The Agile Professional Culture: A Source of Agile Quality

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Ever since agile software development was introduced in the millennium shift, it has become a controversial software engineering topic with practitioners and researchers arguing about the benefits of it. The opinions have been widely divergent, on one side the supporters of the plan-driven predictable Software Process Improvement (SPI) embracing repeatable processes and continuous improvements, and on the other the agile development putting individuals and interactions over process and tools, working software over comprehensive documentation, customer collaboration over contract negotiation and change response over comprehensive plans.

In this article, the agile methodology is examined from the human and cultural points of view. The concept of culture is analysed for deeper understanding of human and cultural dynamics influencing the agile professional culture. Parallels are drawn to success factors identified in recognised management approaches, such as the Effective Technical and Human Implementation of Computer Systems (ETHICS) and Total Quality Management (TQM).

The type of organisation, suitable to embrace the agile professional development culture, is identified by examining the success factors observed. The democratic type of organisation in the C.H.I.D.I. (Clan-Hierarchical-Democratic-Disciplined) typology is proposed to be the most suitable to create and sustain added business value and competitive advantage for agile software development. Copyright © 2007 John Wiley & Sons, Ltd.

KEY WORDS: agile development; soft issues; human factor; Effective Technical and Human Implementation of Computer Systems (ETHICS); TQM; agile culture

1. INTRODUCTION

Agile techniques have been used since the beginning of software development. As systems grew, a chaotic situation appeared, often characterised as ‘code and fix’. In order to make software development more predictable, emphasis was laid on Software Process Improvement (SPI) as inspired from other engineering disciplines, which had acknowledged that a high-quality process delivers products of predictable quality. The organisations did not want to be dependent on uncontrollable champions and thus the repeatable processes were employed by roles or actors or in fact by changeable software developers. Although there is evidence that SPI methodologies have improved the quality and productivity of software (Fenton et al. 1994),
particularly regarding predictability, stability and high assurance (Herbsleb et al. 1994, Boehm and Turner, 2003), the software industry is still far from becoming a mature engineering discipline (Georgiadou et al. 2003). The most frequent criticism and resistance to SPI relate to bureaucracy. The agile methodologies, also known as light-weight methodologies (Agile Manifesto 2006), were developed in the mid-1990s as part of the reaction against the bureaucratic plan-driven process-based approach and the traditional life cycle models, which were considered inadequate (Beck 2000, 2003). Instead, incremental design and rapid prototyping were introduced promising lower defect rates and faster development times together with a solution for frequently changing requirements (Boehm and Turner 2003). In agile development, the phases overlap with design starting during analysing and coding starting during detailed design. The test-driven development embraces test scenarios before development and testing along with implementation. Most agile methods empower developers to respond to changing customer requirements, even late in the life cycle. This promises increased customer satisfaction (Beck and Fowler 2001, Holcombe 2005). Acceptance of changes also empowers the customers and end-users. However, the high iteration frequency has consequences for contract variables, such as scope, price and time, creating a need for flexible contracts (Ceschi et al. 2005), which in turn may be a drawback for the customer’s cost-analysis plans.

For increased understanding of the significance of the human factor in agile development and its evolution from know-how and proven practices in software development, we draw parallels to success factors identified in Effective Technical and Human Implementation of Computer Systems (ETHICS) and Total Quality Management (TQM). Both these widely recognised management approaches highlight the significance of soft human issues, such as motivation, empowerment, participation and teamwork. Furthermore, our study unfolds the incentives behind the new agile professional culture by analysing layers of culture and revealing its artefacts. Finally we claim that democratic type of organisations, which have horizontal hierarchy emphasising flexibility and spontaneity, are the most suitable organisational cultures to embrace the agile professional culture.

2. HUMAN RESOURCE MANAGEMENT

The multidisciplinary character of Information Systems (IS) calls for a soft human approach and effective Human Resource Management (HRM). A socio-technical approach recognises the interaction of technology and people. It produces work systems that are both technically efficient and have social characteristics which lead to high job satisfaction (Mumford 2000). Such an approach takes account of the fact that different individuals and groups have their own needs, interests and values. We have analysed two management approaches, which emphasise a socio-technical viewpoint, namely ETHICS (Mumford 2000) and TQM (Deming 1986) and simultaneously we have drawn parallels to agile development in order to understand the strengths and weaknesses of agile development for continuous improvement.

