How to build an informative workspace? An experience using data collection and feedback

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Abstract

Several works on the agile community discuss the use of a team’s workspace for displaying and using information. The management of an Informative Workspace (IW) can be a challenging task as it involves such different matters as team adaptability, continuous reflection, workspace layout, human cognition, usability, etc. Our paper explores this subject and it is divided in two distinct phases. The first phase describes a data collection run on eight academic agile teams in order to identify some valuable aspects on managing an IW. This phase was based on proposing suggestions to the teams regarding their IW use, according to their specific needs and context, and gathering feedbacks from these suggestions, leading us to a set of seven heuristics on managing an IW. On the second phase a five point Likert scale survey was applied in order to reinforce or refute these heuristics’ validity, which resulted in reinforcing most of them. At the end of these two phases we describe the seven proposed heuristics connecting them, whenever possible, to available references on other agile community works.

Keywords: informative workspace, agile metrics, agile tracking

1. Introduction

Agile methods define a somewhat different approach on developing software compared to some more traditional methodologies, which is usually
related to an adaptive way of handling issues. One of the most inherent attributes of this kind of approach is emphasizing communication during the software project life-cycle. Several works on agile methods mention some benefits on using the team workspace for displaying relevant information for team members and other stakeholders [1, 2, 3, 4]. The use of Informative Workspaces (IW) has been typically considered only as a communication issue, but there are references mentioning its use and relating it to other important matters such as team behavior [5] and self-directed work [4].

On this paper we give directions to answer the following question: “How to build an effective informative workspace?” In order to do so, this study is based on a set of actions performed on eight agile teams regarding their workspaces’ use on managing information. This paper is focused on gathering and categorizing substantial information from these teams experiences identifying some major valuable matters related to IW management.

1.1. Experimentation

Several considerations about IW management are available nowadays on agile development references and papers. Despite all these references about handling IW management issues, there is a lack of systematic data collection works providing concrete evidences about the effectiveness of a few these matters on real-life projects. In addition, considering the comprehensiveness of using informative workspaces on agile environments, it would be hard to address IW management on an ordinary agile project without any simplification, not having some major principles to be focused on.

Collecting such data systematically could also help in evaluating already established concepts on this task besides identifying valuable matters not yet properly addressed by the agile community. The main goal of this paper is to analyze, display and discuss the results of this data collection, providing some directions for this community on managing informative workspaces on diverse agile projects.

2. Data Collection

The concept of global optimization is intrinsic to what we call an agile approach, so to declare any action as valuable on an agile environment requires its evaluation on real projects and its effects should contribute to the welfare of the project as a whole.
In order to identify valuable features on managing IW, actions made by the team related to this task should be collected and bounded to if whether its effects have contributed or not for the team/project in a general way.

The evaluation method should also allow a categorization of the different kind of practices, grouping different actions into simplified categories. This approach is usually required when analyzing a complex environment such as an agile development project, where different contexts require different actions, even though based on the same principles.

Hartmann & Dymond [6] propose a set of principles on choosing appropriate metrics/diagnostics for agile projects based on a list of heuristics. We chose to follow the same concept of “heuristics” as a guideline model for our data collection results, as it promotes adaptability and supports “different actions based on different contexts”.

2.1. Environment

The chosen environments for this experiment were eight open-source academic agile projects performed during the IME-USP’s “Laboratory of Extreme Programming” class - 2010. This was the ninth edition of this yearly lecture, which started in 2001. The adopted approach for learning agile methods on this class was developing open-source software for academic customers using an agile approach.

Each project was assigned to a disjoint team and each team had the permission to freely choose its adopted techniques/practices/approaches in order to develop software the best way possible. The list teams, related projects and team size is available on Table 1.

On this class there was also a role called Meta-tracker - the researcher’s role - responsible for making suggestions to all teams regarding their IW/Metrics management and collecting data from their experiences.

2.2. Approach

In order to accomplish this research’s main goal, IW management performed actions should be monitored and the successful/failure ones should be identified based on its effects. A primary analysis of this data should led to a restricted and clustered set of successful heuristics. In addition, these heuristics should be evaluated as valuable by a large proportion of all team members, in order to prevent isolated successful experiences on a specific environment.
The data collection was separated in two phases. Phase one had a more exploratory action-research based approach, since it had some elements related to action-research method such as “empowerment of participants”, “collaboration through participation”, “acquisition of knowledge”, and “social change” [7]. We used this approach to gather enough data from successful IW related actions in order to propose a primary set of heuristics regarding managing an IW.

On phase two, the value brought from each heuristic to an agile environment is evaluated by most of the team members by applying a five point Likert scale survey - validating each heuristic as useful or not. With the survey results, it was possible to reinforce/refute phase one’s proposed heuristics.

