Introduction to Teamwork

1

#narrative module: #teamwork

Learning outcomes

By the end of this module, you should demonstrate the ability to:

- Recall the definition of a team
- Describe the difference between a team and a group
- Determine what type of functional team you are on
- Determine the performance level of your team from the five performance categories
- Describe the key aspects of a high performing team model (see Figure 2)
- List and explain the five factors that lead to successful teams
- Identify the five stages in the Tuckman team model and explain each stage
- Given a team scenario (or video of a team working), identify the stage they are in

Recommended reading

After this module:

- **Implementing a Project > Working in Teams > 2. Organizing**

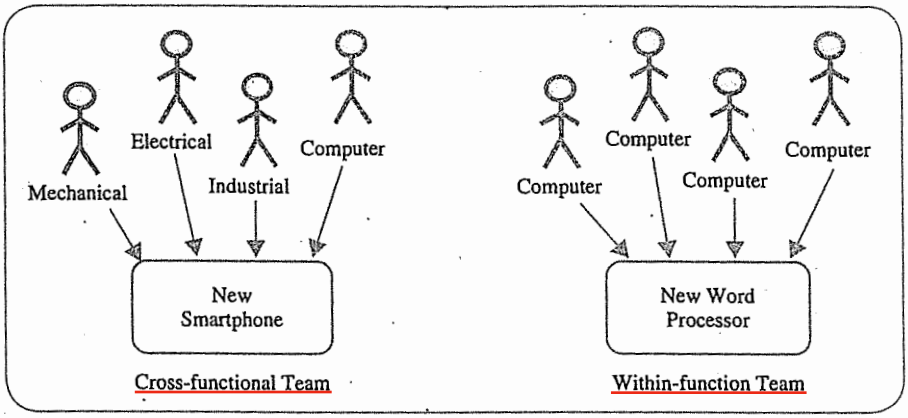
1. Introduction

As an engineer you will find that you work extensively in teams. Effective teams bring diverse perspectives to design and generally provide better solutions than individuals working alone. This is because problems can be solved more quickly, more and better new ideas can be generated, and ideas are implemented more efficiently by teams than by individuals. Understanding how teams work is an important part of any work environment. Understanding teams will help you be successful!

A ***team*** is a group of people who come together to work in an interrelated manner toward a common goal. The key difference between a group of people and a team is the common purpose or goal and the reliance on the skills of all the members to meet the goal [1]. A group of people who come together to make independent decisions to reach a goal do not form a team. Put another way, team decisions are not simply a sum of independent decisions made by individual people. And the work that a team accomplishes is not a set of individual isolated pieces that are stapled together. Teams operate as an entity and often develop characteristics (almost personalities) apart from their members.

1.1. Types of Teams

Teams are often categorized either by their function or by their performance. There are ***cross-functional teams***, across disciplines and skills, and ***within-function teams,*** within a discipline or skill set.



Alternatively, teams can be considered in terms of their performance rather than the function of the individual members [2,3]. Note that all types of experience, knowledge, and skill sets do not have to be represented on a team. Often expertise in some areas related to the project can be hired or contracted and components of the project can be licensed or purchased by the team.

Sometimes a group of people working together performs below what would be expected from the sum of individuals in the group; this is called a ***pseudo team***. Pseudo teams work as a set of isolated individuals. This type of "team" is characterized by poor communication and a lack of commitment to a team purpose. ***Potential teams*** perform at or slightly above the average team member. Potential teams communicate better than pseudo teams. There are some synergistic work habits in this type of team.

Real teams perform well. Real teams communicate actively and have developed cooperative, synergistic work habits. ***High-performance teams*** go well beyond the capability of the individual members. High-performance teams are highly communicating, cooperative, and synergistic. They fully actualize the potential of every team member. Creating a high-performance team requires ongoing effort from every team member and a commitment to the shared goal.

1.2. Building Successful Teams

Research on effective teams has shown that there are five underlying common factors that make teams highly successful [1–5]:

1. The team shares a common goal or purpose.
2. There is both individual and group accountability.
3. Real work is undertaken: work done is directly relevant to the project and the project is perceived as relevant and valuable by the team members.
4. Processes, skills, and mechanisms are in place to deal with both task and people issues: the team has effective procedures for dealing with team conflict and project difficulties.
5. Group processing occurs: the group reflects on their work, celebrates together, and resolves issues together.

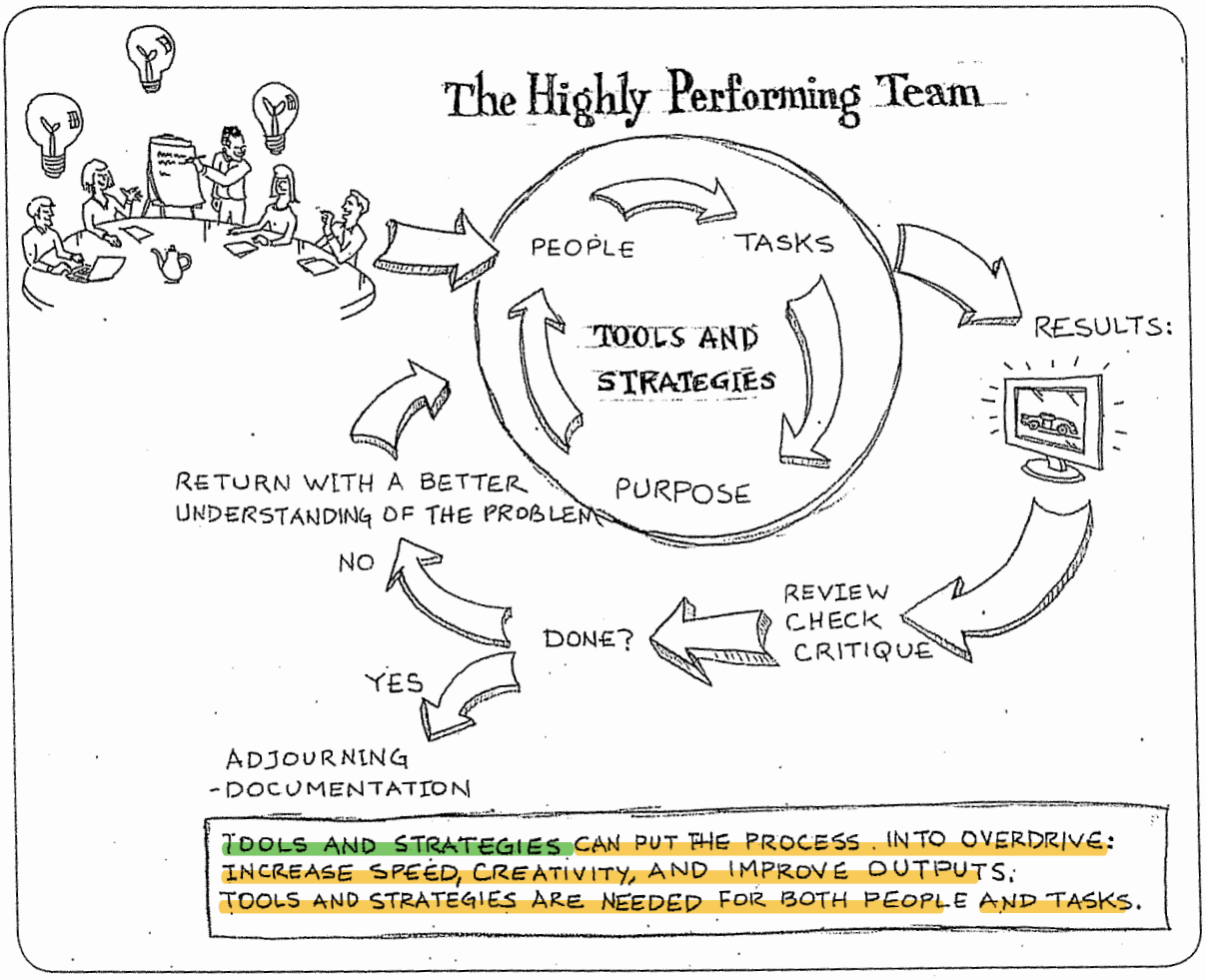


FIGURE 1 High-performance teams successfully balance people issues, tasks, and purpose (goals). They use tools and strategies to keep everyone engaged and working together.

