Agile Methods and Organizational Culture: Reflections about Cultural Levels

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Abstract: Agile methods emerge as an alternative to improve quality and performance in software development processes. However, as agile methods are essentially focused on human aspects, their application in companies depends mostly on their adequacy to the current organizational culture. This study explores the view of the organizational culture in three levels as a theoretical framework to allow early detection of problems that could jeopardize the adoption of agile methods by a company. This paper points out that many facilitators or obstacles to the adoption of an agile method can be hidden in the lower levels of the organizational culture. Additionally, the paper shows that a superficial analysis of those issues can lead to a miscomprehension about the possibility of applying an agile method in a software company. This paper also evidences that the interpretation of the levels of organizational culture improves the understanding on how an agile culture should be established.

Keywords: Agile methods, Organizational Culture, Agile Culture, Software Companies.

1. Introduction

Agile methods have attracted increasing interest from software companies, since they represent a reaction to the more prescriptive methodologies, regarded as bureaucratic due to the large amount of artifacts that are usually produced. This excessive bureaucracy may slow down the software production. However, some specific factors should be taken into consideration when adopting any agile methods. They differ from the prescriptive methods also due to their higher dependence in relation to human relations, i.e., the effectiveness of agile methods depends on how people interact.

The human aspects may represent a major obstacle for adopting an agile method: applying such methods require a working environment where developers and other stakeholders have

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principles and cultural values compatible with the demands of agile methods. The research presented in this paper is based on the premise that organizational culture can accommodate a new agile method in a positive or negative way. In this sense, the current company culture plays an essential role for a successful or flawed agile method implementation.

Chiavenato [1] addresses the importance of organizational culture by saying that it represents the perception of managers and workers and reflects the predominant mentality at the organization. The organizational culture corresponds to the values and beliefs of the company’s staff, and it guides their behavior. Tolfo and Wazlawick [2] investigated, and confirmed, the influence of organizational culture in the adoption of agile methods.

Schein [3] noticed that three hierarchical levels could be identified in the organizational culture: visible artifacts, espoused values, and basic underlying assumptions. According to the aforementioned author, the analysis of those levels improves the perception of the organization’s global culture, because an important aspect of the culture may be hidden in lower levels. Moreover, it is important to be aware that, at first sight, some visible artifacts may cause a wrong interpretation of the company’s reality and even statements about adopted values may not correspond to the values actually shared. This may happen due to the influence of some basic underlying assumptions.

This paper studies the levels of organizational culture, as proposed by Schein [3], and their possible influence on the adoption of agile methods, founded on the theoretical basis described above. The study is based upon studies on software companies with some experience in adopting agile methods, previously presented in by Tolfo and Wazlawick [2]. Complementarily to that work, this paper studies the influence of the three levels of organizational culture in software companies and how the analysis of those levels could contribute to the understanding of the organizational culture in the context of agile methods.

It is important to remark that this paper neither prescribes a method for the evaluation of organizational culture nor details any plan for organizational change. It is understood that organizational culture, as well as organizational change, are subjective and wide issues that should be contextualized for each organization. Furthermore, it is important to be aware that the adoption of an agile method inside an organization is just one example of changing initiative where organizational issues are involved.

Section two of this paper presents different perceptions about agile development. Section three tackles organizational culture and its implications in the organizational context. Section four draws considerations about agile culture. Such considerations are represented through the theory of organizational culture levels, which helps to understand the structure of an agile culture. Finally, section five illustrates studies on software companies where different levels of organizational culture were identified.

2. Different Perceptions about Agile Development

When trying to understand the meaning of the word “agile” in the context of agile methods, authors such as Larman [4] and Hunt [5] state that being agile is being flexible and fast in
order to respond to changes. Highsmith [6] states that *agility* means being able to both create and respond to change in order to make profit in a turbulent business environment.

On the other hand, Shore and Warden [7] understand that being agile consists in following an agile philosophy that has productivity improvement as a consequence of a different way of working, and not only working faster. Shore and Warden highlight that agile methods are processes that support the agile philosophy. According to Shore and Warden, in order to be agile, it is necessary to really put agile values and practices into work.

Shore and Warden [7] remind that, in order to follow an agile philosophy, it is important to bear in mind the balance among the needs of each stakeholder of a software project. They use the term “success” to refer to the satisfaction of those necessities. According to them, agile development proposes reaching organizational, personal, and technical success. Technical success can lead to personal success. For example, producing high quality and easy to maintain code can make programmers proud and motivated. Nonetheless, technical and personal successes do not necessarily guarantee organizational success, because a high quality software code made by a motivated team may not imply in organizational success (profit, competitive differentiation, brand projection, and enhanced customer loyalty).

The authors warn that organizational success is generally neglected by software teams in favor of technical and personal success, which is easier to be accomplished. They remind also that even if the team neglects the organizational aspect, other stakeholders involved in the organizational structure will judge developers taking into consideration that requirement. According to the authors, senior management and board are oriented by their business view and they are more worried about the return of investment made by the project than about the fact that the code is elegant or easy to maintain.

From the perspective presented by Shore and Warden [7] - where agile development is an alternative to reach personal, technical and organizational success -, it is possible to state that these agile values and principles bring an undeniable contribution to the community involved in software development, because they provide good practices at the working environment.

However, those values alone do not constitute magical and immediate solution to existing problems in software projects (such as low technical qualification of software development teams) [8]. The agile values and principles represent a new working philosophy that includes behavior and attitudes that could lead to better results along the implementation process [8]. In this sense, Taylor et al. [9] says that, because of the empirical nature of agile methods, the potential practitioners need to carefully assess whether they are exposed to the risks that can make agile method adoption problematic.

