

QUALITY INNOVATION & EVIDENCE IN HEALTHCARE PHYSICAL ENVIRONMENTS IN ENGLAND & SWEDEN – ESTABLISHING A COLLABORATIVE ROADMAP

G. Lindahl¹, M. Phiri², G. Mills³, P. Fröst⁴, M. Strid⁵ and A. Price⁶

ABSTRACT

Regulators, providers and commissioners in healthcare worldwide are facing severe funding constraints that are putting increased pressures on the quality of healthcare delivery. Within England, NHS resources have grown unsustainably, and all organisations are engaged in initiatives to increase quality, innovation, productivity and safety while decreasing cost. Within the Swedish case the decentralised organisation of healthcare into County Councils faces similar problems. This comparison between a centralised English system (looking towards decentralisation) and a decentralised Swedish system (investigating the benefits of centralisation) may provide significant learning. This study investigates the English and Swedish healthcare systems examining their similarities and differences according to various factors - organisational roles, regulator standards, best practices and innovation in quality and organisation learning tools. It also evaluates the role of improving design quality via mandatory standards and compliance criteria on the one hand and others factors which drive excellence on the other. An international best practice framework is proposed that is capable of ensuring evidence based design and informing the balancing of compliance and excellence criteria.

KEYWORDS

evidence, design, standards, quality, innovation, QUIPP

BACKGROUND

A number of academic authors have written about healthcare system design, organisational structures, political relationships and governance (e.g. Winchester & Storey 2007, Martinussen & Magnussen 2009, and Kristiansen & Pedersen 2000). Crucially, there have been no studies on the interrelationships between organisational structures and quality and safety assurance systems (guidance/standards & tools). In most countries changes in the regulatory framework for healthcare facilities and real estate have mirrored those of political and governance re-structuring and re-organisation and thereby affecting both in the procurement, provision/ delivery, productivity and quality of the physical healthcare environments. Despite this there is an increasing recognition that patient care and environmental quality improvements are dependent on the balance between standards and guidance systems, and factors for achieving excellence.

¹ Chalmers University of Technology, Construction Management, Sweden, Goran.Lindahl@chalmers.se

² School of Architecture, University of Sheffield, UK, m.phiri@sheffield.ac.uk

³ Loughborough University, Department of Civil & Building Engineering, G.R.Mills@lboro.ac.uk

⁴ Chalmers University of Technology, Architecture, Sweden, peter.frost@chalmers.se

⁵ Chalmers University of Technology, Architecture, Sweden, marie.strid@chalmers.se

⁶ Loughborough University, Department of Civil & Building Engineering, A.D.F.Price@lboro.ac.uk

The mission of this review based on a literature analysis, interviews and focus groups at Loughborough and Chalmers Universities is to understand the benefits of both these existing and to learn lessons that will shape further studies, innovation and ultimately enhanced design quality. No studies have been conducted or published comparing the two healthcare systems and their interrelationship to mandatory/compliance and excellence criteria. The two healthcare systems in England and Sweden are suitable case studies because they have a similar organising principle that is not solely market based and also because these countries represent the researchers science base. Both healthcare systems are founded on versions of the related principles of solidarity and universal coverage. Historically, England and Sweden have taken different approaches (the latter indicated in Figure 1 being less centralised than the former- Figure 2). Both diagrams indicate a structure that reflects the three roles of the regulator, commissioner and providers of healthcare services. Sweden (like other Scandinavian and European countries) has a decentralised healthcare governance model. This research offers opportunities to learn and identify benefits from Centralisation exemplified by the English NHS governance system compared with Decentralisation indicated by the Swedish Healthcare System which also represents the preferred governance model in Europe (Saltman et al. 2007).

Figure 1 shows a simplified model of the macro-structures of NHS England. Since its inception in 1948, the English NHS has always seemed very centralised, compared with other European healthcare systems. During its set up, the NHS was conceptualised as a national service, replacing the existing local health services. There was central parliamentary accountability, as characterised in the often quoted remark of Aneurin Bevan (the minister of health who was a key political proposer for the introduction of the NHS): 'When a bedpan is dropped on a hospital floor its noise should resound in the Palace of Westminster' (Allen 2006). The British Parliament (Westminster) provides the legislative authority with the remit for policy occurring within the Department of Health. England is subdivided into eight Strategic Health Authorities (SHAs) whose remit is to act as the arm of the Department of Health within the regions. The SHAs oversee the functioning and development of the full range of health services within their territories. Within each of these geographic areas a variety of provider organisations exist.