2.1. Agile Development Compared to ETHICS – Success Factors

Mumford (2000), one of the pioneers in the socio-technical movement, created the ETHICS methodology in the 1980s. The ETHICS philosophy evolved from the science of organisational behaviour and is based on the principles of participation, by members of the team, the department and the organisation in the relevant decision making process as well as by user participation. Management theories that emphasise participation consider it as being morally right; people should be able to determine their own destinies. Also they may consider that participation will make it easier to create a committed workforce. Another view is that participation is a valuable educational experience and provides understanding and knowledge that can assist an organisation to more effectively realise its objectives.

Although ETHICS was developed for an expert group (software professionals) to design a system for a non-participating client or user, its most important advantage lies in the fact that it can assist users to become partners in the design process, as it provides a systematic methodology and a set of analytical tools which enable users to analyse their own efficiency and job satisfaction needs, set design objectives to improve efficiency and job satisfaction and develop strategies which will achieve these objectives. Mumford (2000) argues that participation brings job satisfaction, which in turn creates commitment.
In agile development, participation is one of the key issues. Collective code ownership, pair programming, user involvement and team rotation are examples of participation. Our perception of the enthusiastic software developers in agile development is that they have high levels of job satisfaction because of broadened participation and their enthusiasm is an expression of their job satisfaction. However, more scientific evidence needs to be collected to statistically prove this relationship.

In today’s competitive world of constantly fluctuating demands on organisations in terms of rapidly changing technology and customer needs, change is an inevitable process in which all employees in an organisation are involved in, either as everyday small-scale changes (incremental), such as adopting a new version of a software system, or in large-scale changes (radical), such as a cultural change or change of strategy with subsequent changes in structure and operations. ETHICS has three objectives related to the management of change:

- The first objective seeks to legitimise a value position in which the future users of computer systems at all organisational levels play a major part in the design of these systems. The argument is that the likelihood of both job satisfaction and efficiency increases when people are able to influence the design of their own work situations. If we draw parallels to agile development, we can conclude that the collective ownership of the code and empowerment of software engineers can make them feel that they can influence their own work situation.

- The second objective is to enable groups concerned with the design of computer systems to set specific job satisfaction objectives in addition to the usual technical and operational objectives. Here it is argued that unless job satisfaction and quality of working life objectives are made explicit, the human impact will be unpredictable because it has not been consciously planned for. The result could be that the staff may respond in a negative way including absenteeism and increased labour turnover. All of these responses can impose high financial costs on the management. If we draw parallels to agile development, we can find that there are specific rules regarding roles, relationships and work procedures (Robinson and Sharp 2003). In agile development, the everyday stand-up meetings (problem formulation and participated decision-making take place and guide action), story cards (components that have to be implemented during the next iteration) and system metaphors (a set of small metaphors from which responsibilities, class, method and variables are derived; a fundamental facilitator for sustaining shared vision) are examples of work procedures and workgroup activities.

Table 1 is a summary of the success-factors of the ETHICS model and the parallels drawn to agile development.

By analysing the influence of the human success factors in ETHICS that bring job satisfaction and subsequently commitment and improved efficiency and by comparing them with agile development we found similar factors. We draw the conclusions regarding agile development, that human factors, such as specification of roles and relationships, influence on own work situation and explicit working life objectives, as well as a well-functioning organisation improve participation, job satisfaction, commitment and efficiency. These are also considered success factors in agile development. However, in future, a more scientific approach is needed to statistically prove the relationships.
2.2. Agile Development Compared to TQM – Success Factors

The TQM concept (Deming 1986) was originally developed in Japan after the Second World War for manufacturing industries. Successful implementation of TQM methods contributed to Japan’s industrial success especially in quality and reliability. The TQM philosophy adopts a disciplined and structured approach focusing on customers and continuous improvement emphasising the importance of people, culture and process management by documentation and monitoring of processes, compliance of results to plans according to Deming’s plan-do-check-act circle (Deming 1986). The principles of TQM were adapted gradually in the software industry (Schulmeyer and McManus 1992) and SPI models, such as ISO9001:2000 (ISO 2006), Capability Maturity Model Integrated (CMMI 2006), Bootstrap (Kuva et al. 1994) and ISO-15504 (Dorling 1993) are all built on the principles of the TQM philosophy.

