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Title:

Opportunities for e-brainstorming in pre-design processes of healthcare projects

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Abstract
The complexity of hospital buildings is analogous to that of a small town with a service, residential and industrial area all in one. Healthcare projects are characterised by a varied composition of stakeholder groups, both internal and external, who expect and require the facility to fulfil different needs. Focus groups and workshops are familiar tools through which ideas are generated and gathered during the pre-design processes of briefing and option selection. In workshops and focus group meetings the challenges of group dynamics and politics, together with the dominance of the 'small but vocal minority' have been reported. Furthermore, the need to involve several stakeholders in healthcare projects may also be inhibited by the practical difficulty of bringing everyone together in workshops at the same time. A literature review has identified typical stakeholder compositions in healthcare construction projects. From this an exploratory study of collaborative electronic brainstorming (e-brainstorming or EBS) in the early stages has been undertaken. A literature review of the various forms of manual and electronic brainstorming is presented together with a discussion of the challenges of, and opportunities for, effectively involving the many NHS stakeholder groups. It has been found that, regardless of the associated challenges, engaging with a vast number of disparate stakeholders is possible. Existing ordinary, as well as specialist ICTs could enable satisfactory pre-design collaboration. A conceptual framework of when, who and how to innovatively apply e-brainstorming in the pre-design stage of healthcare projects has been presented in the final section.

Key words: *Collaboration; E-brainstorming; Idea generation; NHS; Pre-design; Stakeholder involvement*

1 Introduction

Globally, the healthcare sector is believed to be one of the most volatile (for example, Hildrey, 2003). The sector is rife with frequent changes stemming from volatile politics, complex issues and daunting economics (Miller and Swensson, 2002). Constantly changing information and communication technologies, advances in medical and nursing management technologies, as well as, changing models of care also challenge the performance and management of existing healthcare facilities. In the UK, this sector is said to be one of the most complex and rapidly changing both from a technical and organisational perspective (EPSRC, 2008). The publicly funded National Health Service (NHS) is at the centre of the UK healthcare sector. It is said to be one of Europe's biggest organisations, employing a workforce of about 1 million people and purchasing goods and services totalling £11 billion per annum (NHS PASA, 2008). This reflects the enormity of NHS' stakeholder base a typical representation of which is shown in Figure 1. This fact is further exacerbated by the reality that all UK citizens are potential stakeholders to the NHS (Welsh and Pringle, 2001). These global and national issues hence entail new pressures on the existing NHS healthcare infrastructure. As such, this calls for a new outlook on how healthcare facilities are planned, built and managed over the long term.

Drivers for innovative pre-design processes in the NHS
Over the last decade, the Department of Health has been reviewing its operational processes and policies. As a result of the review exercises, several policy reports have been published. The *NHS Plan* (DH, 2000) set out ambitious targets of how to create a modern health service that is responsive to the citizens who pay for it and the patients

who use it. Further to this, the Government announced its plan to devolve power from '*Whitehall*' to NHS frontline organisations and staff (Milburn, 2001a). This arrangement aimed to encourage greater autonomy for NHS Trusts and Primary Care Trusts (PCTs). These and other reforms, for example the recent '*Patient and Public Involvement* (PPI) initiative (DH, 2008a), imply that staff, patients and the public are now empowered to take part in the planning of care and services that affect them. Recent emphasis in global issues such as sustainability/sustainable development (WCED, 1987; DH, 2008b), as well as the need for public accountability (for example, Cabinet Office, 2006) further corroborate the above NHS reforms.
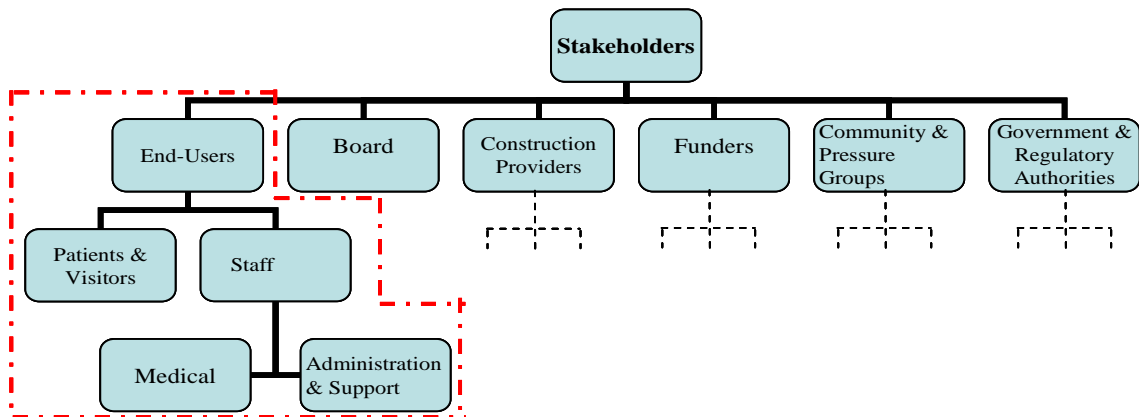