2.3. Phase One

In phase one we made a series of interviews on each team. These interviews were made several times during their projects duration in order to understand their current context/problems and to help them deal with it by using IW and Metrics techniques. These techniques were based on our previous experiences on IW and Metric management, along with some statements and discussions available on other works regarding this subject on the agile community.
On each interview we asked for some members to talk about their team current situation on several matters. After understanding each team’s current context and talking for a few minutes about it, we made some suggestions on how to use their IW to improve their current context and sometimes how to improve the current IW situation itself.

In addition, on each interview at least some statements about the effectiveness of each earlier made suggestions were requested for the team members - which summaries we electronically recorded for further analysis and classification.

An example of suggestion made to Calopsita team is described on Table 2. Based on this suggestion, Calopsita team created a frame to help them on managing which team members should be assigned to update their frames and boards on a daily basis. With this frame, team members could be easily assigned as the ones having the fewer number of days worked on this task. A picture of this frame is available on Figure 1

<table>
<thead>
<tr>
<th>Id</th>
<th>Context</th>
<th>Suggestion</th>
<th>Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Coach says that team’s frames/boards are not being regularly updated.</td>
<td>Create a frame for identifying how many times each team member had the daily responsibility of updating this frames/boards.</td>
<td>Team member “Beatriz” says it helped, since it was easier to assign team members for this task.</td>
</tr>
</tbody>
</table>

Figure 1: Frame based on suggestion.
The feedback collected from each suggestion provided a classification of all suggestions in five categories regarding the value brought from each one to the teams: 1. Positive; 2. Negative; 3. Undefined (The feedback could not be defined as positive or negative); 4. Unperformed (The suggestion was not performed by the team - indicating non-acceptance of the team members); 5. Not collected (The suggestion feedback could not be collected).

2.3.1. Results

All the complete list of suggestions, their rationale, feedbacks and classifications are not available on this paper because of size constraints, but they are described on the data collection website [8].

Most of the suggestions made to the team members were evaluated as having some positive value to the projects. Surprisingly, no suggestion performed by the team members was evaluated as having a negative result, although 22 suggestions were not even performed (indicating negative acceptance of a suggestion even before trying it), and 4 could not be directly classified as positive or negative. The classification of all suggestion feedbacks is available on Figure 2.

![Figure 2: Feedback summary.](image)

Not having a single performed suggestion with a negative feedback could be considered as a somewhat unusual result. This absence could not be considered as an indication that suggestions were made very accurately, since 22 given suggestions were not even tested by the team members. These unusual results could be a constraint to precisely evaluate a restricted set of
valuable principles for managing IWs and to accomplish this research’s main goal. Because of these constraints on phase one’s results, a more accurate data collection tool was needed during phase two.

Although phase one’s results were not conclusive enough to accomplish this research’s main goal, several of the suggestions made on this phase were tested on these projects and indicate valuable characteristics on at least specific situations of these teams. Many of the successful suggestions had some common characteristics within themselves and could be clustered for further analysis. These common characteristics were often based on some principles behind their rationale - which we chose to analyze by applying an evaluation survey on phase two.

The principles for phase two’s analysis were chosen by clustering some major successful feedbacks from phase one results into a restricted set of heuristics. On the following list we present an example of positive feedback gathered on phase one’s results related to each one of the heuristics proposed for phase two.

1. **Keep the most important frames/boards near to daily meetings place**
   - Atletismo - 6
     - *Context*: Team uses the kanban board for guiding the development of its features and this board is kept far away from their daily meeting’s location;
     - *Suggestion*: Change the kanban board with the niko-niko frame (which in this workspace is closer to daily meeting’s location).

2. **Divide IW related work between all team members**
   - Ingresso na Pos - 13
     - *Context*: Coach thinks that team members have not been much interested on informations displayed on the workspace that she considers as relevant;
     - *Suggestion*: Rotate the responsibility of updating such frames/boards between team members on a daily basis.

3. **Focus your IW on current specific needs**
   - Atletismo - 5
– **Context:** Team members recently agreed on always having a pair of developers responsible for testing features already developed on the current iteration;

– **Suggestion:** Create test tasks post-its, having a different color from regular tasks on the kanban board, for easily managing/assigning this kind of task.

4. **Display information taking human brain assimilation into account**

   • **Calopsita - 15**
   
   – **Context:** Coach says that today’s information on burn-up is not very clear, since each day is represented as an sequenced number on the chart;
   
   – **Suggestion:** Represent each day in the burn-up using a complete a date instead of a sequential number for: 1. better historical purposes; 2. clear information that today’s update was already made.