TQM requires a cultural change in the organisation (Atkinson 1993). In the TQM approach Deming (1986) emphasises management responsibility and the intrinsic link between leadership and the quality of processes, which in turn should lead to quality in products and services. Management commitment and leadership are the driving factors for motivating employees to strive for continuous process improvement (Mauro and Mauro 1999, Mauro 1999, Mellor 2005). The trend today seems to be to integrate product and process quality and their interactions. The TQM principles require quality awareness throughout the whole organisation and a change in attitudes towards quality by imposing a constant thinking of improving the process and the product.

The agile methodologies try to congregate plus points and advantages from existing methodologies without bringing about the disadvantages. Some of the features in agile development are totally in contrast with TQM, such as the plan-driven approach versus agility, process emphasis versus product emphasis and much documentation versus executable lean documentation; others have many similarities, such as customer focus, employee commitment and satisfaction. Given below are different characteristics of agile methodologies discussed in the light of TQM.

2.2.1. Flexibility

The distinction between predictive (plan-driven/TQM) and adaptive (agile) approaches recognises the fact that achieving planned milestones does not necessarily equate to customer success. Mellor (2005) draws attention to the basic strategic

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### Table 1. Comparison of success factors in ETHICS and agile development

<table>
<thead>
<tr>
<th>ETHICS</th>
<th>Agile development</th>
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<tbody>
<tr>
<td>HRM - Job satisfaction &amp; quality of working life objectives are made explicit</td>
<td>Individuals &amp; interactions over processes and tools</td>
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<tr>
<td>Participation - Considered to create job satisfaction and commitment</td>
<td>40 hours week</td>
</tr>
<tr>
<td>Influence on own work - Considered to increase job satisfaction and efficiency</td>
<td>Pair programming</td>
</tr>
<tr>
<td>Knowledge sharing - Considered a process of negotiation &amp; reconciliation of interests</td>
<td>Collective ownership of the code</td>
</tr>
<tr>
<td>Communication - Communication between different stakeholders is supported</td>
<td>Team rotation</td>
</tr>
<tr>
<td>Customer Involvement - The analytical tools &amp; the systematic methodology enable user involvement</td>
<td>Empowerment of software engineers</td>
</tr>
<tr>
<td>Organisational system - Specification of roles &amp; relationships</td>
<td>Pair Programming</td>
</tr>
<tr>
<td></td>
<td>Design of work procedures, individual jobs and workgroup activities</td>
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</table>
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notion in knowledge-intensive companies, which is to realise the fact that the future cannot be predicted. Detailed organisational plans for the future do not make sense. A strategic decision in this situation is to base the activities on the company’s own resources and keep on developing them (Conner and Prahalad 1996). This also means creating a flexible and open organisational culture that can quickly respond to various business situations (Rantapuska et al. 1999). The agile approach emphasises individuals and interactions over processes and seems to have recognised the fact that the future cannot be predicted. A strategic competitive advantage in agile development is flexibility to changing requirements with a quick response. No detailed plans are made. Instead frequent changes in requirements are considered a necessity to support the customers in sustaining and improving their competitive advantage.

One of the central features in the agile methodologies is cyclic and incremental development. The intangible nature of software (Siakas 2002) and the difficulties of software professionals to capture and understand the business domain and requirements (Rantapuska et al. 1999) have created the need for cyclic and incremental development with increased user involvement and early versions of software delivery in order to improve software quality. The high iteration frequency also has consequences for contract variables, such as scope, price and time and thus the contracts need to be flexible. This may create a drawback for the customer’s cost-analysis plans.