Figure 1: Typical NHS Stakeholder groups

NHS Trusts are now operating in a more consumer-driven healthcare market. Agendas for healthcare built environments are specifically being developed around the aspects of *consumerism, design quality* and *sustainability* (PCC, 2008). Originally a premise of the private sector, consumerism may be defined as the desire for competitiveness in the market (Ridley and Jones, 2002). NHS' *consumerism agenda* focuses on improving the patient experience by addressing their needs, emphasizing on the individual rather than patients in general (PCC, 2008). The agenda further suggests that patients be viewed as customers. As such, their needs should inferably be put before the needs of healthcare providers through ensuring their comfort and convenience in both organization of care and in the quality of the healthcare built environment. The implication for the healthcare facilities now, more than ever before, is such that they are expected to be more attractive (aesthetic quality) and more patient-focused, among others. NHS' *design quality agenda* is related to the increasing awareness of the linkage between design of the physical environment and patient recovery (Lawson and Phiri, 2003), as well as, its linkage to work performance and job satisfaction of clinical staff (Ulrich *et al*., 2004). Finally, the *sustainability agenda* means that a sustainable NHS considers environmental, social and economic implications of its built environments.

The NHS needs to work with its stakeholders in the process of defining agenda for proposed or future facilities. Delivering modern healthcare facilities, within limited resources, under today's dynamics and demands is an undisputable challenge. NHS may need to reinvent the way it arrives at its design goals within the given constraints. It is required that means of generating as many ideas as possible are devised. Complacently accepting that the historical way of providing services is to be projected indefinitely into the future (Smith *et al*., 2003) may lead to failed designs, unsatisfied end-users and eventually facility obsolescence. Moreover, the consumer-driven markets in which it operates now, together with all the recent global and national issues imply that

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involving all staff, patients, and the public in all processes is a prerequisite for satisfactory service delivery.

This paper is an exploratory study into creative idea generation in the pre-design stage. It is based on literature and is an insight into the theory and practices involved in group collaborative idea generation. Specifically, it highlights the advantages of using electronic brainstorming (hereafter, EBS) over the traditional brainstorming techniques. (The NHS is currently involved in nationwide public consultation exercises). The paper further looks at the opportunities that exist for the NHS to take advantage of existing modern communication technologies if EBS were to be applied in the consultation process, briefing (requirements capture) and option-generation. The premise of the paper is that all people have the ability to generate creative ideas (Hawkins, 1999). The other argument is that "by using consumer [end-user] needs as a point of departure to explore multiple solutions, one can generate a wide range of possibilities outsides one's current repertoire of solutions" (Fraser, 2007:70). Therefore, EBS could be a useful method for reaching many end-user groups, enlisting their additional input in generating innovative ideas before design commences.

Research background and justification
Currently, the Government is undertaking the largest hospital building programme in the history of the NHS. By 2007, major hospital schemes worth over £4.9 billion had been opened, others worth £4.6 billion were under construction, and new major hospital schemes worth £8.5 billion were forecast to be open by the end of 2010 (DH, 2007).

The early stages of construction projects, and indeed, most projects, are characterised by the making of critical decisions (Duerk, 1993; Bruce and Cooper, 2000). These pre-design decisions affect the success or failure of the ensuing phases of the lifecycle (Kelly, 2002). Barton and Pretorius (2004) have noted that most economic decision-making, public or private, concerns the application of limited resources. Accordingly, it has been noted (Best and de Valence, 1999) that for the large sums of money they invest in building procurement, clients who commission the design and construction of buildings hope to maximise the value they obtain. Moreover, as has been noted by Earl and Clift (1999), increasingly, decision-makers are being faced by complex investment decisions created and made emotive by diverse stakeholder expectations.

However, past research (for example, Okoroh *et al*., 2001) has expressed concerns over the capability of most NHS hospitals to demonstrate best value practice in providing an efficient, innovative as well as added value in-house non-clinical service to NHS trust customers. The National Audit Office (NAO, 2001) noted that when procuring healthcare facilities, NHS does not obtain value for money for reasons such as inability to manage the early stages of projects to ensure that users are properly engaged in the process to avoid later changes to the functional requirements for healthcare facilities.

NHS needs to pursue further opportunities and means of engaging more with the hospital end-users in the early stages. Capturing a greater range of ideas may be one way of managing the early stages better. Arntzen (2003:38) has posited that "a building … is only as efficient and functional as its inhabitants/users". Conversely, the *2020 Vision* report (Building Futures, 2002) suggests that many of the buildings the NHS is currently acquiring through the 30-year long PFI contracts in ongoing hospital building programme could be largely obsolete well before the end of this period. It attributes this obsolescence to the NHS' low expenditure on researching future building needs. Several authors have cited building end-users as a useful, indispensable and ready

source of (pre)-design data because they are said to be closest to the interface between the physical built environment and its functional performance (for example, Bordass and Leamann, 1997; Blyth and Worthington, 2001; Emmitt, 2007). In addition, literature shows that user involvement has positive effects on the success and user satisfaction (Kujala *et al.,* 2005). It is therefore hoped that through rigorous application of electronic media (through EBS), improved possibility for reaching more end-users and consequently more ideas for better service and hospital buildings will be attained.