Simply stated, a team needs to have a clear purpose or goal that is understood by everyone and the team itself must have methods it will use to keep itself on track, resolve issues between people, and resolve problems associated with getting the work done. In high-functioning teams, people and their relationships are seen as equally important as the tasks. Your team needs to meet these five themes to be highly successful and this can be challenging.

Part of being a high-performance team is developing the habit of ***reflection***. This means reflecting on an experience and intentionally thinking through what you learned from it. In business there are formal methods for reflection of this type; they are called ***lessons learned*** activities. We suggest you practice reflection and use past experiences to help you learn for your next team assignment.

Reflection (Lessons Learned)

Think about the best team you have ever been on. It could be a sports team, a band, your theater group, or a club. What were its characteristics? Was it a real team, or was it a pseudo team, or a potential team? Did it meet the criteria for a high-performance team? Was it a functional team or cross-functional? Were there conflicts? How were they solved? Was there a clear goal that everyone was striving for?

Consider the five factors that contribute to a successful team. How did your team rate in these five areas? How could the team have improved in these areas?

2. The Tuckman Team Model

Engineers generally work in teams, so understanding how teams can become successful is important both when you are in school and when you are at work. There are many different models of how teams form and ultimately work effectively together. One of the most commonly used models was developed by Bruce Tuckman in 1965 (#Tuckman). It is a four-stage model that was later expanded to five stages [4,6,7]: ***forming, storming, norming, performing,*** and ***adjourning*** (Figure 2). While the model in the figure appears linear, it is really iterative. The addition of a new team member, a major change in the project, or other disruptions and creative conflicts will cause the team to go back to an earlier stage. A team may repeatedly go through forming, storming, norming, and/or performing on their way to successfully completing a project.

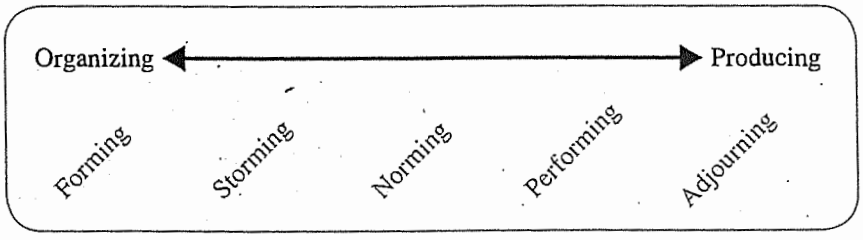


FIGURE 2 Modified version of Tuckman's team development model [6-8].

The first three stages of team development—forming, storming, and norming—can be categorized as ***organizing***. During these stages it is particularly important that your team defines the roles and responsibilities of its members, chooses a team leader, sets team rules, and gains a clear understanding of its purpose. If these things do not happen, then the team will stall and will not move into stages four and five, which can be categorized as ***producing***. It is while producing that the team will have its greatest productivity in reaching the goal. It is where the team is tuned and cohesive.

Effective teams are not easily formed. Every team member has to understand how a team works, and how to interact with the individuals in the team over the course of a project. The remaining modules in this section describe the stages of team dynamics (the Tuckman model, as described) and the team-oriented project management aspects.

KEY TERMS

team	**reflection**	**cross-functional team**
lesson learned	**within-function team**	**forming**
pseudo team	**storming**	**potential team**
norming	**real team**	**performing**
high-performance team	**adjourning**	**Tuckman team model**
organizing	**producing**	

3. Questions and activities

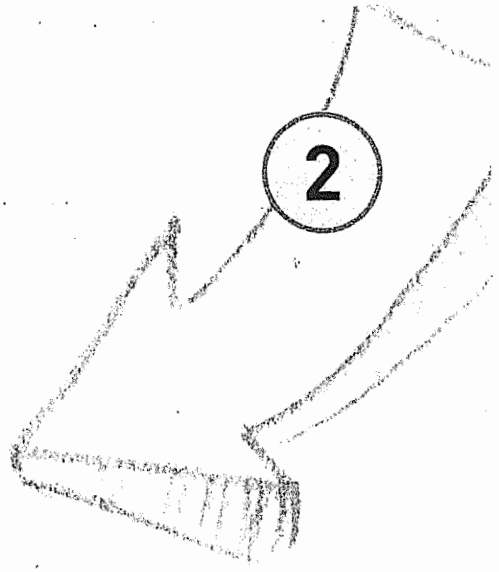
1. Which of the following designs might require a cross-functional team and which might require a within-functional team? Discuss your answers with your colleagues. Are there reasons for both?
   - **a.** Design of a toaster
   - **b.** Design of a calculator app for an iPhone®
   - **c.** Redesign of automobile assembly plant
   - **d.** Design of coffee room in automobile assembly plant
   - **e.** Design of an automobile steering wheel
   - **f.** Design of an entertainment facility for an automobile
2. Think about the best team you have ever been on. It could be a sports team, a band, your theater group, or a club.
   - **a.** What were its characteristics of the group?
   - **b.** Was it a pseudo team, potential team, real team, or high-performance team? Explain your reasoning for identifying the team as one of these.
   - **c.** Was it a functional team or cross-functional?
   - **d.** Were there conflicts? How were they solved?
   - **e.** Was there a clear goal that everyone was striving for?
   - **f.** In the list given in the section "Building Successful Teams," which of these factors did your team have? And which were lacking? Explain your answers.

3. Some things you learn because someone teaches you, but often the best lessons are those where you learn by experience. In your groups, talk about things you have done and the lessons you have learned from doing those things that you can reapply later.
4. You and others have probably encountered many new people when you started your engineering education. Discuss situations where you have seen aspects of the Tuckman model happening in the relationships you have seen being formed.

4. References

[1] Hensey, M. *Collective Excellence: Building Effective Teams,* 2nd ed. Reston, VA: ASCE Press, 2001.
[2] Smith, K.A. *Teamwork and Project Management,* McGraw Hill Higher Education, 2004.
[3] Katzenbach, J.R., and Smith, D.K. *The Wisdom of Teams: Creating the High-Performance Organization,* Boston: Harvard Business School Press, 1993.
[4] Tuckman, B. Developmental sequence in small groups. *Psychological Bulletin* 63 (6):384–399, 1965.
[5] Tuckman, B.W., and Jensen, M.C. Stages of small-group development revisited. *Group & Organization Studies (pre-1986),* December 1977, p. 419.
[6] Hensey, M. *Collective Excellence: Building Effective Teams,* 2nd ed. Reston, VA: ASCE Press, 2001.
[7] Tuckman, B.W., and Jensen, M.C. Stages of small-group development revisited. *Group & Organization Studies (pre-1986),* December 1977, p. 419.

