

# Learning Patterns for Group Assignments - Part 2

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Teamwork and collaboration skills form an essential part of the skill-set of every professional who's not working in isolation. Group assignments are therefore included in many curricula so that the students can build up an experience with working in teams. This experience can be made explicit by describing it as collaboration learning patterns, which will help beginning students with their group assignments and also support the teachers with their supervising activities. In this paper we present six such patterns, which are part of an ongoing larger project: *MANAGE THE PROJECT*, *MEDIATE THE DISPUTE*, *KEEP MOTIVATED*, *START IMMEDIATELY*, *REGULARLY CHECK REQUIREMENTS FULFILLMENT*, and *SPREAD TASKS APPROPRIATELY*. The goal of this larger project is to work towards a pattern language for student collaboration learning.

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## 1. INTRODUCTION

Group assignments form an essential part of many curricula. Nearly all Computer Science curricula include at least one larger project, usually called capstone project. In the Netherlands, many universities — especially the universities of applied sciences — include multiple group assignments in their CS curricula, covering different aspects of CS or software engineering. The goal of these projects is to let the students make experience with teamwork and collaborating with other students in order to accomplish a common goal: finishing the project with a satisfying result. Beside exposing the students to a situation comparable to real-world projects in the work-field, and therefore helping them to gain these important teamwork skills, these projects are also used for having the students applying and combining the learned techniques, methods, or skills on a larger scale.

As in real-world projects, there is a high chance that problems of different kinds arise during these student projects. However, students who already worked with many groups have a lot of experience, they implicitly know how to do it better than beginning students. Making this knowledge explicit and available to beginning students is one of the goals of this ongoing work. We decided to use *educational design patterns* as the way for describing this knowledge. Design patterns have been shown as well suited and valuable, also in different educational contexts.

The basis for the patterns presented in this paper was created in a series of pattern mining workshops, which are described in detail in [Köppe 2012b]. The first resulting patterns were published in [Köppe 2012a]. All patterns are intended for supporting beginning students during their first group assignments. They also help teachers who supervise

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these student groups, as these patterns hopefully help students to solve problems more by themselves and therefore minimize the need for teacher support.

In the next section we discuss the properties of successful student teams. Then we describe the pattern format and offer a first categorization of all yet described patterns. The patterns themselves are presented in the following section. We conclude with a summary of the short version of all already described patterns as reference.

## 2. SUCCESSFUL STUDENT TEAMS

Christopher Alexander describes in *The Timeless Way of Building* [Alexander 1979] that in things that are alive and good the *whole* emerges. Students also experience this *whole*, they know if a group assignment went well or not so good. This *whole* in group assignments is strongly related to successful student teams and the pattern language they use. Successful means in that case that they both have learned during the assignment, but also were rewarded either by grades, feedback, or in other ways. That students work thereby in teams adds a crucial factor to the whole, only the combination of both lets the *whole* emerge.

Usually a group is formed with individuals that are in differing degrees known to each other. In some cases they do not know each other at all, in other cases it can be that some of them have worked together on projects before.

When a group starts on an assignment, they usually aren't a close team. In successful projects, once a group has been working together for a while they are moving forward to and eventually will become a team. The people in the team start to know each other well, know what to expect and what skills, strengths and weaknesses everyone has. They are more willing to help their team-mates. But this is not the natural way for beginning students, they have to learn how to walk it.

More experienced students do know how to walk this way, they already have built their own pattern language for it. They apply their own patterns — often but not always unconsciously — in order to generate the *whole*, the successful student team. Groups that don't have or know these patterns or are not applying them lack this wholeness, which leads to bad grades, unsatisfied students and also unsatisfied instructors.

In resume, a team is an advanced group whose members can work together well. They are able to solve problems without help from non-team members. Team members know the expectations of the others. Not only does this mean that it will be easier to split tasks, but also that the team members are more likely to put time and energy in the tasks and in the team in general.

The patterns presented in this and an earlier paper [Köppe 2012a] are the patterns from such experienced students. They describe the patterns they have built themselves during multiple group assignments and can be used for designing successful student teams. If applied, the chance of the project being successful as result of being a successful student team increases, making the project more *whole* in the Alexandrian meaning.