Moreover, it is worth to remember that, according to Moore [10], when new methodologies are adopted, failures frequently happen because they are usually adopted in order to solve specific problems related to software development. However, compatibility analysis relating the new methodology and the organizational culture is not often made in those situations. This is considered to be one of the main issues for the success of the application of agile methods.

Considering Moore’s [10] and Shore and Warden’s [7] statements, it is necessary to understand the concept of organizational culture and its implications in a company context. This will be made in the next section, where the importance of understanding the levels of organizational culture will be shown as presented by Schein [3].
3. Organizational Culture and its Three Levels

According to Dennison [11], the culture of an organization includes habits, traditions, and working ways, and it is largely influenced by the company history. In other words, it refers to the way the company usually works and how it seeks its goals. A simpler definition of organizational culture is given by Johnson [12]: “the way we do things around here”.

According to Chiavenato [1], organizational culture is the institutionalized way to think and act, and its essence is expressed by the way the company does business, the way it deals with customers and employees, and the autonomy given to its members.

Schein [3] defines organizational culture as “a pattern of shared basic assumptions that a group learned in solving its problems of external adaptation and internal integration, and which has worked well enough to be considered valid and, therefore, worth of being taught to new members as the correct way to perceive, think, and feel about those problems”.

Schein [3] also says that organizational culture is manifested in three different levels: visible artifacts, espoused values, and basic underlying assumptions. Such levels can be observed in figure 1.

**Figure 1 – Levels of organizational culture. Adapted from Schein [3].**

The first level of organizational culture (visible artifacts) includes the cultural phenomena that can be seen, heard and sensed. At this level, information is easy to obtain, but hard to understand, and it is difficult to grasp the relying logic of the group’s behavior. The first level deals with aspects such as working environment, technology working routines, behavior patterns observed in organization members, language, way of dressing, myths, and stories [3].

According to Schein [3], the second level (espoused values) is about values that the members of the group are aware of and which explain their behavior, that is, “what is right and what is wrong”. Those values appear in aspects such as company beliefs, strategies, rules, goals, and philosophy. At this level, there is a higher possibility to understand culture than at the first level. The reasons behind the group’s behavior remain hidden or unconscious, because those values are simply expressions of those reasons though.

Finally, the third level (basic underlying assumptions) is about values that are internalized as the right way for the members of a group to feel, to perceive, and to think. Those assumptions are generated by conscious values that are shared by the group and that lead to specific behaviors. Those behaviors, being considered adequate to solve problems, gradually are assumed as the right ones until they turn into unconscious assumptions, becoming undeniable and natural. The third level analysis allows a deeper understanding of the organizational culture than the precedent levels. At this deeper level, culture can be seen as a set of shared mental models that the members of an organization adopt and consider as the right ones.

Schein’s approach states that understanding the culture of an organization implies entering its core, where values and behavioral patterns are found. They have been forged by assumptions that were gradually established. This has to do with understanding the subjectivity of the organization.

With regards to the way of observing culture, Schein says that each company has unique characteristics, and thus he criticizes the use of questionnaires as a main tool to assess culture. According to Schein, questionnaires can hardly portrait the subjectivity of values and assumptions on which the organizational culture is build. When inquiring about questionnaires’ efficacy, the author cites the questionnaires prepared for the approaches presented by Hofsted [13], Cameron and Quinn [14], and Goffe and Jones [15] as examples.
Among the alternatives used to reveal the organizational culture, Schein recommends that the business problem have to be defined in the beginning in order to change some aspects of the company or to adopt a new strategy (the desired change). After that, meetings can be organized for activities intended to identify, list and compare visible artifacts, shared values, and basic assumptions of the organizational culture. It would be possible to identify the facilitators, challenges, and obstacles only after understanding the desired change and the levels of culture.

Similarly to the levels presented by Schein, Chiavenato [1] make an analogy between the organizational culture and an iceberg. In this metaphor, they say that organizational culture is like an iceberg that has a visible higher part (because it is above the surface of the water) and a lower hidden part. The analogy between the levels and the iceberg highlights certain formal aspects of the organizational culture. Therefore, the visible artifacts – policies, methods, proceedings, goals, organizational structure, and organizational climate – in the first level of the organizational culture represent the top of the iceberg (figure 2).

Hence, the informal aspects hidden in the organizational culture, such as perceptions, feelings, attitudes, values, and group rules that are present in the second and third levels of the organizational culture constitute the submerged part of the iceberg (figure 2).

FIGURE 2 - Iceberg of organizational culture. Adapted from Chiavenato [1].

Taking for granted that sub-cultures will appear inside an organization, meaning one different culture for each group or department in the organization, Schein [3] says that, if it is possible to observe some shared assumptions between different units, then it can be handled as a unique organizational culture (dominant culture) even if the sub-units have their own peculiarities.

Dominant culture expresses central values that are shared by most organization members. Thus, when people talk about the culture of some organization, they are actually referring to its dominant culture. Although many companies have sub-cultures that guide members’ behavior, it is the shared aspect of dominant culture that allows it to guide and shape that behavior [16].

It is easier to understand an organizational culture by knowing that it is composed by different cultures, where generally one of them is dominant, and knowledge of levels of organizational culture can help too.

The next section is a study about organizational culture considering agile methods and agile culture. It depicts the ideal organizational culture for using agile methods. It is important to notice that it is not possible to present an exact and definitive definition of an agile culture that is valid for every organization, because each organization has a different reality, and then, contextualizing the reality of each company is paramount, observing what is valid or not for a given environment, taking into account the different internal and external influences, such as, the basic assumptions of the stakeholders, the kind of product that is being developed and the reality of the market where it is inserted. Therefore, the next section presents a study comparing different authors who associate organizational culture and agile methods. That comparison allows the discussion of the applicability of the theory of cultural organization levels for a better understanding about how an agile culture can be structured.

