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Teams

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1   Abstract

In this paper, we characterize teams as groups of at least three people with complementary skills who are committed to a common purpose or performance goals and who complete their interdependent tasks through collaboration [Katzenbach(2003)]. We discuss how teams can be virtual, which challenges follow from geographical dispersion of team members and how they can be addressed and overcome. Furthermore, we outline the feats that members should have in every team. Lastly, we present a list of collaboration tools that enable teams to work together both synchronously and asynchronously. We conclude with some of our own experiences from the virtual work on this project and our opinion that what is considered extraordinary and challenging about virtual teams nowadays might not be perceived equally in the not-too-distant future.

2   Definition of a Team

Both through the course of our studies and in this lecture we have heard of various attempts at the definition of a team [Katzenbach(2003), MIT(2007), Hoelzle(2012)]. For ourselves, we focus the definition on the following three aspects of a team:

1. A team is composed of at least 3 individuals. 2 people do not form a team, since for a pair of individuals it is not possible to partake in the same rich interactions that are possible in a larger group of people, e.g alliance formation.

2. A team works towards some common purpose or performance goal. Ideally, the team members commit to a shared vision of what they want to achieve and hold themselves mutually accountable for the work towards this goal.

3. Lastly, teams can be differentiated from "simple" groups of people through the interdependent nature of their work. In teams, responsibility is shared between members on tasks that require collaboration. Ideally, individual skills can be coordinated so that members are able to maximize their strengths and minimize their weaknesses.

3   Virtual Teams

In today's age of flourishing globalization, teams are faced with new challenges, one especially important being geographical dispersion of its members. These teams - working across temporal, spatial and maybe also across organizational boundaries - are called virtual teams. Typically they are composed of highly cross-functional members from various ethnical and cultural backgrounds working on highly interdependent tasks. The existence of these teams is enabled solely by the use of information technology, especially communication technology.

The challenges these teams face are not only those imposed by their goals, but also the management of the virtual interaction. On top of the task-related processes - such as communication and coordination - also socio-emotional processes - such as relationship building, team cohesion and establishment of mutual trust - need to be taken into consideration.[Powell and Ives(2004)]
Additional strain on the interaction can arise from cultural differences and language barriers. We will discuss the different aspects of the interaction in a virtual team and how it differs from the interaction in a co-located team in the following.

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3.1   Software Development Teams

Another type of team to be mentioned is software development teams. These relate to a virtual team insofar, that their day-to-day work includes a lot of the technological tools virtual teams use - in fact they are mostly the teams that create most of the technologies, which other teams are adopting nowadays, for their own use. As in virtual teams, a lot of collaboration in software development happens asynchronously using these tools. Other than that, software teams are highly specialized teams. Required roles like Architect, Database Administrator, Designer, Programmer, Requirements Analyst, etc. [Ambler(2000)] are usually assigned to individual team members.

3.2   Special conditions

The dissimilarities of the team members – be it by location, by culture etc. – certainly impose the need for special support on the team leader. We will now explain some of the problems and possible solutions:

1. First of all the team members need to be aware that they are working in a virtual team. If they do not keep this premise in mind at all times the team will perform worse than both a co-located team and the average virtual team. [Ferrazzi(2012)].

2. Geographical distribution

   a) The fact that team members might be located in different time zones makes planning of virtual meetings or conferences at convenient times difficult. One or more team members might have to work at an inconvenient time and not be capable of performing to their full extent. This problem can either be worked around or even used to the team's benefit.

      i. Plan the meetings at different times so that each team member at least once has the convenience to work normally and the inconvenience to work long hours.

      ii. Members who are scattered all over the world can work on a "follow-the-sun" schedule. Whenever a member goes to bed he leaves a to-do list for the next who gets up, who can then start working on these tasks. Thus, the work on the project is never halted.

   b) Due to the possibly scattered locations meeting the team members in person can be difficult for reasons of cost and time-effectiveness. If the duration of

the project is long enough the effort will most certainly have positive effects and make up for the initial investment by boosting the team's spirit and performance. See 'The kick-off meeting'.