## 3. THE PATTERNS

The patterns apply to group assignments that take place over a period of time where students are not necessarily all and always in the same place. The student groups are assumed to be already assigned, e.g. by using TEACHER SELECTS TEAMS [Pedagogical Patterns Editorial Board 2012], ideally in group sizes of about 4-5 students [Oakley et al. 2004].

### Categories

Some patterns are applicable for all sorts of group assignments, some are only applicable in certain contexts. This will be reflected in categories which become part of the contexts of the patterns. One such categorization criterion which also has been applied to other organizational patterns is the *moment of implementation* (e.g. in [Manns and Rising 2005; Köppe 2013]). This leads to the categories *Begin of Assignment*, *Middle of Assignment*, *Final Phase of Assignment*, and *Independent of Implementation Moment*. Figure 1 shows the mapping of all yet described patterns (from both part 1 and 2 of this work) to these categories.

There certainly are other categories possible, like the kind of projects (e.g. research projects, prototyping projects, or software development projects). These still need to be explored and are part of future work.

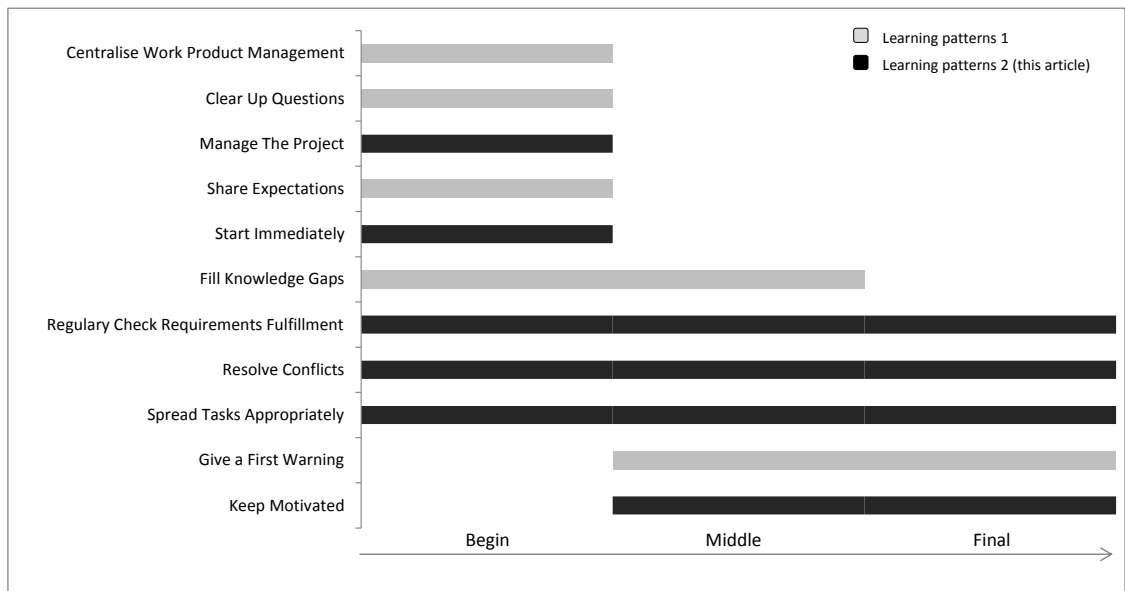


Fig. 1. Learning Patterns Project Timetable (for part 1 see [Köppe 2012a])

### Pattern format

The patterns use a version of the Alexandrian pattern format, as described in [Alexander et al. 1977]. We chose this format as it is easy to read and fits better for the student collaboration domain than formats which focus more on the technical domain (e.g. design patterns as described in [Gamma et al. 1994]). The first part of each pattern is a short description of the context, followed by three diamonds. In the second part, the problem (in bold) and the forces are described, followed by another three diamonds. The third part offers the solution (again in bold) and consequences of the pattern application — which are part of the resulting context — and advices for the implementation of the pattern. As last part an example of the application of this pattern is given. References to related patterns are made explicit by writing the names of these patterns in SMALL CAPS.