5. **Make your daily IW tasks done by a pair of team members**

   • **Archimedes - 1**
   
   – **Context:** Team members points out on a reflection retrospective the importance of helping the “tracker” of each day;
   
   – **Suggestion:** Make updates and changes on the informative workspace being done by a pair of team members each day.

6. **Provide an easy-maintainable and practical IW**

   • **Mezuro - 13**
   
   – **Context:** Team performs task division on its daily meeting and assign a pair of developers for each task. However, it represents this division by rewriting everyday team members’ names on the board near to assigned tasks post-its;
   
   – **Suggestion:** Write team member’s names on different color post-its and move them near to assigned tasks post-its instead of writing their names.

7. **Remove less valuable frames/boards from your IW**
• Calopsita - 2
  – Context: The main board of the team has lots of information and it is considered by the team members as visually over-polluted;
  – Suggestion: Keep only a few set of informations displayed on this board.

The set of heuristics that were chosen for phase two’s analysis are available, linked to the complete list of related positive suggestion feedbacks, on Table 3.

<table>
<thead>
<tr>
<th>Heuristic</th>
<th>Team / Suggestion Id(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keep the most important frames/boards near to daily meeting’s place</td>
<td>Calopsita - 4,14 Atletismo - 6</td>
</tr>
<tr>
<td></td>
<td>Dojo Online - 2 CoGrOO - 2</td>
</tr>
<tr>
<td></td>
<td>Mezuro - 4</td>
</tr>
<tr>
<td>Divide IW related work between all team members</td>
<td>Calopsita - 10 Ingresso na Pos - 13</td>
</tr>
<tr>
<td>Focus your IW on current specific needs</td>
<td>Calopsita - 12 Atletismo - 1,3</td>
</tr>
<tr>
<td></td>
<td>Mezuro - 1,2</td>
</tr>
<tr>
<td>Display information taking human brain assimilation into account</td>
<td>Calopsita - 3,9,15 Atletismo - 2,5</td>
</tr>
<tr>
<td></td>
<td>CoGrOO - 1</td>
</tr>
<tr>
<td>Make your daily IW tasks done by a pair of team members</td>
<td>Archimedes - 1</td>
</tr>
<tr>
<td></td>
<td>Calopsita - 11</td>
</tr>
<tr>
<td>Provide an easy-maintainable and practical IW</td>
<td>Mezuro - 13</td>
</tr>
<tr>
<td>Remove less valuable frames/boards from your IW</td>
<td>Calopsita - 2,16</td>
</tr>
</tbody>
</table>

2.4. Phase Two

For obtaining better results in order to assert the proposed heuristics as valuable, they should be evaluated by a large proportion of all team members.
To collect this data in order to make such an evaluation we applied an on-line survey to team members.

2.4.1. Survey

The survey was applied in Brazilian Portuguese, it was made available on the internet and team members received notifications about its availability by e-mail. Each proposed heuristic had a related five point Likert scale evaluation question regarding its usefulness/importance on the projects in order to reinforce/refute phase one’s results.

For proposing some valuable principles on IW management, it is required to relate some actions performed by the teams with their further opinion about these actions. Teams/members that have not performed any action regarding a specific matter should not have their opinions evaluated regarding this matter, at least not in the same level as the ones that have it.

In order to distinguish relevant and experienced answers we added a (Yes/No) question for most of the heuristics asking if the member or his team had experiences with an heuristic during their project, and its related evaluation question was not shown in case of a negative answer.

The complete survey had the following structure:

- Two questions about respondent categorization (which team he belongs and if he is a coach or not);

- Seven couple of questions about each proposed heuristic, for each heuristic:
  - One (yes/no) question regarding if the team member consider that his team practiced or took actions involving the specific heuristic (if applies);
  - One five point Likert scale question about the usefulness/importance of this heuristic on his specific project environment, which is both described and analyzed on section 2.4.2.

- Two free essay questions about valuable matters on IW management and its issues.

2.4.2. Results

The survey was made available to all 48 team members anonymously (including coaches) and we received 30 responses (62.5% of team members).
Most of heuristics were pointed out as valuable by the respondents. These results reinforce phase one’s suggestion feedbacks and its related classifications.\footnote{The questions, originally in Brazilian Portuguese, were on this paper translated to English.}

Figure 3: Daily Meeting Proximity.

Daily meeting’s proximity was considered important as high or very high by 86% of respondents, which definitely reinforces it as valuable. More details are available on Figure 3.

Figure 4: Tracking collectiveness.

Tracking collectiveness was considered as useful as high or very high by 70% of the respondents, which also reinforces it as valuable, as summarized.
“Specific issues handling” results were also positive, pointing the usefulness of using IW to handle specific problems with 70% high or very high responses, its results summary is available on Figure 5.

