the investment in human resources careful consideration. There are often critical human resource aspects involved in fielding a new system that, if overlooked, could spell disaster. There must be complete satisfaction with the training and education programme for

the staff involved. It must be given the proper support to ensure that the programme will achieve the aim of enabling the staff to realise the maximum benefit from the new system.

- For bespoke systems developments, whether in-house or externally contracted, a reporting system for the recording of modifications, design defects, operational failures, and maintenance routines and observations. For significant modifications there must be a formal Change Management control process. This is particularly important where there is likely to be a change to the Specification and thus the Contract, which may affect the cost and/or prices and could prejudice safety in 'safety critical systems'.

- No confusion between the stage leading up to Acceptance of the System and the stage that follows, namely Operation. When the System has passed all its Acceptance Tests, and only then, it should progress to Operation. The reason for this is that there is usually a clean break contractually at this stage.

- A satisfactory maintenance contract must operate separately from any post-design fault rectification that the Contractor or the 'in-house' Systems Team may be carrying out.

- Supervision and detailed management of the operation and maintenance of the IM&T systems and services will always remain the ultimate responsibility of the Board. Sufficient in-house skills and experience to be able to carry out this function must be maintained.

Procurement Of Information Systems

Annexe 5

1. The procurement of information systems within the NHS is undertaken using a set of procedures developed by NHS Supplies. The procedures, known as POISE (Procurement Of Information Systems Effectively), have now been published in their second edition but due to be revised in 1999.

2. POISE has four main stages, each sub-divided into more detailed phases:

    i. Planning and preparing for the procurement - including researching the market, planning the project, setting up project structures and organisation, developing the Outline and Full Business Cases;

    ii. Preparing documentation - including the Summary of Need (SON), the Official Journal of the European Communities (OJEC) advertisement and the contract framework;

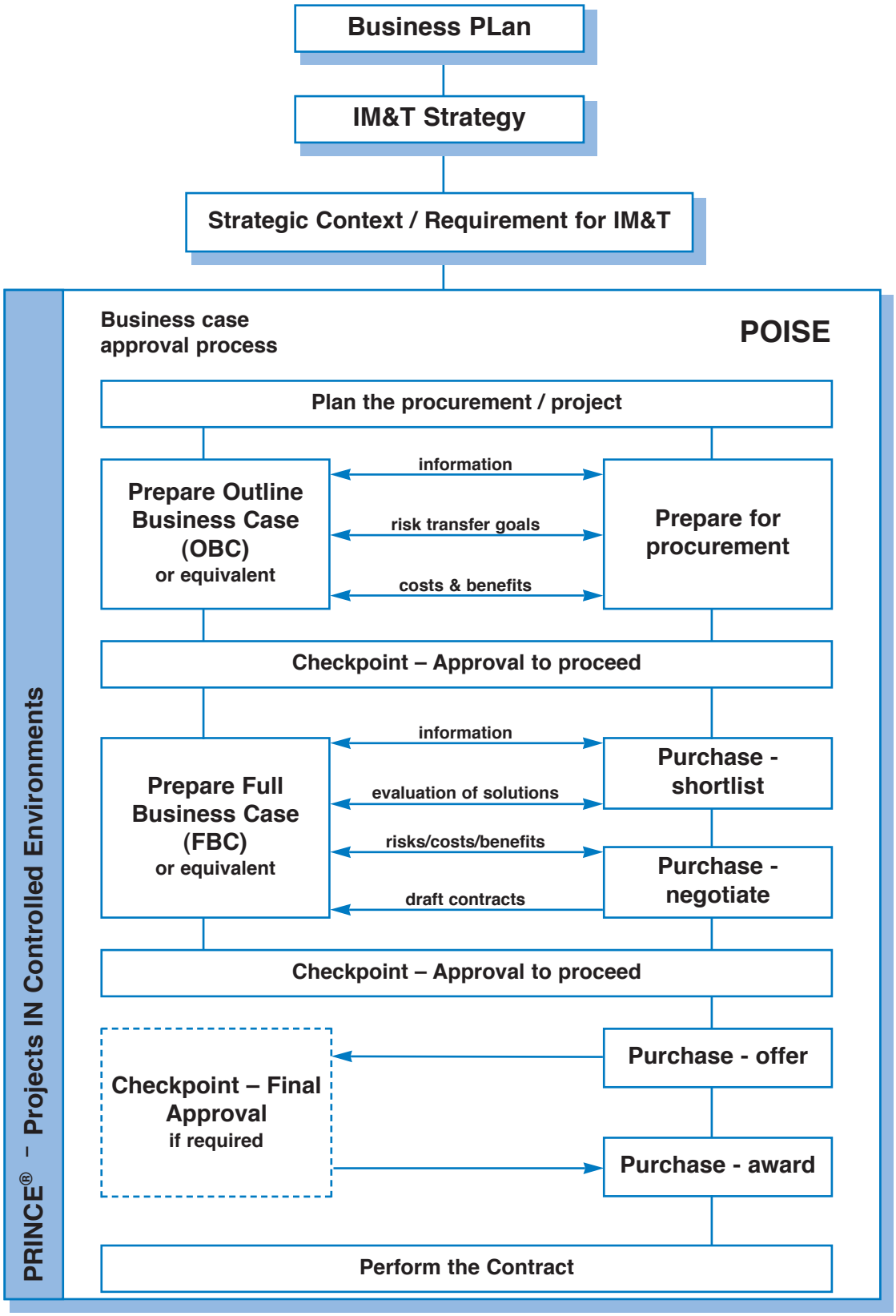
    iii. Purchasing the system or services - including the issuing of documents to suppliers and the circulation of supplier responses and the award of contract;