2   Literature review

Idea generation and brainstorming

A problem is a question or an issue of concern that needs to be solved or studied (Daellenbach and McNickle, 2005). Smith *et al.* (1998) perceive that design and construction projects are a result of someone or a group of individuals identifying an unsatisfactory state of affairs that may need to be addressed through construction of a new building. Therefore, building design and construction could be handled as part of a problem-solving process which starts with a bid to understand the problematic issues. Hence, understanding the problematic issues is the crux of the pre-design phase which comprises the construction briefing process and those processes involving options-generation and solution-identification. Figure 2 represents the problem-solving cycle in through the life of a facility.
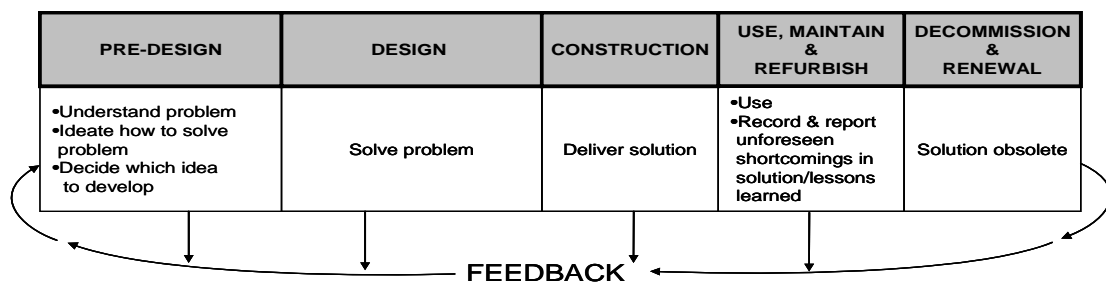
PRE-DESIGN	DESIGN	CONSTRUCTION	USE, MAINTAIN & REFURBISH	DECOMMISSION & RENEWAL
•Understand problem •Ideate how to solve problem •Decide which idea to develop	Solve problem	Deliver solution	•Use •Record & report unforeseen shortcomings in solution/lessons learned	Solution obsolete

FEEDBACK

Figure 2: Problem solving in Pre-Design

Chinyio (2007) argues that if there is a problem to be solved, problem-solving requires that the major task is the accurate identification of the problem. However, according to Schon (1991:40), "in real world practice, problems do not present themselves to practitioners as givens, …. They must be constructed from the materials of problematic situations which are puzzling, troubling and uncertain". He further suggests that in order to convert a problematic situation into a problem, one must do a certain kind of work that involves making sense of the situation that initially makes no sense. Designing complex healthcare buildings presents a typical example of attempting to solve a problematic situation. These building are required to comply with a myriad regulations while at the same time satisfy the multi-faceted stakeholders who may be affected by a given situation or as a result of the proposed solution. Moreover, in dealing with multiple stakeholders, it has been recognised that their needs and requirements may at times conflict (Green, 1996). In the pre-design phase, some stakeholder needs and requirements may be known, clear and easy to define at the time of statement of need while some others will be difficult to ascertain at that point. In addition, it has also been said that the construction briefing process is about the said things as well as the unsaid (Salisbury, 1998; Emmitt, 2007). Therefore, for a start, the conceptual need for idea generation methodology during pre-design is pertinent. It will be needed in trying to make sense of the problem at hand, in understanding implicit needs, as well as, during that time when needs have been understood but their solutions are still pending.

Group workshops are a familiar approach for collaborative creativity and modelling problems (Shaw, 2003; Hilliges *et al*., 2007). Brainstorming activity is said to be central to all 'Soft Operational Research (OR)' methods which use group workshops (Shaw, 2003). Brainstorming involves creative thinking. Rawlinson (1981:8) defined creative thinking as "the relating of things or ideas which were previously unrelated". He further posited that creative thinking is imaginative and often leads to many possible answers and ideas. In brainstorming, all group members are encouraged to spontaneously propose ideas without censoring any (Huczynski and Buchanan, 2007) as a means of getting a large number of ideas in a short time (Rawlinson, 1981). Osborn (1957) proposed brainstorming as a method to improve group idea generation suggesting specific procedural rules for successful idea generation. These rules were based on scientific research which had confirmed that ideation could be more productive if criticism was concurrently excluded, and that the more ideas generated the better because in ideation "quantity helps breed better quality" (pp. 167). These rules also are intended to maximize possibilities for mutual stimulation: participants are instructed to generate many ideas; to think of uncommon ideas; to combine and improve ideas; and to refrain from criticism.

Brainstorming procedure
Aiken et al. (1996) divided idea generation into two main categories: *brainstorming* and *brainwriting*. In *brainstorming* [generally portrayed as Face-to-Face (FTF) manual brainstorming in this paper] a group contributes by taking turns to comment on an issue under discussion. The ideas are written down on material that is visible to all. Graetz *et al*. (1997) asserted that 'traditional' or FTF manual brainstorming is still structured around Osborn's (1957) rules which serve to minimize interference that could be caused by evaluation. The advantages of this technique are that it involves social interaction and encourages a high level of group cohesion. *Brainwriting* could either take the form of interactive FTF or nominal (non-FTF) sessions, among other existing versions. The interactive FTF (brainwriting pool) is characterised by silent, hand-written communication with participants sitting round a table, silently writing ideas on sheets of paper which are passed round the group rotationally. In the nominal (non-FTF) variation (also called, gallery writing), large pieces of paper are pinned on walls around the meeting room, people only silently write their ideas. The advantages of this variation over FTF manual brainstorming are that participants do not need to take turns in speaking (Gallupe *et al*., 1991; Nijstad *et al*., 2003); all ideas are recorded, and, depending on the system, a high degree of anonymity is maintained.