2.2.2. Employee Satisfaction and Commitment
In TQM management, commitment and leadership are the driving factors for motivating employees to strive for continuous process improvement (Mauro and Mauro 1999, Mauro 1999). Subsequently the TQM principles require quality awareness throughout the whole organisation and a change in attitudes towards quality by entailing a continuing thinking of improvements the process and the product. The TQM philosophy worked well in Japan, because the Japanese culture was well-suited to these kinds of concepts, but when it was transferred to other countries, e.g. the United States and Europe, the results were not always as expected (Kaneko et al. 1995).

The peoples’ issues, the most important asset in software development, which is based on brainpower and capability of producing software, are emphasised in the agile approach. The foundation of agile development lies in small teams working in a co-located development environment developing non-safety critical software (Abrahamsson 2004). Agile development relies on self-directed teams consisting of highly skilled, motivated and innovative software engineers, who are self-organised active learners and collaborative with each other in team work. To further motivate the team members, they are provided the support they need, and they are trusted in terms of the accomplishment of the required tasks. Trust has shown to be a key factor in dynamic teams (Siakas and Balstrup 2005). Trust enables co-operative behaviour by promoting open exchange of information, effective responses to crisis, reduction of conflict (Rousseau et al. 1998, Sydow 1998) and job satisfaction (the creation of a good fit between the employee’s job expectations and the job requirements as defined by the organisation) (Mumford 2000). The prime condition for trust is uncertainty, as well as lack of information and control (Giddens 1990). If the activities are visible and easy to understand no trust would be necessary. Trust is related to absence in time and space and is often discussed in relation to concepts such as risk, control and power (Das and Teng 2001, Imsland 2003).

The commitment required by agile methodologies seems to pose similarities with TQM, which requires a cultural change by emphasising commitment at all levels in the organisation. The first step in TQM is to convince every employee of his/her own role in total quality. The difference is that in TQM people are thought of as being roles instead of individuals and the processes are designed to work irrespective of who will be in the role, while in agile methodologies people are considered to be unique, highly creative professionals. In order to obtain commitment, empowerment of software developers, communication horizontally and vertically, as well as end-user participation are important means for obtaining commitment.

In agile development different processes are created depending on the project. Thus every project can have a different process depending on user needs. Processes imposed by management are by nature resisted. Management and software developers have an equal role in the leadership of projects (Agile Manifesto 2006). Also at regular intervals the team reflects on how to become more effective, and tunes and adjusts its behaviour accordingly. This
could be compared with the continuous striving for quality in TQM. The driving factors in TQM comprise good leadership/management commitment and effective communication/collaboration on all levels within the whole organisation. In the agile methodologies the dynamics within the team are the factors governing improvement.

Empowerment and employee satisfaction are common themes in both TQM and in agile methods. User involvement and frequent iterations increase domain knowledge in the development process, which in turn increases developer motivation, commitment and satisfaction, the key elements for success (Abrahamsson 2002, Siakas and Georgiadou 2003).

2.2.3. **User Satisfaction**

One of the basic principles in TQM is customer/user satisfaction, as it seems to be in the agile approach as well. How can user satisfaction be obtained? The reasons for buying a product depend on the customer. Different customers are likely to have quite different views about what a quality product is (Siakas et al. 1997). The customer’s concerns on quality factors are rather different from those of the developers and the managers. Some quality factors are important to all stakeholders. Customers mainly require correct software that fits its purpose, is easy to use, ready in time to a price that gives value for money. The behaviour of the software after release is in the customer’s interest (not the development process), which in addition to a fit for purpose, everyday use of software involves ease of improvements, adaptation to changing requirements and connectivity to other systems. Quality attributes of the end product is of greatest interest for the user. However, quality is a complex condition depending on the opinions and attitudes of the stakeholders. The different quality views may conflict with each other (Siakas et al. 1997, Siakas and Elli 2005). To obtain satisfied customers and repeat orders, customers/users are usually placed first thereby recognising that user satisfaction and fitness for purpose are the ultimate measurements for high quality. The customer’s view in terms of quality attributes has to be taken seriously into consideration for ensuring user acceptance and satisfaction (Ishman 1995, Siakas and Elli 2005). Quality plays a vital role in achieving a competitive advantage, based on the notion of continuous improvement throughout the organisation. In a survey carried out by the authors in four countries, namely Denmark, Greece, Finland and the United Kingdom, totally 306 software developers at different levels answered questions regarding software quality (Siakas 2002). To questions regarding the meaning of software quality, 85.7% of the respondents considered that software quality means user satisfaction.

