

AEC INDUSTRY CULTURE: A NEED FOR CHANGE

A. Weippert¹

Queensland University of Technology, Brisbane, Australia.

S.L. Kajewski²

Queensland University of Technology, Brisbane, Australia.

ABSTRACT (CIB T6S4 and T6S7)

Future development in determining new and improved ways for Architectural, Engineering, and Contractor (AEC) industry participants to do business through information and communication technology (ICT) tools and systems is dependent on the innovation of the user, not only the technology itself – i.e. the successful implementation of ICT requires careful consideration to the ‘human touch’. The success of technological developments, in terms of uptake and usage, can be improved if the conditions of innovation diffusion within project organisations, parent organisations, and the broader AEC industry are better understood and brought into play. This includes the matching of technological innovation with the perceived needs and preparedness for change on the part of the industry.

Supporting the aims and objectives of a two year industry and government supported research project, and as a major deliverable, this paper provides a brief literature background on one of its recently completed investigations into the unique and ‘deeply embedded’ culture of today’s AEC industry in an attempt to better understand its inherent resistance to change. This investigation is not intended as a comprehensive statement of the AEC industry’s need or ability to change its existing culture. Rather, it provides an overall snapshot and supposition of how today’s AEC industry can benefit from both a cultural and technological driven change.

Key words: Technology; Culture; Change; AEC Industry.

INTRODUCTION

Four decades of international Architectural, Engineering, and Contractor (AEC) industry publications reinforce poor communication and information transmission; coordination; and teamwork issues, are the cause of countless performance problems on numerous AEC projects. Debatably, today’s industries, businesses and personal worlds are also dominated by a wide range of technologies and e-activities, including: computers, email, Internet, Web sites, etc., finding it more and more difficult to function without them. Yet, the success of any profession is described as going beyond simply exchanging electronic information. That successful information and communication technology (ICT) implementation requires careful consideration to the ‘human touch’. Research also shows that the AEC industry in particular is becoming a major adopter of ICT, experiencing increased benefits for a wide range of its member’s day-to-day activities. Yet, there is still significant room for improvement. Organisations, for example, that have the supposed ‘optimum’ ICT implementation or change strategy may find it worthless, because the organisation’s culture is not properly aligned with, and supportive of the strategy, and therefore, will either stall or simply fail (Schneider W.E. 2000).

Over the past decade, the word ‘culture’ has dominated the thinking of many managers and become an integral part of their everyday language. In other words, today’s global competitive business environment has made the culture of an organisation a critical aspect of its success (Sadri G. and Lees B. 2001). Every organisation within the industry has its own unique culture, sub-culture, character, nature, and identity. It has its own history of success and failures, which reinforces or challenges the organisation’s ‘way of doing things’. Older and more successful organisations, for example, are said to have stronger cultures, natures, and identity (Meudell K. and Gadd K. 1994; Schneider W.E. 2000). Yet, despite the growing awareness of various cultural issues, little attention is paid to the practical, day-to-day process involved in creating, managing and changing culture (Williams A., Dobson P. et al. 1993).

Unfortunately, the transformation of personalities (culture) and traditional processes within any organisation, team or group is not easy (Michel H.L. 1998), characteristically hindered by the AEC industry’s unique and determined way of ‘doing things’ the way it always has, and by its deeply embedded and resistive nature to change. Hence, due to an industry culture being notorious for continuously challenging the successful implementation of innovative change, one of the main objectives of this research project undertaking is to

¹ A. Weippert is a Research Associate undertaking a PhD at the School of Construction Management and Property, Queensland University of Technology, Brisbane, Queensland, Australia.

² S. Kajewski is Assistant Head, School of Construction Management and Property, Queensland University of Technology, Brisbane, Queensland, Australia.

provide an overview of the 'deeply embedded' culture of today's organisations, teams and participants, and focus on the needs, opportunities and subsequent changes necessary to, for example, effectively apply innovative ICT to current / traditional AEC industry practices and processes. This paper provides a summary of this investigation's findings.

CULTURE

Research indicates, one of the last available 'mechanisms' left for organisations to improve their competitive position within the AEC industry is by considering its people (culture) along with its technology. In other words, if one wants to make AEC industry organisations, groups and project teams more efficient and effective, then one must better understand the role that culture plays within them (Schein E. H. 1997). There are arguably many reasons why the study of an organisation, group or team's culture is important:

- Culture focuses on communication at all levels of a hierarchy, where individuals identify who they are in relation to one another and their environment, and where shared understandings form identifiable subgroups / sub-cultures.
- By focusing on culture, one inevitably focuses on the daily routine and 'sense-making' that is the process of building identities and shared reality among members.
- A cultural approach focuses on largely ignored issues such as assumptions and brings underlying values and motives to the surface.
- The understanding of culture offers a better insight to the managers and leaders – not in order for them to better shape the culture, but to better understand and participate in the 'sense-making' activities of members.
- Undertaking a cultural approach will help identify novel approaches and understandings of future organisations, groups and teams.
- Finally, culture is pervasive, not simply a variable that affects the organisation, group or team, but indistinguishable from it (Pepper G. L. 1995).