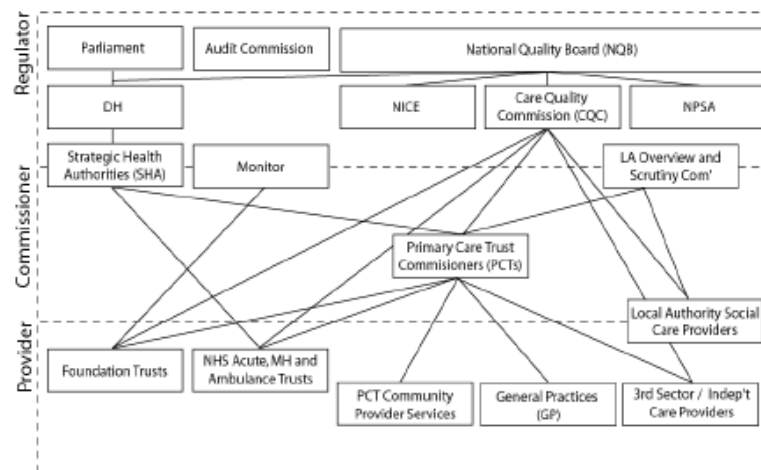


Fig. 1. The English National Health Service System (Phini & Mills 2010)

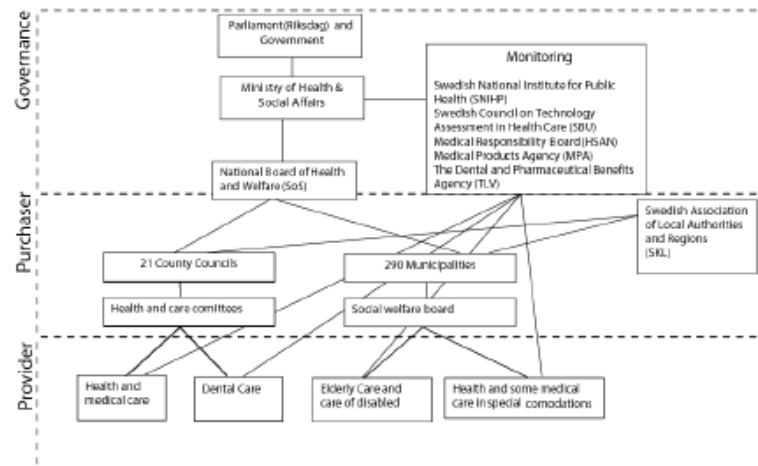


Fig. 2. The Swedish National Healthcare System (Mills, Stridh, Fröst & Lindahl 2010)

Figure 2 shows a simplified model of the macro-structures of the Swedish healthcare model. The Swedish central government establishes the political agenda, principles and guidelines for healthcare but is not involved in the actual production of healthcare. Due to decentralisation and constitutional rights of self-determination stated in the Health & Medical Services Act 1982 and in the Swedish constitution (Swedish Code of Statutes); the regional authorities - County Councils (CCs), have far-reaching rights to manage the healthcare sector as well as to levy taxes to finance the provision of healthcare (Fredriksson & Winblad 2008). State grants represent the second largest source of healthcare funding, some of which is partially earmarked for special healthcare reforms and initiatives by the central government in its role of guaranteeing core values such as efficiency, equality and countrywide equivalence.

ADDRESSING COMMON CHALLENGES: THE CENTRALISED NHS ENGLAND AND THE SWEDISH HEALTHCARE SYSTEM

Despite taking different approaches in the evolution of their respective healthcare systems both England and Sweden are now focused on:

- Driving up design quality while improving productivity as well as looking at the challenges of increasing demand for healthcare from a growing and ageing population, new sophisticated technology and ever higher patient expectations. In the provision of healthcare infrastructure worldwide changes in medicines, clinical practice, technological developments and the organisation of the healthcare sector occur more frequently and unpredictably than the updating of the guidance, which are directly related to the built facilities. Technologies, policies and services are subject to shorter lifecycles than the relatively inflexible built assets that support them.
- Embracing evidence-based and patient-centred approaches to design quality and productivity challenge. Although all acknowledge that research shows that well designed hospital environments can have a real impact on patient recovery and well being. New knowledge is required on how this can be implemented in practice. Research found that evidence-based

design is critical in determining capital and running costs of healthcare buildings and has the potential to significantly reduce these running costs by up to 20% because running costs typically exceed capital costs within 2 years of commissioning (Lawson & Phiri 2003).