Organizing



#process module: #teamorganizing

Learning outcomes

By the end of this module, you should demonstrate the ability to:

- Clearly describe the important characteristics of the forming stage
- Recognize when teams are in the forming stage, storming stage, and norming stage

Recommended reading

Before this module:

- **Implementing a Project > Working in Teams > 1. Introduction to Teamwork**

After this module:

- **Implementing a Project > Working in Teams > 3. Tools for Organizing**

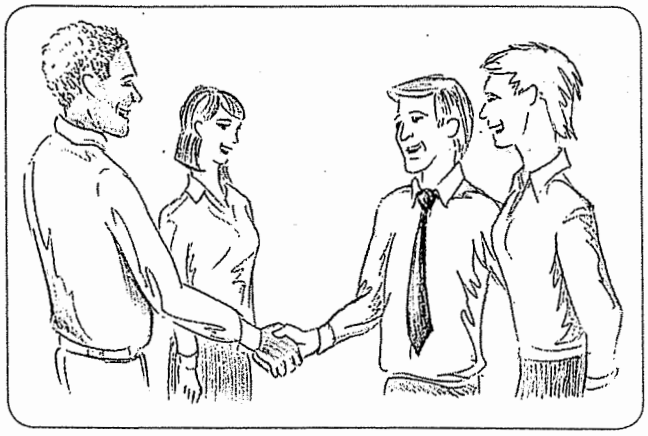
1. Organizing

The ***Tuckman team model*** has three stages that happen when teams are starting up: forming, storming, and norming (see Figure 1). These stages can also recur repeatedly during the project when there is a disruption in the project or team or a conflict. These are typical stages a team will go through as it organizes and coalesces into a working unit.

A companion module to this one, "Tools for Organizing," contains a set of specific tools and techniques that can be used to reduce the length and negative interactions during these stages (#toolsfororganizing).

1.1. The Forming Stage of Team Organizing

In the ***forming*** stage, the team is coming together but still operating as a set of individuals (#forming). This stage is dominated by individual team members thinking more about themselves than about the team. Think of how you feel each time you start in a new team. Do you ask: What is my role? Why did I end up in a team with that person? How will I fit in to this group? Will I still be able to get the grade I want? Who will be the team leader?



During forming, people are generally more polite and interactions are more formal.

All these feelings are natural in this stage, which is dominated by the team getting to know and trust each other. In this stage, if you are the team leader you may find that you will need to be directive and focus the team on the tasks that need to be accomplished. It is also important to get the team members to define the project they are working on.

Forming is often a comfortable stage because team members are being careful with one another as they get acquainted. It is like being at someone else's family gathering with a lot of people you don't know. People usually actively work to keep conflicts from starting.

If you are observing a team in this stage you might see:

- Polite conversation
- People being quiet or tentative
- Focus on task definition
- Exchange of limited personal information
- Use of the word "me" and "I"
- Very little expression of strong opinions

These behaviors are a natural part of team formation. It is important to let people get used to and gain trust in each other. During this phase you should exchange contact information and define the ***purpose*** for your team (i.e., the design project).

At the end of this stage, you will need to be ready to start making decisions as a team. Your roles and responsibilities should be clearly defined, the project goal or purpose should be clear to all team members, and you should have selected your team leader.

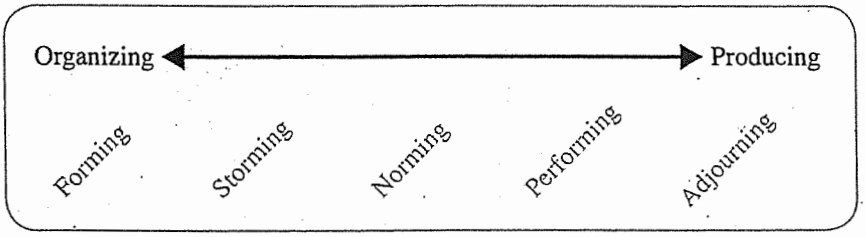
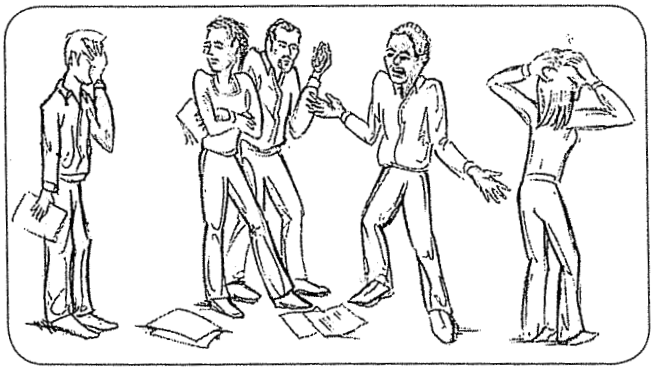


FIGURE 1 Modified version of Tuckman's team development model [1–3].

1.2. The Storming Stage of Team Organizing

In the ***storming*** stage the team is in conflict (#storming). This is the least comfortable stage of team development but is a very important one. Teams can get stuck here all the way through the project if they are not careful. In this stage, different ideas come out as team members get more comfortable with one another. Opinions are expressed, work habits are revealed, and expectations come to the surface. One of the most common points of conflict in storming is related to assumptions. You assume that your teammates will behave the way you want them to, and they don't. Roommates sharing a kitchen or bathroom will be familiar with this stage—as the roommates become familiar with each other, their habits emerge and cause tension and conflict.



During storming, disagreements over work practices and expectations arise.

Resolving these issues requires discussion, agreement, disagreement, and ***compromise***. Roles and responsibilities, if not already clear, should be finalized and assigned to people. The leadership pattern for the team will emerge. Resistance to the leader may start to occur, as well as resentment toward the project itself. Conflict can occur as the design problem is elucidated in more detail and the direction of the team made clearer. If you are the team leader, you will need to be directive and sometimes assertive to keep the team on track and to avoid getting stuck in this stage. Be prepared for team members to resent any exercise of authority in this phase.

If you were observing a team in this stage you might see:

- Conflict and anger over disagreements
- Resistance to decisions
- Intolerance
- Focus on small details
- Frustration with the behavior of teammates

Teams can get stuck in this stage and may revert to individual decision making and the project work returns to a strategy of tacking together individual pieces. If this happens, your team members will do what they individually think needs to get done, rather than what the team has decided needs doing. The team reverts to a ***pseudo team***. The work quality will suffer. To get through this stage it is helpful to have picked an assertive team leader (not aggressive and not timid) who keeps the team focused on the task rather than on personalities. Team leaders who are too aggressive or timid during this phase of team development will lose the support and trust of their team. It will be difficult for them to effectively manage the team moving forward. It is also helpful to start defining how the team will make decisions: deciding how to decide. This process will need to be clear in the norming stage for the team to move forward from organizing phase to the producing phase of the model.

Individuals should try not to become unduly upset at what happens during the storming phase. When upset however, avoid insults or personal attacks. When others are upset, work to moderate the situation and to work out the problems in a logical,

fair fashion. The golden rule is important in this stage: treat others as you would have them treat you. A team whose members are willing to forgive behavior of others during times of stress will quickly move past this to a strong working unit where the deficiencies of each individual are more than compensated for by the coordinated strengths of the team.

