# For Some Places More Than Others - Agility and Organizational Culture

Lourenço P. Soares[1,2(✉)] and Ângela Freitag Brodbeck[2]

[1] ThoughtWorks Brasil, Porto Alegre, Brazil
lous@thoughtworks.com
[2] Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil
angela@brodbeck.com.br

**Abstract.** The adoption of agile methods for software development has proven to be an activity sensitive to the culture of the organizations seeking to adopt them. Agile projects occur in different situations: from the most ideal to those that require extensive adaptations. This study aims to explore the relationship between selected basic cultural assumptions of organizations and agile practices. Correlations identified were explored looking to offer an initial map suggesting approaches to introduce agile practices based on the cultural profile of the organization. The most notable results were that basic cultural assumptions of "Pragmatism", "Favors communication" and "Collegial/participative" are the ones most correlated with agile practices and the practices of "co-location", "Test Driven Development", "Continuous Integration", "Code refactoring", "pair programming" and "Stand-up meeting" showed no representative correlations with basic cultural assumptions, indicating that they may be a good alternative to start an agile adoption by technical practices. One of the main contributions of this work is proposing a preliminary model that highlights the relationship between organizational culture and adoption of agile practices, suggesting areas for further research.

**Keywords:** Organizational culture · Agile methodologies · Agile practices
Adoption of agile practices · Cultural dimensions · Basic assumptions
TDD · Continuous integration · Stand-up meeting · Co-location

## 1 Introduction

There are few companies these days that can remain competitive without Information Technology. Be it at the core of the business or limited to opportunistic explorations, IT projects can determine the success or failure of an organization. These projects are managed in many different ways, from ad hoc processes to the waterfall model using Gantt charts.

At the turn of century, noticing the chaos of the absence of a proper process and the frequent inefficiency of the waterfall model [1], a group of software developers proposed "agile" as a more appropriate way to manage IT projects [2]. Highsmith [3], one of the signatories of the Agile Manifesto [4] states that the growth and the criticism of agile

methods have to do with values and culture, and not taking cultural factors into account is the main cause of failure in the adoption of software development methodologies. Research by Begel and Nagappan [5] identified the incompatibility with culture as one of the barriers to adoption of agile methods.

In contrast, Robinson and Sharp [6] indicate that agile practices can be adapted to produce a methodology that is appropriate for a particular culture, and cultural analysis can help prepare an organization to introduce changes [7].

Often, there is a conflicting relationship between culture and practices that one seeks to adopt in IT organizations, which can harm change initiatives, particularly in the context of agile methodologies adoption. Thus, this study aims to:

(a) Identify in literature how the various characteristics of an organizational culture are described and how they can be measured;
(b) Identify the practices that best represent, for the purposes of this work, the principles behind agile methodologies;
(c) Identify which basic assumptions of organizational culture are more or less related to the adoption of agile practices by mapping the basic assumptions prevailing in organizational culture of different companies and their correlation with the adoption of agile practices in the implementation of information systems in said companies.

## 2    Main Elements of Study Execution

This study was based on cultural elements that can be classified as national, regional, organizational, group or individual, focusing on organizational elements. Besides these, elements of agile methods and its main practices were analyzed and mapped.

### 2.1    Culture Elements

Ali and Brooks [8] define culture as "shared patterns of behavior." Within the organization, the definition by Ed Schein, also used by Fleury et al. [9] was used:

> The culture of a group can now be defined as a pattern of shared basic assumptions learned by a group as it solved its problems of external adaptation and internal integration, which has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems [10].

Both Hofstede and Hofstede [11] and Schein [10] suggest the use of different dimensions to describe an organizational culture in aspects relevant to empirical studies. For Schein basic assumptions are organized in the following dimensions [12]:

**Nature of Human Activity:**  Between *Environment dominant* (the organization acts as if subordinate to the environment it operates) and *Organization dominant* (the organization believes in its ability to determine the environment and the market). Between *Proactive* (the organization accepts that individuals can cause instability in the search for improvement) and *Reactive/fatalistic* (the organization expects the protocol to be followed and when unforeseen results happen, it accepts the consequences).