In this paper we present six patterns: **MANAGE THE PROJECT**, **MEDIATE THE DISPUTE**, **KEEP MOTIVATED**, **START IMMEDIATELY**, **REGULARLY CHECK REQUIREMENTS FULFILLMENT**, and **SPREAD TASKS APPROPRIATELY**. All these patterns are on a high level and typically require more fine-grained patterns for their implementation. This will be reflected in the patterns themselves.

We decided to write the patterns in a way that addresses the reader directly using *you*. As the target audience are beginning students, we expect that this will help these students to adapt the patterns more easily than if they were written in the third person.

## MANAGE THE PROJECT

You started working on a project that includes a variety of tasks. You have been debriefed by the instructor and know what is expected from you. You received a deadline, resulting in a time-span in which you will have to complete the project.



**The project cannot be finished successfully if you are running out of time due to unfinished tasks.**

*Unaware of Workload.* The group does not have an estimation of the time needed to complete the amount of work. One possible consequence of this is that at the end they run out of time.

*Unknown Project Status.* A group member is not sharing information — about her work progress, problems, decisions or the work she does — with the group. This results in that the group is not aware of the current status of the assignment.

*Wrong Priorities.* A group member is working on a task which is of less importance at the current moment of the project.

*Task Dependencies.* A group member cannot finish her task, because she needs the result of another task.

*Decision Making.* A decision by itself is not good or bad but if only one group member makes all of the decisions alone or members decide for themselves, without sharing their thoughts or taking the whole group in consideration. This could lead to conflicting choices and could even result in the group having to redo the work completely.



**Therefore: Use project-management to control the variety of tasks and to improve the efficiency of the group.**

In a project, different responsibilities are involved. These could be categorized and specified as a role. To those responsibilities, tasks could be assigned. For instance, the role of team leader would hold the responsibility of planning, organizing, monitoring and motivating. His tasks would be to arrange meetings, keep track of progress among the group members, define tasks- and work products and put them into a schedule. Or the role of a front-end developer would hold the responsibility of usability, design, development and documentation. Her tasks would be to design and develop software interfaces and to write user documentation. Or maybe the group shares most of all the responsibilities. But it always starts with a pile of work that has to be done. Managing that pile of work and SPREAD TASKS APPROPRIATELY could increase the efficiency of the group significantly. By REGULARLY CHECK REQUIREMENTS FULFILLMENT you could check if the current work done meets up the defined criteria.

You should make a decision about how you are going to manage the project. By choosing a project-management methodology, for instance PRINCE2<sup>1</sup>, SCRUM<sup>2</sup> or OpenUP<sup>3</sup>, it will give you an appropriate and structured approach on project management. Project-management methodologies like the mentioned ones prescribe roles and their responsibilities, but also specify work products which you could use to support your team to achieve your project goals. Switching to a project management methodology requires all team members to participate in this process. This often involves extra meetings and documenting what progress is going to happen and what progress has already been made. But by doing this, the status of the project is more understandable for everyone. It will also help the group to improve and manage their project as a team. Only if you are experienced with team managing or if your team has been working efficiently together, you could also use your own way of managing the project.

<sup>1</sup><http://www.prince-officialsite.com/>

<sup>2</sup><http://www.scrum.org/>

<sup>3</sup><http://epf.eclipse.org/wikis/openup/>

Using a project management methodology successfully requires to have some knowledge about it. If the group, or some of the group members aren't familiar with the chosen method, they will have to do some extra studying to gain this knowledge. This might cost some extra time.



*A group of students got an assignment for 10 weeks. After a week no one knew what the status was or what needed to be done. Two people worked on the same part and one delivered nothing. In the third week there was a mid-term assessment. This resulted in a bad grade, because the products that were delivered didn't meet with the requirements.*

*So the group decided to manage the project in order to reach a better collaboration. They sat down and discussed the problems. Based on this they worked out a schedule, defined task and who's responsible for these tasks and arranged meetings on every Wednesday. They also started to use an online tool with an issue-list, to report the problems they encountered. During the weekly meetings, work-parts and the issue-list were discussed. Upcoming tasks were divided, by applying SPREAD TASKS APPROPRIATELY, and the schedule was adjusted if needed, also applying . REGULARLY CHECK REQUIRMENTS FULFILLMENT. In the end the use of this project-management contributed to a better final grade.*

## MEDIATE THE DISPUTE

You are a member of a group. You are either in the beginning, in the middle, or in the final phase of the project.