The module "Managing Teams" considers the type of teammates you might run into, and how to build a strong team despite the individual weaknesses that we all have (#managingteams).

1.3. The Norming Stage

In the ***norming*** stage of team development, the team has essentially "got its act together" (#norming). It has determined its common goal; in the case of a design project, the project has been defined and planned out. While team members will still have their own ideas, they will be willing to ***compromise*** in order to make the team work effectively. In a high-performance situation, conflicts are sometimes seen as opportunities for creative development and people adopt the ideas of others and build on them rather than simply compromising. In the norming phase team members are taking responsibility for team decisions. The team has agreed on how to work together and on what the standards for the team are, and roles have been defined.

During norming, team members develop strategies for accommodating differences and actively engaging all team members.

None of the teammates will likely fully agree with each decision made, but they will understand that every decision is not right or wrong, but depends on perspective. Often team members will decide to soften or change their opinions as they come to understand the viewpoints of their teammates, but will in any case support the team in the collective decision.

This phase of team is characterized by:

- Agreement on how the team will behave (i.e., the norms of behavior)
- Agreement on a decision-making process
- A leadership style that is less directive and more supportive
- General ***consensus*** on the team goals and activities
- Processes and procedures are agreed on and followed not by directive but willingly as an accepted and valued part of team practice
- Members begin to trust each other and appreciate every member's contributions more fully
- Greater focus on tasks rather than resolving people issues
- The emergence of a team personality that is separate from any one of the team members

1.4. Moving to Performing

Once the team has reached the norming stage, they can move into performing. The members know how to work with one another and share a common goal and a pathway to the goal. They are ready to spend less time negotiating the process and more time on working toward the goal.

KEY TERMS

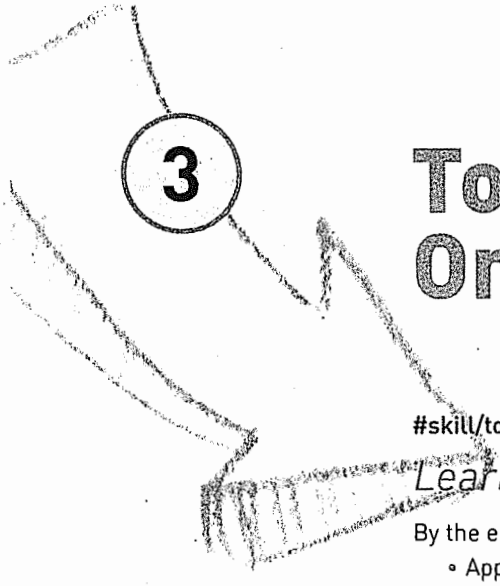
Tuckman team model	**purpose**	**compromise**
pseudo team	**consensus**	**forming**
storming	**norming**	**organizing**

2. Questions and activities

1. Describe the stage your team is currently in. Is it forming, storming, norming, or have you moved on to performing?
2. Using the stage you are in currently, or thinking back to when your team started a project together, can you identify the behaviors of the team and relate them to the behaviors listed in this section? For example, did you observe "agreement on a decision-making process" when you were norming?
3. Give three specific examples of events that occurred in your team and relate them to the relevant stage the team was in at the time. For example, consider an exchange between team members that occurred at a team meeting, or the way the team made a particular decision, such as who would work on which piece of the project.

3. References

[1] M. Hensey. *Collective Excellence: Building Effective Teams,* 2nd ed. Reston, VA: ASCE Press, 2001.
[2] B. Tuckman. Developmental sequence in small groups, *Psychological Bulletin* 63 (6):384-399, 1965.
[3] B.W. Tuckman and M.C. Jensen. *Stages of Small-Group Development Revisited, Group & Organization Studies (pre-1986).* December 1977, p. 419.



3 Tools for Organizing

#skill/tool module: #toolsfororganzing

Learning outcomes

By the end of this module, you should demonstrate the ability to:

- Apply tools and strategies relevant to the forming, storming, and norming stages to successfully help move your team through these stages
- Determine the appropriateness of each tool and strategy for your team in its current stage, or for application in a given scenario (i.e., case study)

Recommended reading

Before this module:

- **Implementing a Project > Working in Teams > 2. Organizing**

After this module:

- **Implementing a Project > Working in Teams > 4. Producing**

1. Tools and Strategies for Forming

The forming stage is the stage where a team comes together for the first time (#forming). A good practice in the forming stage is to put in place ***team rules***, sometimes called ***team beliefs*** or a ***team charter***. This is a set of behaviors that the team members agree will govern their interactions with one another. This may seem silly, but these "rules of the road" will help the team members and team leader define how they will behave. Such rules often include items like: come prepared to meetings, don't be late, no cell phones on during team meetings. The rules can be used to deal with behavior that is getting in the way of achieving the task. Even if you do not reread the rules frequently, the act of negotiating them is an important forming activity. Just like children negotiating the rules of a game on the playground before playing, it helps to lay the groundwork for the activity.

For every team meeting use ***agendas*** and keep ***minutes*** (#teamdocuments). Agendas and minutes are used routinely in business for a reason, not merely for the purpose of being more bureaucratic or pretending to be more professional. These documents are going to help keep your team on track and moving forward. It is easy to forget who

told what to whom, who is doing which part when, and what your team did just a few weeks ago. Agendas and minutes are part of documenting the process. Assuming that the project is too simple to require these practices invites problems. Getting into the habit of using these practices early on will help to avoid problems later.

Examples of Constructive Team Rules

- Do not answer cell phones, play games, or work off topic (e.g., social media, text) during team meetings.
- Treat teammates with respect.
- Show up on time (the team should decide what "on time" means).
- Give each other the benefit of the doubt, unless proven otherwise (especially in email and other written communication). Always respond constructively to written communication.
- If a member breaks the rules, call them on it. This means immediately bringing it to their attention respectfully and directly.
- Let people know if you are in trouble as soon as you know you're in trouble (e.g., getting overwhelmed, unable to deliver work on time).
- Decide how the team will communicate and how the members will collaborate on documents (e.g., Google docs, Dropbox, or other file sharing systems).
- Answer emails, texts, and phone calls from teammates; decide what is a reasonable response time.
- A problem with a member is a team problem. Everyone needs to take responsibility for doing things differently to make the team work. Don't play the blame game (i.e., it is their problem so they need to fix it). Instead say, "It is our problem we need to fix it."
- All members should ensure that they know what the work expectations are for an assigned task, and the deadline for that task at the time the work is assigned. This rule will ensure that people are clear on what they are being asked to deliver and when. If the team member responsible for section D of the report thinks this means two paragraphs but everyone else thinks it means two pages, there is going to be conflict.

Other questions to answer:

- If work isn't delivered on time, at what point does the rest of the team take on the job of doing the person's work for them (and removing their name from the author list)?
- How much warning needs to be given before a team member who is not responding is cut out of the process?
- What are the team's expectations for quality of work? Is everyone striving for the highest grade possible, or would people be happy just to pass?
- What happens if the team rules are broken? What are the penalties? Consider every problem, such as late for or missing a task, late for or missing a meeting, not responding to emails, very substandard work, among other issues.