**Nature of Reality and Truth:** Between *Moralistic authority* (the organization trusts the boss/expert/manual to determine the proper way of doing things) and *Pragmatism* (the organization tries to obtain objective information and believes truth emerges from the exchange of ideas among all).

**Nature of Space:** Between *Favors privacy* (the organization creates private spaces and discloses information as needed) and *Favors communication* (the organization adopts an environment that facilitates the rapid exchange of ideas).

**Nature of Time:** Between *Near future oriented* (the organization uses its planning as basis for decisions) and *Past oriented* (the organization revisits previous experiences to look for solutions to problems). Between *Long time units* (organization favors a long-term view, disregards minor delays) and *Short time units* (the organization plans its activities with a short horizon of time and sees small delays as significant).

**Nature of Human Nature:** Between *Humans are basically good* (the organization believes that properly motivated people will exceed expectations) and *Humans are basically evil* (the organization suspects that people will act inappropriately if given the chance). Between *Human nature is fixed* (the organization believes that people are what they are and cannot change) and *Human nature is mutable* (the organization believes that people adapt to different situations and can improve depending on the context).

**Nature of human relationships:** Between *Groupism* (the organization believes that all good things come from the group and strive to create consensus) and *Individualism* (the organization believes that individual talent is key to problem solving). Between *Collegial/participative* (authority is determined by the context and the leader defers to the group) and *Authoritarian/paternalistic* (the organization believes in a strong hierarchy).

## 2.2   Elements of Agile Methods

The Agile Manifesto [4] and the methodologies associated with it caused a significant change in the way teams develop software. According to Taylor [13]:

> Agile methodologies generally promote a project management process that encourages frequent inspection and adaptation, a leadership philosophy that encourages teamwork, self-organization and accountability, a set of engineering best practices that allow for rapid delivery of high-quality software and a business approach that aligns development with customer needs and company goals.

Fowler [29] points out that "one of the hardest parts of introducing agile methods into an organization is the cultural change it causes." Because of the flexible nature of agile methodologies, it is often better to adapt practices when these prove inadequate to a given context, provided the agile values are respected [2, 6, 14, 15].

In order to compare practices and adoption, a number of agile practices were selected based on a comparison of several authors [2, 5, 14, 16–20] (Table 1). They were selected by measuring how often they were mentioned in the reference literature and mapping

them according to the 12 principles of the Agile Manifesto [4] (the principle of "Our highest priority is to satisfy the customer…" was considered as a meta principle, resulting of the conjunction of the others and as a guiding principle for the application of all practices, not mapping exclusively to a single practice).

**Table 1.** List of selected Agile practices and its corresponding principles. Number of papers considered that reference the practice in parenthesis.

| Practices (mentions) | Reference | Principles |
|---|---|---|
| Delivery planning (5) | PLAN | Welcome changing requirements… |
| Requirements in form of stories (3) | REQS | |
| Iterations/small, frequent deliveries (7) | ITER | Deliver working software frequently… |
| Active customer involvement (7) | CUST | Business people and developers must work together… |
| Multidisciplinary team (2) | MULT | |
| Motivation (2) | MOTV | Build projects around motivated individuals… |
| Co-location (2) | COLO | The most efficient (…) face-to-face conversation |
| Test Driven Development (8) | TDDV | Working software is the primary measure… |
| Continuous Integration (8) | CINT | |
| Sustainable pace (6) | PACE | Agile processes promote sustainable development… |
| Code refactoring (6) | REFA | Continuous attention to technical excellence… |
| Pair programming (7) | PAIR | |
| Simplicity (5) | SIMP | Simplicity… |
| Incremental project (2) | INCR | |
| Minimum modeling/documentation (2) | MIND | |
| Collective understanding (7) | COLU | The best (…) designs emerge from self-organizing teams |
| Stand-up meeting (3) | STND | |
| Visual progress indicators (4) | VIND | |
| Retrospectives/learning (3) | RETR | At regular intervals, the team reflects… |

## 3   Study Method

This work is understood as exploratory study [21]. At the time the survey was performed, no other studies were found relating cultural dimensions and agile practices adoption.

