

A Tale of Two Teams: Success and Failure in Virtual Team Meetings

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Abstract. Interaction between two teams with the same team leader and with similar size and goals moved from weekly face-to-face meetings to virtual meetings because of the temporary displacement of the team leader to a time zone six hours ahead of the rest of the team. One team focused primarily on software development and the second team on developing and testing a research instrument. The Software Team floundered through multiple different meeting arrangements and eventually agreed to disperse until the leader returned to the same time zone. In contrast, the Research Instrument Team kept a single meeting time that was set before it moved to virtual gatherings, and continued to be an active and productive team. This paper explores what factors led to this divergence in team success and concludes that the implicit temporal structures entraining the members of the Software Team coupled with an inability to repair member unhappiness and an unequal dispersion of skill sets among virtual and co-located members led to one team's eventual shutdown.

1 Introduction

Global teams are a critical part of the workforce in both software and usability engineering [1,3,4]. They have high potential to gain time-to-market advantages by use of a twenty-four hour work cycle. In addition, wage advantages can be had by outsourcing work to countries with lower costs. Finally, emerging markets make it advantageous for companies to distribute their labor forces to countries where new markets are perceived [6].

Even with the spread of the internet, advances in development and management tools, increased education standards and increases in English as the de facto technology language, global teams have not worked as well as hoped [8, 11]. Productivity has often been low, and even successful teams are fragile and plagued with multiple problems. Some of these problems are postulated to stem from cultural differences; others from the physical and temporal distances that limit communications; still others from the limitations of the communication medium used to manage teams.

This work investigates two design and development teams: one that smoothly became a successful virtual team and the other whose transition to “virtualness” experienced serious difficulties. Prior to becoming virtual, both teams met regularly

face-to-face, and both teams were highly productive. Both teams had the same team leader and were the same size. The teams moved to a virtual setting when their team leader temporarily relocated to another continent for six months. Because the team leader attended meetings virtually, all members of both teams used this opportunity to also participate in the meetings virtually. Within three months, one team continued to meet on a regular basis and be highly productive. The other team struggled with meeting attendance for eight months and has now been closed down until the team leader returns.

We explore the causes for the divergence in these teams through a series of one-on-one telephone interviews and through a review of the detailed meeting minutes. In the course of the interviews, many factors were identified as potential reasons for the divergence in the two teams, but two factors were found to be critical differences. First, we found that implicit temporal structures entrained the unsuccessful team to the extent that members were not able to find a suitable time in which all members could effectively attend meetings [12]. These temporal entrainments did not, in and of themselves, lead to the slowdown in the team. Rather, they instigated a series of seemingly minor problems such as, one or another party might be kept waiting for a virtual meeting for long periods without knowledge of what was causing the delays. This led to tension amongst team members, and this tension remained unrepaired for long periods of time. The key effect of virtualness in this case was the lack of effective ways to perform the needed repair. [11]

The second factor was interpreted to be an interaction of leadership style and skill distribution. On the successful team, the distribution of skills was somewhat even; all members had diverse skills and the team roles could be interchanged. In the other team, there were greater differences in the types of skills members possessed, and as a result, the team roles were much stricter. This was especially acute because it was the remote team leader who possessed the most unique skill, that of team management and interface design. In addition, the location of software development skills in the three co-located members led to a formation of a sub-team that created its own agenda and worked separately from the rest of the team. The casual management style of the leader allowed this sub-team to form and also to set its own design agendas. Similar results on subteams have been reported elsewhere [4].

In summary, the divergence of two seemingly similar teams with a common leader has provided a natural study permitting us to draw comparative insights about factors that contribute to global teams' success or failure. We explain a variety of small problems that led to one team's shutdown and describe a set of relatively trivial procedures that the struggling team could have attempted to circumvent their problems.

2 Description of the Software Team

The Software Team has been in existence for about four years. The team is involved with all aspects of the software product being produced, from conducting exhibits at trade shows, conducting user studies, negotiating contracts with other software vendors and writing descriptions of the software product being developed.