3. Cultural differences

   a) Social habits
      In different cultures there are different ways of beginning and leading a conversation. Americans often use the set phrase "How are you?" upon which Germans tend to answer with their actual situation. The other way around the American might be offended by the German not asking for his well-being. Although these are only very small issues they can - in sum - lead to tension among the team members and need to be taken care of beforehand.

   b) Way of discussing
      Especially in the Arabic world it is common to discuss very hotly. However other cultures are usually not used to this behaviour and might easily misinterpret the way of discussion for aggression and therefore get angry themselves. The team manager must assure that either the temper of the one is restrained or the others are made aware to the fact that their counterpart is just discussing 'normally'.

4. Language

   a) English as standard language
      As it is the 'business language' being fluent in English is a requirement for working in an international team.

   b) Translations, idioms and "false friends"
      If not all members can resort to a common language the lack of mutual understanding can lead to conflicts within the team. Another problem is idiomatic speech that is not known to everybody, especially if sayings are translated directly into English e.g. "Vom Regen in die Traufe" directly translates to "From rain to eaves" but rather corresponds to "from the frying pan into the fire".

5. Technical terms in different languages
   It is a common thing to know the terms of one's field of expertise in English but less so with the vocabulary of other fields. Explaining the terms of software engineering to a designer can cost precious time. In such cases the team leader needs to assess the necessity of such explanations.

3.3   The kick-off Meeting

The kick-off meeting is a face-to-face meeting at the beginning of the work phase and helps to build the team's cohesion by getting to know each other on a more personal level than it is possible by means of virtual communication. In this meeting every team member should introduce himself and the field he is working in. Telling a personal story of one's own is also important in order to establish social relations. Furthermore sharing the hopes and expectations for the project helps building a common vision and mindset. At this opportunity the team leader will set and explain guidelines for work practices like

1. Communication

   a) Internal
      e.g. questions need to be answered within a certain time, team members are to be treated with respect at all times, report to the team leader if problems or conflicts arise

   b) External
      e.g. spelling of the company name in a certain fashion, include a disclaimer in written communication

2. Documentation
   e.g. put down all information that might be used for maintenance of the product or for further development in a project wiki.

4   Feats of your Team Members

4.1   Diversity

The team members can be diverse in many different ways. Apart from being in different locations or speaking different languages they have different skills and professional backgrounds. In order to profit from this diversity all team members need to embrace the idea of being different and dispel biases against other fields of expertise. As Kathleen Eisenhardt points out that two engineers make the worst team. Through diverse views on things more options are available from which to choose the best suited one [?].

4.2   Communication

Communication is another key aspect of members working efficiently in a team. In general teams of introverts who tend to communicate less produce worse results than teams of extroverts. Through extensive communication among the team members they will create more cohesion, work more coordinately and perform better. Thorough communication about more personal topics helps to build relationships between the members of a team. If two persons dislike each other they can omit the personal talk and focus on the topic-related issues instead. Good communication on the

task leads to more efficiency by having more iterations of question-answer-cycles and helps to avoid a doubling of work[Belbin(1996)].

4.3   Honesty

Being honest is a prerequisite to being communicative about all aspects of the work progress including advances but also delays, problems and failure. The members need to be informed about such issues to help solve them faster. It may seem easier to deceive others in a virtual environment but it turns out that in fact email is a more 'honest' media than most other including telephone and speech. One reason is that e-mail conversations leave a record and people think twice before 'lying' if it is stored and can be used against them[Hancock(2012)].

4.4   Trust

Communicating openly will eventually lead to trust among the team. Trusting the other team members and the quality of their contributions is a basis for delegating tasks. If they don't trust one another they might settle for doing the tasks themselves creating doubling and wasted efforts.

4.5   Skills

Every member needs to contribute at least a basic set of skills to the team. They must quite naturally be in the specific field of expertise. Introducing measures for estimating the person's performance can be a good mean but needs to be applied carefully. Additionally, social skills matter just as much as the technical ones and are the key to successful teamwork [Kawasaki(2007)].

4.6   Praise

Particularly over long projects the team manager must seek to maintain the motivation of all team members. In order to do this success and accomplishments of individual team members must be praised. A pat on the shoulder still remains a great motivator. Having in mind that the contribution is appreciated can also lead to additional individual commitment for the project.