This study used a quantitative research method [22], using as instrument an online survey form. It was considered, according to literature [10, 11], to be good enough for an initial search of insights into the role of culture in inhibiting or facilitating organizational change.

The case study was carried out between March and April of 2011 in the company ThoughtWorks Inc., global leader in consulting and the use of Agile methodologies in implementation of software development projects [23]. The source data was collected from ThoughtWorks Inc. consultants delivering software or providing advice on software delivery based on their experience during the delivery or after it has finished. These

consultants were distributed globally in many different organizations and cultures, which have different levels of knowledge of Agile.

For cultural dimensions, the model used was adapted from the one proposed by Schein [12] described in Sect. 2.1. A five point scale between the cultural assumptions at each end of a given dimension was used to measure an organization's manifested behavior with regards to that dimension.

A comparative analysis of previous works was used for the selection of agile practices surveyed (Table 1). The adoption of a given practice was measured using the scale proposed by Boehm and Turner [24] for "Levels of Software Method Understanding and Use" (Table 2).

**Table 2.**  Levels of software method understanding and use.

| Level | Description |
|---|---|
| Level -1 | May have technical skills, but unable or unwilling to collaborate or follow shared methods |
| Level 1B | With training, able to perform procedural method steps |
| Level 1A | With training, able to perform discretionary method steps |
| Level 2 | Able to tailor a method to fit a precedented new situation |
| Level 3 | Able to revise a method (break its rules) to fit an unprecedented new situation |

The responses were based on the subjective perception of consultants from Thought-Works Inc. on the client's experience and satisfaction with agile methods; the culture of the client organization; and the understanding and use of agile methods put forward by employees of the organization at the end of the project.

For data analysis, descriptive and multivariate statistical procedures were employed using statistical functions as Pearson correlation and hypothesis test (t test error probability Type I ($\alpha$) accepted of 0.01) [25–27]. No data cleansing process was performed. Each dimension of culture was separated in the two basic assumptions it corresponds to, with assumptions on the left of the scale having the negative correlation value, and assumptions on the right of the scale having the positive correlation value. Thus, negative correlations between a practice and a dimension indicate, in fact, a direct correlation with the assumption on the left in a certain cultural dimension. To avoid drawing conclusions on extreme situations with a low number of responses, only the top 20% of the assumption and practice pairs with the highest correlation were selected for analysis [13].

## 4    Analysis of Results

The survey consisted of questionnaires distributed to a population of 1400 consultants, with a return rate of 8.14% (114 responses), which allowed calculation of a correlation between the cultural dimensions researched and selected agile practices. The questionnaires were validated by two specialists from ThoughtWorks and the results verified and commented by five others. Both questionnaire and results were reviewed by three members on an examination board. The results can be seen in Table 3. The darker the