- c. Developing strategies and plans that will deliver tangible or evident benefits in the face of spiraling costs of running or operating healthcare facilities. In England the underlying basis of the NHS system is under threat. Similarly, in Sweden, the essential principles of the Nordic model for the delivery of community services, including healthcare, i.e. universal availability, high quality, finance through taxation and public provision may not be sustainable and public provision may need new strategies and structures to develop.
- d. Providing built healthcare environments which enable delivery of high quality care for diverse patient populations in carbon neutral care settings. Healthcare facilities are heavy users of energy, water and other resources making them suitable candidates for sustainable environmental design.

In both England and Sweden, concerns have been growing about existing standards guidance in healthcare systems stifling innovation and associated difficulties of raising quality and safety in healthcare facilities. The existing ensemble of systems and standards guidance may be viewed by some specialists in their fields to be incomplete, out-of-date and not adapted to today's National Health Service and most importantly not appropriate to guide well innovation in the future development of the service (Moss et al 2001). In Sweden the closure of the Healthcare & Social Welfare Planning & Rationalisation Institute (SPRI) in 1995 meant that national guidelines for planning healthcare facilities were no longer produced. This shifted focus from complying to standards to locally develop design processes has its own problems, one of which is the creation and maintenance of national learning and the benefits of nationally led standardisation, control of stakeholder expectations and procurement economies of scale. One of the advantages of locally lead processes is that quality assurance is more likely to be achieved through stakeholder consultation and the involvement multi-disciplinary specialists who have a broad ranging and up-to-date expertise.

The centralised NHS England and the decentralised Swedish Healthcare System have adopted evidence-based and patient-centred approaches. The importance of evidence-based design has increased since Ulrich (1984) first showed the measurable effects of views on patient health outcomes. Post-operative patients recovered faster and took less analgesic medications when windows faced a natural view rather than a brick wall. Since then many studies have supported and added to our knowledge. A review of available research to identify credible evidence relevant to design has been conducted (Rubin, Owens & Golden 1998, Ulrich et al 2004, Lawson & Phiri 2000, Phiri 2006). The review by Lawson & Phiri 2000 led to the development of the Sheffield Healthcare Environmental Database published by the Department of Health Knowledge & Information Portal. Ulrich 1997 proposed a theory of supportive design for healthcare that emphasizes reduction of stress, provision of personal choice, positive distraction and attention to nature. However, despite these reviews and all such theories, there are still unanswered questions regarding the nature of the evidence base for design. Calls in England, Community Health Partnerships 2008 and Darzi 2008 etc. indicate demands for high impact research and evidence-based design to improve healthcare outcomes and enhance quality and value for money. Unpublished reports in Sweden point to the need to utilise evidence-based decisions to achieve effective end-efficient solutions in the healthcare sector.

LESSONS FROM CENTRALISED NHS ENGLAND: RESEARCH & DEVELOPMENT

An important aspect of centralised planning has been its impact on the healthcare estate. Standards guidance were developed in 1962 to aid a large continuous and centrally financed national hospital building programme. The 'Hospital Plan', initiated by the Bonham Carter Report, provided a context in which there was development work, feedback and redevelopment. The famous Hospital (Health) Building Notes (Ministry of Health 1961) became the world's first point of reference in the field of hospital planning. Health Building Notes (HBNs), Health Equipment Notes (HENs), Health Technical Memoranda (HTMs) and Capricode began publication in the 1960s in support of the 10 year programme of hospital building. Activity Database (ADB) and Room Layouts were also developed in the 1960s for the rapid computation of equipment schedules, department plans and whole hospital layouts in support of the hospital building programme for the 1962 'Hospital Plan'. Since the 1960s these systems and standards have built up into a 'big-system' of elaborate and comprehensive health facility planning information which requires and relies on heavy and continuous investment in professional work something. The trouble with such a system is its reliance on public funding and political support from Governments coming in and out of power, for centralized estates and facilities.

From 1990s onwards the centralisation approach brought in PFI (Private Finance Initiative) justified on ideological grounds that the private sector is better at delivering services than the public sector. The programme introduced the building of over 75 healthcare projects in the UK as a whole. Figure 3 provides an example. The global financial crisis which began in 2007 presents PFI with difficulties because many sources of private capital have dried up leaving central government to fund the so-called 'private' finance initiatives itself.