Culture is also identified as one of the most difficult and complex approaches to understand. This is mainly due to culture being defined in so many different and sometimes conflicting ways (Pepper G. L. 1995). Based on various literatures, culture:

- *"Begins to form wherever a group has enough common experience" which inturn becomes the "property of that group"* (Schein E. H. 1999) p13.
- *"Is influenced by traditions, myths, history and heritage...it is the sum of how we do things around here"* (Hensey M. 2001) p49.
- *"Pervades the decision-making and problem-solving process of the organisation, influencing the goals, means and manner of action...a source of motivation and de-motivation, of satisfaction and dissatisfaction, thereby underlining much of the human activity in an organisation"* (Williams A., Dobson P. et al. 1993) p15
- *"Is a pattern of shared basic assumptions that has been learnt whilst solving problems, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems"* (Schein E. H. 1997) p12

"When we know what culture is, we know what needs to be changed for culture to change. Only once we appreciate its nature can we understand how it might be changed. When we know its role, we can comprehend its importance" (Williams A., Dobson P. et al. 1993) p11.

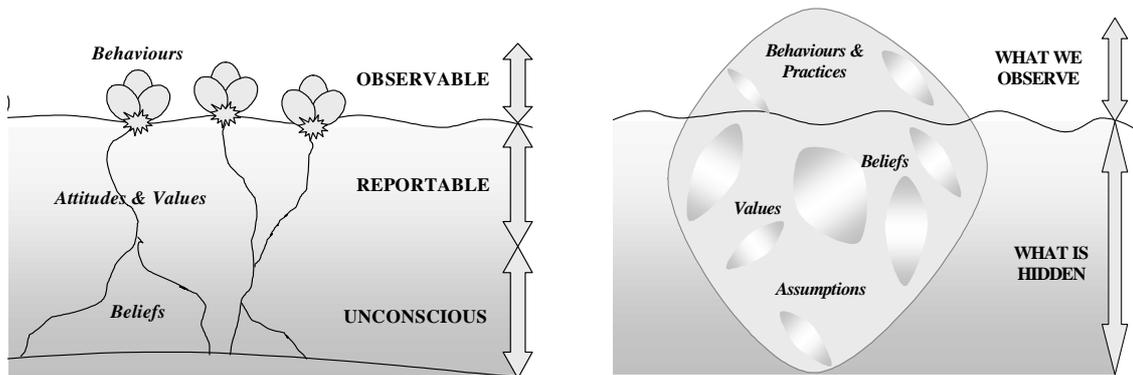
Characteristics

When it comes to humans, culture is identified as *"a set of mores, values, attitudes, beliefs, and meanings that are shared by the members of a group or organisation"* (Williams A., Dobson P. et al. 1993; Duarte D. L. and Snyder N. T. 2001), and is often the primary way in which one 'group' (organisation, team, etc) differentiates itself from others. Further described as influencing and influenced by various issues, ranging from major strategic decisions down to the layout of the offices or the way members of an organisation, group or team address one another.

The characteristic patterns of a group's behaviour and the elements of its culture can be portrayed using a diagram of a Lilly pond, behaviours and elements, which over time become 'invisible' and 'second nature', serving as 'shortcuts' for guiding actions and making decisions. Similarly, culture can also be portrayed using a diagram of an iceberg, exposing a partially 'hidden' culture created by repeated interactions between members of a group, and which guides their behaviours (FIGURE 1). In short, the diagrams illustrate that the behaviour, attitudes, and values, etc. of members are dependent upon the sets of both conscious and unconscious beliefs that individual members possess, and that these beliefs are seen as a 'key element' of organisational culture.

FIGURE 1

The 'Lilly Pond' and 'Iceberg' of Culture and Behaviour

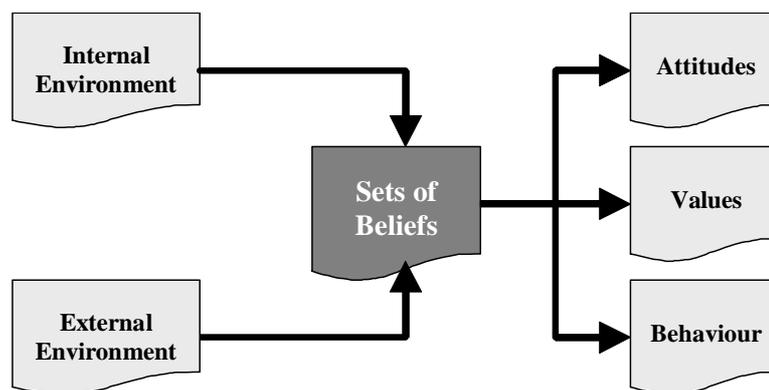


(Williams A., Dobson P. et al. 1993) and (Duarte D. L. and Snyder N. T. 2001)