A key feature of this team is that all of the work being done by the team members is voluntary. The team is producing a downloadable software product to help the blind

and visually impaired. The product reads RSS feeds from online newspapers and other internet sites, converting the information from text to speech. It is also built using open-source software with the intent of making the downloadable package free to users. The team's goal during the virtual year was a release its first software version and the design of an additional application for the interface.

The team has five members and has had fifty per cent turnover since its inception. Three of the members are computer scientists who manage the coding, maintenance and testing of the software product. A fourth member is the team leader and a fifth member is the usability engineer who also has web development experience. The team has regularly met weekly for two hours at 6 PM on Wednesdays including socializing time and dinner. This team could be described as a viable, lively and highly interactive team. Between meetings, there was significant email exchange, and team members were constantly finding out new web sites, papers or products that other members were encouraged to look at [10]. Agendas for each meeting were solicited ahead of time. Issues were brought up and discussed and consensus was invariable achieved. Often the software team would arrange a second UML design meeting or debug meeting to resolve some of their issues. In the last year before the team went virtual, the group completely rewrote the software product in Java, added a new text-to-speech engine, changed the input mechanism, worked with a set of blind consultants to obtain feedback on the designs and built a robust enough software platform to exhibit the product at two trade shows.

The team used a Yahoo™ Group to manage itself. A calendar of meetings with automatic reminders was kept on the Yahoo Group and team members used the Yahoo ListServ to send emails to the entire team and uploaded papers and documents to the Yahoo Group.

3 Description of the Research Instrument Team

The team has four members. Two of the members are working on their doctorate and the instrument development is part of their research. The other two members are faculty members interested in the research project. The team leader is the thesis advisor for the two students. The key reason that the team is a joint team is the mutual interest in global software development.

The goal of the Research Instrument Team has been to conduct a survey to be distributed to a set of Fortune 500 companies on issues relating to global virtual team management. The work involved developing and conducting the survey, analyzing results, and setting up additional corporate relationships. This team had been in existence for about a year before it went completely virtual. The team met once a week during the year to discuss issues and plans. One of the members frequently attended the meeting by telephone throughout the year because of time commitments elsewhere. When long range planning had to be done, the team met for an all day retreat on Saturday.

The team had generated two papers and two doctoral consortium proposals before it went virtual. It also developed, validated and tested the reliability of two survey instruments that capture and model what are believed to be relevant factors affecting

team performance and satisfaction. The survey instruments were piloted in four separate team-based courses at two universities.

Face-to-face meetings typically lasted two hours. Much discussion took place over the research issues that the team faced. In addition, many research hurdles associated with partially completed surveys, incomplete team responses and subject scheduling had to be dealt with. Much of the activity of the team members during the time between meetings was spent ferreting out information that was needed or negotiating survey schedules with course instructors. Meetings were focused on problem solving and there was less socializing and off subject conversations than in the other team.

This team also uses a Yahoo Group to manage itself. The Yahoo Group was primarily used for uploading papers to be shared with other team members. The mail service part of the Yahoo Group was not used as frequently, and documents created by the group tended to be exchanged via email rather than through the Yahoo Group repository.

The Research Instrument Team had less social exchange than the Software Team. Email exchanges usually occurred a day or so before each meeting as meeting members shared the work they had done during the week.

4 Management Practices of the Team Leader

Both teams became virtual in late June of 2006. They have been meeting or attempting to meet for the months of July through January. The team leader of both teams implemented the following management practices for both teams in an effort to counteract some of the problems the teams were likely to experience with the limited bandwidth of the communication tools that were selected.

Both teams connected using a voice over IP conferencing system. One person in each group became the designated conference originator. Initially, all attendees were virtual from both teams.