Problems with FTF brainstorming
Controversy surrounds Osborn's (1957) earlier perceptions that groups interacting through FTF brainstorming workshops could outperform individuals in terms of both quantity and quality of ideas. Huczynski and Buchanan (2007) perceive that the very strengths of group processes like FTF brainstorming may prove to be its very weaknesses too. For example, the practical difficulty and cost of bringing individuals together in one place counters the benefits of considerable contributions from supposedly independent minds. FTF brainstorming is based on the belief that under given conditions, a group of people working together will solve a problem more creatively than if the same people worked separately as individuals (Huczynski and Buchanan, 2007). On the contrary, they argue that the presence of the group is said to permit members to 'bounce ideas off each other' or in the second stage throw out half baked ideas which other members might have developed.

Group polarisation is another problem that is associated with FTF group activities such as brainstorming. This phenomenon occurs when a position that is held by the majority of group members is intensified (in a given direction) as a result of discussion (Lamm, 1988). Group polarisation can therefore lead to irrational and hence ineffective group performance.

Similarly, the *Groupthink* tendency occurs when groups and teams develop a high level of cohesiveness as a result of dynamics of group interaction. This would otherwise be a positive consequence, but its undesirability would arise from the desire to not disrupt the unanimous consensus, thereby leading to reluctance to realistically challenge the group's thinking (Huczynski and Buchanan, 2007).

Diehl and Stroebe (1987) thought *production blocking* to be the main source of productivity losses in FTF manual brainstorming. It occurs when an individual is unable to simultaneously interject ideas without violating group etiquette or breaking the concentration of members (DeRosa *et al.*, 2007).

Emmitt and Gorse (2003) report that although earlier research (Stroop, 1932) found group interaction to have produced a higher degree of creativity in relation to individual performance, research on idea generation through FTF brainstorming has shown individuals to outperform the group by a factor of 2:1. Their findings are corroborated by other research (for example, Lamm and Trommsdorff, 1973; Diehl and Stroebe, 1987) which attribute these shortcomings to factors such as, social anxiety which inhibits member participation; feelings of intimidation by the 'vocal minority' who may dominate idea generation sessions; or, to reduced personal responsibility. Similarly, individuals may be afraid to be seen as vocal if they seem to be contributing many more ideas than others and this inhibits their performance.

Electronic brainstorming (EBS)

In order to counteract the problems that have come to be associated with FTF manual brainstorming, some organisations have turned to Group Support Systems (GSS) like EBS. DeRosa *et al.* (2007) perceive EBS as a form of e-collaboration which has been reported to offset some of the principal procedural, behavioural, social and psychological constraints on group brainstorming. De Vreede *et al.* (2003) report GSS to depend on software tools for structuring and focusing efforts of teams toward achieving a goal. Data collected from EBS sessions is said to be richer, and easier to analyse than that captured from manual FTF sessions (Shaw, 2003) while the method has also been reported to facilitate development of a group memory (a collection of ideas is instantly accessible).

Aiken *et al.*, (1996) reported that in its purest form, EBS takes the form of *brainwriting* either as *electronic individual poolwriting* or *electronic gallery writing*. They show that the most commercially used EBS specialist systems are based on brainwriting methodology. Using these systems, meetings are normally coordinated with Electronic Meeting Rooms (EMR) equipped with hard- and software (Petrovic and Krickl, 1994). Examples of similar established methods for idea generation include, *Nominal Group Technique* (NGT), electronic blackboards, and Delphi (Aiken *et al.*, 1996). Michinov and Primois (2005) present a further aspect of EBS. They refer to EMR-based sessions as being synchronous (carried out in real time) within space and time constraints, while others such as email, that are not as spontaneous, could be are said to be asynchronous.

Electronic individual poolwriting

This is based upon the nominal FTF *brainwriting* technique in which participants write ideas on sheets of paper. The electronic version simply substitutes the paper for disk files. Further details on the technology used are available elsewhere (for example, Petrovic and Krickl, 1994; Michinov and Primois, 2005). Ideas are almost totally anonymous, they are automatically recorded and the group can contribute in parallel (Aiken *et al*., 1996). Its major advantage arises from the large number of ideas generated making it more productive, while the disadvantage is that participants cannot see others' ideas during the meeting (Vogel and Nunamaker, 1990).

Electronic gallery writing

This is the electronic version of gallery writing. In the technique, participants submit typed ideas and view all others' submitted comments at any time. Once an idea is entered, it becomes available for others to view in a shared space, on a designated section of the monitor in each workstation (DeRosa *et al*., 2007). This method has been reported (Aiken *et al,.* 1996) to be less productive than electronic individual pool writing. Because information is shared, participants were found to spend more time reading others' ideas than contributing their own. On the contrary, they observe that depending on the objective of the meeting, this is not entirely bad, for example if the goal is to promote a high degree of information sharing or group synergy.