4. Considerations about Agile Culture

Although it is believed that incorporating agile methods, values and principles may foster agile culture in an organization, there is not yet a precise definition about what agile culture is
and which elements characterize it. On the other hand, it can be seen that authors who address this issue present different associations between culture and agile methods. Taking those associations as a starting point, it is possible to make some considerations about agile culture.

When relating organizational culture and agile methods, Derby [17] asserts that in some companies, organizational culture is composed by a set of cultural elements, whereas in other companies, it is composed by an aggregated pack of different cultures, where one of them is dominant.

In this sense, Highsmith [6], Cockburn [18], and Derby [17] relate different kinds of existing cultures in organizations, such as: power culture, collaboration culture, and bureaucratic culture. Derby [17] states that it is not impossible to implement an agile method in an organization where a power or bureaucratic culture prevails, but an agile culture could be certainly better adjusted to companies where a collaboration and adaptation culture prevails. Moreover, Lindvall et al. [19] considers that being agile is a cultural question. Then, the author believes that if the culture is not adequate, the organization will hardly become agile.

Siakas and Siakas [20] present similar considerations to the aforementioned authors. They relate agile methods to the cultural layers proposed by Hofstede [21] and to four kinds of organizational culture (Clan, Hierarchical, Democratic, and Disciplined). They finally conclude that democratic organizations are more adaptable to agile culture because they provide horizontal hierarchy and emphasize flexibility and spontaneity.

According to Siakas and Siakas [20], in democratic organizations, “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”.

Boehm and Turner [22] say that there are two kinds of cultures in the context of software development: agile and plan-driven. He says that in an agile culture, people feel comfortable and free to make decisions in an environment with handcrafting characteristics, where each one seeks to do the work needed for a successful project in a confident way. However, in a plan-driven culture, people feel comfortable and empowered when there are clear policies and proceedings that define their role at the company. This is an environment closer to the style of production lines in which personal roles and tasks are well defined.

According to Hirsch [23], moving from a plan-driven culture to agile development is not easy. This transition requires changes in many established practices and may even touch core values held by stakeholders. The areas affected are wide ranging and require changes in management, user involvement, willingness to take on responsibility, contract management, and ability to live with many uncertainties.

Authors like Ever and Rising [24] and Tate [25] affirm that in order to adopt an agile method in a sustainable form, changing the way of working and thinking is not enough; a change in principles and values must also occur. In addition, Tate recommends promoting sustainable development culture and new product development culture. The first allows the teams to reach and sustain a high rhythm of long-term software development, whereas the second is linked to the exploratory nature of agile methods.

Tate [25] also mentions the existence of two distinct cultures of software testing that can be present in the context of organizations: the defect detection culture and defect prevention culture. According to him, in a culture oriented to defect detection, the test and quality assurance teams are in charge of finding defects, and this could produce a high number of non-detected defects that are sent over to the customer. However, in a culture of defect
prevention, most defects are identified as soon as possible, before the product is received by
the test and quality team, and then, fewer defects are delivered to the customer.

According to Tate: “In a defect detection culture, most defects are found through manual
testing and after the product has already been coded. On the other hand, in a defect prevention
culture, the emphasis is on finding defects before coding the product. The predominance of
low-value manual testing and elaborate defect tracking systems in defect detection has a very
real cost, as does the fact that there is a time delay between when a defect is introduced and
when it is fixed. By contrast, in a defect prevention environment, the result of thoroughly
automated testing, high-value manual testing, and fewer defects reaching customers offsets
the cost of spending extra time on team collaboration and writing automated tests” [25].

Anderson and Schragenheim [26] claim that there is a strong similarity between the agile
principles and the principles observed in a learning organization [27]. Anderson and
Schragenheim also say that when a company becomes agile, it promotes the culture of
continuous learning as well. Hence, they recommend that in order to keep the company agile,
it is important to build a culture where all team members are encouraged not only to do their
tasks, but also to think about the way to get them done, creating mechanisms to do them
better. In addition, the authors point out the necessity of an open-mind and trusting culture
that guarantees the vitality of an organization where members learn. For example, in an open-
mind and trusting culture, a meeting serves not only to deal with good news, but also to
discuss problems and difficulties.

Ambler and Jeffries [28] affirm that in the case of cultures that are hostile to the agile
methods, the chances of successfully applying an agile methodology are drastically reduced.
For this reason, the authors suggest some initiatives to be taken in order to create an agile
culture in an organization. One of them is the aptitude to bypass wrong concepts concerning
agile modeling, such as the wrong perception that says: agile modeling is doing no modeling
at all.

*Teamwork* is highlighted by literature as being essential for the development of agile methods.
Considering cultural aspects involved in agile modeling, Hunt [5] argues that one of the
obstacles for teamwork is the fact that many developers unconsciously tend to consider their
part of the system as their property.

According to him, this fact may promote a culture of blame, where developers believe that
they are responsible only for their part and tend to blame colleagues for problems that are not
their responsibility. This can also lead to a punishing system that inhibits developers’
confidence and motivation. The feeling of owning a part of the system, mentioned by Hunt,
can eventually generate resistance to apply suggestions in parts that developers believe to be
of their responsibility.

Because of that, Hunt [5] understands that agile modeling promotes the idea that the system is
the property and responsibility of the team as a whole. This can help avoid a culture of blame,
which is bad for agile culture [29, 5, 6], and promote humility, because it shows people that
nobody knows all aspects of a system.