The relationship between the above beliefs, attitudes, behaviours and values is summarised in FIGURE 2, portraying culture as 'defined needs related to behaviour', and thus related to that of organisational behaviour. Further illustrating that the attitudes, values and behaviours of members of an organisation are dependent on the 'sets of beliefs' they possess, which inturn underlie their attitude, value and behaviour with respect to a specific person, action or object.

FIGURE 2

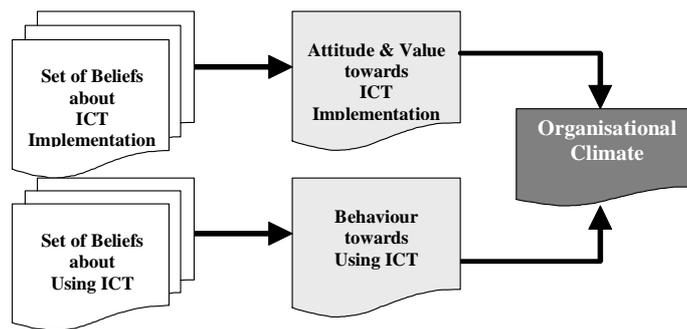
Relationship between Belief, Attitude, Values and Behaviour



(Williams A., Dobson P. et al. 1993)

Furthermore, when implementing change – e.g. a new ICT system or process - the 'climate' of an organisation, team or group is also influenced by the relationship between how members would like or ought to behave and what the work environment dictates that they do, in relation to that implementation (FIGURE 3). Of course, employees or team members can be forced to comply to 'the new way of doing thing around here', but usually at a price. On the other hand, if their attitudes, values and behaviour are in harmony, then a stronger and more effective culture is likely to result, where members are committed to the overall change, goals and methods of the organisation, group or team (Williams A., Dobson P. et al. 1993).

FIGURE 3
Organisational Cultures and Climate



Adapted from (Williams A., Dobson P. et al. 1993)

Strong vs. Weak

Care must be taken by AEC industry organisations when attempting to simply 'brand' a group or team as simply having either a 'strong' or 'weak' culture – i.e.: is it a strong culture because its central beliefs and attitudes are strongly held; or because they are common to all groups (homogeneous); or because it promotes overall effectiveness? In (Bate P. 1996), for example, a 'strong' culture is described as having employees with increased authority and responsibility, who can be relied on to set their own standards and discipline, and where this 'freedom' is conditional upon the ability to 'deliver'. According to (Williams A., Dobson P. et al. 1993), the strength of an organisation's culture is defined as the extent to which the members have 'internalised' the beliefs, attitudes and values that exist within the organisation – i.e.: whereby individuals undergo a 'reasoning process' to mutually accept, agree with, own and value the beliefs, attitudes and values of other members. Further stating strong cultures are characterised by "*dedication, spontaneity and cooperation in the service of common values*" that can operate in direct conflict with the goals of senior management and other sub-cultures. That a strong culture is unlikely to be 'imposed', but rather 'fashioned' through the availability of valid information, openness, trust and free choice. The internalised beliefs, attitudes and behaviours of a 'strong' organisational culture is less likely to change, but in the case of a 'weak' organisational culture, changes in policies, rewards, tasks and structures are likely to "*modify organisational behaviour and cause a cultural shift*".

CHANGE

The phrase - "*If you do not see a truck racing towards you, you are unlikely to jump out of the way...likewise, if you do not realise that you are standing on a treasure of gold, you are unlikely to bend down and pick it up*" (Black J. S. and Gregersen H. B. 2002) p20 - reinforces the importance for organisations, groups and teams to realise and create a 'need' for change, before the act of change can take place. Unfortunately, for the industry to be convinced of the need for change is easier said than done, because people tend not to see even the most obvious threats and opportunities because they are 'blinded' by the '*way we have always done things around here*'. Many organisations decide to change their existing culture based on the need to implement a strategically driven change, due to a certain 'crises' or 'opportunity' being identified – i.e.: many organisations are driven to change due to business demands, not necessarily by the need to change culture. Yet, this change strategy requires a change in organisational objectives, work methods, habits, systems, structures, training, and the way people '*think or do things around here*' (i.e. culture). The successful change in culture can therefore promote a strategic change, but if not properly implemented and managed, both existing and 'enforced' culture groups may constrain a new business strategy (Williams A., Dobson P. et al. 1993; Bate P. 1996; Schein E. H. 1999). *If people fail to see the need for change (whether threat or opportunity drives it), they will not change*" (Black J. S. and Gregersen H. B. 2002) p20.