Fig. 3. Queen Elizabeth Hospital Birmingham (BDP Architects)

A comparison of information available for the healthcare project teams using 1980s guidance and 2000s guidance and design tools shows the extent of the problem. A review of HBNs alone shows that overall 139 documents have been produced since 1961 and the majority of these (87 out of 139 i.e. 63%) have been produced within the two decades of the 1990s and 2000s.

One issue arising from the introduction of the procurement methods of PFI, Procure 21 and the creation first of Hospital Trusts and second of Foundation NHS Trusts has been that mandatory adherence to standards has become merely advisory. The consequent removal of ownership of the healthcare facility from the Trust or healthcare provider and placing responsibility for design, construction and maintenance entirely in the hands of the contractor has made the status and implementation of systems and standards guidance dependent on and to be determined contractually by the output specification whose delivery in the built facility is out with any independent professional control.

Another important impact of the centralised healthcare planning and associated introduction of PFI has been the development of design tools and sponsorship of estates and facilities research.

LESSONS FROM DECENTRALISED SWEDISH HEALTHCARE SYSTEM: RESEARCH & DEVELOPMENT

In Sweden, as in England the 1960s and 1970s also saw a large expansion of hospitals; i.e. large, complex and entire hospitals built to norms/ standards specifying designs and functions. This occurred hand-in-hand with the (then) modernisation of the housing sector. The healthcare system is thus integrated in the welfare state based on equal access to healthcare for all citizens: costs shared and funded by taxation - about 80 % (Kristiansen & Pedersen 2000). The Healthcare & Social Welfare Planning & Rationalisation Institute (SPRI) was instrumental in this development, producing documents, reports and guidelines for planning. SPRI 1968 to 1995, aimed to support healthcare planners with quality development, economy and informatics. Although a core competence centre for research, development, effectiveness and processes, it was closed (in line with wider health policy decentralisation changes) when decentralisation became a more general rule for governing planning with criteria for specific designs left to the County Council. This decision was partly made on the basis that no new hospitals would be needed in the foreseeable future. With the abolishment of SPRI, national guidelines for healthcare facilities are no longer produced and the primary responsibility for knowledge development and planning of healthcare buildings were transferred to the individual County Councils.

Instead what apply are general guidelines for all buildings and quality standards for health & safety. Consequently, despite the strong tradition of centralised guidelines the effects are not immediately apparent. After having had a design culture based on standards, suddenly none exists and design is governed by the healthcare processes thereby shifting focus to accessibility, quality and efficiency of the healthcare systems and the emergence of healthcare logistics. However, there were problems with waiting lists, and even though treatment was working well, both access and quality of the architectural healthcare environment were unsatisfactory.

From the late 1980s market aspects had been introduced into the healthcare systems to allow competition among providers but because most of the healthcare system was public the effect was more of reorganisation through "quasi-market mechanisms" (Martinussen & Magnussen 2009). In 1995 the initial phase of decentralisation was by the end of the 1990s followed by the establishment of larger counties to exploit scales of economy for service provision within the public sector including healthcare. Decentralisation has not led to a new hospital building or modernisation programme let alone to the development of guidance and standards. The new millennium saw a focus on meeting challenges of scarce resources with aims for efficiency and

identification of new ways of delivering healthcare. At this time further development of choice models is implemented that facilitates competition albeit, the competitors have to be certified by the counties to be eligible for public funding. Today, based on the egalitarian approach from the welfare state, the focus is still on patient's rights and patient-centred approach (Magnussen et.al 2010) and also large counties are still the main player in all these processes while planning happens at hospitals within the organizational framework of the county level and no common or national development plan exists, as for example is the case in Finland. The need for modernisation of architectural healthcare environments, based on development of medical processes, has seen a recent new development i.e. to build the new Karolinska hospital in Stockholm. The project has been politically decided to be carried out as a PFI project, the first in healthcare in Sweden (Stockholm County Council 2010).

A number of reports and decisions from 2001 and onwards established the need for a new university hospital, to replace the present Karolinska University Hospital in Stockholm. The question was Why should Karolinska Solna be replaced rather than be refurbished? The review of the existing property stock of Karolinska Solna was unequivocal: the hospital was spread over a large area with 40 buildings, with weak connections and logistics. Furthermore, many buildings were old, outdated and unsuitable for the provision of modern hospital services.