    iv. Performing the contract - including contract implementation and management, as well as post-implementation review.

3. Within POISE, there is a structured Business Case Approval Process for IM&T projects. Current guidance on the approval process for IM&T procurements is contained in HSG(95)48 10 and FDL(97)26 13, End of Universal Testing for PFI.

4. The following diagram illustrates the current relationship of POISE to an IM&T investment project. Regular checkpoints are built into the process, allowing for approval to proceed to be given by the relevant authority.

    It should be noted that that the whole process is derived from a strategic need for an IM&T solution as contained in the organisation's IM&T strategy, which in turn is determined by national information strategy and local implementation plan.



POISE in relation to the IM&T investment project

5. The Board must be aware of the following when identifying from whom final approval for an IM&T investment will need to be sought:

   i. The delegated limit below which all NHS Trusts and Health Authorities can approve their own business cases is £1 million Whole Life Costs, irrespective of annual turnover.

   ii. For Whole Life Costs above £1 million, the responsibility for approving the investment is:

Above £1m and below £20m	NHS Executive (Regional Office & Headquarters)
£20m and over	NHS Executive Headquarters & HM Treasury

N.B. The Whole Life Costs for an IM&T system or service are defined as all capital and running costs associated with the development, implementation and operation of the project over its lifetime, which are undiscounted and exclude VAT, whether recoverable or non-recoverable to the NHS body.

6. If a Private Finance option is not considered appropriate, Board members need to be satisfied of the case for this, whether the project is within the Trust's delegated limit or not. If it is outside the Trust's delegated limit, the case for exemption has to be made to the Regional Director responsible for Performance Management, as prescribed in FDL(97)26.

7. Up-to-date policy and information is available on the IM&T Investment Website at: www.open.gov.uk/doh/itinvest.htm or from the local NHS Executive regional office.

Criteria For Approval Of Business Cases

It is important that Board members understand the responsibilities delegated to them in respect of approving IM&T business cases and are aware of the criteria by which business cases are approved. The following list sets out these criteria, more details of which may be found in NHS Executive guidance, specifically the Capital Investment Manual[11] and the latest Health Service Circular (HSC).

1. That the investment is part of an overall IM&T strategy based on the organisation's business plan, reflecting the national IM&T strategy as appropriate.