(*continued*)

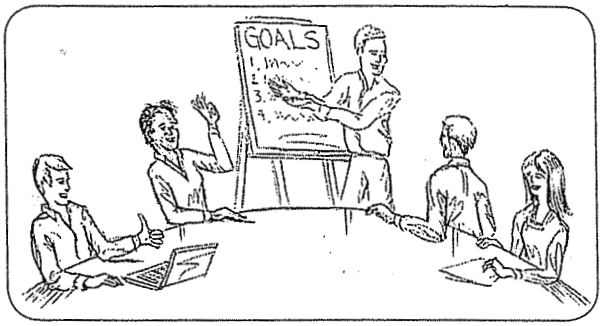
*Examples of Destructive Team Rules**

- If you are late for a team meeting you have to buy everyone a treat.
- You can play on your laptop during team meetings if you agree to do more of the work.
- People who don't get their work done have to wear a hat that says, "I'm a loser who let my team down."
- If you are 5 minutes late even once for a meeting you have to leave; you are not allowed to attend the meeting.
- Team members should tell each other exactly what they think of them at the end of each meeting (or publically online).
- If a team member delivers inadequate work for one report, they have to do more of the work on the next report.
- The team leader is responsible for cleaning up any team messes and rewriting anything that is poorly written.
- If a member doesn't deliver their work at least 2 hours before a deadline, then the rest of the team is responsible for writing the missing sections. (This is a bad rule because 2 hours is not nearly enough time for the team to remediate the situation. It isn't fair to the team.)
- Team meetings are optional for people who finish their part of the work early.

*Adapted from actual team rules that we have seen undergraduate design teams try to use.

A note on rules: Consequences should be part of the rules. These consequences should be generally strong; the team can decide to reduce a penalty if they think it is warranted, but it is not fair nor is it easy to increase a penalty. Consider as well repeat offences: Should being late a second time be dealt with more harshly than the first? When do you invoke harsher consequences? Ideally consequences should improve the overall team performance, not be used to punish individual team members.

2. Tools and Strategies for Dealing with Storming



Working through conflicts requires negotiation, decision making, and commitment to shared goals.

Storming is when your team rules become really important (#storming). During this stage review your rules frequently, and address issues as soon as they arise. Don't wait until things get terrible. If the rules are not working for the team, then revise them to be more effective.

A few brief tips to use in the storming stage:

- During the storming stage a lot of time will need to be spent on resolving people issues, leaving less time for tasks. Make sure you account for this in your project planning; it is an important necessity.

- Recognize that you have flaws too, and there will be times you won't be able to deliver on promises also.
- Set early deadlines for the first deliverables (i.e., work that needs to be delivered to the team to be incorporated into a team document such as a report). This will allow you all to see how the team operates, and have time for recovery from misconceptions and performance issues.
- Remind yourself of what you value about each team member. Even though you see the weaknesses at this phase, every person has strengths too.
- Discuss the issues with a positive sense of humor and work toward positive goals.
- Do not wait until people are really angry to resolve a conflict. If you see a problem looming, call it out and discuss it before it becomes critical.
- If your team has to resolve a major conflict close to a deadline, be especially calm, responsive, and professional (pick your words and actions carefully) to combat the tension. Sometimes the team can agree to postpone dealing with the underlying issues until immediately after the deadline (and be sure to do it, or it will again be an issue at the next deadline).
- Reaffirm your commitment to making this team work.
- Recognize that even the most wonderful teams will go through storming periods.
- Keep communicating.

2.1. Negotiating Conflict

In *Getting to Yes,* Roger Fisher and William Ury define a system for mediation that is highly applicable to the storming and norming stages of team development [1]. They claim that there is little to be gained by arguing over "positions." A "position" or a "stand" is a statement of a belief that something is absolutely true or right. It might be your position, for example, that the people who work harder should get the greater reward and that people who do not work hard should be punished. The problem is that you can waste a lot of time arguing about whether one person's "position" is more valid than another's. Fisher and Ury's four-step process is adapted here: for engineering design teams:

1. **Separate the "people" from the "problem."** It is easy, when you are having a conflict, to get emotional and blame a person for the problem. But if you can back away from that, perhaps by allowing time to "cool off" a bit, you can start to see the problem as separate from the person or people involved and turn your attention away from "blaming" and onto "solving." In other words, it is not really going to help to blame someone and then punish or humiliate the person. While it might seem like some kind of justice, the problem will still be there and have to be solved anyway. Try to define the problem itself and move away from "blaming" the people responsible. Then focus the team on addressing the problem and finding strategies for better team performance.
2. **Focus on "interests," not "positions."** Instead of arguing about who is right and who is wrong, ask one another, What do you actually *want to accomplish?* The best solution to a problem is not a matter of rewarding the right people and punishing the wrong people. The best solution gets people most of what they want and helps the team accomplish its goals.

Sergei Bachlakov/shutterstock

FIGURE 1 Even experienced groups will go through every stage of team development; however, people who have spent their careers successfully working on many teams are able to more quickly deal with issues and move into productive collaborative work.

3. **Develop solutions that will benefit everyone.** Once you have achieved step 2, start to generate ideas that will achieve your team goals. This is much like generating alternative solutions to a design problem and you can use many of the same tools, such as brainstorming.
4. **Define effective performance measures.** After you have agreement on beneficial solutions, you have to come up with a systematic way to put them into practice and monitor whether the solution works. Some project management tools would be effective here. Defining some simple performance measures to monitor the strategy you are using to improve team performance enable you to move onto the next stage, Performing.

Note that there was a cause and an effect. Deal first with the effect. Next, adapt your team processes and rules to deal with the cause so it will not happen again. This second step should be done without personal attack if at all possible: The revised rules and processes should apply to all team members.

3. Tools and Strategies for Norming

3.1. Making Decisions

The team must decide how to make decisions and needs to put in place a clear decision-making process (#teamdecisionmethods). This needs to start in the forming stage and continue to evolve in the norming stage or the team will never move to the producing stages of the Tuckman model (e.g., performing) (#norming). Decision making can be a considerable source of frustration for many teams. It is one of the most difficult parts of team work because you will need to live with, and support, decisions that you don't fully agree with.

Two of the more common decision making methods are ***consensus*** and ***voting***. For design process decisions there are many tools that can be used. However, most simple team decisions do not require anything more complex than voting or consensus. There are pros and cons to each of these strategies. You should also probably have in place a "crisis" decision-making strategy for when there is not the time to come to consensus or the team is deadlocked and voting will not work (see next section).

Making Decisions in a Crisis

There will be occasions when you do not have time for consensus and not all of the team members are available for a vote–for example, 15 minutes before a deadline when you realize that your report is missing a key figure. Your team needs to have a process for making decisions in these tight situations. This may never be needed, but it is useful to have in place just in case. The typical strategy is to empower the person in charge to make an ***executive decision*** on the spot. An executive decision means the person makes an individual decision on behalf of the team. So if you have tasked one person to submit the report and they find the error, then they are empowered to decide what to do (e.g., include a rough hand-drawn sketch, leave the page out, add in a note, or wait for a printout of the figure and get a late penalty on the report). Crisis decision making is very stressful and difficult, unless you have a lot of practice at it (e.g., emergency room doctors). Everyone has to agree that whatever the person decides to do, you all will do your best to support the decision.

Performance Measures

By the norming phase your team should have developed effective process strategies, such as the use of agendas, minutes, and status reports. These, used in conjunction with your project plan, will help you formulate performance measures, which indicate how well your team is performing. To norm effectively, make use of these performance measures to monitor the team activities, and use this information to continue to improve team performance.