TQM requires emphasis on the customer. Trompenaars (1997) explains that customer orientation is connected to the inner-direction or outer-direction of a culture. In outer-directed cultures, as in Japan and Singapore, it is a natural behaviour of adaption to try to satisfy the customer. He describes this just as a surf-rider who responds to the waves and keeps his balance when others lose theirs.

2.2.4. **User Involvement**

The literature has suggested that higher customer involvement also results in higher quality, especially in terms of meeting requirements (Berki et al. 1997). In order to ensure conformance to requirements, user satisfaction and competitive advantage, agile development involves the user in the entire development process. However, customer identification can be difficult and may require the identification of suitable internal customer representative(s) providing a single point of contact both for the team and the senior management on a daily basis. The high iteration frequency in agile development also provides opportunities for product feedback (Karlström and Runeson 2005). It is argued that agile methods make the key business users a very strong partner in assuring quality (Beck and Fowler 2001, Beck 2000, 2003). Rather than completely leaving quality to the IT professionals, the key IS users are co-responsible for conformance to requirements. In fact the only part that has adequate extensive domain knowledge needed for verifying fit for purpose (user satisfaction) is the key business user. Thus it is inevitable that more user involvement in the development process, the higher the possibility for conformance to requirements, fitness for purpose and user satisfaction and ultimately quality of the end product. It is important that IS stakeholders state clearly their objectives and expectations from the software products so that agile software developers can respond to the characteristics by incrementally developing the agile final product and by adopting agile work
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Table 2. Comparison of success factors in TQM and agile development

<table>
<thead>
<tr>
<th></th>
<th>TQM</th>
<th>Agile development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership</td>
<td>- Emphasis on management response and the intrinsic link between leadership and the quality of processes</td>
<td>- Management and software developers have an equal role in the leadership of projects</td>
</tr>
<tr>
<td>Customer</td>
<td>- Strong customer/user emphasis</td>
<td>- Customers on board</td>
</tr>
<tr>
<td>Focus</td>
<td>- Customer satisfaction focus</td>
<td>- Increase customer satisfaction</td>
</tr>
<tr>
<td>Flexibility</td>
<td>- Predictive approach</td>
<td>- Adaptive approach</td>
</tr>
<tr>
<td></td>
<td>- Long term plans</td>
<td>- No detailed plans, short term plans</td>
</tr>
<tr>
<td></td>
<td>- Emphasis on processes</td>
<td>- Flexibility to changing requirements</td>
</tr>
<tr>
<td></td>
<td>- Compliance to standards</td>
<td>- High iteration frequency</td>
</tr>
<tr>
<td></td>
<td>- Bureaucracy</td>
<td>- Test-driven development</td>
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<tr>
<td></td>
<td>- Extended documentation</td>
<td>- Executable lean documentation</td>
</tr>
<tr>
<td>Motivation</td>
<td>- Management commitment and leadership are the driving factors for motivating employees to strive for continuous process improvement</td>
<td>- Self-directed teams consisting of highly skilled, motivated and innovative software engineers</td>
</tr>
<tr>
<td>Job satisfaction</td>
<td>- Replaceable roles</td>
<td>- Skilled individuals</td>
</tr>
<tr>
<td>Empowerment</td>
<td>- Empowerment emphasises a cultural change by highlighting commitment at all levels in the organisation</td>
<td>- Empowerment of software developers, communication and end-user participation supported</td>
</tr>
<tr>
<td>Collaboration</td>
<td>- Collaboration horizontally and vertically between and within departments</td>
<td>- Small teams working in co-located development environment reflecting on efficiency and tuning accordingly</td>
</tr>
</tbody>
</table>

Table 2 summarises the TQM success factors analysed and the parallels drawn to agile development.

A field-study carried out in Greece (Sfetsos et al. 2004) showed that customer involvement increased domain experience. However, involvement by on-site customer was difficult in practice and other ways of communication had to be invented. Customer involvement is in general considered a potential in customised projects, but in software package projects the customer is unknown in the stage of software development. In future, this part of the software market is also likely to increase with e-Business customers who buy off-the-shelf software. The question seems to be whether customers are willing to spend the time required by agile methodologies in order to train developers in the business domain or will they in the future request more multi-skilled software developers.