**There is a dispute between group members, which has a negative impact on the motivation and the participation. There might be negative consequences on the project results.**

*Conflicting personalities.* In a group there can be people whose personalities don't go well together. After working together for a while, this can cause an increasing dislike in each other.

*Bad communication.* If the communication in the group isn't good, there is a chance people misunderstand each other. And if the misunderstanding is serious enough, this could result in a conflict.

*Different expectations.* When group members have opposite expectations or goals, especially when this is not shared well between them, there is a chance a conflict occurs.

*Insufficient motivation.* A group can have a member who is only doing the very minimum, never shows any motivation and sometimes just doesn't finish her parts at all. This shows the group that they can't rely on her. If they need to split tasks in a later part of the assignment, they will be less likely to trust her with important tasks. Also, if there is a student in the group who is doing not enough, the others in the group could get annoyed.

*Bad decision making.* If the one in charge of a group is making wrong decisions, there is a risk the other group members will become unhappy with his leadership and a conflict could occur.

*Blaming.* If a group member is blamed for a certain problem he didn't cause himself, this can cause some irritations towards his fellow group members. Being unfairly blamed often results in unhappiness to work with these particular students anymore, especially if the blaming happens on a regular basis. This can result in a conflict.

*Placating.* A group member takes all the blame for mistakes, even when he has nothing to do with it. The other members can start to abuse this situation.

*Wiseacre.* One group member has an opinion that doesn't fit with and ignores the view of the others.



**Therefore: Identify the cause of the dispute together with the concerned group members - and maybe some outside person like the teacher. Once the cause has been found, find a way where both parties can live with during the rest of the project or, if possible, look for a solution that will resolve the dispute.**

If a conflict occurs, the first stage is to identify the cause of the clash. Once the cause has been found, the goal is to try to find a solution for it. This isn't always easy, especially if the conflict has been going on for a while or has been caused by serious issues. Sometimes, for example when there are opposing personalities that has been causing problems, it can be useful to get help from other students or a teacher to mediate the dispute. Together, they will have to discuss the issue and express their feelings and ideas. To come to a solution, it is important to take each others interests into account and to understand what will be needed to bring the project to a successful end. They have to find a middle way that works for both.

For a group where the leader's actions have caused a conflict, it is important to talk about it. Talk with each other, try to remain friendly and discuss the issue in a mature way while looking for a solution. Sometimes a leader isn't aware that

his actions are causing conflicts, talking about it can help. Another possible approach is to suggest to (temporary) take another leader to see how that goes.

Also, if the communication between the team members isn't good and this is causing issues, it's important for the fellow team members to help out as much as they can in providing any communication when possible. Just to sit and talk with the team about the occurring issues is important to get things resolved or at least get some mediation.

The same counts when a team member is unmotivated or when there are opposite expectations and these are causing a clash. If SHARE EXPECTATIONS didn't work, the only way would be to all sit together and share thoughts and opinions.

As the main goal is to finish the assignment successfully, in the end they have to find a middle way all could live with. Once they have found a compromise that works for all involved, they will have to keep working on the problem so it won't escalate again or find ways to avoid it. Also, KEEP TEAM SPIRIT high might help. If the team spirit is high, the team is more happily together and this could surely help to prevent further conflicts.