Fig. 4. The new Karolinska hospital, Stockholm (White Architects)



Fig. 5. The new Karolinska hospital, Stockholm (White Architects)

Redevelopment was also deemed to be too expensive, with an estimated cost of SEK 7 billion (€650 million) over 10 years (Stockholm County Council 2004), relative to the functionality of the refurbished site and by comparison with a new build. Constructing a new hospital was therefore considered to be more cost effective compared to renovating and refurbishing.

In April 2008, the decision was made by the Stockholm County Council to build a new university hospital in Stockholm, to treat patients previously referred outside of the region to receive some specialist treatments and to improve the integration of care pathways and shared diagnostics. In June 2008, it was decided that the new university hospital will be built using the PPP (or PFI) model which includes also financing as well as management of the building after the completion. Figure 4 and 5 show the early Karolinska hospital design.

The introduction of PFI in the decentralised Swedish Healthcare System suggests the need to learn from the experience of a centralised NHS England and to draw a comparison on how quality improvement can be better assured. The study by Barlow *et al* (2010) of the PFI process in England found a number of issues that may diminish innovation for each project i.e. barriers in communication between architects and hospitals; risk aversion due to the competitive bidding environment, the PFI funders' need to protect their investment and the trusts' need to transfer risk to the private sector; and limited knowledge transfer or learning from completed PFI projects. The competitive environment ensured that experiences of private partners typically remained within individual firms, with only some sharing within the PFI consortium. The study also found that the need to reduce capital costs to match affordability limits established by the 'public sector comparator' impeded design innovation especially as these limits were set at unrealistically low levels and aspirations.

In England use of design tools such as ASPECT/ AEDET Evolution and BREEAM Healthcare, is in part mandatory for healthcare projects. The absence of tools developed to be used by the

decentralised Swedish Healthcare System means a reliance on the experience of Local or International project teams. In some situations tools developed elsewhere may be applied in a Nordic situation. A statement from one project team member illustrates this: “The New Karolinska Solna will be designed to meet three main environmental assessment certifications: ISO 14001, LEED® and GreenBuilding” (Stockholm County Council 2010). Also local political objectives paired with the hospitals strategies combine with tool sets owned by international consultants who are experienced and competent in the use of tools such as LEED. National standards and tool development priorities in England have in some cases facilitated change and been used as a baseline from which to manage local political and stakeholder pressures.

AN INTERNATIONAL BEST PRACTICE FRAMEWORK TO ENHANCE THE DESIGN, CONSTRUCTION AND MANAGEMENT OF ARCHITECTURAL HEALTHCARE ENVIRONMENTS

The foregoing analysis of both the centralised English NHS and the decentralised Swedish healthcare system reveals a need for a framework to address the challenges of quality, innovation productivity and prevention. An international best practice framework is therefore proposed for validation. The main challenge for the framework is that it should facilitate implementation in situations where either centralisation or decentralisation of the healthcare governance model is the norm. The framework comprises a number of key components.

The first component of the framework is the development of guidance and mandatory standards that support outcomes such as sustainability, auditability, measurable benefits; sharing of best practice; patient safety values; revenue consequences; utilisation of space; inspirational guidance etc. Of crucial importance are guidance, design and modelling tools that facilitate the provision of built healthcare environments which enable delivery of high quality care for diverse patient populations in carbon neutral care settings.

At the base level guidance needs to fulfill requirements of:

- a. Official and objective information from healthcare administrations and whose authority derives from a suitable evidence-base. This covers the provision of authoritative list(s) of standards/ guidance documents indicating bibliographical sources as well as their historical background, including methods of creating them.
- b. Consistent healthcare facility information within topics and across them - i.e. minimum overlaps, effective cross-referencing to other regulations/ norms with no contradictions. This includes using standardised and concise descriptions, consistent space standards and technical specifications.
- c. Up-to-dated information that recognises changing healthcare policies and regulations. Frequent updates are necessary to respond to ongoing changes in healthcare delivery and technological developments. The Internet and online publishing offer opportunities for regular updates while guarding against the temptation to build up elaborate unwieldy and comprehensive systems.
- d. Good usability via user friendly navigation and sign-posting making the information easy to find and use; offering appropriate referencing that indicates what was published and when. This includes improved functionality through adding value to text-based information and enabling interfaces with other tools – such as planning design and management tools. Making it easy to find the relevant and essential information at the appropriate granularity or level to

one's needs is helpful to utilise limited resources in the most cost-effective way in order to provide 'must-have information' for acute, primary and community healthcare settings.