The following procedures were followed for both meetings:

- An agenda was established for the meeting
- Action items from the previous meeting were reviewed in the agenda.
- The team leader took the minutes for the meeting
- The team leader also served as the facilitator of the meeting.
- Documents that had been mailed to team members or posted on the team's group were discussed
- A social exchange was scheduled for the end of the meeting in which each team member was asked to tell something fun that had been done during the week.
- Minutes of each meeting were sent to all team members right after the meeting

These practices deviated from the face-to-face meetings. In particular, the Research Instrument Team was less likely to use an agenda in face-to-face meetings. Neither team maintained minutes when the meetings were face-to-face, although individuals took notes during the meetings.

5 Meeting Difficulties for Both Teams

Initially, there were significant difficulties with the low cost digital conferencing technology being used by both teams. One of the key issues that team members faced was degradation in voice quality and connection problems that depended on the available instantaneous bandwidth of each individual's internet service. Speech was frequently broken up and the speaker was asked to repeat a statement – sometimes three or four times.

“Its pretty powerful, but the downside is that it is still a bit of a fragile environment. We're relying on networks....being up.....with decent throughput...that everyone has the same version of the software...and that peoples PCs work.”
(Software Team member)

Another difficulty with the meeting was background noise. This problem was resolved over time as team members purchased headsets or a standalone microphone to avoid this problem. The Software Team ran tests on the quality of sound with different options until they arrived at a usable solution. Their solutions were used to help the Research Instrument Team.

A larger meeting difficulty was the difficulty of walking through very complex material remotely. The Software Team walked through UML diagrams and the Research Instrument Team discussed reams of statistical analysis runs. If comprehension became too difficult at one meeting, the responsible team member was given an action item to prepare a summary document that would make the discussion clearer at the next meeting.

Team members at both meetings indicated that team meetings could be tedious and that they would often catch themselves reading email, cleaning up their filing system or playing computer games.

6 Meeting Difficulties for the Software Team

One of the key problems encountered by the Software Team was the inability to come up with a viable meeting time. Meetings were set to begin at 6 PM, with the leader starting the meeting at midnight since she was six hours ahead. Since the meeting lasted approximately three hours, including pizza time, this meant that the team leader would be heading home at 3:00 AM.

The next meeting attempt was to set the meeting at noon. This would be 6:00 PM in the team leader's country. Because of limited lunch hours, the team could not meet for more than one hour. Additionally, two of the attendees were often called to other meetings on short notices.

The third attempt was to schedule the meeting at 7:00 AM for four of the team members and 1:00 PM for the team leader.. One team member never came to this meeting and two others missed this meeting once or twice because they could not get up at 7:00 AM.

To meet the time zone constraints of individual members, it was decided as a fourth attempt, to hold the meetings on Saturday at noon. The first virtual meeting

was tried. One of the team members forgot about the meeting and a second member decided not to show up.

A fifth solution was tried, that of making the meetings into face-to-face meetings except for the distant team leader. Meetings were set to occur on Saturdays. However, attendance at the meetings was still poor. In addition, meeting members would come to these meetings late making it unclear to the on-time members whether a meeting could take place or not. Since all team members had to travel some amount to make it to the meeting and since meetings scheduled on Saturday took time from other scheduled activities, committing to a meeting that then did not occur became a significant deterrent to attending the next meeting.

A sixth solution presented itself with the arrival of home internet by the Team Leader, and 6:00 PM (midnight) meetings were set for Wednesday each week. This was the team's normal meeting time when they were all co-located. A key problem with this arrangement was that the team members often gave notice that they could not attend a meeting approximately one hour before the meeting. Many of the reasons for non-attendance were, "going out with a friend," "not feeling too well," "have a family event to attend," etc. For those members who did make the meetings, there began to be a buildup of frustration with what was perceived as a cavalier attitude of the other members. In mid-January, the two exasperated managers agreed to stop having team meetings until further notice.

The problem with each of the attempted meetings was the loss of one to three members. In a team as small as the Software Team, this slowed work considerably, so the team could not make progress on important issues until that member again joined a meeting. Eventually, the forward momentum of the project stopped and the team meetings involved going over the same material multiple times. Meetings became boring rather than the rapid exchange of new ideas.