KEY TERMS

team rules	**team beliefs**	**team charter**
agenda	**minutes**	**consensus**
voting	**executive decision**	

4. Questions and activities

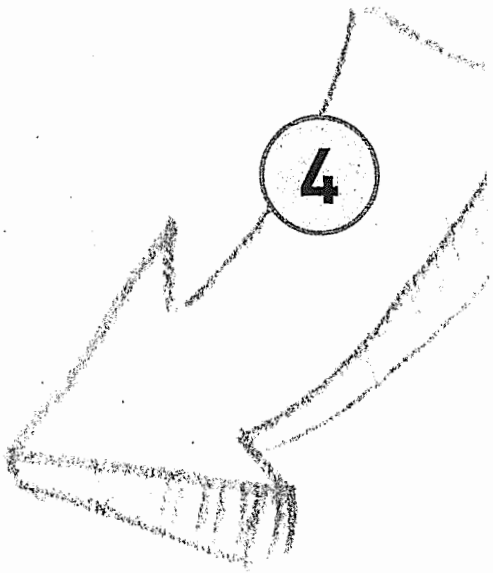
1. Pick a few of the destructive team rules. Explain why each rule is destructive, or give an example of where the rule would fail to improve the performance of the team.
2. A team member has failed to deliver a section of a report at the designated time for the second time in a row. What should the team do?
3. A team member becomes unavailable by email, is not appearing in class, and nobody seems to know where the person is. What does the team do?

4. Discuss why each of the stages of organizing (forming, storming, and norming) are not as productive as the performing stage, which comes next.
5. A productive team has reached the performing stage. What might happen in the following instances (relate your answer to the Tuckman model):
   a. A vital piece of design equipment breaks.
   b. A team member leaves.
   c. A team member, working under a misconception, spends a significant amount of time producing part of the design, which has to be thrown out.
   d. There is suddenly a need for a significant change in the design, which will change the structure of the design and also the amount of time and cost of the technology.

5. References

[1] R.F. Fisher and W. Ury. *Getting to Yes: Negotiating Agreement without Giving In.* New York: Penguin Books, 1991.

Producing



#process module: #teamsproducing

Learning outcomes

By the end of this module, you should demonstrate the ability to:

- Identify the two stages in the producing phase of the Tuckman model
- Clearly describe the important characteristics of the performing stage
- Recognize when teams are in the performing stage
- Clearly describe the important characteristics of the adjourning stage
- Recognize when teams are in the adjourning stage

Recommended reading

Before this module:

- **Implementing a Project > Working in Teams > 3. Tools for Organizing**

After this module:

- **Implementing a Project > Working in Teams > 5. Managing Teams**

1. Producing

Most of a team's time will hopefully be spent in the Producing stages of the Tuckman model: Performing and Adjourning (#Tuckman). In these stages the team is cohesive and dedicated to working on the project. In the Performing stage many of the team issues have been settled and the team is functioning effectively. However, as new issues arise the team may revisit the Storming and Norming stages and then return Performing. Even high-performing team will go through these iterative processes, but they will do this quickly and efficiently and with a focus on returning to Performing.

2. Performing

When a team enters this stage it has achieved the balance between focus on tasks and focus on people (#performing). The team is ***strategic*** and clearly understands what it is doing. Strategic means the team focuses on developing efficient and effective

When teams are in the Performing stage, the focus is on the tasks at hand and achieving the goals of the project. Less time is spent on the team relationships.

processes and procedures for accomplishing shared goals. The team members will have a shared understanding of the problem, project, or design and their focus is generally on the goals. The members also look out for one another and have a shared sense of responsibility and ownership of the project.

This stage of team development is characterized by:

- Roles are clearly defined.
- The team organizes itself; every member takes responsibility for involvement.
- There is an understanding of and respect for each team member's strengths and weaknesses.
- Strengths are celebrated.
- Weaknesses are supported.
- The members are interdependent and individually accountable and responsible.
- The team leader is only required to provide limited direction; the team is self-directive.
- Team language is characterized by the use of "we" and "us" as opposed to "me" and "I."

2.1. Tools and Strategies for Performing

To perform well and continue performing well throughout the remainder of the project, the team needs to:

- Continue monitoring performance and feed this information back to the team members.
- Continue using this information to find new ways of improving performance.
- Not become complacent; continue communicating actively.
- Not assume that you know what the other team members are thinking, even though you now know them well enough to guess.
- Recognize that the team may occasionally Storm and Norm again, and build time for this into team meetings.
- Regularly reassert expectations, and discuss process.
- Make sure everyone is listened to and everyone is engaged.
- Enjoy the project; not every team you work on will get to the performing stage, so enjoy working on a well-performing team, and reflect on how you got here.

3. Adjourning

Adjourning is when the team breaks up but may also occur when in long-lasting teams if a member leaves or there is significant change in the team structure or purpose. In the case of an engineering design project it is usually marked by the submission of the finished design project, and sometimes occurs when an intermediate

goal is reached. The team will feel good about what it has accomplished, but team members who have become closely bonded may also feel some sense of loss.

This stage of team development is characterized by:

- A lack of energy as members resist the change.
- Evaluation of the team's efforts.

3.1. Tools and Strategies for Adjourning

- Celebrate your achievements.
- Thank your teammates.
- Reflect on what you have learned from working with this team; some time teams will use a formal ***lessons learned*** activity to improve their chances of success on the next project.

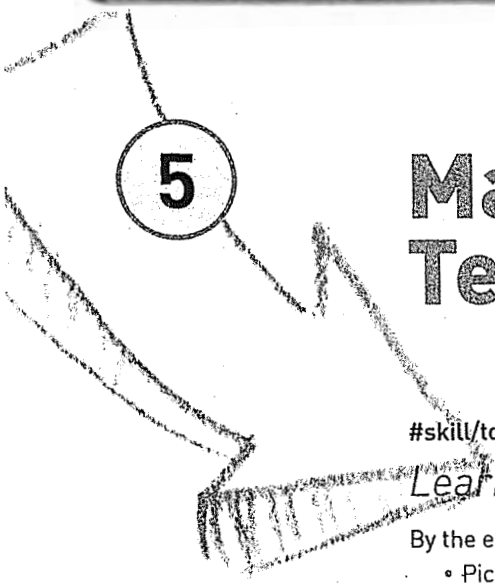
Not every group will become a high-performing team. Understanding this team model, and the tools and strategies for the different phases, can help you achieve a better level of performance. However, much of what differentiates a poor team from an excellent team is attitude. There is a saying in industry that "companies hire for attitude, and train for skills." This may not be 100% true (your grades do matter), but it makes a point. Your attitude matters and it will affect what you get out of this experience. You may not be fully satisfied with the results when the team adjourns. However, this experience will be an important part of your engineering education.

KEY TERMS

producing	**performing**	**adjourning**
strategic	**lessons learned**	

4. Questions and activities

1. What differences might you see in the performance of a team member that is part of a Norming team and one that is part of a Performing team?
2. List two things you could do to help your team reach the Performing stage and remain in that stage. Explain why these strategies would be effective.
3. Explain two strategies you could use for quickly and efficiently Storming and Norming again if a disruption occurs in your project.
4. What are two ways of celebrating a successful project and appropriately (and professionally) thanking your colleagues for their efforts?
5. Many organizations will talk about the importance of "networking."
   a. What online facilities are available to you for networking?
   b. Does it make sense to establish networking connections with your teammates?