The importance of “Ease of assimilation” was evaluated as high or very high by 80% of the responses, providing enough data to reinforce the related heuristic as valuable. The summary of this aspect responses can be viewed on Figure 6.

“Tracking in pairs” responses show more divergent results, being considered as having low or very low usefulness by 17% of respondents and high or very high by 44%. These data definitely does not invalidate the related
heuristic as valuable, given that 83% of respondents consider it as at least regular. Although, it’s applicability should be further evaluated on different environments compared to the other heuristics for more conclusive evidences. Figure 7 shows a summary of its related responses.

Practical manipulation received a remarkable “high” or “very high” percentage of responses (87%), denoting that in some environments having practicality on IW managing tasks could be a very important matter when designing an IW, as shown in the results of Figure 8.

Less valuable informations removal was evaluated as at least regular regarding its importance by all team members. But the respondent opinions between regular, high and very high were well divided resulting 23%, 33% and 30% respectively. These results, summarized on Figure 9, denote this heuris-
tic as an at least important one. We suppose that its acceptance could be strongly related to other environmental issues (such as visual pollution for example) since there was some divergence on its results. Having no respondent affirming it as having a low/very low importance and its importance being mostly well divided between the other classifications could also indicate this heuristic as having a somewhat “higienic” characteristic on IW management - that we should be aware of in order to prevent negative influence on the workplace.

2.4.3. Results X Related Work

Several of the proposed heuristics based on phase one’s data and then reinforced by phase two’s survey results can be directly or indirectly referenced to some software engineering/agile methods literature.

Using IW for handling specific problems encountered by the team is described on Beck & Andres’ [3] statement of “if you have an issue that requires steady progress, begin charting it”. It can also be related to some metric management techniques, such as Goal Question Metric [9] which defines metrics based on organization goals - on a top-down approach.

The importance of practical manipulation on IW management is related to Cockburn’s [1] information radiators desirable characteristic “Is easily kept up to date”, and also with Beck & Andres’ [2] tracker responsibility of measuring important metrics without a large of overhead.

The value of ease assimilated IW artifacts can be found on Cockburn’s [1] description of “Is understood at a glance” as a desirable attribute of an information radiators. Blandford & Furniss [10] also consider several aspects
related to human cognition which includes brain assimilation issues.

The importance of removing less valuable information can be denoted by Beck & Andres’ [3] “if the chart stops getting updated, take it down”.

The value of keeping the most important frames/boards near to daily meeting’s place was not found on agile community works, but it can be indirectly related to Hartmann & Dymond’s [6] principle for choosing appropriate metrics/diagnostic: “Provides fuel for meaningful conversation” - given the intrinsic goal of communicating along the daily meeting. The value of this aspect is also related to Poppendieck & Poppendieck [4] suggestion of making self directed work possible by the use of visual controls (such as kanban), taking into consideration the task planning purpose of the daily meeting.

Aspects such as pairing on IW tasks and making IW a collective responsibility could not be directly related to any known references by this paper authors. The study of reasons behind the value of such aspects could definitely provide additional contribution for the agile community and it should be addressed in future researches.

3. Conclusion

On this work we propose a restricted set of heuristics for IW management based on the results of a data collection on eight different agile teams. Five of the seven proposed heuristics have direct or indirect related references already established on the agile community, making this data collection useful by reinforcing such references using real project experiences.

Phase two results provided more relevant data in order to evaluate this series of heuristics, but phase one’s action-research based approach was extremely important by providing a simplified set of relevant aspects.

Some of the proposed heuristics had already some support in the agile literature and their relevancy was demonstrated in practice such as “Focus your IW on current specific needs”, “Provide an easy-maintainable and practical IW”, “Display information taking human brain assimilation into account” and “Remove less valuable frames/boards from your IW”.

However, we realized that some collectiveness/communication heuristics could not be directly related to other agile references such as “Make your daily IW tasks done by a pair of team members”, “Divide IW related work between all team members” and “Keep the most important frames/boards near to daily meetings place”. Based on this fact we can denote that such
matters should be better analyzed by the agile community on further re-
searches regarding the use of informative workspaces.

Given the primary goals of this data collection and based on its results and analysis, having established a small set of heuristics based on evidence can be helpful and contributes to practitioners by giving directions to build an effective informative workspace.

One major constraint of this work is that this data collection was only applied on an academic environment, which can be different from commercial software development in several ways. However, the differences on managing informative workspaces on academic projects might not be much considerable when compared to subjects as scope negotiation, customer satisfaction, etc. In addition, we intend to apply other data collections on the future in order to qualify or disqualify this paper results using data triangulation.

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