*A group of students had to work on a team assignment. They never worked together before and they were all quite different people. One of them preferred to do homework on the very last minute, while one of the others wanted it to be done as soon as possible. Both of them were quite direct persons who said what they think. This resulted in a slight annoyance about the way the other one worked. As the assignment progressed, they started to dislike each other more and more. To the point that they wished they were in a different group. This resulted in a drop of motivation that affected the whole team. After they sat down with a person outside their group, in this case a teacher, they discussed the issue, and together they agreed on some improvements. Both were going to do the assigned parts the way they prefer. And they decided to do some social activities to build up the team spirit (as in CELEBRATE YOUR TEAM). This worked out really well for both of them, and with the raised team spirit motivation improved quickly. They also agreed that if further issues would occur, they would have to try to discuss it with each other directly before a new, more serious problem could arise. As result, there were no other conflicts the remaining time of the assignment and when something small occurred, they discussed this in a mature and successful way.*



## KEEP MOTIVATED

When the group started working on the assignment, they were motivated. The group already did SPREAD TASKS APPROPRIATELY. They tried to resolve previous conflicts (as in MEDIATE THE DISPUTE). If there has been a lack of knowledge or skills, they did CLEAR UP QUESTIONS and FILL KNOWLEDGE GAPS. They are either in the beginning, in the middle, or in the final phase of the project.



**During the execution of a group assignment, insufficient participation, bad quality deliverables or simply not getting satisfaction from the given tasks can be the result of decreased motivation.**

*Unmatched Skills.* It is important that the assignment is at a level students are able to do or that it is not too easy. If the assignment requires the students to do something above or below their current knowledge, this can cause a serious drop of motivation. The feeling of not knowing how to do certain parts of an assignment, especially if it's not possible to FILL KNOWLEDGE GAPS, results in that they are unable to finish the tasks properly. This can have the same demotivating effect as if they can do something without any effort.

*Too much Pressure.* As students are often doing more than one class at the same time, it can happen that these classes will have assignments and deadlines that are not far apart. This can result in an unexpected high working pressure to finish all requirements in a short period of time. If the working pressure is unrealistically high, there is a chance the student decides that he probably would not have enough time to finish the requirements, so he could decide to do nothing at all.

*Loss of Interest in the Assignment.* When an assignment progresses, it could happen that a student loses interest in it. It can be that the student is not interested in the subject, or sometimes an assignment or course can be a lot less interesting than the student expected in the first place.



**Therefore: Try to get tasks assigned which you are interested in or switch (temporarily) to another role in the team. Try to keep everything interesting and help your fellow team members, especially those who struggle with motivation or with their tasks.**

There are different forms of motivation, usually those are split in 2 categories: Intrinsic Motivation and Extrinsic Motivation. Intrinsic Motivation is internal motivation, like being motivated by something you like to do, or because you think something is important. Extrinsic Motivation is external motivation, for example the possibility to get a reward for doing some work.

Usually it's better when people are motivated intrinsically, with this way of motivation it means that the student is motivated by his own thoughts and ideas. He could want to improve his knowledge about a certain subject or is simply just motivated because he enjoys it.

The first thing is to try to find the reason for the lack of motivation, to see if it comes from within or from the environment around you. It is important to know what is causing the problem. Once this has been found, only then it is possible to start working on that particular issue. There are different solutions, depending on the reason behind the lack of motivation.

For example, to regain interest in a uninteresting assignment, a good way to start is to try to have fun with the people you are working with. CELEBRATE YOUR TEAM by doing activities together, switch tasks often and try to get the tasks that you enjoy. If you see one of your team members is struggling with motivation, ask the person what she would like to do and try to motivate her when you can. Another possibility to make things more interesting is to switch the working location. A new working environment can make a big difference.

There are times when the working pressure is very high, the best solution for these situations is to make sure to SPREAD TASKS APPROPRIATELY , so the person won't be overwhelmed by the many different things he has to do (as in ELIMINATE BOTTLENECKS). Also, try to motivate and help each other out when possible.

Another possible approach to get your team or a single team member motivated again is switching tasks and roles. If the students are often exchanging the parts they are working on and the roles they are having in the team, this results in an increased intrinsic motivation as they would be spending less time working on uninteresting parts.

Take breaks often and remember why you are doing the assignment; make sure to remember you have some clear goals that are worth working for.

Once one finds out he is losing motivation, he has to explain this to the rest of the team as soon as possible so they can think along how to prevent further motivation loss and altogether start working to stimulate each others motivation. Also, set some short term goals that you can complete without too many problems. Completing tasks is much more motivating than having one big thing dragging on for too long.