5 Managing Teams

#skill/tool module: #managingteams

Learning outcomes

By the end of this module, you should demonstrate the ability to:

- Pick a team leader
- Apply strategies to manage both people and tasks
- Analyze some standard team problems and suggest remediation strategies for them

Recommended reading

Before this module:

- **Implementing a Project > Working in Teams > 4. Producing**

After this module:

- **Implementing a Project > Working in Teams > 6. Management Strategies**

1. Introduction

Every team is as different as the members in the team and the project they are working on. To make a team perform effectively is a continuous, dynamically changing process as unique as the team itself. Despite this uniqueness you will find that certain strategies and the understanding of certain situations and people will help you and your teammates work effectively together.

2. Team Leader

One of the most important decisions that you will make as a team will be the selection of the team leader. In undergraduate engineering design teams, your leader should have several duties. He or she will be the member of the team whose role is the closest to that of a ***project manager*** found in engineering companies. They will often assign or oversee the assignment of tasks to team members, keep track of where the team is in the project, deal with issues that arise relating to people, and will likely bear the responsibility of communicating with the instructor if issues become critical and cannot be resolved by the team without help.

Typically, one of the team leader's primary duties is managing team communication and activities. Team leaders certainly can and should do technical work and writing but will be overloaded if they try to do too much and also lead the team. Being a team leader, as distinct from a project manager, means they are also full members of the team. It would be a mistake for a team leader to take on too much or too little work on the project.

There is generally one key difference between the teams that you are part of when you are in school and those when you are working. The team leader in the work environment is often, but not always, someone who has the responsibility and the authority to assign tasks and to discipline team members. In university or college design teams, you are all peers. Being on a team of peers adds complexity to the role of team leader. The leader must provide direction and guidance to the team when all the members are equal. They must be highly persuasive and respected by the team, and able to help the team reach consensus while maintaining mutual respect. Select your team leader with care!

> Reflection
>
> Take a moment to think about what you want a team leader to do. Discuss what you want your leader to do as a group before the selection of that leader. Then take some time to think about the characteristics that would make a good leader based on what your group has decided the team leader is to do. Do you want the person who is the most technically able, the person with the best marks, the person with the best organizational skills, the person people like the most, the person who wants to control the situation, the relaxed person on the team, or the person who is not afraid of confrontation?

3. Managing Tasks

Things can go wrong with tasks within a team. Here are some of the issues that occur most commonly in student engineering design teams. Your team rules should specify who has the lead responsibility for managing these issues. Usually it will be the team leader, or an assigned team member, who will have the first level of responsibility for helping to prevent and in dealing with these problems.

> Managing ≠ Micro-managing
>
> ***Managing*** a team or its activities means guiding the work and collaboration between team members to make sure everyone is working effectively together. This is different from ***micro-managing,*** or being highly and specifically directive. Being very controlling or directive rarely works in a team where everyone is equal and the team leader or other members have no more authority than anyone else on the team (see ***hijacking*** below).

3.1. Meeting Focus

One of the most common challenges that teams face is having difficulty conducting focused meetings. Too often meetings are used just to exchange information, not to get work done. The solution is to set an ***agenda*** and keep ***minutes*** so you do not repeat tasks and you can get work done in your team meetings (#teamdocuments).

Design teams frequently find that they do not have enough time in team meetings to get everything done. Regular team meetings should be no more than an hour or two. This is assuming that these meetings are primarily work sessions with decisions being made and work being completed. Make sure the agenda is not too long; a good agenda should be short enough to complete in one meeting, and long enough to put the time to good use. Assign a person to chair the meeting and keep it on track. The chair position should rotate so that all team members have an opportunity to manage a meeting, and provide the agenda. Someone other than the chair should keep the minutes. Often a status report will provide the key elements to an agenda.

There is a simple technique for saving time by linking your agenda with your minutes. The minutes should be a list of tasks assigned, including deadlines and decisions made at the meeting. It should have a brief review of previously assigned tasks, including progress against deadlines. The minutes from the last meeting will become the agenda for the next meeting. Other information that needs to be recorded from the meeting can be put in a separate area of the agenda document for the next meeting and should be kept to a minimum. When done this way, your agenda and minutes become very closely linked to your project plan.

3.2. Task Timing

Another common issue that teams face is underestimating how long it takes to do things. This results in an inability to complete tasks on time and reflects a lack of effective planning (#tasks). You may find that actual times are as much as twice your initial estimates or more. Experienced designers will often add half or more to their first task time estimates because they know they tend to be optimistic.

Sometimes the problem is that tasks cannot be done in parallel; they must be completed serially. In order to make a realistic project schedule, engineering design teams use project planning tools. Two of the simplest and most frequently used are ***PERT charts*** or ***Gantt charts*** (#Ganttchart). A Gantt chart is a list of tasks illustrated as a bar graph on a calendar (see Figure 1) to record the tasks and task timings, and to order the tasks in a project.

3	Rough in electrical circuits	1 day: 2	electrician
4	Rough in plumbing	2 days: 2	plumber
5	Plumbing inspection	2 days: 4	
6	Finish walls	3 days: 5,3	carpenter
7	Finish electrics	1 day: 6	electrician
8	Build cabinetry	4 days: 1	carpenter
9	Finish cabinetry	3 days: 6,8	carpenter
10	Install sink, tub, toilet	1 day: 6	plumber
11	Install tub	1 day: 6	plumber
12	Install final lighting	1 day: 6,7	electrician
13	Final inspection	1.5 days: 10,11	
14	Electrical inspection	2 days: 12	
15	Done	0 days: 11,13,14,9	

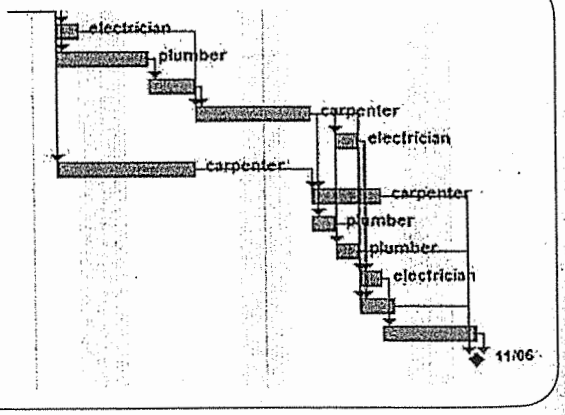


FIGURE 1 Part of a Gantt chart for a bathroom renovation project.

To use a scheduling tool effectively, be sure that you have listed all the tasks that are needed to complete the project. Then start from the project completion date and work backward to figure out how long you have to complete each task and when you need to start. This tool will not only help you keep on schedule but will provide you with the agenda items for your meetings and will show when certain tasks have to be completed before others can be started.

4. Managing People

In an undergraduate design team, there is often an early expectation that everyone is going to contribute equally. Unfortunately, things do not always work out this way. Because you are all peers, dealing with people issues can be particularly problematic. It helps to first identify the type of problem behavior you are dealing with. We have found that there are generally four major "people" issues in undergraduate engineering design teams. They can be grouped as ***hitchhikers***, ***hijackers***, ***isolationists***, and ***enablers***. Hitchhikers are by far the most common.

4.1. Hitchhikers

Hitchhikers are people who contribute significantly less to a project than everyone else [1]. They seem to always have an excuse ("too busy," "test tomorrow so I couldn't make the meeting," "I forgot," etc.). Or they just go silent: they don't return emails, calls, or texts, and they often miss meetings without communicating. However, they expect to get the same credit for the work as everyone else on the team.