The culture of blame highlighted by Hunt [5] can really become an obstacle for the adoption
of an agile method. Facilitating management (that considers errors as a learning process) must
not be confused with absence of control or omission regarding responsibilities, though. In the
same way, taking risks and being courageous do not mean being reckless in the same sense
that innovation and simplicity do not correspond to lack of planning.

Bossavit’s [30] remarks about a failed project deserve considerable attention. He identified
three organizational aspects at a company that determined its way of acting and its vision
about the world. He called those aspects “culture”. For him, those aspects are the main influence on the failure of the XP project in a company. Despite their negative influence, he used positive expressions to name them: Passion, Daring and Glamour.

Passion and Daring cultures represent the values that took the company (that was formed by a young team without solid experience) to imprudently sign a contract to develop a complex software system in an extremely short time [30].

Passion and Daring cultures also influenced the decision of adopting a new software development method (XP method) on a project that was already late and with serious problems. Moreover, those cultures led the company to make mistakes, such as not to keep the customer present and not to keep the customer posted about doubts and problems that the team was facing during the development process [30].

It can be said that it is incorrect to believe that a project considered agile will succeed only because developers show motivation and disposition to innovate and take risks. Although those values are fundamental, they are only few in a wider set of values that are necessary, such as knowledge, responsibility, and coherence. There must be balance among those values.

Bossavite identify Glamour culture when perceiving that the team focused attention only on code elegance, without paying attention to important internal measures of quality, such as abstraction level, modularity, and redundancy.

Due to the close relation between agile methods and organizational culture, Hussman [31] alerts that although agile development may work well in the beginning, the key to the success of any agile project is to promote and maintain an adequate culture, and this consideration is very important. However, according to Schein [3], culture is usually stable and hard to modify, because it represents the cumulative learning of a group. Moreover, Schein says that parts of the culture are essentially invisible, and for him, culture at this deeper level can be seen as the mental models shared among the members of an organization and adopted as the correct ones.

Schein [3] considers that what directs and constitutes the essence of a culture are the learned and shared basic assumptions, upon which people build their daily behavior. Schein questions the validity of quick trainings that promise to create a teamwork culture as well as workers empowerment, or even a learning organization. According to Schein, those arguments are all invalid unless they show how the basic assumptions in which the new values are based must be adapted to the environment in which the organization intends to work.

Having Schein’s definitions in mind, it can be understood that an adequate culture for fostering agile philosophy should be supported by a set of basic assumptions existing in the organization. Such assumptions should provide support to the shared agile values. The implementation of practices and the use of tools involved in a given agile method consist only of visible artifacts from an agile culture. In other words, they are the manifestations of the culture that appear in the organization context.

Figure 3 intends to represent the aforementioned considerations and the agile culture. It is possible to see the third level of the agile culture (basic assumptions) that is based on the considerations of authors cited before in this section that relate organizational culture and agile methods. It is also possible to perceive that those assumptions are similar to the principles declared by the Agile Manifest [32].

Shared values (second level) are originated from the Agile Manifest and from specific agile methods, such as XP. The visible artifacts (first level) are represented by the practices and
technology proposed by agile development. If there are not basic assumptions that provide support for those values, then the practices would probably not be sustainable.

FIGURE 3 – Representation of the levels of an agile culture.

Condensing the ideas of authors cited in this section, it can be said that the basis for the promotion of an agile culture should be founded on basic assumptions such as: belief in the competence and responsibility of individuals, mental models that enhance adaptation, cooperation, continuous learning and improvement, stimulus to creativity, to foster innovation, and take moderate risks, systemic view of sustainability and pro-activity, and awareness that agile philosophy must be in line with the mission of the organization and the satisfaction of different stakeholders.

By analyzing figure 3, it is possible to observe that from the basic assumptions – mental models that give importance to adaptation, cooperation, learning and continuous improvement – raise values such as discussion, participation, respect, and consensus. That combination of basic assumptions and values are some of the aspects that constitute an agile culture, and from them, agile practice such as pair programming, daily meetings and collective code become feasible and represent manifestations (visible artifacts) of that culture. Likewise, democratic styles of management and facilitators can also be considered just as manifestations of an agile culture based on the previous assumptions and values.

Considering the pieces of evidence shown in this section and the representation of the levels of an agile culture (figure 3), it is possible to see that a great part of the obstacles or facilitators for the adoption of an agile culture are in the basic assumptions of the stakeholders. Then, the next section presents empirical studies that involve the observation of those basic assumptions.

5. Observing the Levels of Organizational Culture in three Software Companies

This section discusses studies by Tolfo and Wazlawick [2] that show the influence of organizational culture in the adoption of an agile method. Some companies that develop and sell software were studied, and three cases nicknamed “Corporativa”, “Web” and “WebGames” are presented here.

Complementarily to Tolfo and Wazlawick [2], this paper uses those studies to evidence the levels of organizational culture in the companies’ context. That brings to the surface values and principles (basic assumptions) that constitute the culture of the company, which can be compared to agile method’s values and basic assumptions, and also to the agile culture, which is presented in the forth section of this paper.

One of the main contributions of this study is to show that the perception of cultural levels can improve the effectiveness of the cultural analysis in the context of the adoption of an agile method. In other words, being aware of those levels is important because it allows a more accurate perception of the organizational culture receptivity or repulse to the values and principles of agile methods.

5.1 Case 1 - Corporativa Company

The main business of the Corporativa Company is developing Internet portals. The visualization of the levels of organizational culture begins with the visible artifacts (first level) that include aspects such as working environment, working routines, and behavioral patterns of the members of the organization.
Those artifacts show that the working environment of the company is characterized by informality. Its working environment includes some project managers and a small team, all of them working at the same place because there is no department division or cubicles.