Timing vs. Cost

In today's increasingly competitive and ever changing AEC industry environment there are no 'quick fixes' to truly help deliver long-term excellence within individual organisations, groups and project teams. The pace, size and complexity of change is greater than ever before, overwhelming many of those who face it. Changes such as:

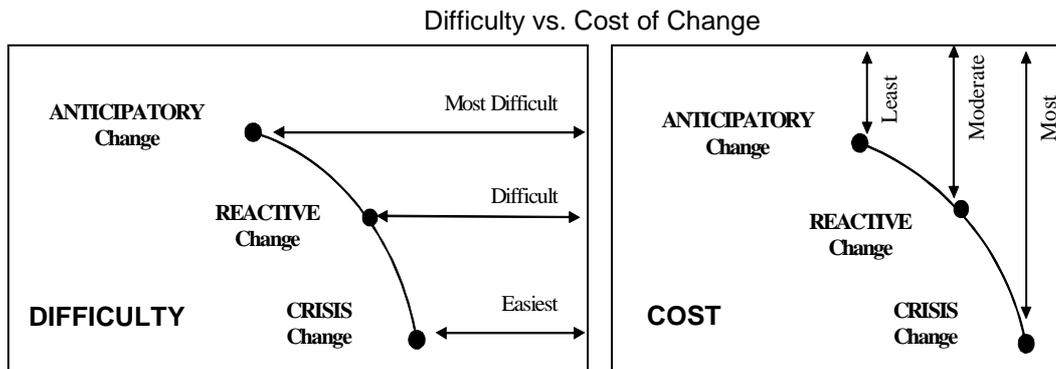
- The need to transform a business that succeeded for years by focussing on customer service that must now focus on technical proficiency to keep up with increased domestic and global competitiveness;
- Redesigning and adapting existing jobs to incorporate these new and never used before technologies; or

- Transforming the current culture and sub-cultures of an organisation from, for example, a cautious or 'reactive' culture, to a fast or 'first-mover' (Black J. S. and Gregersen H. B. 2002).

Research shows the timing and cost effectiveness of implementing the following three types of change process or method in an organisation could determine the success or failure of a change (FIGURE 4):

- **Anticipatory:** When change leaders look ahead and predict change in advance – typically most difficult to implement yet most cost effective.
- **Reactive:** When change leaders react to the obvious signs and signals that change is needed
- **Crisis:** When signs and signals to change have multiplied and intensified to the point where the change leaders no longer can deny them – generally the easiest to implement but at a higher cost.

FIGURE 4



Adapted from (Black J. S. and Gregersen H. B. 2002)

Methods

Changing the culture of an organisation and its members takes time. That is because it is a slow process for people in existing or newly established 'social systems' to develop a new set of common held beliefs, attitudes and values (Williams A., Dobson P. et al. 1993). Today's industry organisations are using a wide variety of mechanisms in an attempt to change their culture. The identification of the aforementioned 'crisis' and 'opportunity' factors, for example, are echoed in (Whyte J. 2002), stating there are two major methods to create the need for change. The first method to motivate people to change is when they are confronted with a real or perceived threat (e.g. job security, increasing competition, etc), which in turn motivate short-term behaviours. The second method is through real or perceived opportunities (e.g. improved profitability, greater productivity, increased employee development, etc), which in turn motivate long-term behaviour within an organisation. Importantly, the real or perceived threats and opportunities will vary from organisation to organisation, where certain key threats and opportunities are better or worse for one but not the other. Further investigations identified a number of alternate key methods of changing the culture of an organisation, including:

- **Changing People:** By changing people, particularly those in key positions or with more uncompromising attitudes, one may change the pattern of beliefs and attitudes within the organisation more easily.
- **Changing Places:** By 'reshuffling' or 'rotating' groups and/or individuals, with different knowledge, experiences and learning, and moving them into key positions within other sub-cultures.
- **Changing People's Beliefs and Attitudes:** Due to beliefs of individuals being influenced by or formed through observation, interaction, participation, and persuasive communication, organisations may use one or more of the following methods for changing the beliefs, attitudes and values of their employees:
 - Through use of role models: By recognising the importance of senior / key individuals, acting as role models to achieve the desired attitudes and behaviours of employees.
 - Through participation: Formalised group discussions, such as morning meetings, team briefings, etc., as methods for developing shared beliefs and attitudes.
 - Through use of formal communication: Although a common process, it can be used more extensively and effectively by formally 'communicating' the organisation's culture to their employees and local community from which they recruit the majority of their employees through in-house or external corporate advertising media groups and, for example, publishing articles entitled '*Protecting Customer Investment*'; '*Putting the Customer First*'; or '*Responding to Change Demands*'.
 - Through counselling: When, for example, there is a need for an organisation to make significant reductions in staff in order to cut costs and improve its profitability, it is difficult to promote a proactive and positive culture at the same time. Therefore, in order to encourage and maintain a positive culture,

research suggests each level of management carry out one-on-one consultations with their employees prior to, during and after the change process.