**Table 3.** Map of the correlation between practices and cultural dimensions.

| Practices (Reference in Table 1) | Environment dominant → Organization dominant | Proactive → Reactive/fatalistic | Moralistic authority → Pragmatism | Favors privacy → Favors communication | Near future oriented → Past oriented | Long time units → Short time units | Humans are basically good → Humans are basically evil | Human nature is fixed → Human nature is mutable | Groupism → Individualism | Collegial/participative → Authoritarian/paternalistic |
|---|---|---|---|---|---|---|---|---|---|---|
| PLAN | 0,0578 | **0,4233** | **0,4362** | **0,3699** | 0,2518 | 0,1772 | **0,4088** | 0,0438 | 0,1982 | **0,4590** |
| REQS | 0,1591 | 0,2092 | 0,3400 | 0,3332 | 0,2405 | 0,0515 | 0,1742 | 0,2145 | 0,3033 | **0,3520** |
| ITER | 0,1494 | **0,4451** | **0,3814** | 0,2531 | 0,1768 | ,0140 | **0,4144** | 0,0609 | 0,0848 | 0,3022 |
| CUST | 0,0614 | **0,3764** | **0,4178** | **0,4326** | 0,1178 | 0,0528 | **0,4955** | 0,3452 | 0,1751 | **0,3813** |
| MULT | 0,1268 | 0,1566 | 0,2876 | 0,3104 | 0,1620 | 0,0156 | 0,2419 | 0,2609 | **0,3674** | 0,3361 |
| MOTV | 0,0924 | **0,4077** | **0,4707** | **0,3840** | 0,1633 | 0,0261 | **0,5151** | 0,2859 | 0,2716 | **0,4349** |
| COLO | 0,0933 | 0,1612 | 0,2235 | 0,2871 | 0,0955 | 0,0988 | 0,3396 | 0,1935 | 0,1233 | 0,2527 |
| TDDV | 0,1785 | 0,0787 | 0,1787 | 0,0939 | 0,1686 | 0,1747 | 0,1309 | 0,0960 | 0,2463 | 0,2139 |
| CINT | 0,1001 | 0,1864 | 0,1428 | 0,0964 | 0,2848 | 0,1218 | 0,1677 | 0,0276 | 0,1656 | 0,1809 |
| PACE | 0,1152 | 0,2627 | **0,3881** | 0,3031 | 0,0218 | 0,0932 | 0,2931 | 0,2706 | 0,2961 | 0,2848 |
| REFA | 0,0236 | 0,1775 | 0,2552 | 0,1582 | 0,0469 | 0,0485 | 0,2506 | 0,1642 | 0,1586 | 0,2092 |
| PAIR | 0,1198 | 0,2237 | 0,1950 | 0,2899 | 0,1532 | 0,1033 | 0,2398 | 0,2499 | 0,1796 | 0,3226 |
| SIMP | 0,1149 | 0,3330 | 0,2517 | **0,3791** | 0,1446 | 0,0701 | **0,3686** | 0,2827 | 0,2453 | **0,4057** |
| INCR | 0,1122 | 0,2733 | 0,1849 | 0,2393 | 0,1589 | 0,1834 | 0,3195 | 0,1962 | 0,2312 | **0,4253** |
| MIND | 0,2079 | 0,2834 | 0,3052 | **0,4489** | 0,1682 | 0,0017 | **0,3626** | 0,2177 | 0,2900 | **0,4686** |
| COLU | 0,1373 | **0,3687** | **,4271** | **0,4221** | 0,1198 | 0,1067 | **0,4515** | 0,3250 | **0,4153** | **0,5238** |
| STND | 0,0709 | 0,0533 | 0,1778 | 0,2507 | 0,1013 | 0,0831 | 0,2499 | 0,1376 | 0,2340 | 0,2589 |
| VIND | 0,2309 | 0,2252 | **0,3512** | **0,3755** | 0,3043 | 0,0371 | 0,2999 | 0,1438 | 0,2138 | 0,3306 |
| RETR | 0,1840 | 0,1112 | **0,3902** | **0,3941** | 0,0981 | 0,1143 | 0,2353 | 0,1519 | 0,3413 | 0,2780 |

cell the higher the correlation, either positive or negative. It is important to notice that a high value for modular correlation does not imply that this correlation is significant. This requires a hypothesis test, which was done in selected cases.

Positive or negative correlations represent the influence of different assumptions on the adoption of a practice. In Table 3 cultural dimensions are in columns, so negative values indicate a strong correlation with assumptions to the left in the column heading while positive values indicate a strong correlation with assumptions to the right in the column heading. Only the highest 20% of the correlation results (in bold in Table 3) were selected for a detailed analysis. All correlations highlighted proved significant.