2. That there is a properly structured business case demonstrating sound investment.

3. That account has been taken of achieving the same benefits from better use of existing assets.

4. The benefits (cash releasing and non-cash releasing) have been properly and realistically identified and assessed with a commitment from the affected parties to their realisation.

5. That full assessment of the risks surrounding the investment is carried out at an early stage together with an evaluation setting out how sensitive options are to change in the underlying assumptions that have been made.

6. That there is a clear understanding of the procurement process.

7. That the investment as a project will be handled in a structured manner (PRINCE® being the NHS standard methodology).

8. That there is an unequivocal commitment from the Chief Executive and Board Chairman and clear understanding of their continuing roles, and of their senior staff, in the procurement, implementation and benefits realisation process.

9. That there is sufficient and adequately skilled IM&T resource to successfully manage the specification, procurement and implementation of the system.

10. That there is a resourced and structured training programme.

11. That there is a clear plan for benefits realisation, including a commitment to assign responsibilities for realising benefits to an individual with sufficient authority and resources to deliver.

12. That there is a commitment to post-implementation evaluation, the results of which will be made available to the authority approving the investment.

NHS Executive September 1997

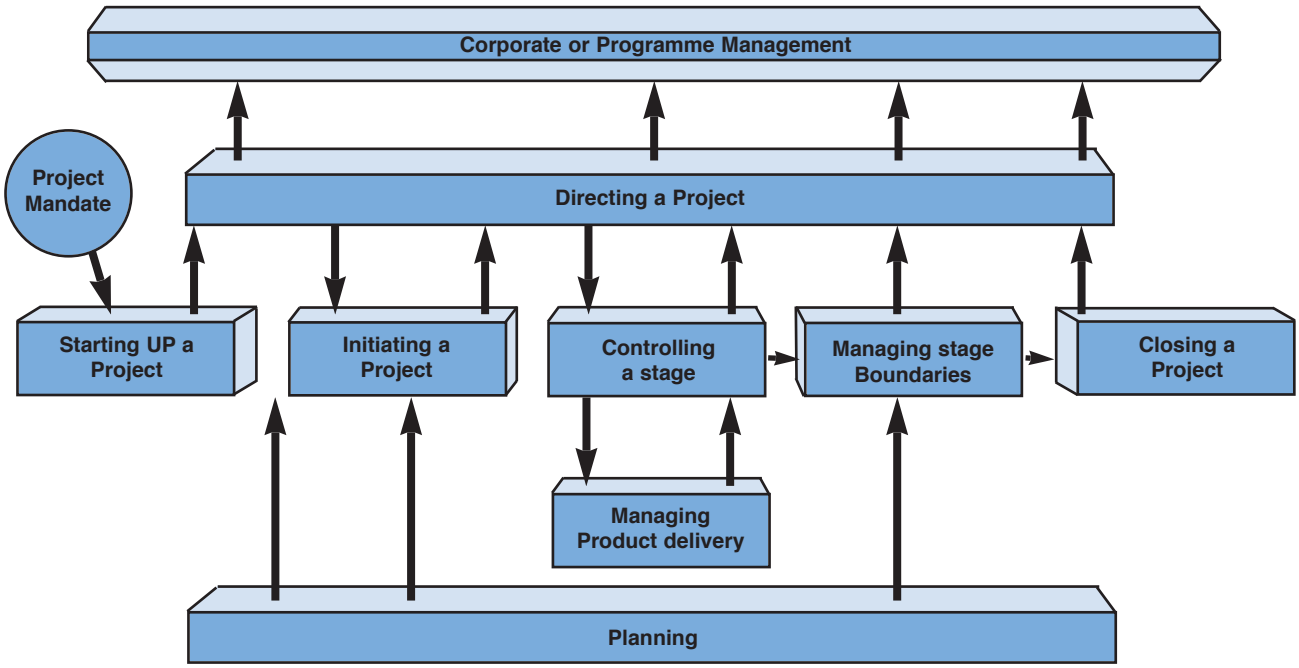
PRINCE® Project Management Methodology

Annexe 6

1. PRINCE (PRojects IN Controlled Environments) is a project management methodology covering the organisation, management and control of projects. The Central Computer and Telecommunications Agency (CCTA) first developed it in 1989 as a UK Government standard for IT project management. PRINCE remains in the public domain and copyright is retained by the Crown. PRINCE® is a registered trademark of CCTA.