– Through Management education: Educating management using external consultants is a central strategy for many organisations to achieve a cultural change. On completion, managers are to run 'customised' internal programs to help 'cascade' this newly acquired culture change knowledge and management process down to the rest of the staff.

- **Changing Behaviour:** Changing culture is a matter of changing values and attitudes, rather than teaching people new techniques or replacing old procedures or processes with new ones. On the other hand, the teaching of new skills is likely to change people's beliefs and attitudes towards, for example, their capabilities in producing a new product or outcome.
- **Changing Structures, Systems and Technology:** Changing the structure of an organisation will usually make some, and rather unpredictable, impact on its culture – i.e.: influencing existing work groups and communication networks. However, through revised or improved reward, appraisal, monitoring, budgeting and control systems, found to be linked to specific behaviours, are largely more capable of changing people's beliefs and attitudes towards performing in particular ways.
- **The Corporate Image:** By developing a corporate image (via name, logo, advertising, publication of success, etc), typically develops positive attitudes among both customers and staff and enhances their overall commitment towards the organisation (Williams A., Dobson P. et al. 1993).

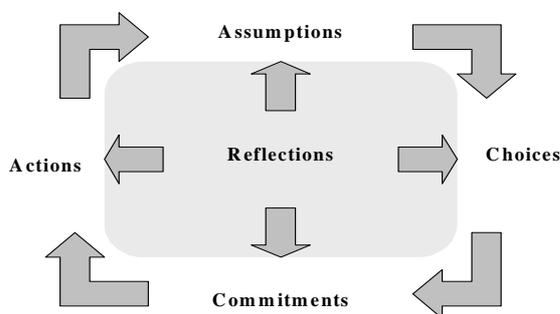
When implementing change, studies show that the aim of changing the existing culture of an organisation is usually secondary, and that the initial method of change is usually the implementation of a new strategy. However, by introducing new company policies and objectives, though the use of one or more of the above methods, inturn changes people's beliefs and attitudes and thus the culture of the organisation.

Processes

One of the analytical frameworks identified during this investigation is the **Change Process Model** (FIGURE 5) enabling organisations to facilitate substantial change and improved implementation via five critical activities, which inturn help ensure long-term effects:

- **Identifying Assumptions:** Assumptions can be considered as the '*taken for granted*' beliefs that individuals have about reality, which guide their actions and are to be isolated and fully understood before an organisation will advance and accept any change.
- **Analysing Choices:** This includes examining how decisions are made, who participates in the decision-making process, what criteria are used, and what consequences follow the choices made.
- **Making Commitments:** Requires choosing between two or more desirable outcomes. Leaders and their employees must then determine which of the positive outcomes they desire most and which they are willing to allocate financial and human recourses over a lengthy period.
- **Selecting Appropriate Action:** Where organisations take definite actions to help satisfy their assumptions, choices and commitments.
- **Engaging Critical Reflection:** Where organisations attempt to understand why they made certain decisions, but perhaps more importantly, how to improve upon that action.

FIGURE 5
Change Process Model



(Gilley J. W. and Maycunich A. 2000)

Investigations identified a further three analytical frameworks used to describe the process of culture change:

- **Force Field Model:** Based on early 1950's research into changing behaviours of individuals and social systems, (Williams A., Dobson P. et al. 1993) elaborated on a model portraying two sets of forces

(driving and restraining) to help bring about change. Firstly, one is encouraged to identify the various forces impeding on the change 'target' (e.g.: implementing an innovative ICT solution or process); secondly, one is encouraged to consider the relative strengths of these forces, and finally it helps one explore alternate strategies to 'modify' these forces (TABLE 1).