Based on the results, it is worth noting that the basic assumptions of "Pragmatism", "Favors communication" and "Collegial/participative" are the ones that correlate more with agile practices, with 8 practices with high correlation for each assumption. This can be seen as aligned with the four values of the Agile Manifesto [4] as seen in Table 4.

**Table 4.** Values of the agile manifesto and basic cultural assumptions.

| | |
|---|---|
| Individuals and interactions over processes and tools | "Favors communication" |
| Working software over comprehensive documentation | "Pragmatism" |
| Customer collaboration over contract negotiation | "Collegial/participative", "Favors communication" |
| Responding to change over following a plan | "Pragmatism" |

On the other hand, four dimensions showed no correlation among the 20% analyzed: Between "Environment dominant" and "Organization dominant"; Between "Near future oriented" and "Past oriented"; Between "Long time units" and "Short time units"; and between "Human nature is fixed" and "Human nature is mutable". It is surprising that the last one showed no correlation, since the concept of "Agile Mindset" [28] speaks explicitly about the belief that people can change.

Another interesting observation is that the practices of "co-location", "Test Driven Development", "Continuous Integration", "Refactoring code", "Pair programming" and "Stand-up meeting" showed no representative correlation with any basic assumption. This suggests that these practices are more culture "agnostic" and possibly can be adopted more easily by any organization. Many of these practices ("Test Driven Development", "Continuous Integration", "Refactoring code" and "Pair programming") are highly technical, which may explain why many adoptions of agile methodologies in organizations are led by software development teams.

Therefore, one could assume that, particularly in organizations with predominantly "Favors privacy", "Moralistic authority" and "Authoritarian/paternalistic" cultural assumptions, an Agile adoption will be more successful if it starts by implementing the practices of "co-location", "Test Driven Development", "Continuous Integration", "Refactoring code", "Pair programming" and "Stand-up meeting".

## 5    Conclusions and Contributions

Based on the highlighted correlations, one can argue that it was possible to identify cultural assumptions that are related to the adoption of agile practices. This was achieved by seeking in literature instruments which allow the classification of the culture of an organization, listing a set of practices representative of agile principles and looking to measure the correlations between these in real situations.

Although the results are encouraging, one must be aware that their validity is limited due to the inherent limitations and biases of surveys and the small number of responses. It is also a subjective matter within a fairly homogeneous population, limiting extrapolation of results.

Therefore it is considered that this work may contribute to a deeper exploration of the theme by suggesting significant correlations between the adoption of agile practices and cultural assumptions of different organizations.

To the academia, this work serves as an initial model to look into agile methods and practices in the organizational culture domain. We hope that these results encourage researchers to consider organizational culture as an important aspect in studies of adoption of these methodologies. For practitioners, we hope this inspire companies looking to adopt agile methodologies to consider the culture of its organization, and plan strategy accordingly, aiming, for example, to start the journey by the practices that seem less sensitive to culture, and eventually seeking to adapt their culture (or the expected results) according to these limitations.

Several possibilities for future studies arise from this work. To confirm its results, and mitigate any bias that this study could have been subject of, it is necessary to expand the set of sources analyzed, seeking a greater volume and diversity of data. In addition, a longitudinal study with a limited set of customers observing the impact of agile practices in organizational culture can help to establish a causal relationship and deepen the understanding of the nexus between agile practices and organizational culture. We believe it is also important that the practitioners of agile methodologies - from beginners to the more experienced - pay attention to day-to-day moments where culture was an impediment to improvement, or, to the contrary, a boost to change. Conveniently, the Agile Manifesto itself suggests moments of reflection where this debate can be rewarding.