4.7   Compromise

Insisting on your own opinion will not contribute to the team's success. In particular if there are many different fields of expertise present this will lead to a wide variety of opinions. Before you get stuck in endless debates you must make a compromise. Find a solution that everybody can be content with.

5 Technology

One of the key aspects of collaboration is technology. A team is only able to work as good as its software enables it to. This is especially important for virtual teams as software shapes their very core. There are three key requirements every software has to fulfill [Mark Mortensen(2008)]:

1. Simplicity

   The more complex a tool is, the more time your team members will need to set it up, learn how to use it and to get started. Time they need to get their job done instead of wasting it for configuration, integration and incorporation. Besides, more functionality does not necessarily mean better interactions. Your tool should get out of your way and let you focus on what's really important: the message. One might argue that this wasted time can be saved later, due to a more powerful tool and therefore a more effective work process. However, its likely that you'll see yourself spending more time on the correct usage of the software than the actual content. So make sure your software does exactly what its supposed to do and does it as precisely and simple as possible.

2. Reliability

   One main reason for the ongoing popularity of phone calls in times of advanced software tools and apps like Skype and FaceTime is its reliability. Though it can not compete in terms of functionality, it is without doubt the most unfailing communication tool. The latest video conferencing, instant messaging, or screen sharing feature won't help you if you're internet connection can (again) not be established. Your phone, however, is a reliable and proven communication tool that will not let you down easily.

3. Accessibility

   No matter if you're in Africa enhancing your international reach, in Antarctica figuring out if this is the place for your next server farm or just about anywhere else, you might want to be able to contact your team members at any given time. Here again your cell phone will serve you well.

6   10 "Must Have" Software Tools

The following list will enumerate the 10 "must have" tools every team should be using. It covers the fundamental collaboration techniques and helps your team to gain efficiency. Furthermore, it will give you an extensive insight on what modern technology is capable of and provides a good reference point for your custom software solution.

1. Conferencing Software
   The most basic and probably most important type of communication is talking to your team members, via phone, the internet or in person. To enhance the limited interaction of a phone call one can use conferencing software. This is a tool that enables you to talk to several people simultaneously. Video conferencing software even provides the possibility to see each other face to face and thereby provides a more personal setting. Due to further enhancements like instant messaging and data transmission this software can satisfy large parts of your requirements for collaboration.

2. Screen Sharing
   Closely related to conferencing is screen sharing software. Additionally to seeing and hearing your partner you might want to be able to see what he's working on right now. Instead of having to save and share his progress laboriously he can eas-ily share his screen. This enables you to see what he's doing in real time. That brings us to our next point.

3. Real time collaboration
   The two previous tools already were examples of real time tools. Real time means that you can collaborate simultaneously and synchronously on the same task. I.e. it is very useful to work on a document simultaneously as you can see what the others are writing and you don't have to merge it intricately afterwards. Another example is pair programming, which is considered to be extremely beneficial.[Thawar(2012)] Writing code simultaneously together means that it will be high-quality, include knowledge from different domains and that the general work atmosphere is much more intense.

4. Version Control
   Version control describes the method of saving your works progress at certain points in time. This can be archived by simply using the "save as" functionality of your program to capture improvements in the documents with snapshots or by using a more sophisticated version control system like git. This will even allow you to revert documents to an older state, compare different versions, merge them

or to get detailed insights in the development process. Furthermore it servers as your backup utility as you can easily push your changes on different servers or to team members to let them inspect your work and use your documents and your data.

5. Issue tracking
   To keep track of all the things your team has to do, make sure to set up a issue tracking program. It provides a fast and easy interface to manage all your tasks. There are several aspects that will improve your overview and productivity dramatically.

   a) Assignment
      Assign tasks to certain team members or sub teams to clearly divide and define the teams responsibilities and accountabilities.

   b) Time Tracking
      Define the deadlines and group the issues to milestones to clearly outline your further steps. In addition monitor the implementation time of features and by that the efficiency and productivity of your team members.

   c) Type Definition
      By specifying the type of your issue, i.e. bug, feature, improvement, support, etc. you have a very useful measure of your work quality. The number of bugs for example gives insights on how accurate the work is done and the number of features is an indicator of the innovative capacity of your workforce.