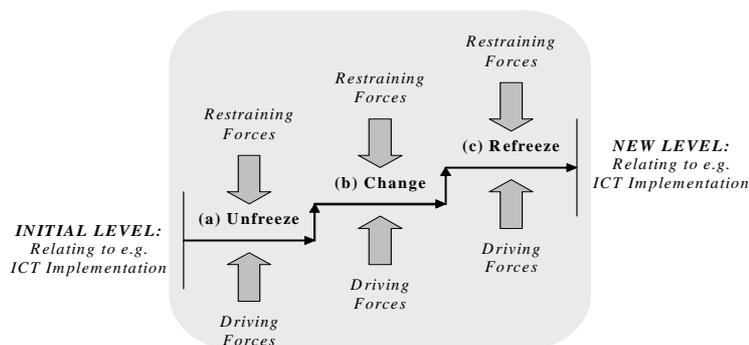
TABLE 1

Forces of Change	
DRIVING FORCES (eg)	RESTRAINING FORCES (eg)
• Change at the top	• Career-based organisation
• Powerful external influence	• Low turnover
• Powerful leader	• Stable environment
• Crisis or opportunity	• Lack of clear authority
• Acceptance of need to change	• Blindness to the need to change

- **Three-Stage Model:** Again based on early 1950's research and elaborated on by (Williams A., Dobson P. et al. 1993) and (Schein E. H. 1997), is yet another useful and 'revolutionary' mechanism in bringing about change in culture. Achieved by firstly, 'unfreezing' existing forces, secondly, introduce change (geared to re-establishing the 'equilibrium of forces') and finally, to 'refreeze' the new situation.

FIGURE 6

Three-Stage Model

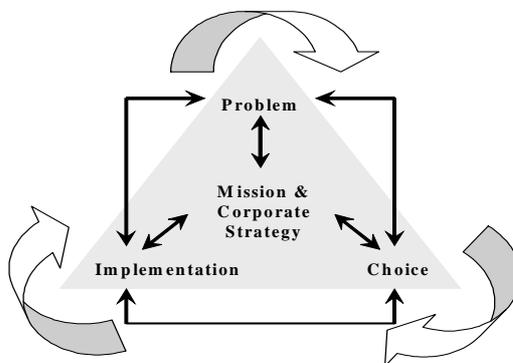


Adapted from (Williams A., Dobson P. et al. 1993) and (Schein E. H. 1997)

- **Decision Making Model:** Described as a common and rational tool used to encapsulate the various stages management teams go through in solving organisational problems or in developing new opportunities in a change process (Williams A., Dobson P. et al. 1993).

FIGURE 7

Decision Making Model



(Williams A., Dobson P. et al. 1993)

Due to their very simplicity, the above change models / processes can be applied to a wide range of applications, whether at a group, team, individual or organisational level, and highlight the importance of a number of considerations in managing change.

DRIVERS AND BARRIERS

A number of drivers of change have been identified during this investigation, including:

- **Motivation:** For any change to occur within an organisation, group or team there will always be some sense of threat, crisis, or dissatisfaction present (i.e.: motivation). Where the '*original way*' (challenging that change) will have to be unlearned before '*the new way*' can be learned. This can be achieved by applying, for example, the aforementioned Three Stage Model (Schein E. H. 1999).
- **Leadership:** When a culture becomes 'dysfunctional', it is the unique role of leadership to perceive the functional and dysfunctional elements of an existing culture, and to manage cultural change in such a way that the group can survive in a changing environment. New leaders, for example, are highly influential drivers of change, because they usually bring with them new ideas, recipes for success, visions for the future, and experience (Williams A., Dobson P. et al. 1993). With leaders being conscious and having a detailed understanding of the cultures and sub-cultures in which they are embedded (Schein E. H. 1997), will ensure a more successful and permanent change in culture within an organisation, group or team.
- **Beliefs and Rewards:** There is no doubt that needs and values vary from person to person or from team to team. It is therefore important for change leaders to better understand what motivates individual members in order to move forward. Larger organisations, for example, may feel it is time-consuming if not impossible to try to determine what the needs and values of hundreds of employees are. The trick here is to 'cascade' and customise this process down the organisation – i.e.: where senior leaders firstly determine their own motivations to change, then delegate the task of determining the motivational rewards of employees down the hierarchy of the organisation (Black J. S. and Gregersen H. B. 2002).
- **Training and Education:** Many organisation leaders bring about change and convince employees and managers of the need to '*do things differently*' through training and education. Unfortunately, "*employees do not always believe what their leaders tell them unless they are educated to the economic realities of their business*" (Schein E. H. 1999) p120. Unlocking an individual employee's potential creativity, skills, and abilities is believed to be a logical and essential opportunity for organisations to develop and improve long-term efficiencies, and a major driver for change (O'Donoghue A. 2001).