By analysing the human factors in TQM and by drawing parallels to agile development, we recognised that the TQM approach is extremely bureaucratic in comparison to the flexible agile development, which fast respond to changing requirements. Similarities are found in the emphasis on empowerment of employees, job satisfaction and commitment on all levels, which are considered to improve the total IS quality. The user in both approaches is considered to be the fundamental judge of quality and therefore user satisfaction and fitness for purpose are considered...
to be the fundamental measurement for high quality.

3. THE AGILE CULTURE

In this section the agile professional culture is described. An investigation from the viewpoint of other disciplines, such as anthropology, sociology and organisational behaviour was carried out for deeper understanding of the underlying dynamics influencing success factors in agile development.

Researchers and practitioners have identified and discussed the importance of culture in organisations, but there is no common understanding or agreement on the definition of culture (Groeschl and Doherty 2000). The lack of clarity on definitions and meanings of different terms commonly used in a cultural context could be attributed to the fact that, regarding cultural studies many different academic disciplines are involved, where the same terms have different meanings; different terms are also used for the same concept.

However, there are similarities in the different approaches used in identifying and defining culture. Researchers (Kluckhohn 1951, Kroeger and Kluckhohn 1952, Kluckhohn and Strodtbeck 1961, Inkeles and Levinson 1969) relate differences between cultures to different approaches in solving common human problems. Many more recent researchers (Schein 1985, Hofstede 2001) seem to have adopted this approach. There are cultures of, e.g. a family, a tribe, a region, a national minority or a nation. There is cultural variation within and among cultures and there are different levels and forms of cultures.

Hofstede (2001) depicts different layers of culture as the layers in an onion (Figure 1), indicating that values represent the deepest level and symbols the most superficial manifestation of cultures.

Symbols are characteristics of a cultural group, such as words, objects, conditions, acts or characteristics of persons that have a deeper meaning for an individual or a group. Symbols are considered superficial and can easily be changed and copied by other cultural groups.

Heroes are persons, real or imaginary, living or dead, who possess characteristics highly priced in a culture – the person everyone will count on when things get tough.

Figure 1. Layers of a culture (adopted from Hofstede 2001)

Rituals are collective activities carried out for their own sake and are considered as socially essential. Ways of greeting and paying respect to others are examples of rituals.

Symbols, heroes and rituals are visible to outsiders and are collectively called practices. However, their cultural meaning is invisible and lies in the way these practices are interpreted by the insiders.

Many business and political meetings have ritual purposes in addition to rational purposes.

Values are tendencies that prefer certain states of affairs over others. Values are learnt implicitly from childhood and are taken for granted. They are qualities, principles or behaviours considered morally or intrinsically valuable or desirable; they remain unconscious to those who hold them.

In agile development there are many examples of the layers given above, such as planning games (Robinson and Sharp 2003), story cards, metaphors (instead of requirements), as well as different types of ‘release’ machines (a celebration every time some code is released) and other signals for opening, closing and progress (Reifer 2002). All these features strengthen the feeling of group belonging and shared values and are in fact manifestations of the agile professional culture. Mumford (2000) considers that shared stakeholder values in organisations (strong organisational culture) are important for commercial success in tomorrow’s competitive globalisation.

Hofstede (2001) stated that everyone belongs to a number of different groups and categories of people at the same time. He calls this mental programming...
within people, corresponding to different levels of culture, for example at a national, professional and organisational level.

Similarly as with the layers of cultures (Figure 1), Schein (1985) has depicted levels of cultures and their interaction (Figure 2). Levels of cultures apply to organisational culture. The main difference between the two figures lies in the distinction between artefacts (visible daily activities) and espoused values (goals and vision).