Discussion

Brainstorming is a good way to generate many ideas especially in the early stages of problem-solving. Rawlinson (1981) noted that because of the need to suspend judgement and to accept wild and silly ideas, a FTF manual brainstorming session is almost out of control. He further reported that with the passing of the years the word 'brainstorming' had become debased and consequently it became associated with a group of people sitting around a table and throwing out ideas, resulting usually in a small number of not very good ideas. Paradoxically, empirical research has found that control of a brainstorming session generates more, not less, ideas (Diehl and Stroebe, 1987; Mullen *et al*., 1991). The introduction of EBS as an electronic version of NGT has succeeded in counteracting the criticism attributed to brainstorming.

Productivity associated with EBS (*electronic gallery writing*) in synchronously interacting groups is highly rated (Gallupe *et al*., 1991, 1992). However, DeRosa *et al*. (2007) advise that the practical benefit must be considered relative to the all the other methods brainstorming groups to which it is compared: Their findings are that, superiority of *electronic gallery writing* over FTF manual brainstorming, in terms of idea quality and individual member satisfaction is unclear. They further posit that, in terms of idea quality and quantity, the method is not demonstrably superior to manual nominal *brainwriting* groups. However, in terms of efficiency, *electronic gallery writing* has been found to be better than nominal *brainwriting* techniques. This has been attributed to issues such as: less likelihood to replicate ideas because of the availability of accessible cumulative output from the group (Pinsonneault *et al*., 1999). It has also been found that in some cases, small groups ideating through nominal manual brainwriting groups outperform similar *electronic gallery writing;* however, the trend is said to reverse with large groups (Dennis and Valacich, 1999).

It has been found that, although EBS (especially synchronous EBS) can generally be a successful process, it is not without its flaws. Nevertheless, it has been noted, that most unhappy participants would rather attribute the failures to the meeting results rather than

the technique itself. Research by de Vreede *et al*., (2003) unveils the distinct causes of unhappiness with results as: poorly defined goals (deliverables) by the meeting owner; conflicting expectations about meeting content; or, a dislike for anonymous communication. Poorly perceived facilitation-support has also been cited as another. By avoiding these pitfalls, EBS can be a worthwhile endeavour for capturing the views and ideas from the populace.

Opportunities for the NHS
These findings are fundamental to our advocacy for the use of EBS in pre-design collaborative idea generation with NHS stakeholders. A report by *Building Futures* (2002) highlighted that due to the internet, media coverage and other NHS initiatives such as *NHS Direct*, citizens are becoming more informed about healthcare issues. It further projected that the following 20 years would see continued development of consumer culture, and that growing availability of information would lead to increased public expectations about how care is delivered and the quality of the public buildings in which it is delivered.

Depending on the target-group, EBS could be a valuable medium of collaboration. Utilising ordinarily available electronic media may serve towards alleviating some of the pitfalls advanced by de Vreede et al. (2003). PCTs could call upon staff and the public to supply their ideas and opinions about a relevant issue at specific communicated dates and times. This could be at synchronous live EBS sessions akin to *chat-room*/forums or teleconferences. Alternatively they could let all targeted participants contribute their ideas via mass email. Access to meeting-goals and expected deliverables, as well as the ability to post one's identity are all possible through *electronic gallery writing* methods like *chat-room* forums. Moreover, there is the added advantage of getting the participants to contribute from the comfort and convenience of their offices or homes, or even to not have to participate at a very specific set time through the use of email.

Broadening collaborative media through EBS is beneficial. By increasing stakeholder accessibility to the pre-design process, taking advantage of ordinary electronic media, chances are, that, many more people will be able to contribute. Hence, valuable ideas may not be missed during the consultation and idea generation exercises. This view is supported by information from the Office of National Statistics, UK. It is indicated that in 2008, 65% of UK households had internet access (ONS, 2008). This statistic depicts a great opportunity to involve many, moreover, the trend seems upward. If taken advantage of, an opportunity exists to learn as much as possible directly from the service users and the general public what is actually needed, valued and expected of the built health environment. The ideas generated will aid pre-design decision making and consequently help to avoid functional obsolescence of the facilities.

Proposed conceptual framework for application of EBS in the early stages
It is recognised that collaborative problem-solving requires much more than joining work forces (Hilliges *et al*., 2007). It is said to involve, exchanging knowledge and information; coordinating different skills (Hawkins, 1999); interpreting information so that new ideas can be created and new solutions found (Graetz *et al*., 1997; de Vreede *et al*., 2003). The fact that NHS' vast and disparate stakeholder base constitutes patients, staff and the public, notwithstanding, other providers such as construction teams, general supplies and services, has been highlighted in *Section 1* of this paper. The conceptual EBS framework (Figure 3) is based on the different stakeholder categories depicted in *Figure 1*. The framework represents involvement of the various stakeholders

in the pre-design stage, while at the same time proposing different EBS techniques that could be used in collaborating with them. For example, if the framework were to be applied to primary care projects, it would be founded on two key assumptions:

(i) Ideas being generated are related to building construction projects at Primary Care Trust (PCT) level. Therefore the framework focuses on Stage 1 to 4, of Primary Care Planning and Design guidance (PCC, 2008);

(ii) At this stage, construction contractors or consortiums are not appointed yet (unless a long-term partnering agreement is in place, in which they would be regarded as development partners). Therefore, focus is on collaboration between the board, as PCT decision-makers; end-users; community and pressure groups (the public); and; government and regulatory authorities.