"Things fell apart from a communication standpoint.... There was just misunderstandings like that. You send an email and you assume that somebody has read it whether somebody has read it or not. There was a situation where an email was sent out to confirm a meeting and several group members assumed that not replying was implicit agreement whereas when the meeting came about and we had [technical] difficulty getting connected, the [remote team leader] didn't see the team come on in ten minutes and then assumed that no one was there. And, because of the lack of email [further] assumed that no one was participating." (Software Team member)

7 What Caused the Software Team to Fail?

We have presented two successful face-to-face teams in which members were highly productive and very satisfied with their teams. While the Research Instrument Team was somewhat more culturally diverse than the Software Team with one member coming from another country, the team composition was quite similar in the two teams. Both teams had a wide age distribution.

Possible factors in the Software Team's slowdown are listed and addressed in the following paragraphs. Analysis of these factors points to two that appear to be causally critical.

- *The Software Team had less motivation overall, or less "momentum" because, e.g. their team's work happened to be at a natural stopping point when the team became virtual* -- We considered differences in initial motivation between the teams, but participation in both teams was voluntary, making us discard this possibility. All team members did gain authorship on papers coming from their work. While Software Team members did not need this benefit because they worked as programmers in the industry, it seems unlikely that this would cause a serious difference.
- *The Software Team met primarily for social reasons and lost this socializing when the team became virtual* -- There are two reasons why the loss of socializing through a team going virtual does not apply. First, large parts of the software development end of the Software Team already worked virtually. They would often share screens and use chat to solve nasty problems that came up. A social exchange was also tried at the end of the Software Team's meeting, i.e., members were asked how they had spent their weekend, but team members were not as eager to participate in this social exchange as the Research Instrument Team was.
- *The Research Instrument Team really had two managers, that is, two faculty members, with one member still being local and able to maintain the momentum of the team* -- Although the Research Instrument Team ostensibly had two managers, the Software Team also had a local and remote team leader. One of the key benefits that the software development end of the team obtained from team membership was mentoring. One of the Ph.D. students on this team was a senior level software developer at a prominent computer company. He was in charge of the software development for the team. The two other team members continually learned software tricks from him which enhanced their job skills significantly. Much of the between meeting exchange in the Software Team was in solving software problems and working with the team's software manager.
- *The Software Team was carrying out a unique task - software development. This task has different properties that are not suited to virtual teams* -- It can readily be argued that there are many similarities between software and survey instrument development. For instance, in both cases, work is product-oriented – developing software and survey. In both cases, the pace of the work was driven by self- and team-imposed deadlines. The detail that has to go into question design and the order of questionnaire layout is similar to that required in software. Walking through a set of thirty regression analyses to determine an overall model of effects is as complicated as debugging code. We also observed similar mentoring between more skilled and less skilled team members but not at the level that occurred in the Software Team.
- *The Software Team could not find a convenient time to meet* – The scheduling issue is perhaps the most compelling cause of difficulties, and is acknowledged by team members. While scheduling is a likely factor, its effect is indirect. It appears that the key factor is actually frustrated expectations resulting from scheduling accommodations.

"I think the majority of those problems was people having their scheduling conflicts and then put , you know, the six time zones and the communications failures on top of that...things just went kind of ugly for probably a month, month and a half" (Software Team member)

Because all business was transacted at the main meeting (unlike the Research Instrument Team which also had many individual meetings) there was no way for individuals to express their dissatisfaction with anyone else's team attendance behavior without making it a meeting wide issue. None of this discontent was expressed in the conference calls. Apologies were made for late arrivals, but not for last minute decisions not to show up for meetings. Meetings became discussions of what to talk about at the next meeting when everyone shows up. The priority for attending the Software Team meetings had dropped in each member's ratings so that other events took higher priority, including getting sleep.