It was possible to notice that informality characterizes the software development process, because although they declare to sympathize with agile methods, there is no established method. The management overvalued the fact that a shared environment was created at the organization. It was said that it was idealized to facilitate teamwork and pair programming, as the XP method prescribes. It was also said that some XP practices were already being used at the organization, such as refactoring, pair programming and continuous integration. However, it was seen that working consists just in an analyst that identifies requirements by interviewing a customer; then, the manager receives a document with the requirements to be coded, makes a division into modules, and distribute them to each developer according to his/her level of experience and the number of projects allocated to them. After implemented, each part is integrated and tested by someone responsible for the tests. When the system is ready, it is delivered to the customer.

At the company’s working place, it was noticed the existence of a frame with a company’s mission, vision, values, and strategy, which by chance coincide to the agile values and principles. For instance, they are based on ideals of searching for excellence in the company’s field, teamwork, agility, and customer and collaborators satisfaction.

The interviews with managers and developers show that they really seem to believe in the declarations exposed at the frame. They consider themselves as a team and believe to be oriented to customer satisfaction.

However, during the observation of the working routine at the organization, it was possible to notice some inconsistencies among the declared values and the reality of the company. In addition, it allowed the visualization of the second level of organizational culture – shared values.

In fact, although developers state that they work as a team, what really exists in the company is a working group subordinated to a centralizer management. It was noticed that developers do not have a real wide view about the project they are involved with, and that they know little about what their colleagues are working on. Those are fundamental aspects to characterize teamwork.

Besides, observation of the daily work at the company allowed perceiving that the shared working environment, although essential to the XP practices, was paradoxically prejudicial at Corporativa for the adoption of agile methods. What happens is that the fact that the management works at the same environment of the development team inhibits pair programming and teamwork due to a situation of constant monitoring and communication inhibition. Then, it was perceived that there were practically no teamwork, and pair programming was limited to sporadic support between workers whenever it was asked.

Still in the second level of organizational culture, another contradiction was noticed between the customer focus declaration and the fact that there were practically no contact with the customer, exception made for some visits by the analyst and manager in the beginning and in the end of the project.

After identifying the inconsistencies related to teamwork and customer focus, one can search for the meaning of the adopted behavior. This leads to the third and most hidden level of organizational culture: basic assumptions. Such assumptions are unconscious and unquestionable values, beliefs, and certainties assumed to be so natural that they are shared by the group, and make people behave in a given way.
During the investigation of the third level, it was perceived the existence of a culture of blame and a punishment system similar to the one mentioned in section four of this paper. It was noticed that developers assigned to the manager a strong, authoritarian and punitive controlling profile. Although the company has weekly meetings to discuss software projects, the observation showed that such meetings mostly consisted in the manager demanding results and punishing eventual failures instead of discussing solutions and improvement strategies with the team. Moreover, it was noticed that the manager’s attitude made developers produce only what was necessary, without any intention of questioning practices and suggesting innovations. Thus, at this company, the punishment system was considered to be one of the greatest obstacles to the adoption of the XP method.

On the other hand, the manager understands that the developers’ lack of maturity and low qualification must have a rigid and centralized surveillance. Regarding customer contact, the manager believes that developers do not have enough ability to interact more often with customers. These beliefs checked at the interviews and visits to the software company comprise the basic assumptions of the people in the organization. Those are the values people really believe in, and which influence their behavior.

With the data gathered at this company, it can be said that the visible artifacts of organizational culture (first level) lead towards immediate interpretations, which can cause the false impression that they really represent the company’s culture. Those immediate interpretations may show misunderstandings specially when analyzing other cultural levels.

In the Corporativa Company case, the informal and shared working environment does not imply necessarily in cooperation and teamwork. Similarly, the customer satisfaction goal is only present in the company’s framework, and not in real actions.

Moreover, the incongruence identified at Corporativa showed that the isolated use of questionnaires is not a safe option for the assessment of organizational culture. According to Tolfo and Wazlawick [2], questionnaires can be used as an artifact for collecting initial information that should be compared to the results of other means of analysis. One example of that was the application of online questionnaires with identical questions to developers and managers. Interestingly, developers and managers answered the same questions in a completely different way. Examples of such questions are: “Are developers reluctant to assume more personal responsibilities?”, “Do developers rather obey orders than assume responsibilities and take risks?”, and “Do developers use to make suggestions for improving the software development process?”. 

According to the answers depicted in Figure 4, developers tried to answer the questionnaire in a favorable way to themselves, while management answered in an opposite way.

FIGURE 4 – Different perceptions of managers and developers.

The interpretation given by developers led to different perceptions. The first one is that they are based in what Schein [3] calls desirable culture, that is, a set of desirable values that do not match the reality observed in the company. In reality, the announced values are not sustained when confronted to the punishment culture of the company. The second perception is that just because of this punishment system by management, the employees chose to give only positive and non compromising answers. Moreover, the answers given by the management evidenced their perception or negative mental models regarding their subordinates and the way they work.

Corporativa revealed other discrepancies among what was seen in online questionnaires and that was perceived during interviews. The following question illustrates well what happened:
“How are errors made by developers that could delay or compromise software projects treated?” The answers obtained by Tolfo and Wazlawick [2] are presented in Figure 5.

FIGURE 5 – Question number 7 applied to developers.

Half of the group of developers at Corporativa answered option (a), which considers that errors are part of the learning process. However, during interviews it was possible to see that because of the punishment system of the company, even with the promise of anonymous answers the least compromising answer was chosen, due to the fear of negative reactions from superiors.