2. Since its introduction, PRINCE has become widely used in both the public and private sectors and is now the standard for project management in the NHS. Although PRINCE was originally developed for the needs of IT projects, the method has also been used on many non-IT projects. The latest version of the method, PRINCE 2, is designed to incorporate the requirements of existing users and to enhance the method towards a generic, best practice approach for the management of all types of projects.

3. PRINCE 2 is a process-based approach for project management, providing an easily tailored and scaleable method for the management of all types of projects. Each process is defined with its key inputs and outputs together with the specific objectives to be achieved and activities to be carried out.



4. The method describes how a project is divided into manageable stages enabling efficient control of resources and regular progress monitoring throughout the project. The various roles and responsibilities for managing a project are fully described and are adaptable to suit the size and complexity of the project, and the skills of the organisation. Project planning using PRINCE 2 is process-based which means the project plans are focused on delivering results and are not simply about planning when the various activities on the project will be done.

5. A PRINCE 2 project is driven by the project's business case, which describes the organisation's justification, commitment and rationale for the deliverables or outcome. The business case is regularly reviewed during the project to ensure the business objectives, which often change during the lifecycle of the project, are still being met.

6. There are often different groups of people involved in projects: the customer, one or more suppliers, and of course the user. PRINCE 2 is designed to provide a common language across all the interested parties involved in a project. Bringing customers and suppliers together typically involves contracts and contract management, and although these aspects are outside the scope of PRINCE 2, the method provides the necessary controls and breakpoints to work successfully within a contractual framework.

Benefits of PRINCE 2

1. PRINCE 2 is a structured method, providing organisations with a standard approach to the management of projects. The method embodies proven and established best-practice in project management. It is widely recognised and understood, and so provides a common language for all participants in the project.

2. PRINCE 2 provides benefits to the organisation, as well as the managers and directors of the project, through the controllable use of resources and the ability to manage business and project risk more effectively. PRINCE 2 enables projects to have:

   - a controlled and organised start, middle and end;
   - regular reviews of progress against plan and against the Business Case;
   - flexible decision points;
   - automatic management control of any deviations from the plan;
   - the involvement of management and stakeholders at the right time and place during the project;
   - good communication channels between the project, project management, and the rest of the organisation.

3. Of course, the full benefits of using PRINCE can only be achieved if relevant staff have an adequate understanding of the concepts and competence in the processes involved. This applies as much to the senior executive who is given the responsibility of chairing the Project Board, as it does to the Project Manager or to the humblest Project Assistant. Each must be aware of their role and responsibilities for ensuring the project is successful.

4. Project Boards should be rigorous in remaining within their Terms of Reference and in meeting only at stage-related intervals. They should neither meet routinely at fixed intervals nor range in their discussions over all the details of projects.

5. However, not withstanding the role of users, developers and the business in the PRINCE structure, it must not be used to avoid placing direct responsibility for the success or failure of a development on an accountable officer. However, this individual must be invested with sufficient status and authority, and must possess the necessary competence to ensure project success.

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Sources of Further Information

NHS Executive
Quarry House
Quarry Hill
Leeds
LS2 7UE
Tel: 0113 254 5000
Website: www.imt4nhs.exec.nhs.uk

For issues on NHS information management education and training, contact:

Enabling People Programme
NHS Executive - South & West
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The National Audit Office
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Tel: 0171 798 7000
Website: www.open.gov.uk/nao/home.htm

The British Computer Society
1 Sanford Street
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Tel: 01793 417417
Website: www.bcs.org.uk

Central Computing & Telecommunications Agency
Rosebery Court
St Andrews Business Park
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Tel: 01603 704567
Website: www.ccta.gov.uk/cctahome.htm

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