- *The Software Team's distribution of skills was uneven and distributed geographically* -- A second reason for the team's demise was the tacit breakup of the team into two subteams.

First, a Senior Usability Leader left the project almost as it went virtual because of consulting commitments. The Team Leader's expertise was also human-computer interaction. This created a team where the virtual part was creating the user interface design and the co-located part was developing the software for the design. The co-located group began to make more design decisions and the meeting discussions became more about software issues than interface design issues. The Team Leader was not happy with some of the design decisions being made but felt that it was better to let the Software Team run with the decisions in order to keep up the momentum of the project. Both user interface people began to feel irrelevant to the project as the document exchanges and meeting conversations became more technical. The Usability Engineer commented, *"I don't attend because there is nothing for me to do."* In interviews with the software team, they expressed this distinction as a preference to discuss code related issues during meetings.

The software team was rather surprised when the team leader worried about the team failing. They felt that they were accomplishing a lot and working quite hard on the project. They commented, *"yes, there were some time difficulties in setting up meetings but they were not serious."* They did not feel that the issue with missed meetings and lateness was at all serious.

The local software team also did not feel the need for the weekly meetings because they were in constant contact through phone calls, email, a version control software program and instant messages. Yet, the weekly meetings were the primary contact of the usability and design side of the group [14].

A rudimentary version of the software was made available for download on the group's website. In January, the Team Leader and Software Manager decided to end meetings for the moment because it was too much effort to keep them running.

8 Conclusion

In the above discussion, we have carefully reviewed a series of reasons for why one team had troubles with virtual meetings and a second team managed to continue to perform productively. Interviews with members of the team having troubles indicate underlying issues that were not a part of the successful team. A buildup of discontent occurred with the team leaders and the other team members that was not brought out and discussed with team members. When it finally did come out, through the interviews, some team members were surprised that the team leader thought problems existed. Members who had regularly missed or had been late for meetings did not consider this behavior to be an issue. In addition, none of the co-located members felt that they were deviating from the goals of the project. In contrast, the team leader felt that step-by-step, the original design had been eroded so that what was to be made available no longer contained the usability characteristics intended. Unfortunately, the virtuality of contact made it hard for her to convey some of these design issues. In addition, there was also a tendency to argue against her ideas for practical reasons from the tightly knit co-located part of the team. Because the team consisted solely of volunteers, the leader was also concerned that imposing too many restrictions on the work of the team would lower their motivation and potentially lose them as team members. In the end, both the team leader and software manager were frustrated with other team members temporal reliability and the direction the project was heading.

These results suggest that temporal constraints indirectly affect virtual team performance as does the distribution of team member skill sets. Thus virtual team management needs to look at these issues when setting up virtual teams. But more important, could something have been done that would have prevented the problems with the Software Team. The answer is unequivocally, yes. Below, we list a variety of activities that would have prevented the Software Team's demise.

- When the co-located usability people left the team, they should have been replaced.
- The anger and frustration with the missed meetings and the late arrivals should have been discussed in individual meetings with the team leader .
- Meetings in which member goals are stated and differences worked out should have been held at regular intervals.
- Meeting tools which allowed for richer presentation of difficult concepts should have been regularly used.

These are simple fixes. They take work but can be put in place. The current reason they are not being put in place is because the virtualness of the team was, by plan, only temporary as the team leader will be returning the United States.

The key point in this paper is that very trivial items caused very large problems in a virtual team that was neither that far apart in terms of time zone differences or in terms of team member differences. Outsourcing and off-shoring to globally constructed teams which can be expected to be much further apart than the team discussed are certain to suffer from an exacerbation of the above two problems.

"I listed probably what I think were about ten factors...and all of them are trivial by themselves, but in aggregate form, where it becomes like the perfect storm of the group not working well " (Software Team member)

In Memoriam

This paper is in memory of John Visicaro, a member of the Software Team who suddenly took ill and passed away on January 21, 2007. John was only 43 when he died and was such a vibrant and important member of the Software Team that he will be sorely missed.

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