According to Schein [3] the necessity of anonymous answers during organizational culture analysis usually reveals the existence of a punishment system. In this sense, for this author, companies where workers are afraid to be identified by the answers given in questionnaires reveal more about basic assumptions than any statistical analysis of the answers. He also understands that in companies where there is no punishment system institutionalized, it is possible to study culture by bringing together analysis groups to openly discuss values and certainties shared inside the organization.

Considering the values and principles of agile methods and the possibility of applying some of those methods in the Corporativa Company, it was possible to notice that a few questions needed to be asked: How can one change the values of an authoritarian, centralizer and punitive management? Would it be necessary to take over the current manager? Is it possible to delegate more autonomy to immature teams?

In this sense, Luppi [33] states that people only change when the change is really desired, because forcing a change in others is an authoritarian position. People must be convinced that changes will bring benefits to themselves.

Luppi also says that in cases where cultural incompatibility is confirmed, it would be even necessary to substitute leaders or employers by others that have personal values better aligned to what has to be disseminated. Changing the values of a person may require work reeducation and can take years.

Regarding autonomy delegation to immature teams, as in the case of the Corporativa Company, it is worth to mention that Miller [34] considers that agile methods can provide mechanisms for developers to collaborate among themselves. However, the author points out that it is necessary for a team to be formed by qualified professionals in order to obtain this evolution.

5.2 Case 2 –WebGames Company

The WebGames Company is a games developer for desktops (offline) and online multiplayer. The first level of organizational culture starts with visible artifacts. In this sense, The company has an organizational environment characterized by a certain level of formality. Its employers are grouped by specialization in so-called “islands”, which are rooms subdivided into cubicles.

Although the first level of the organizational culture – the one of visible artifacts – suggests that WebGames is a company significantly different from the former one, both of them have practically the same mission, vision and values declarations. WebGames and Corporativa claim to be focused on ideals of searching for excellence in operating areas, innovation, agility, and, above all, customers and employers satisfaction.
On the level of shared values (second level) congruence is identified within some of the visible artifacts. In WebGames, there is a reasonable qualification level for the technical team, there is good relationship with the customer, as well as high productivity and product acceptance by the market.

However, interviews with developers showed that a strong sense of apprehension was present because according to the interviewees, the pressure for results made by investors prevents teamwork and improvement initiatives such as the adoption of an agile method. This posture held by shareholders allows the manager to stipulate schedules with impossible deadlines and to impose severe audit on results and product evolution.

The pressure imposed by investors also allowed understanding the apprehensive climate in the company’s environment. Thus, it helps to understand the third level of organizational culture that concerns basic assumptions. Values and believes of investors conditioned their behavior, which are reflected in the attitudes of the manager and developers.

After some analyses at the WebGames company it is possible to say that the business vision or result orientation, which rose from the basic assumptions of investors, is predominant in the company, and creates a feeling of apprehension inhibiting existing potentials to promote innovation and teamwork. This set of basic assumptions is called here business subculture.

Although the business subculture prevails in this company, it is possible to perceive that there is potential teamwork. In this organization, even fearing workers cooperate with each other and are bound by strong affinities. The main affinity is the love for challenges and other idiosyncrasies of games development. In the present paper such feelings are called games subculture.

Comparing the passion feelings (games subculture) and apprehension (business subculture) that forge the behaviors of WebGames developers, the second subculture is predominant and overshadows the first one. In this way, as said by Derby [17], different cultures can coexist in software companies, one of them being predominant.

The findings about that company also reinforce Schein’s affirmation [3] that questionnaires alone cannot capture all basic assumptions that involve the operational, tactical and strategic cultural aspects of a company. One example of that is the fact that the online questionnaires captured teamwork as a desired value in WebGames, but they do not identified the negative influence to teamwork, generated by the basic assumptions of investors.

In this sense, the history of WebGames was studied in order to improve the understanding of the concurrent subcultures origin in that company. Despite being a new and small enterprise, WebGames was found to have an intense history. A few years ago some Computer Science students undertook their own business around their passion for games developing. Some of the consequences of those shared feelings were the cohesion and high productivity of the team that ended by eventually generating profit and the company's growth. In the beginning WebGames was lead by its founders, and the working environment was characterized by extensive collaboration and informality. In that context, the essence of teamwork and creative process were attached to rituals and shared feelings that gave birth to the games subculture. Informal conversations and affinities among stakeholders converged to the same subjects, most of them related to games, e. g. releasing a new product, characters and game scenarios developed at the company and also by the competitors. Furthermore, developers and sometimes even founders met voluntarily after working hours to have fun playing on the net or participating at events and training courses in the area.
As WebGames was evolving – still with its founders on command – new employees were hired and the company was organized. A cohesive and capacitated team was formed which started to adopt XP gradually. However, the evolution of those practices and values was interrupted due to considerable organizational changes.

Those changes happened at a stage where the company launched new products. The company had to seek for investors’ money, and that changed considerably its structure. The number of developers rose three times, new posts were created. Regarding agile methods, the new structure of the company made them abandon XP practices that were being adopted, such as pair programming and daily meetings. Furthermore, the environment became more formal and controlled. In the end, as mentioned before, teamwork was jeopardized by the pressure made by investors, and the business subculture prevailed.

After some time, the founders ended up by selling their company to investors. The company remained evolving and profitable. It is worth noticing that WebGames continues to attract developers in love with games development and investors that seek profit, both maintaining the subcultures that exist (not in harmony) inside that organization.

The identification of basic assumptions that mix business and games subcultures also contributed to a better understanding of the meaning of technical, personal and organizational success as shown by Shore and Warden [7]. In the beginning of the company, the perceptions of WebGames founders were attached to technical and personal success, even unconsciously. Thus, the code generated at a high speed of productivity together with passion by games, lead to personal and technical satisfaction. That scenario was considered valid to that stage of the company because incidentally it made profit (organizational success) as one of the consequences, which is not always the case.