Similarly, technological and cultural barriers of change identified during this investigation, include:

- **Technological:** In an 'ideal world', every member within an organisation, from senior executives down to site personnel, are constantly looking for and embracing new and innovative technologies that make their work more effective and simpler (Grenier R. and Metes G. 1995). However, in the 'real world', a typical organisation and its craving for innovative technology remains in most cases a dream, due to harbouring any of the following reasons:
 - Convinced investing in ICT is more a cost factor (with unacceptable returns), rather than a value generator.
 - Perception that it is bad business and equally non-contributing to replace old, unused, or broken technologies with new ones.
 - Difficulty in getting integrated ICT systems.
 - Large percentage of managers and employees are satisfied and very much use to the old or traditional way they work and do business.
 - Insufficient stakeholder drive.
 - Lack of time (too busy) to implement or learn a new a new technology or change process.
 - The fear of potential embarrassment. That even with formal training and education readily available, certain individuals may still feel incapable of learning or incompetent in using a new technology (Whyte J. 2002).
- **Cultural:** As stated before, changing an existing culture is inevitably a difficult and slow process. Where the all too common phrase "*you can't change culture overnight*" becomes a major excuse for not changing culture at all. Research indicates that in certain cases organisations attempt to change their culture, yet employees end up learning only the basics of the new / expected culture (beliefs, values, and attitudes, etc) without fundamentally altering their 'old' culture. As such, the 'new' culture is only superficially different from the old and only a matter of time before the traditional '*ways of doing things*' resurface (Williams A., Dobson P. et al. 1993). For that reason, when AEC industry organisations, teams or groups consider, for example, the implementation or adoption of new ICT in their long-established (traditional) processes and multiple work cultures, they can not assume once electronically and simultaneously linked, that it will automatically ensure an increased sense of community, improved collaboration or improved understanding of others (Graham M.B.W. 1996). On the contrary, the AEC

industry as a whole must realise that when undergoing a technology driven change of any kind, the technology itself is only one of several inter-related components that potentially ensures improved performance (Cabrera A., Cabrera E.F. et al. 2001). Where again, the implementation of a new ICT will inevitably be unsuccessful if the organisation's culture is not properly aligned with, and supportive of an overall business strategy (Schneider W.E. 2000).

FUTURE RESEARCH

Future publications on the remaining research deliverables for this project (not included in this paper due to them being incomplete at the time of compiling this paper), will include (1) outcomes of an 'ICT in Construction Survey Instrument', currently distributed nationally in an attempt to identify current AEC industry perceptions, barriers and enablers to the adoption of innovative ICT solutions; (2) The identification and assessment of new and emerging handheld ICT solutions – including AEC industry benefits, drawbacks as well as future applications; (3) an overall 'snapshot' of current public and private AEC industry sector opportunities and practices in the implementation and application of electronic tendering, by ascertaining the barriers and enablers from both a technological and end-user perspective; and finally (4) the development of a set of ICT best-practice guidelines and/or models, based on this projects collective findings, in an attempt to stimulate the use of innovative technologies in building and infrastructure projects, potentially resulting in increased ICT knowledge, awareness and skills of companies in both the public and private sector.

In addition to the aforementioned four remaining research deliverables for this project, and as part of a PhD undertaking, research activities will further identify various AEC industry culture (a) driving and restraining forces; (b) threats and opportunities; whilst (c) considering various proven and innovative change methods / processes (similar to those highlighted in this paper) in order to develop, test, trial and evaluate an effective, easy to use, but more important, AEC industry specific 'Culture Change Framework' that team leaders can strategically put into practice in order to help determine an overall success rate on their decision to adopt an innovative ICT solution (i.e.: technology driven change) - through identifying and rating team member:

- needs (motivational factors, recourses, etc);
- competency levels (leadership, training, etc);
- underlying values, attitudes, assumptions, perceptions and beliefs, etc. (culture) relative to that change.

CONCLUSION

In an attempt to better understand its inherent resistance to change, this paper provides a brief outline and background literature on one of the recently completed and preliminary investigations into the unique and 'deeply embedded' culture of today's AEC industry. Based on the literature provided, initial investigations concur AEC industry organisations and teams will change only as far and as fast as its collective individuals are willing to change, because people are and always will be 'instinctively programmed' to resist any form of change. Therefore, to change any organisation or team strategically and successfully, one must first attempt to change individual beliefs, attitudes and values (i.e.: culture) before the organisation or team as a whole can benefit (Black J. S. and Gregersen H. B. 2002). Yet, culture is identified as not a sure or stand-alone remedy to achieve, for example, improved organisational performance, described as being '*complex*', '*multi-levelled*' and '*deeply rooted*' - a concept that must be observed and analysed at its every level before it can be fully understood or successfully changed and managed (Williams A., Dobson P. et al. 1993; Schein E. H. 1999). Therefore, when examining or attempting to change an existing culture, industry organisations are to keep in mind that 'culture' is never 'singular' and always 'plural', that every culture is made up of a whole range of mentalities and sub-cultures, all of them different, and at different stages of development (Bate P. 1996). Fortunately, this paper recognises an increase in the relevance and importance of organisational culture and the need for it to be changed (Williams A., Dobson P. et al. 1993).