Basic assumptions according to Schein (1985) are solutions taken for granted for identifiable problems. They evolve as solutions to problems, are repeated over and over again and refer to the implicit, deeply rooted assumptions that people share. Basic assumptions are held unconsciously and guide perceptions, feelings and emotions about situations. They are complex, non-confrontable and non-debatable aspects of human group psychology, and involve beliefs (and their interpretation), values and emotions. Basic assumptions can be compared to values in Figure 1. Both these models are static in the sense that they reflect the anthropological view, which considers that culture is static and the fundamental values are inherited from generation to generation and change only slowly (Hofstede 2001).

Espoused values refer to a normative or desired vision of the organisation as opposed to activities carried out on a daily basis. An example of espoused value is the mission statement, which defines the long term vision of the organisation in terms of ‘where it wants to be and whom it wants to serve’. In mission statements usually the purposes of the organisation and principal business aims are stated together with the key beliefs and values of the organisation, definitions of major stakeholders and ethical principles, which influence code of conduct. Schein (1985) proposed that initially the stakeholders who prevail, namely founders and their leaders, influence groups in the organisation and thus slowly shared values become shared assumptions.

Artefacts refer to the physical and socially constructed environment of the organisation. Artefacts are the most visible and most superficial manifestations of an organisation’s culture (Brown 1998) and include language, symbols, heroes, behaviour patterns, rules and procedures, material objects, physical layouts and technology. Artefacts can be compared to practices in Figure 1.

The agile approach can be considered to be a culture of its own. It has the characteristics of a group of people that differentiate themselves from others through a whole set of shared practices including visions, principles, ideals, etc. that emerge in the interaction between members of a group. The XP for example draw attention to four XP values, namely, communication, simplicity, feedback and courage, the underlying basis for the twelve principles which are translated into practices. These practices are the artefacts for the XP culture.

Having a consistent culture is important to create consensus and agreement and to avoid culture clashes and friction in a group/team and in the whole organisation. The social characteristics of the team members are important. Employment of technically highly competent and competitive software professionals generates the basis for the creation of a strong culture. A project with a very complex problem domain affects even architectural choices, in the form of generating a system that is partitioned into subsystems. Architecture is important, it emerges from the principles and values of the

Figure 2. Levels of cultures and their interaction (adopted from Schein 1985)

Figure 3. Values versus practices in organisations
team culture – and culture by its very nature cannot be planned; it can merely be guided. However, it is argued that agility may lead to more complex and not well-documented systems through a fragmented software development process (Boehm and Turner 2003). Figure 3 shows the relationship between values and practices in organisations.

Values are deep-rooted basic assumptions expressed by the national culture. The influence from the professional culture is less deep-rooted than the national culture (the way we have been brought up) and is dictated by our profession (agile culture). If the organisational culture supports the professional culture by suitable reward/recognition and career development systems, a potential outcome is motivated, thus satisfying agile software developers.

Fang (2006) uses a new metaphor for understanding the dynamics of culture. Instead of using the bipolar paradigm (e.g. feminine versus masculine) he describes culture in the metaphor of an ocean, which in a given context at a given time shows visible wave patterns on its surface (compared to visible cultural values and behaviours) and also numerous ebbs and flows underneath of amazing depth (comparable to unseen and unknown cultural values and behaviours). Fang’s view demonstrates the sociological view which considers that different values in society interact with changing economic and political conditions and thus the culture is believed to be dynamic (Cray and Mallory 1998). Fang expresses this by referring to the “internal mechanisms (yin-yang) and external forces (e.g., globalization, institutional, economic, technological, situational factors), invisible and “unconscious” values and behaviors (ebbs and flows) beneath the water surface can be stimulated, powered, activated, promoted, and legitimized to come up to the ocean’s surface to become the visible and guiding value patterns at the next historical moment”.

Whatever viewpoint we take (anthropological or sociological), it seems obvious that there are invisible and unmanageable values of which we need to be aware in order to make the most of the situation.