## Appendix A – Survey Questionnaire

**Culture and Agile Practices**
Please answer the questions below based on your experience in past and present ThoughtWorks projects you've been involved. Your name and the client/project information will be kept private and used only for data aggregation and to calculate response rate. Please feel free to leave feedback, remarks or describe a case of particular interest in the field available at the end of the form. Thanks for your time!

**Project profile**
The next few questions will be used to identify the project characteristics for aggregate analysis:

Client/project:                                        Your role:
Client country of origin:                        Project end date:
Project type (Onshore / Offshore):      Project duration:

Client's experience with Agile: No experience 1 2 3 4 5 Experienced practitioners
Client's satisfaction with Agile: Extremely frustrated 1 2 3 4 5 Extremely satisfied
Did the project finish on target and on budget? Yes/No/Not finished/I don't know

**Client Organization Culture**
For the following questions, please answer what, in your opinion, best reflects the attitudes, behaviors and beliefs of the group involved in the project from the client's side.

**Nature of Human Activity – 1.**  Does the organization acts as if dominated by the environment it is part of, trying to find available niches and considering all external factors before doing anything (e.g.: they refuse to make any changes without consulting every stakeholder, like legal and design people)? Or the organization believes in its capacity to influence the market with their own effort, displaying a belief in progress regardless of what the current consensus is (e.g.: they try and release products they believe in, regardless of marketing surveys)?

Environment dominant 1 2 3 4 5 Organization dominant

**Nature of Human Activity – 2.**  Does the organization let its members act pro-actively and improve things even if it means making the environment unstable for everyone else sometimes (e.g.: They try many physical lay-outs until they find the one that is acceptable for everyone)? Or the organization expects its members to follow detailed instructions and act according to protocol, accepting their fate if something unexpected happens and the protocol breaks down (e.g.: They avoid updating their tech stack without many meetings and a detailed timeline)?

Pro - active 1 2 3 4 5 Reactive,  fatalistic

**Nature of Reality and Truth.**  Does the organization trusts the boss, local specialist or "the right way of doing things" to determine what is right when it is time to make a decision amid great uncertainty (e.g.: there is a methodology book that every one regards as the final arbitrator of any dispute)? Or the organization try to gather objective information and, in lack of those, believes that truth will come out of debate among everyone involved (e.g.: to make a decision, two or more members of the team explain their ideas and test it out to see what works best)?

Moralistic Authority 1 2 3 4 5 Pragmatism

**Nature of Space.** Does the organization adopts a working environment that favors private conversation, avoiding disrupting anybody with conversations that are not pertinent to the whole group, and only releasing information in a need-to-know basis (e.g.: the boss have people come to his office when he wants to talk to them and interrupting a colleague without permission is an offense)? Or the organization adopts a working environment that makes the fast exchange of ideas easy at the expense of individual privacy (e.g.: the team – including the boss – shares a common working area and the group is all facing the centre of the room when possible)?

Allowing privacy 1 2 3 4 5 Allowing communication

**Nature of Time – 1.** Is the organization normally focused in the near future, using a quarterly or annual goal as benchmark for decision-making (e.g.: they postpone a change until after the current release in order to avoid risking it)? Or the organization normally looks to past experiences when looking for solutions for a problem (e.g.: they do not adopt a given methodology because they tried before and it didn't work)? An intermediate position would be focus on the task at hand, without looking into long-term consequences or previous experiences.

Near future orientation 1 2 3 4 5 Past orientation

**Nature of Time – 2.** Does the organization favors a long term vision (months or years) and don't worry too much about small delays (e.g.: they are fine with a complex task taking longer than expected and are willing to negotiate the consequent delay in order to do the right thing). Or the organization plan activities with a short time frame (days or weeks) and consider small delays a big issue (e.g.: holding weekly status meetings where every delay is immediately looked into)?