Stakeholder Group / Project Stages / EBS Methods	BOARD / PCT Management	End-Users	Public (Community & Pressure groups)	Government & Regulatory Authorities
Stage 1: Understand National Policy Framework	░			
Stage 2: Prepare SSDP*	░	░	░	░
Stage 3: Prepare procurement plan	░			
Stage 4. Develop project brief	░	░	░	░
EBS methods/technique				
EBS/GSS Specialist Software (FTF and non-FTF)	✔	✔	✔	✔
Teleconferences	✔			✔
Videoconferences	✔			✔
Email	✔	✔	✔	✔
Internet	✔	✔	✔	✔
SMS* Texting		✔	✔	

- *SSDP = Strategic Service Development Plan; SMS = Short Messaging Service (for Mobile phones)
- Shaded (non-solid) = Involved group

Figure 3: EBS application in Pre-design stages of healthcare projects

For each task that requires interactive idea generation, the framework could be augmented by Rawlinson's (1981) proposed six stages of brainstorming:

1. State the problem and discuss;
2. Restate the problem. Begin problem statement with: "how to…";
3. Select and record a basic restatement. Begin restatement with "in how many ways can we…";
4. Warm-up session – short quick-fire session to get participants free-wheeling;
5. Brainstorm;
6. Wildest idea (takes the wildest and most foolish idea from the session and tries to turn it round into some more useful ideas).

Depending on the complexity of the problem to be solved, group size and corresponding quantity of ideas generated, the idea generation exercise may not be carried out fully in one session. It could be carried out as a series of workshops spread across several days as need dictates.

4. Conclusion and further research

Arntzen (2003) has noted that a hospital is characterised by its complexity and its changing technology. He presents the analogy of a hospital and a small town with a service, residential and industrial area all in one. Furthermore, this paper has demonstrated the magnitude of the disparate demands being made on the today's and future healthcare built environments. Holistically, considering all these foregoing factors implicitly calls for rethinking pre-design processes. For, inherently, with the new policies and global agenda adequately involving stakeholders (including end-users) seems to be a prerequisite. Service design (including infrastructure) must have their input and decisions must be auditable and accountable to the tax paying public and citizens. At the same time, other typical parameters like time, cost (whole life costs) and quality must be withheld. From a whole life value and functional design perspective, end-user input has been shown to be indispensable. Therefore, there is an urgent need to devise creative ways for achieving satisfactory public built environments.

Many managers are said to have no time to run a brainstorming session as they have to make quick decisions (Rawlinson, 1981). In addition, the prospect and practicality of actively engaging a large number of stakeholders seems unfathomable. However, the aspect of brainstorming is both about quantitative idea generation and creativity especially amidst complexity. Moreover, with the current trends in technology advancement, consumerism and regulations, NHS stakeholders will begin to consider collaboration and consultation a given. The moment has come to take advantage of existing communication technologies in collaborating and involving stakeholders in the pre-design stages or else encounter costly mistakes. It has been shown in this paper that the technologies applied do not have to be specialist as such. It has also been demonstrated here how EBS could generate many more ideas from which that much needed solution could result. Similarly, with today's technologies and innovative ICTs, data management and evaluation seems easier now than it was a decade ago, making it an enabler to the electronic collaborative process.

Generally, having completed an idea generation exercise, decision-makers are faced with a choice of what is a good idea, and which of them is to be further pursued or carried forward to the next stage. A fundamental part of meaningful collaboration, it is important that participants are informed of the result of the creativity session(s) as well as the next stage after, lest they feel it was a waste of their time. The next stage ensuing idea generation is evaluation and selection (which is beyond the scope of this paper) which again could be a collaborative exercise between the NHS organisation and key representatives from stakeholder groups.

This paper has been written as part of wider level ongoing research into innovative improvement of healthcare facility design and construction processes. The research is in its early stages. After this exploratory study, the next step is to carry out an empirical study into currently applied collaborative ideation methods within the pre-design phase of NHS construction projects. This next level forms part of a deeper empirical investigation into stakeholder and community engagement in whole life value delivery of healthcare facilities.

References

Aiken, M., Vanjani, M. & Paolillo, J. (1996) A Comparison of Two Electronic Idea Generation Techniques. *Information and Management,* 30**,** 91-99.

Arntzen, E. (2003) Buildings - from Concept to Use. *Business Briefing: Hospital Engineering and Facilities Management***,** 38-45.

Barton, R. & Pretorius, F. (2004) Managing Values: Challenge for Public Projects in Hong Kong. *Value Manager, HKIVM,* 10**,** 15 - 23.