6. Calendar
   As already mentioned it is important to capture your goals and tasks for the future. Very handy for this purpose is a globally shared calendar. It's the place where all you team mates can store and look up what's going on and what will be important in the near future. Ideally all your other software tools also have access to this calendar so that everything is neatly kept at one place.

7. Human Resource Management
   Another very important aspect of collaboration is that you should know exactly who you are working with to be able to choose the best for every task. That's why you want to have software to manage all your team members. A short profile page will tell what a person has been doing before, what expertise he is contributing to the team and what his plans and dreams for the future look like. It can even give you a quick overview on what that person has already achieved in the team and how much time he or she has spent on work. Thereby you can more easily delimit performers from non performers and build your perfect team with just the right people.

8. Forums
   Conferencing software is great

for synchronous communication. Sometimes, however, you might not be able to communicate synchronously due to time shifts or a general shift in work time. Occasionally you will also want to make sure that everything you are talking about is written down so that nobody can claim to have said something else than he actually did. That's when a forum comes in handy. It constitutes a simple but yet effective means to discuss different ideas and topics.

9. Wiki
Wikis are the tool of choice when it comes to any kind of documentation. It's the place where you should write down your communication guidelines, your style guidelines, software documentation or just about anything else that needs to be remembered and be accessible for everyone.

10. Monitoring
In order to keep your team up to date it's very useful to set up a central monitoring website. There you can display graphs about market share, market penetration, customer satisfaction, visitor numbers etc. It can also contain news feeds and widgets to your other software tools. This site is very important as it normally is your central drop-in center and start screen for your following work. Also consider to put up a screen at a central place in your office so that everybody can look up the latest numbers with a glimpse.

While using the tools it is essential to review your productivity on a regular basis and if applicable rethink your software setup. Try to find your favorite toolset!

7   Our Work as a Virtual Team

As mentioned during our presentation, we simulated a virtual team during the creation of this paper and its preceding in-class presentation. In an initial face-to-face kick-off meeting (as described above) we defined our toolset: For asynchronous communication we used Facebook Messenger. We synchronised via Skype as conferencing and screen sharing tool. Google Documents/Drive was our choice for both asynchronous and synchronous collaboration during the planning phase for the presentation and especially in the process of writing this paper. It also includes version control. Finally, we decided on prezi as a presentation software, partly for stylistic reasons, but also because of its real time and collaboration capabilities. We agreed on the English language as language of communication to emulate an environment of team members that have to adapt to a non-native language. Our

experiences during the work on this project were very positive in almost all aspects. Except for the temporary unavailability of the internet connection for one of us our chosen tools proved reliable and simple to use. We also felt entirely comfortable about the collaboration via conferencing and screen sharing. Neither did the result suffer from the virtual work - we did receive a 1.3 for our presentaion. Nor did we feel we were missing out the social aspects, since online messaging and internet calls are as much part of our social life as it was now for the project related work. This simulation, of course, can only partially simulate a real virtual team environment - we could not test for cultural differences or different time zone activity. However, we believe that virtual interaction - extraordinary and extraordinarily challenging as it might be perceived today - will eventually become just as much part of work as "normal" face-to-face interaction.

8   Conclusion

In conclusion, we find that working in teams can be of substantial benefit. If in team - be it non-virtual or virtual - members coordinate individual skills on their interdependent task well, each can maximize strengths and minimize weaknesses. Especially diversity, professional or cultural, leads to a multiplication of ideas and opportunities for the team. Virtual Teams, although profit from the typically very large diversity of their members, face special conditions and challenges. These arise from the novel kind of interaction by means of communication technology as well as the cultural and ethnic differences of its members. However, these challenges can be overcome if team members approach their task with the right attitude and with the help of the technological tools that exists today. Furthermore we find that the feats required of team members - such as honesty, mutual trust, commitment, reliability, willingness to compromise - are required of virtual and non-virtual teams all the same, the difference solely being the way these are implemented or achieved. Combining these findings with our own experiences, we are convinced that over time working in virtual teams will become just as much part of our work environment as the teamwork perceived as "normal" today.

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