Long time units 1 2 3 4 5 Short time units

**Nature of Human Nature – 1.** Does the organization believes that people are intrinsically good and, when properly motivated, will exceed expectations when performing the tasks they are responsible for (e.g.: they do not demand results, focusing on making sure everyone has all the resources necessary to do the job)? Or the organization believes people is intrinsically bad and believe people will misbehave if given the opportunity (e.g.: an organization that has cameras everywhere to make ensure security and good behavior)?

Humans are basically good 1 2 3 4 5 Humans are basically evil

**Nature of Human Nature – 2.** Does the organization believe that people are what they are and can't change their nature regardless of any context changes (e.g.: the organization prefers to postpone a meeting then let someone represent somebody else that is out sick)? Or the organization believes people can change, adapting to different roles depending on the situation and/or the way they are treated (e.g.: the organization lets a user pair with a developer if the user believes he can help that way)?

Human nature is fixed 1 2 3 4 5 Human nature is malleable

**Nature of Human Relations – 1.**  Does the organization believes that all good things come from the group and members strive for conformity (e.g.: people frequently ask everybody else's opinion before deciding on trivial things)? Or the organization believes that individual talent is the solution for any problem (e.g.: if somebody works all night alone to do a nasty hack to fix an issue in production, then he or she is praised as an example)?

<div align="center">Group as center 1 2 3 4 5 Individual as center</div>

**Nature of Human Relations – 2.**  Is the authority in the organization determined by context, with the boss deferring to the group members' experience to assign power according to the situation (e.g.: the input of skilled engineers holds more weight in the decisions regarding the tech stack)? Or the organization believes in a strong hierarchy where power and influence are a consequence of each person's relative status (e.g.: no matter how obvious a solution is, it must be cleared with the boss first)?

<div align="center">Collegial/Participative 1 2 3 4 5 Authoritarian/paternalistic</div>

| | May have technical skills but unable or unwilling to collaborate or follow shared methods | With training, able to perform procedural method steps | With training, able to perform discretionary method steps | Able to tailor a method to fit a precedented new situation | Able to revise a method (break its rules) to fit an unprecedented new situation |
|---|---|---|---|---|---|
| Release planing | | | | | |
| Use of stories | | | | | |
| Frequent releases | | | | | |
| Client participation | | | | | |
| Morale | | | | | |
| Colocation | | | | | |
| TDD | | | | | |
| CI | | | | | |
| Sustainable pace | | | | | |
| Refactoring | | | | | |
| Whole team | | | | | |
| Pair Programming | | | | | |
| Simple design | | | | | |
| Incremental design | | | | | |
| Minimal documentation | | | | | |
| Shared understanding | | | | | |
| Stand-ups | | | | | |
| Information Radiators | | | | | |
| Retrospective/ self-improvement | | | | | |

**Agile practices adoption**
In the table below, please check the option that matches your perception of the client's team skill level in each given practice in the last day of the project.

**Agile practices mastery levels**
If a particular practice wasn't tried/does not apply in the project you are describing or the scale doesn't fit, leave that row unanswered. Mastery levels based on Cockburn (2000), Boehm and Turner (2003) and Sato et al. (2006).