It should be noticed that the growth and evolution of WebGames attracted investors with strict business perception, motivated only by organizational success. At that stage, the modus operandi existing since the foundation of WebGames became invalid and was gradually changed to become more formal and profit motivated.

Considering the current modus operandi in WebGames and taking a possible adoption of the Scrum method as an example, the following questions arose: How would it be possible to elaborate and give priority to lists of requirements and iterations along with authoritarian and excessively profit greed investors? What degree of autonomy a Scrum Master would have in order to play the role of an Agile Coach and disseminate agile premises in that organization? Would it be possible to adopt a sustainable rhythm in an environment characterized by pressure for results and working out of regular hours?

Because of those findings, it can be understood that to complete the adoption of agile methods it is very important to have a balance among the technical, personal and organizational perspectives. Furthermore, it has been possible to notice that the agile values and principles used in practice can lead to such balance. However, what makes it hard to adopt the agile philosophy or to achieve balance of the stakeholders’ perspectives is that different interests, feelings, values and basic presuppositions from the organizational culture are involved.

5.3 Case 3 –Web Company

The third study is about Web Company that has as its main business the development of solutions for competitive intelligence. Observing the first level of organizational culture, one
can notice that except by the non existence of investors among stakeholders and by the wider informality in organizational climate, there is an organizational structure similar to that of the Web Company.

Similarly to both companies presented before, Web has a frame with its mission and vision that said that it is guided by ideals of searching for excellence in its area, teamwork and workers satisfaction. However, the frame exposed at Web added the declaration of continuous learning and consensual decision making as values.

From continuous learning comes the belief that declared values are progressively adopted and adjusted to actions that are tuned to the company strategies and stakeholders satisfaction. As for the declaration of consensus as a value, it was emphasized that if associated to discussion, respect and equity could lead to workers identification and commitment to the organization.

Still at the first level of organizational culture it was possible to say that by means of working cells the company is fairly using the Scrum method in most of its projects. The method is mixed with some practices of Extreme Programming, such as automation tests and intensification, programming patterns and continuous integration of developed code.

As the observations and interviews were made it was possible to check some congruencies among visible artifacts and shared values at the Web Company. That led to the second level of organizational culture. An example of that was the perception that the choice for agile methods as well as the mission, vision and values declaration were produced on meetings, brainstorm sessions and workshops where participants discussed and sought for consensus regarding decision making that affected the whole company.

One remarkable point is that the choice for agile development was due to the necessity of adopting a method adjusted to the working style, instead of adjusting all the organization to the method. Furthermore, it was seen that the mix of agile methods (Scrum and XP practices) was kept in continuous learning, questioning and improvement.

After perceiving the tuning among the visible artifacts and shared values at Web, it was necessary to understand the basic assumptions, which provided meaning to the adopted behavior. With that, the third level of organizational culture was reached.

This level of organizational culture showed the beliefs and perceptions that build behaviors at Web. It was possible to notice that leaders work continuously to keep the company in an evolutionary learning line. That could be seen on the resolution of tactical and operational decisions that involved specific projects, and in strategic actions that were implied in the organization survival and evolution. Among those leaders were the Scrum Master and the staff manager. The first played the role of mentor and agile coach, and the second handled the continuous development of competences and organizational values; those people made a joint work allowing the agile principles and values to remain tuned with the company mission, vision and values.

Looking closer at the third level of organizational culture, it was possible to see that the current modus operandi had its essence in the basic assumptions of founders and current owners of the company. They believed that work had to be founded in cooperation and common sense, and started to attract and retain workers that believe in that philosophy. With those basic assumptions, a natural attraction to the agile philosophy was also noticed, which facilitated the adoption of agile methods.
Perceiving the reports and observations obtained it was possible to conclude that Web is an example of organization that has a given balance among the concepts of personal, technical and organizational successes as presented by Shore and Warden [7]. Besides, as highlighted by Anderson and Schragenheim [26] the fact that Web has similarities with a learning organization facilitated the adoption of agile methods.

5.4 Representation of the Levels of Organizational Culture at Corporativa, WebGames, and Web Companies

Figures 6 and 7 show the three studies reported before in order to represent the levels of organizational culture in each of the studied companies. Corporativa and WebGames are presented in figure 6 and Web is presented in figure 7.

FIGURE 6 – Representation of the levels of culture in Corporativa and WebGames companies

The studies are organized in the figures following the iceberg metaphor of Chiavenato [1] and the theory of cultural levels presented by Schein [3]. This organization of data allows a better visualization of the levels of organizational culture at the three software companies that were studied in this paper.

It is important to notice that this study did not make a complete analysis of the organizational culture at the companies. The paper searched the identification of some cultural aspects that could interfere in the adoption of an agile method, in order to highlight the fact that those aspects can be hidden at the organizational environment. In addition, according to Schein [3], the levels of culture range from the very visible to the tacit and invisible.

According to figure 6, understanding the culture by means of levels may bring to light important parts of culture that are usually hidden, such as mental models that represent the ways of thinking, feeling and acting, regarded as the most adequate for a group in a given context – as for instance, the containment feeling in the case of the Corporativa Company and the apprehension feeling in the case of the WebGames Company.

It is worth highlighting that in a comparison between those two companies, although Corporativa has a horizontal organizational structure and a shared and informal working environment, WebGames is the one with more bias to teamwork. However, in both companies obstacles for teamwork were identified, which could possibly prevent the adoption of an agile method. Among those obstacles laid the management style in both organizations, the immaturity of the team in Corporativa, and the influence of investors in WebGames.