Keep everything as fun as possible, but also try to regain focus; reward yourself for finished work by doing something fun and encourage your team members whenever you can.



*A group of students had to work on an assignment. As they progressed with this, some of the group members were a bit disappointed in the course. They had high expectations to learn a lot, but in the end things turned out to be different. They were managing fine, until at one point there were a lot of different tasks that had to be done at the same time. As the working pressure rose, the lack of motivation started to show. At group meetings they had problems to focus and they all wished the course was over. They decided something had to change fast or otherwise things would go wrong. The group leader came with the idea to do a small survey to see how motivated the others were. He asked them to grade their own motivation and if they graded their own motivation low, they would have to explain why it was low.*

*After that, they went to discuss the reasons behind their low motivation. They came to the conclusion that the assigned tasks needed to be switched more often and that the fun in working on those needed to improve. They started by doing activities together and help each other out whenever they could. And as a change, they decided to work on their assignments at one of the team member's places. Working in a different environment already improved the atmosphere a lot. There they split up the tasks in a way so all had the parts they found interesting. The team continued with this approach and finished the assignment with a good grade.*

## START IMMEDIATELY

A group assignment is given to a group of students. This includes deliverables that have to be finished on a prearranged date and requires a certain amount of work and time for the realization. If there were unclear instructions, you clarified these with CLEAR UP QUESTIONS. You find yourself at the beginning of the project.



**Procrastinating to work on the project will affect the total amount of work finished at the end, the quality of the project and possibly the grades.**

*Distant Value.* The assessment and the grading of the assignment are still far away, so working on it now does not seem to add value in short terms.

*Moving Force.* The students do not have any interest in the subject or they lack the motivation to start with the assignment. It can be also from an issue from a task that was assigned to them. The project is not started and the task at hand is not being performed.



**Therefore: Once an assignment starts, exchange personal information and discuss the possible working times. Set up a meeting schedule, make a planning and start working on the first parts of the assignment as soon as possible.**

The problem of this pattern is most common. An assignment is given to a group of students but they don't start with it directly, resulting in a shorter period of time to complete the assignment and an increased working pressure because there is less time available. But if you start directly, you will still have all information clear in your head. If you start working on it at a much later point, you probably already forgot some of the required information.

Start by sharing your personal information and plan some meetings. Once this is done, the group should start working immediately on the tasks ahead. Work with smaller tasks so that you have some finished parts of the assignment in a short period. Starting immediately and with smaller tasks gives you the best benefit of the given time and a continuous experience of added value.

Once every group member understands the assignment, start SPREAD TASKS APPROPRIATELY directly at the first meeting. Now, every one knows what he has to do.

Sometimes, the teachers make the groups, so the students can not choose who they will work with. It is possible a group contains students who have/had a conflict with each other. As soon as their conflict influences the workflow, MEDIATE THE DISPUTE immediately to prevent the project from stagnation. It will also prevent that the rest of the group loses focus waiting for the problems to resolve.



*A group assignment with a total available time of six weeks was given to a group of students. They started to work on the assignment four weeks after assignment. Even during the remaining two weeks, minor progress was made. Most work was done during the last two days before the deadline. When the work products were rated, the products did not meet the defined requirements. This resulted in a low grade.*

*When asked about what the cause of this was, it seemed that the group was just postponing the assignment and were canceling appointments made. The reason was that instructions of the assignment were vague and they did not take any actions because their motivation was too low.*

*The group was given a second chance, and this time they started working on the assignment immediately. Any ambiguities regarding the assignment were solved directly by asking the teacher about it. This change of behavior gave*

*the students a clear picture of the products that had to be delivered. During their first meeting they spread the tasks among the team members. Every team member now knew what he had to do.*

*With the correct tools applied and a better use of their time, the members of the team knew how to go further in the project and what they could achieve. Their motivation about the class increased with their recent success.*

## REGULARLY CHECK REQUIREMENTS FULFILLMENT

A group assignment is given to a group of students. The project consists of single or multiple deliverables and the quality requirements for both intermediate and final goals are determined, either by the teacher or the students. You are at the beginning, middle or final phase of the project.