All this suggests several key guiding principles. Simple unambiguous, streamlined and non-repetitive information with clear definition of what is mandatory and what is not, but is merely a recommendation is important. An essential guiding principle is for a clear strategy of seeking value for money and related to investment levels of the day. Yet another key principle is the need for an open and evolving set of both generic information and guidance on how and when bespoke information should be gathered as part of an emerging design and stakeholder consultation process. It is still uncertain whether this information should be generic over a range of building types or specialities, or should be more detailed a specialty and level of acuity driven. If the later is to be achieved ways must be found to manage the complexity of what would be a comprehensive but unwieldy data set, that could contain considerable duplication.

The second component of the best practice framework is an appropriate evidence-base for mandatory standards and design modelling tools. This refers to activities of carrying well-designed research studies, collating and systematic evaluation of existing studies to facilitate retrieval and use by designers and other decision makers. Conducting original empirical investigations such as (Lawson & Phiri 2000; Stigsdotter & Grahn 2002 and Lawson & Phiri 2003) is essential to increase the number of well-designed scientific studies which indicate the importance of the physical environment on staff and patient healthcare outcomes. Stigsdotter & Grahn (2002) study of the outcomes of healing gardens in the Scandinavian countries is a useful example of gathering local knowledge. Collating, reviewing, structuring knowledge (Phiri 2006), compiling/building up electronic databases for example Sheffield Healthcare Environment Database concerns the adoption of criteria and rigorous standards of hard science: a) rigorous, in that use is made of appropriate research methods that allow reasonable comparisons, and discard alternative hypotheses (the research studies are therefore assessed on their rigor, quality of research design and methods, sample sizes and degree of control) and b) high impact, in that the outcomes explored are of importance to healthcare decision-makers, patients, clinicians and society.

The evidence-base is vital particularly in showing how the designed healthcare estate can impact on such things as length of stay, reduction of falls, rates of cross-infection, risks of clinical error, consumption of medication, sometimes including very detailed results such as heart rates, sleep patterns, staff absenteeism and the like. It can also indicate links to more qualitative measures such as patient satisfaction and staff recruitment and retention. Mechanisms for capturing, storing and retrieving qualitative and quantitative evidence during design to inform stakeholder judgment need to be defined as a necessity, taking into account the new developments and application of IT technologies (e.g. E-databases) and new interfaces for design tools.

The third component of the framework is the development of guidance and tools (such as ASPECT/ AEDET Evolution, BREEAM Healthcare, IDEAs etc.) to aid the design process (Lawson 2007). Research evidence can be invaluable in underpinning the guidance and tools giving them authority especially when challenged by clinicians whose background is in pure science. Research is also needed to ensure information is assembled in a format and style that facilitates retrieval and use by practitioners and updating so that it is always relevant to the latest clinical practice as this continually respond to changes including technological developments. In

1966 Donabedian introduced concepts of structure, process and outcome and these remain today the dominant paradigm for the evaluation of the quality of healthcare. He identified the need in healthcare to look at quality improvement essentials i.e. STRUCTURE (which includes the human, physical and financial resources of an organisation); PROCESS (which includes the set of activities and discreet steps in a process) and OUTCOME (the end result of care and service e.g. length of hospital stay health state, satisfaction, mortality and morbidity rates etc.). Research is justified because of the need to link structural and process measures of the healthcare estate and patient and staff outcomes if there is to be quality improvements in healthcare (Donabedian 1988).

The fourth component of the best practice framework is the creation of a defined strategic plan or route for research and development of the health facility planning information. The nature of development work and the associated levels of investment are crucial in determining whether value for money is being achieved and in demonstrating benefits and added value. The challenge is the creation of a robust plan which transcends the impact due political regime changes.

A fifth component of the framework concerns the development of a learning environment, incorporating feedback from completed construction projects and incorporating experiences from ongoing use of health care facilities, to ensure that successes are not overlooked and innovations do not miss their targets. Feedback is not routine within design, construction, procurement practices because there are many barriers and not enough drivers and as a consequence the means (the constructed facility) is not closely linked to the clients' needs. A significant challenge concerns cultural, attitude and mind set change. For example the construction industry is known to be slow and unwilling to take up new technologies such as those advocated as offering energy savings. The majority of builders like to work with what they know preferring to manage the process this way using traditional methods such as calculating building costs based on materials and labour). The approach in the Nuffield Studies 1955 is a helpful indicator to foster design quality and innovation because it suggests 'a balanced relationship' between 'the accumulated knowledge and experience of those whose daily work has been within the hospital or in hospital design' and the input of 'fresh minds and methods from outside'.

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