Nevertheless, visible artifacts (first level of the culture) at figure 6 shows that both organizations have the same mission, vision and strategy declarations - namely, teamwork, focus on customer and quality. However, in the submerged part of the iceberg (second and third levels of culture) it was possible to notice that there are assumptions and values that eventually lead to behaviors and attitudes that do not correspond to their declared values and visible artifacts.

Figure 7 represents the Web Company discussed in section 5.3. It can be noticed that there is harmony among visible artifacts, shared values and basic assumptions.

FIGURE 7 – Representation of the levels of culture in Web Company

Figure 7 shows that the organizational climate and current working ways at Web (such as using Scrum and XP practices) mean only the upper part of the iceberg, that is, only manifestations of visible artifacts of its culture. In the submersed part of the iceberg, the
developing of values and competences tuned to the strategies of the organization represents the second level of culture. And the most hidden part of the culture – the third level – is about basic assumptions of its leaders and founders that support and give meaning to the upper levels.

The analysis of the organizational culture of Web under the perspective of the levels presented by Schein [3] – taking into account the adoption of agile methods – allows to perceive that this organization developed a competitive advantage that can hardly be imitated. Thus, companies that seek the reproduction of that strategy looking only at the most superficial levels – as the one of the visible artifacts – may end by underestimating the necessary implications for reaching the stage where Web already is.

That means that the current culture at Web is neither the result of an extremely detailed master plan, nor the result of an isolated initiative of training or consultancy, which could be understood as abrupt and fast ruptures. That culture comes from the efforts and learning lessons obtained after a journey. That culture was molded by means of lived experiences from the people, the search for answers to errors and obstacles found during the progressive development of competencies, and the alignment of a set of principles and values to the goals and strategies of the company.

6. Final Remarks

This paper showed that the visualization of the organizational culture through the three levels proposed by Schein may improve its understanding and it helps to decide the viability for adopting an agile method. Thus, one of the main contributions of this study is showing that the perception of cultural levels can make the cultural analysis more effective in the context of adopting an agile method. Therefore, it can be said that the perception of the levels is an important complement to a more critical approach, which proposes the verification of receptivity or repulse of the organizational culture concerning agile values and principles.

The three levels also showed that cultural aspects are not always easily understood and, many times, appearances and discourse are very dissonant to the company’s reality. Examples of that, according to figure 6, are the visible artifacts (the first impression achieved), which do not always coincide with the company’s reality.

Thus, obstacles to the adoption of an agile method may sometimes be hidden under the organization culture. In this situation, the visible aspects, which are easier to collect, may suggest a culture that does not correspond to reality. Understanding the culture of a company is necessary in order to know it in a deeper way. Only after discussing, observing and talking to people one can understand the principles and values that really guide the organization.

Furthermore, this work showed that an agile culture cannot be reduced to a software development process, or to a specific agile method, and it is neither related only to a set of technological artifacts used by a company. As mentioned in section 5, an agile culture is founded on a set of basic presuppositions similar to the agile principles. Those presuppositions are the foundation for shared values that allow the establishment of the agile philosophy, and because of that, the practices and technology used by each agile method represent only manifestations of the agile culture, or the top of the iceberg, that is, its visible artifacts.

This paper also exposed the need for verifying whether the adequacy of organizational culture into the agile values and principles is not present only in the tactical and operational context
of the company, that is, only in what refers to the software development team activities. This is so because even if developers want to change the working systematic by adopting an agile method (for example, thinking about promoting a culture of defects prevention or agile modeling, as presented in section four), they must have in mind that organizational culture is wider and have different implications.

In this sense, as shown in the cases of Corporativa and WebGames, it is worth recalling that organizational culture includes the strategic context, and not only the tactical and operational ones. Then, the strategic context is composed by other stakeholders that may have principles and values, which create obstacles for changing the working systematic and the adoption of an agile method. Among such stakeholders are managers, board of directors, investors and even the company’s customers.

Thus, considering the strategic, tactical and operational contexts, it is possible to see that values and principles of members of an organization can be different and even conflicting. Difficulties on accomplishing changes may be differently interpreted by various points of view by people who are part of the organizational structure. For instance, motivations of a company investor or director may be different from the ones of a programmer [2]. Keeping in mind the fact that certain people can hold a decisive power inside the company, the decision of adopting an agile method must be thought through, because values and perceptions of the investors may act like a barrier for the method implementation.

According to Evers and Rising [31], organizational culture can accept or reject agile principles as if they were the immunological system of the company. In cases where the organizational culture is hostile to the agile culture, cultural changing might not be the best solution. McBreen [35] points out that in order to use a new software development method sometimes the members of the organization should change their values and behavior, that is, changing the organizational culture, which may not always happen easily.

Identifying and understanding cultural aspects of the company must be one of the first attitudes when adopting an agile method is intended. In other words, it is necessary to check if values, beliefs and behaviors that lead the organization are consistent to the values and principles of an agile culture.

This work highlighted that the declaration of values and mission of a company should not be restricted only to messages exposed with good intentions in an organization’s wall or published at the corporate portal. As observed in Web, those declarations should be put to work, becoming concrete actions. Because of that, it should be noticed that, in general lines, the agile philosophy – besides using technical concepts that involve software development – is reasoned on good people, projects or companies management practices. Therefore, when an organization effectively put in practice its intentions declaration, it is probably already easing the way for the adoption of an agile method.

Finally, this study also shows that organizational culture, and the levels proposed by Schein [3] are not only present in large companies, inherently bureaucratic and with decades of existence. Organizational culture is strongly present in small and relatively new companies, in informal working environments, and in small groups, because it involves people and feelings, and those aspects are also very significant in software companies.

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