**If the work products delivered on the date of the deadline are incomplete or not of sufficient quality regarding the defined requirements, then the grading of these products will be insufficient or low.**

*Individual Work.* The group assumes that finished tasks made by an individual group member are done properly according to the given requirements. Because of this assumption, chances are the quality is not checked by the group and therefore the quality can be insufficient.

*Assumptions.* Students think their work products comply with the requirements, but did not actually check it.

*Ambition.* When students do not have the ambition to deliver high quality products, time spend on quality will possibly be low.

*Unseen Events.* During most group assignments events occur which stall the progress of the assignment, e.g. the requirements change. These events could lead to more work, which in consequence often leads to less time for quality checks.



**Therefore: Determine for each deliverable how you can test and check the quality requirement on a regular base. Plan the time required for testing in your schedule and ensure that you have time for resolving issues found in the tests.**

Often the students work on an assignment, but they do not, or too little, check the deliverables against the defined criteria. This will result in lower quality products and in lower grading. By **START IMMEDIATELY** on the assignment and by **MANAGE THE PROJECT** you should try to find some time for testing or checking your deliverables on a regular base.

For each quality requirement you need to find a way to test the deliverables. Like for instance build unit tests for your software, setup a continuous integration tool, make a software test document to write down your test results, arrange a user test with fellow classmates etc. Find out how much time your testing techniques take and consider how much time you want to spend on testing, because a 100 test cases in unit tests will take more time to develop than 15. If you do not aim for high quality products, you should reconsider about what your quality requirements are going to be.

Checking the quality of your deliverables on a regular base allows you to respond to requirement changes or errors in your product in an early stage. This will give you the possibility to adjust your planning and improve the quality.

You could also prevent a decrease in the quality of your deliverables, by **SPREAD TASK APPROPRIATELY**. Appropriately divided tasks will give you more time to check the quality. Let team members give feedback on each others work, because four eyes see more than two. Also tasks assigned to group members who have a high moving force to complete the task given to them will sometimes put up more effort to enhance the quality of the working product. Also it is advisable to **USE A STYLEGUIDE** and **CENTRALIZE WORK PRODUCT MANAGEMENT** to prevent inconsistencies among the work products.



*An assignment was given to a group of students. During the initial evaluation it appears that the current working products did not met the defined requirements. This resulted in a low grading of the initial evaluation.*

*After the initial evaluation took place, they adjusted the planning so, that they could regularly check the quality of the products and solve any dissimilarity between the working products and the defined criteria. Each developer made unit tests before he started on a new feature. They also installed Jenkins to automate testing and building. In that way they could continuously test, build and control their code.*

*The students used SCRUM to directly distribute the changes each day, but also gave a group member the role as a tester. The tester was responsible to find the dissimilarity between deliverables and the requirements. Also they assigned the role of a team administrator to a group member to prevent inconsistency in the versions of the work products. This eventually resulted in a very high grading at the second evaluation.*

## SPREAD TASKS APPROPRIATELY

A group assignment is given to a group of students. You have been debriefed by the instructor about the several tasks and work products that are involved. You find yourself at the beginning of the project.



**If you don't take the limitation of your group members in consideration while assigning the tasks, this could lead to decreased productivity or a missing opportunity to learn new knowledge.**

*Insufficient Knowledge.* A group member does not have enough knowledge to complete the task that was assigned to him. This could interfere with the progress of the assignment.

*Moving Force.* A group member does not have any interest and/or she lacks the motivation to complete the task that was assigned to her. So, possibly, the effort that he would put into it could be reduced.

*Deterioration of Knowledge.* A member of the group can try to take too many of the challenging tasks and responsibilities. This results in that the other members will have less to work on and will learn less from the tasks that were assigned to them. The reversed scenario is also common, where one only takes a few simple tasks while leaving the others to do most of the complex work.

*Task Dependencies.* Some tasks can not be started or completed because they depend on the result of another task. This could stall the overall progress of the project.

*Time Span.* Every task needs a certain amount of time to be finished. If several tasks are assigned to one student, it could take too much time to finish them all before the deadline.