# References

1. Royce, W.: Software Project Management: A Unified Framework. Addison-Wesley Professional, Reading (1998)
2. Parsons, D., Ryu, H., Lal, R.: The impact of methods and techniques on outcomes from agile software development projects. In: McMaster, T., Wastell, D., Ferneley, E., DeGross, Janice I. (eds.) TDIT 2007. IIFIP, vol. 235, pp. 235–249. Springer, Boston, MA (2007). https://doi.org/10.1007/978-0-387-72804-9_16
3. Highsmith, J.: Agile Software Development Ecosystems. Addison-Wesley, Boston (2002)
4. Beck, K., Beedle, M., van Bennekum, A., et al.: Manifesto for Agile Software Development. In: Agilemanifesto.org (2017). http://agilemanifesto.org. Accessed 15 June 2017
5. Begel, A., Nagappan, N.: Usage and perceptions of agile software development in an industrial context: An exploratory study. In: International Symposium on Empirical Software Engineering and Measurement, vol. 1, pp. 255–264 (2007)
6. Robinson, H., Sharp, H.: XP culture: Why the twelve practices both are and are not the most significant thing. In: Agile Development Conference, vol. 1, pp. 12–21 (2003)
7. Dubé, L., Robey, D.: Software stories: three cultural perspectives on the organizational practices of software development. Acc. Manage. Inf. Technol. **9**, 223–259 (1999)
8. Ali, M., Brooks, L.: A situated cultural approach for cross-cultural studies in IS. J. Enterp. Inf. Manage. **22**, 548–563 (2009)
9. Fleury, M.T., Shinyashiki, G., Stevanato, L.A.: Entre a antropologia e a psicanálise: dilemas metodológicos dos estudos sobre cultura organizacional. Revista de Administração **32**, 23–37 (1997)
10. Schein, E.: Organizational Culture and Leadership. Jossey-Bass, San Francisco (2010)
11. Hofstede, G., Hofstede, G.J.: Cultures and Organizations: Software for the Mind. McGraw-Hill, New York (2004)
12. Schein, E.: Organizational Culture. Working paper (Sloan School of Management) (1988). 2088-88
13. Taylor, P.: The Lazy Project Manager. Infinite Ideas, Oxford (2009)
14. Sato, D., Bassi, D., Bravo, M., et al.: Experiences tracking agile projects: an empirical study. J. Braz. Comput. Soc. **12**, 45–64 (2006)
15. Cockburn, A.: Agile Software Development. Addison-Wesley Professional, Reading (2001)
16. Beck, K., Andres, C.: Extreme Programming Explained. Addison-Wesley Professional, Reading (2004)
17. Rumpe, B., Schröder, A.: Quantitative survey on extreme programming projects. In: International Conference on Extreme Programming and Flexible Processes in Software Engineering, vol. 3, pp. 26–30 (2002)
18. Forrester Research: Agile Development: Mainstream Adoption Has Changed Agility (2010)

19. Krebs, W.: Turning the knobs: A coaching pattern for XP through agile metrics. In: Wells, D., Williams, L. (eds.) XP/Agile Universe 2002. LNCS, vol. 2418, pp. 60–69. Springer, Heidelberg (2002). https://doi.org/10.1007/3-540-45672-4_7
20. Williams, L., Layman, L., Krebs, W.: Extreme Programming Evaluation Framework for Object-Oriented Languages, v. 1.4. Department of Computer Science, North Carolina State University (2004)
21. Yin, R.: Case Study Research: Design and Methods. Sage, Thousand Oak (2008)
22. Severino, A.: Metodologia do trabalho científico. Cortez, São Paulo (2002)
23. Palmer, L., Lawler, J.: Agile methodology in offshore outsourcing. J. Bus. Case Stud. **1**, 35–46 (2005)
24. Boehm, B., Turner, R.: Rebalancing your organization's agility and discipline. In: Maurer, F., Wells, D. (eds.) XP/Agile Universe 2003. LNCS, vol. 2753, pp. 1–8. Springer, Heidelberg (2003). https://doi.org/10.1007/978-3-540-45122-8_1
25. Schmuller, J.: Statistical Analysis with Excel For Dummies. Wiley, San Francisco (2009)
26. Chatman, J., Jehn, K.: Assessing the relationship between industry characteristics and organizational culture: how different can you be? Acad. Manag. J. **37**, 522–553 (1994)
27. Prajogo, D., McDermott, C.: The relationship between total quality management practices and organizational culture. Int. J. Oper. Prod. Manage. **25**, 1101–1122 (2005)
28. Rising, L.: The Power of an Agile Mindset (2011)
29. Fowler, M.: Using an agile software process with offshore development. In: Martinfowler.com (2006). http://www.martinfowler.com/articles/agileOffshore.html. Accessed 15 June 2017