4. SUITABLE ORGANISATIONAL CULTURE FOR EMBRACING THE AGILE PROFESSIONAL CULTURE

Four types of organisational culture are proposed (Siakas and Elli 2000, Siakas 2002). Each type belongs to a quadrant formed by two dimensions; on the horizontal axis, the Uncertainty Avoidance (UA) index starting from weak UA and ending in strong UA (0–100) and on the vertical axis, the power distance (PD) index starting from weak PD and ending in strong PD (0–100). The four quadrants proposed form a specific typology of organisational cultures pictured in Figure 4 which are called the Clan, Hierarchical, Democratic, Disciplined C.H.I.D.D.I typology of organisational cultures. These four cognitive types of culture should be considered as ideal types. The exact measurement of culture is hindered by operational and conceptual difficulties and by the multidisciplinary complex character of the research domain. By explaining complex entities using metaphors and simplifications, such as typologies and other kinds of simplified measurements and by using nationality as the basic unit, cross-cultural comparisons are facilitated.

4.1. Clan

This form of national culture has strong PD and weak UA. This means that clan-type organisations are characterised as traditional, having a loose and flexible structure with leaders who are mentors or facilitators. Involvement and co-operation at all levels are encouraged. The organisation offers security and loyalty to the employees. Feelings of personal ownership for employees, loyalty and tradition keep the employees together. The clan culture promotes in-group orientation. The employees usually have characteristics of a particular style and manner of conduct. The strategic approach focusses on
human resources and cohesion. Examples of countries belonging to the clan type are the African and Asian countries (except Japan and South Korea).

4.2. Hierarchical

This form of national culture with strong PD and strong UA relies on stability and control. This means that hierarchical-type organisations have a vertical hierarchy with strong leadership and a clear chain of authority and responsibilities assigned to individuals. The organisation has a high degree of formalism and the members of the organisation have high respect for status. The organisation can be said to be product-oriented. Examples of countries belonging to the hierarchical type are Latin-European, Latin-America, Japan, South Korea and Arab countries.

4.3. Democratic

This form of national culture has weak PD and weak UA. This means that democratic-type organisations have a horizontal hierarchy emphasising flexibility and spontaneity. This type of culture generates initiative and responsibility approaches. The leadership style is that of co-ordination and organisation. The organisation has flexible rules and problems are solved by negotiations. Employees are encouraged to make contributions to the decision-making process and to the development of the organisation in general. Democratic organisations can be said to be people-oriented. Examples of countries belonging to the democratic type are Nordic, Anglo-Saxon and Jamaican.

4.4. Disciplined

This form of national culture has weak PD and strong UA. This means that disciplined-type organisations have a formal structure and a tendency towards universalism and the use of formal rules. The leader is a producer and hard-driver. Employees are facilitated by high levels of self-discipline and self-control. The organisation places a great deal of emphasis on productivity and efficiency and can be said to be task and project-oriented. Examples of countries belonging to the disciplined type are Germany, Austria, Switzerland and Israel.

4.5. The Agile Professional Culture

The agile culture requires active involvement of all team members and seems to be most suitable in democratic type organisations, which have horizontal hierarchy emphasising flexibility and spontaneity. In this type of organisation, consultation, participation, empowerment, consensus and compromises are characteristics in line with the agile culture and agile success factors, such as accommodation of volatile requirements, focus on collaboration between developers and customers, and support of early product delivery.

5. CONCLUSIONS

The purpose of this article was to make more explicit the human and cultural dynamics that bear on the success of agile development. Success factors in agile methodologies are recognised to lie in the motivation and exploitation of the dynamics of the human factor. Parallels were drawn to similar success factors (which are considered to improve IS quality and provide added business value) identified in ETHICS (empowerment, job satisfaction, work procedures and workgroup activities) and TQM (employee satisfaction, commitment, user satisfaction and user involvement). Agile methodologies emphasise user satisfaction through user participation, recognition of and response to continuous changing requirements and frequent delivery of products together with adaptive and iterative software development by self-organising teams that recognise that team-members are committed competent professionals who are able to choose and follow an adaptive process.

The cultural dimension of agile development was investigated and the cultural characteristics of an agile culture were identified. The agile culture imposes a highly competitive environment with cultural, political and social implications. The organisational culture suitable for agile development was identified and examples of countries which promote this kind of organisational culture were proposed.

There is an obvious need for more scientific evidence and further research in order to understand the requirements of agile quality in different cultural and social contexts and to identify controllable and uncontrollable factors for agile IS development.
IS quality requires knowledge of different organisational and national cultures, the methods and tools used, the way they are used and, most importantly, the way people perceive quality and quality assurance.

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