**Therefore: Spread all responsibilities and tasks as appropriately as possible among all group members. Take their knowledge levels, interests, motivations and dependencies between the tasks, time and other constraints into account.**

Each team member has her own skills and limitations. Assign tasks based on these skills and limitations and on the constraints of the project.

Keep in mind the following constraints when dividing tasks among team members: If the knowledge level of the student is too low, the progress could stall and the task could not be finished in time. There are a few possibilities to resolve this problematic situation. For example, an extra team member can be assigned to the task and you can increase productivity with two persons thinking on the same problems. You could also help your team member by suggesting information to read to increase his knowledge as in **FILL KNOWLEDGE GAPS**.

If the time left is too limited for this, it's also possible to reassign the task. Assigning tasks to a team member who has interest in the subject or one that has a high motivation compared to the other students, could increase productivity. Assign the tasks that depend on other tasks first, so that when those are finished the group can move on with the parts that follow.

Every task needs a certain amount of time. Assign the tasks to the team members so that each team member has sufficient time to complete the tasks before the deadline of the assignment. **MANAGE THE PROJECT** to keep track of the progress.

In most cases this pattern is used at the beginning of a project. But sometimes the pros and cons were misjudged or you are using different iterations. In these cases you should redo **SPREAD TASKS APPROPRIATELY**.



*A group assignment was given to a group of students. During the initial evaluation of the project it appeared that one student conducted most of the work products done and possessed the most knowledge of these while the other group members lacked the knowledge of the work products and some work products were not finished.*

*When asking further about the task assignments, it appears that that one person had lots of responsibilities and tasks while the other group members were experiencing some problems executing the assigned tasks. One student could not finish, because he needed results from his group member which was putting a lot of effort in it, but just lacked the knowledge to complete his task.*

*Proposition was made to reassign the tasks among the students. The student with a lack of knowledge was supported from the student with the big workload. And his workload was reassigned to the waiting student. The task of the waiting student was later done by the other two students.*

*After the reassignment the motivation of the group members was boosted. Eventually all students were putting the same effort into the project. Also the student with the lack of knowledge increased his learning and overall participation in the work products.*



#### 4. PATLETS OF REFERENCED PATTERNS

These are the patlets — name, problem, and solution — of the patterns that are described in [Köppe 2012a] and referenced in this paper.

##### 4.1 CLEAR UP QUESTIONS

Some — or all — parts of the assignment description are vague and not understandable. Starting the assignment under these circumstances can lead to a wrong start of the work and also lead to time loss if things are done the wrong way.



Therefore: After the assignment is given, summarize what is clear about the assignment and try to identify what is not. Check this with all team members. If parts stay — or become — unclear, ask the teacher for clarification.

##### 4.2 SHARE EXPECTATIONS

Students might have different expectations of the results and the way of working on the assignment. This often leads to conflicts or an inefficient way of working.



Therefore: Make an opportunity to reflect on the expectations of all group members. Align them, agree on a common set, document them, and have all members indicating acceptance of and commitment to this agreement.

##### 4.3 GIVE A FIRST WARNING

Some group members are not fulfilling the expectations and goals agreed on earlier which leads to an unbalanced participation in the group and endangers a good assignment completion.



Therefore: Confront the group member with his or her behavior and explain why it is a problem, thereby ensuring a constructive attitude. Make the consequences clear if the behavior does not improve and make specific agreements on how the student intends to work on the improvement.

##### 4.4 FILL KNOWLEDGE GAPS

One or more members of the group do not have sufficient knowledge needed for working on the tasks assigned to them and cannot contribute sufficiently to the assignment realization. This endangers the overall successful completion of the assignment.



Therefore: Identify the knowledge gaps and help the group members with acquiring the missing knowledge. Let them in the beginning of the assignment execute smaller tasks of the assignment which match their current knowledge status until they grasped all required knowledge.

##### 4.5 CENTRALIZE WORK PRODUCT MANAGEMENT

If the work products are not available in the current versions to all concerned students, inconsistencies and incompleteness can occur as students might work on different versions which later have to be merged.



Therefore: Make all work products available via one centralized place and keep the work products up-to-date.

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