Best, R. & de Valence, G. (1999) *Building in Value: Pre-Design Issues,* London, Arnold Publishers.

Blyth, A. & Worthington, J. (2001) *Managing the Brief for Better Design,* London And New York, Spon Press.

Bruce, M. & Cooper, R. (2000) *Creative Product Design :A Practical Guide to Requirements Capture Management,* Chichester, Wiley.

Building Futures (2002) 2020 Vision: Our Future Health Environments, Available at: http://www.cabe.org.uk/default.aspx?contentitemid=668, Accessed, 01/12/08. Norwich, Building Futures (CABE and RIBA).

Cabinet Office (2006) Chapter 8: Policy - Openness and Accountability. Available at: http://www.civilservice.gov.uk/about/public/bodies.asp. Accessed: 15/11/08. *Public Bodies: A guide for departments.* London, Cabinet Office.

Chinyio, E. (2007) A Shared Project Brief. IN SEXTON, M., KÄHKÖNEN, K. & LU, S. (Eds.) *Revaluing Construction: A W065 'Organisation and Management of Construction' Perspective.* CIB.

Daellenbach, H. G. & McNickle, D. C. (2005) *Management Science : Decision Making through Systems Thinking* Basingstoke, Hampshire, Palgrave Macmillan.

Dennis, A. R. & Valacich, J. S. (1999) Electronic Brainstorming: Illusion and Patterns of Productivity. *Information Systems Research,* 10 (4)**,** 89-101.

DeRosa, D. M., Carter, L. S. & Hantula, D. A. (2007) The Medium Matters: Mining the Long-Promised Merit of Group Interaction in Creative Idea Generation Tasks in a Meta-Analysis of the Electronic Group Brainstorming Literature. *Computers in Human Behaviour,* 23**,** 1549-1581.

de Vreede, G., Davison, R. & Briggs, R. (2003) How a Silver Bullet May Lose Its Shine. *Communication of the ACM,* 46**,** 96-101.

DH (2000) The NHS Plan: A Plan for Investment. A Plan for Reform. London, Department of Health, HMSO.

DH (2007) Rebuilding the NHS: A New Generation of Healthcare Facilities. Available At:http://www.dh.gov.uk/en/publicationsandstatistics/publications/publicationspolicyandguidance/dh_075176. London, Department of Health, HMSO.

DH (2008a) Patient and Public Involvement. Available at: http://www.dh.gov.uk/en/managingyourorganisation/patientandpublicinvolvement/dh_085874. Accessed: 03/08/08 London, Department of Health

DH (2008b) Sustainable Development in the NHS, Available At: http://www.dh.gov.uk/en/managingyourorganisation/estatesandfacilitiesmanagement/sustainabledevelopment/dh_4119123, Accessed: 05/11/08. London, Department of Health.

Diehl, M. & Stroebe, W. (1987) Productivity Loss in Brainstorming Groups: Toward the Solution of a Riddle. . *Personality and Social Psychology,* 53**,** 497-509.

Duerk, D. P. (1993) *Architectural Programming: Information Management for Design,* NY, John Wiley and Sons

Earl, G. & Clift, R. (1999) Stakeholder Value Analysis: A Methodology for Integrating Stakeholder Values into Corporate Environmental Investment Decisions. *Business Strategy and the Environment,* 8**,** 149-162.

Emmitt, S. & Gorse, C. (2003) *Construction Communication,* Oxford, Blackwell.

Emmitt, S. (2007) *Design Management for Architects,* Oxford, Blackwell Publishing.

EPSRC (2008) Health and Care Infrastructure Research and Innovation Centre (HaCIRIC): Details of Grant. Available at: http://gow.epsrc.ac.uk/viewgrant.aspx?grantref=ep/D039614/1 Accessed 02/03/08. Engineering and Physical Science Research Council (EPSRC).

Fraser, M. A. H. (2007) The Practice of Breakthrough Strategies by Design. *Business Strategy,* 28 (4)**,** 66-74.

Gallupe, R., Dennis, W., Cooper, J., Valacich, L., Bastianutti, L. & Nunamaker, J. (1992) Electronic Brainstorming and Group Size *The Academy of Management Journal,* 35**,** 350-369.

Graetz, K., Barlow. C. B., Proulx, N. & Pape, L. J. (1997) Facilitating Idea Generation in Computer Supported Teleconferences. *Communications of the ACM***,** 317 - 324.

Green, S. D. (1996) Group Decision Support for Value Management. IN LANGFORD, D. (Ed.) *CIB W-65 Symposium, Shaping Theory and Practice.* Glasgow.

Hawkins, B. (1999) *How to Generate Great Ideas,* London, Kogan Page.

Hildrey, S. (2003) Spice Things Up: You've Deliberated, Cogitated and Diversified—Now It's Time to Look at Your Satellite Holdings. Available at: http://findarticles.com/p/articles/mi_hb5067/is_245/ai_n29021772, Accessed 01/12/08. *What Investment.*

Hilliges, O., Terrenghi, L., Boring, S., Kim, D., Richter, H. & Butz, A. (2007) Designing for Collaborative Creative Problem Solving *Communication of the ACM***,** 137-147.