The development of an adaptive and innovative culture is characterised in this paper as one of several critical and mutually reinforcing variables and activities which organisations must implement and manage effectively. In order to achieve this, industry organisations need to define their objectives; decide on how best to achieve them; develop effective tools to evaluate the progress; and finally, learn how to do this against a background of constant change (Williams A., Dobson P. et al. 1993). Further suggesting AEC industry organisations not only manage change, but also develop their collective capabilities in order to turn continuous change into competitive advantage. This, according to (Grenier R. and Metes G. 1995), can be accomplished by letting go of current 'managing change beliefs', and by building an innovative and adaptive culture that can work within a continual change environment. Many organisations decide to change their existing culture based on the need to implement a strategic driven change, due to a certain 'crises' or 'opportunity' being identified – i.e.: many organisations are driven to change due to business demands, not necessarily by the need to change culture. Yet, this change strategy requires a change in organisational objectives, work methods, habits, systems, structures, training, and the way people '*think or do things around here*' (i.e. culture). The successful change in culture can therefore promote a strategic change, but if

not properly implemented and managed, both existing and 'enforced' culture groups may constrain a new business strategy (Williams A., Dobson P. et al. 1993; Bate P. 1996; Schein E. H. 1999).

Initial investigations found the change of culture must be strategically driven, and the change process supported by the full commitment of senior leaders/management. This commitment alone will certainly not guarantee the successful change in culture, and therefore needs to be managed and monitored continuously and effectively throughout the change process. It also cannot be assumed, when trying to change an influential or dominant culture, that any single change mechanism (e.g. new reward system or training program) will be sufficient, because in isolation, it is likely to be 'absorbed' in an existing and more dominant culture (Williams A., Dobson P. et al. 1993).

This paper reinforces the need for continued efforts in identifying ways for the AEC industry to cope with and eventually overcome its resistance to change. By encouraging the use of innovative ICT solutions; identifying practical and effective ways in which people can improve their performance; and by determining improved and strategically driven ways of aligning technology and people (end users) will undoubtedly help increase the overall knowledge, awareness and skills, of all industry stakeholders in bringing about a much needed cultural change. This will result in a major social and technological impact that will integrate the AEC industry in a unique, distinctive, and never before experienced way. *"If you are serious about managing culture, the biggest danger you face is that you not fully appreciate the depth and power of culture."* (Schein E. H. 1999) p185

REFERENCES

- Bate P. (1996). Strategies for Cultural Change. Oxford, Butterworth Heinemann.
- Black J. S. and Gregersen H. B. (2002). Leading Strategic Change: Breaking Through the Brain Barrier. New Jersey, Pearson Education Inc.
- Cabrera A., Cabrera E.F., et al. (2001). "The Key Role of Organisational Culture in a Multi-System View of Technology-Driven Change." International Journal of Information Management **21**(3).
- Duarte D. L. and Snyder N. T. (2001). Mastering Virtual Teams: Strategies, Tools, and Techniques that Succeed. San Francisco, Jossey-Bass Inc.
- Gilley J. W. and Maycunich A. (2000). Beyond the Learning Organization. New York, Perseus Books.
- Graham M.B.W. (1996). "Changes in Information Technology, Changes in Work." Technology in Society **18**(3).
- Grenier R. and Metes G. (1995). Going Virtual: Moving Your Organisation into the 21st Century, Prentice Hall Inc.
- Hensley M. (2001). Collective Excellence: Building Effective Teams. Virginia, American Society of Civil Engineers (ASCE) Press.
- Meudell K. and Gadd K. (1994). "Culture and Climate in Short Life Organizations: Sunny Spells or Thunderstorms?" International Journal of Contemporary Hospitality Management **6**(5).
- Michel H.L. (1998). "The Next 25 Years: The Future of the Construction Industry Communications." Journal of Management in Engineering(September/October).
- O'Donoghue A. (2001). "Motivational Training Hits New Heights." Industrial and Commercial Training **7**(5).
- Pepper G. L. (1995). Communications in Organizations: A Cultural Approach, McGraw-Hill Inc.
- Sadri G. and Lees B. (2001). "Developing Corporate Culture as a Competitive Advantage." Journal of Management Development **20**(10).
- Schein E. H. (1997). Organizational Culture and Leadership. San Francisco, Jossey-Bass Inc.
- Schein E. H. (1999). The Corporate Culture Survival Guide. San Francisco, Jossey-Bass Inc.
- Schneider W.E. (2000). Why Good Management Ideas Fail: The Neglected Power of Organisational Culture. Strategy & Leadership.
- Whyte J. (2002). Virtual Reality and the Built Environment. Oxford, Architectural Press.
- Williams A., Dobson P., et al. (1993). Changing Culture: New Organisational Approaches. London, Institute of Personal Management (IPM).