Huczynski, A. & Buchanan, D. A. (2007) *Organisational Behaviour (6th Edn),* Harlow, England, FT Prentice Hall

Kelly, J. (2002) *Best Value in Construction* Oxford, Blackwell Publishing Ltd.

Kujala, S., Kauppinen, L. & Kojo, T. (2005) The Role of User Involvement in Requirements Quality and Project Success. *Proceedings of the 13th IEEE International Conference on Requirements Engineering (RE'05).*

Lamm, H. & Trommsdorff, G. (1973) Group Versus Individual Performance on Tasks Requiring Ideational Proficiency (Brainstorming). *European Journal of Social Psychology,* 3**,** 361-387.

Lamm, H. (1988) A Review of Our Research on Group Polarisation: Eleven Experiments on the Effects of Group Discussion on Risk Acceptance, Probability Estimation and Negotiation Positions. *Psychological Reports,* 62**,** 807-813.

Lawson, B. R. & Phiri, M. (2003) *The Architectural Healthcare Environment and Its Effects on Patient Health Outcomes,* London, The Stationery Office.

Milburn, A. (2001) Empowering the NHS Frontline - Labour Government's Agenda for Second Term. Speech by the Secretary of State, June, 2001. Available At: http://www.dh.gov.uk/en/news/speeches/speecheslist/dh_4000748. Accessed 22/05/08. London, Department of Health.

Michinov, N. & Primois, C. (2005) Improving Productivity and Creativity in Online Groups through Social Comparison: New Evidence for Asynchronous Electronic Brainstorming. *Computers in Human Behaviour,* 21**,** 11-28.

Miller, R. L. & Swensson, E. S. (2002) *Hospital and Healthcare Facility Design,* New YORK, Norton and Company.

Mullen, B., Johnson, C. & Salas, E. (1991) Productivity Loss in Brainstorming Groups: A Meta-Analytic Integration. *Basic and Applied Social Psychology,* 12**,** 3-24.

NAO (2001) Modernising Construction, Appendix 5: The NHS Estates. Available on: http://www.nao.org.uk/publications/nao_reports/00-01/000187.pdf Accessed on, 26/04/08. London, National Audit Office.

NHS PASA (2008) Social Sustainability. Available at: http://www.pasa.nhs.uk/pasaweb/nhsprocurement/sustainabledevelopment/socialsustainability/landingpage.Htm, Accessed: 20/10/08. NHS Purchasing and Supply Agency.

Nijstad, B., Stroebe, W. & Lodewijks (2003) Production Blocking and Idea Generation: Does Blocking Interfere with Cognitive Processes? *Experimental Psychology,* 39(6).

Okoroh, M. I., Gombera, P. P., J., E. & Wagstaff, M. (2001) Adding Value to the Healthcare Sector - a Facilities Management Partnering Arrangement. *Facilities,* 19**,** 157-163.

ONS (2008) Internet Access. Available at: http://www.statistics.gov.uk/cci/nugget.asp?id=8. Accessed: 01/12/08. Office of National Statistics.

Osborn, A. (1957) *Applied Imagination : Principles and Procedures of Creative Problem-Solving (3rd Ed., Rev),* New York, Scribner's.

PCC (2008) Primary and Social Care Premises - Planning and Design Guidance. Available at: http://www.primarycarecontracting.nhs.uk/planning-and-design-guidance.php?routemap_id=5&process_id=14&sub_process_id=0&activity_id=106. *The Process.* London, Department of Health.

Pinsonneault, A., Barkhi, H., Gallupe, R. & Hoppen, N. (1999) Electronic Brainstorming: The Illusion of Productivity. *Information Systems Research,* 10 (2)**,** 110-133.

Rawlinson, J. G. (1981) *Creative Thinking and Brainstorming* Farnborough, Gower.

Ridley, J. & Jones, L. (2002) User and Public Involvement in Health Services: A Literature Review. SHS Trust- Partners in Change, Edinburgh.

Salisbury, F. (1998) *Briefing Your Architect,* Cambridge, Butterworth-Heinemann/Architectural Press.

Schon, D. (1991) *The Reflective Practitioner: How Professional Think in Action,* Aldershot, Arena.

Shaw, D. (2003) Evaluating Electronic Workshops through Analysing the 'Brainstormed' Ideas. *Operational Research Society,* 54**,** 692-705.

Smith, J., Kenley, R. & Wyatt, R. (1998) Evaluating the Client Briefing Problem: An Explanatory Study. *Construction and Architectural Management,* 5 (4)**,** 387-398.

Smith, J., Wyatt R. & Jackson, N. (2003) A Method for Strategic Client Briefing. *Facilities,* 21**,** 203-211.

WCED (1987) Our Common Future. Oxford World Commission on Environment and Development.

Welsh, T. & Pringle, M. (2001) Social Capital: Trusts Need to Recreate Trust. *BMJ,* 323**,** 177 - 178.

Ulrich, R. (2000) Effects of Healthcare Environmental Design on Medical Outcomes. In: Proceedings of the 2nd Annual International Congress on Design and Health. *Design & Health-The therapeutic benefi ts of design.* Karolinska Institute, Stockholm Sweden.