If you have a hitchhiker on the team and there seems to be a legitimate reason for their non-performance (e.g., they have to work a lot of hours outside school, or they have health issues) then encourage the person to seek help. There may be a part-time option, or other types of assistance from the university or college that could help to meet the person's needs. Shirking work on the design project is not an acceptable way to deal with the underlying problem.

Regardless of the reason, continuing to shift the work to their teammates is not an acceptable option. This overloads the other team members and is unfair. Warnings, early deadlines, and prescribed actions for repeated infractions of team rules may solve the problem. However, if these actions are ineffective the behavior should be brought to the attention of your instructor in a professional and polite manner.

4.2. Hijackers

Hijackers are people who tend to be very anxious about their own grade in the course. They want to make sure everyone on the team does work that is up to their standards. When they disagree with the standard of work, they will often redo it themselves; "If you want something done right, do it yourself" is their motto. Hijackers will use a team leadership position to gain control of the team. While guidance from a team

leader can be very important, particularly in the early stages of team development, too much control exerted by a team leader is abusive and can destroy team motivation.

Hijackers tend to have very little trust in other people's abilities. Hijacked teams often do well initially when the hijacker has enough time to redo work but as the pressure builds these teams tend to break down. The hijacker is overwhelmed with work, or has some personal crisis, and no one else in the team is in a position to step in to help because they have been so left out of the decisions and the tasks that they do not know what is going on or what to do. They have little motivation to fix the problem because they no longer feel any sense of ownership of the project. In the end, work will not be completed and the team generally does poorly. Interestingly, team members of hijacked teams frequently "sit back and enjoy the ride" if the hijacker appears to be able to do most of the project themselves. Those team members will focus on other courses, overloading the hijacker further until the situation implodes and everyone ends up hurt and angry.

Teams should be very careful that they do not place a person with a high need for this kind of control in the position of team leader. The members should work with the person to build trust, and continue to insist on doing their shares of the work.

4.3. Isolationists

Isolationists are willing to get the work done, usually competently, but do not want to interact with the team more than minimally necessary. They are the "just tell me what to do, and I'll do it" people. The work they deliver, while generally acceptable, may not fit very well with the rest of the project because they have not adequately communicated with the rest of the team. They are not involved in team decisions and do not want to take the time to listen to other teammates. Generally they do not value input from others. Isolationists tend to cause the formation of subgroups within a team; their presence causes team fractures. They cause the other team members to spend time and energy trying to make the isolationist a happy team member by accommodating the person's behavior. The balance between tasks and people will be moved too far toward the people side as the other team members try to draw this person in.

Strategies that you can use to manage isolationists include having them be the chair of team meetings and a reporting and updating requirement on their tasks. Basically this mechanizes their team involvement and requires them to take part. However, the most important strategy is to hold the rest of the team together and try not to spend inordinate energy and time accommodating this behavior.

4.4. Enablers

Enablers help everyone out. They want to be good citizens and can end up getting too much work handed to them because they do not say "no." If everyone else is "too busy" they will volunteer for tasks, and more tasks. They do not mean to take over the project, they are often not the team leader, and they are not behaving this way because they want to control things; they are just trying to make sure everyone else on the team is happy. As a result, they become overwhelmed and are unable to deliver on their promises. The likely consequence of this behavior is that the team does not meet its goals.

The team and team leader need to be very careful that tasks are assigned evenly and that they do not overload enablers simply because the person keeps agreeing to take on more work. When tests and other course assignments loom they will let the

team down. While it may be tempting to take advantage of an enabler, in the end the project generally suffers.

5. Using the Information: Dealing with Team Issues

Having a good decision-making strategy and a clear task list helps avoid a number of the people issues just described. A task list will help to define roles and responsibilities and the team and team leader can make sure the work is distributed evenly. Well-defined, appropriate team rules will deal with minor problems.

If you have a team problem, then a team member (usually the team leader) must speak to the person *in private* and clearly set out what needs to change and why. This is not easy. If this is your responsibility, you must at all times speak objectively and calmly to the behavior, not to the person's character. Do not wait too long. If not dealt with, both the team and the person involved are going to struggle as the workload increases and all team members become more stressed as they try to meet deadlines and commitments. If the behavior continues, then move to other resolution strategies.

For school projects, you may want to involve the instructor in helping you deal with the issue. Often it is a good strategy for the team leader to inform the instructor on an "information only" basis. It means that the instructor will understand the nature, severity, and duration of the problem if ever called on for action if the problem becomes severe.

Challenges with people will happen throughout your professional career. This means that the strategies that you learn and the experience you gain in your student design teams will serve you well in your career. If you, yourself, have some anti-team behaviors—that is, if you are in some respects a hitchhiker, hijacker, isolationist, or enabler—now is the time to recognize and to stop those behaviors. Finding ways to cope with your need to control (if you are a hijacker) or your need to make people happy (if you are an enabler) in a manner that is effective for you and the people you work with is essential to make you a better team member.

Remember, a team is not simply the sum of its parts. Highly successful teams are able to leverage the differences in people's abilities and styles to be productive. Learning team skills will provide you with valuable knowledge for success in university or college and in your career.

KEY TERMS

project manager	**managing**	**micro-managing**
hijacking	**agenda**	**minutes**
PERT chart	**Gantt chart**	**hitchhikers**
isolationists	**enablers**	

6. Questions and activities

1. Practice writing up an agenda for a team meeting for your project. Do you have a project plan to help you construct the agenda?
2. Develop a template for your meeting minutes that you can use for every meeting. Make sure it has a place to put the project title, date, and people in attendance at

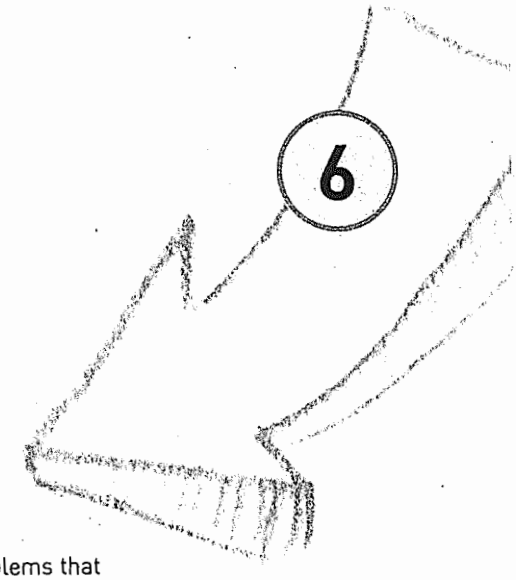
the meeting. Then add in a structure for the other elements that should go into the minutes. This template can be shared with your team and used for every team meeting.

3. At a team meeting a new task is identified as needing to be done by the next meeting. How might the response differ among the following types of team members:
   a. A team member if the team is in the Forming stage?
   b. A team member if the team is in the Storming stage?
   c. A team member if the team is in the Norming stage?
   d. An ideal team member if the team is in the Performing stage?
   e. A team member if the team is in the Performing stage, and the member is a hijacker?
   f. A team member if the team is in the Performing stage, and the member is a hitchhiker?
   g. A team member if the team is in the Performing stage, and the member is an isolationist?
   h. A team member if the team is in the Performing stage, and the member is an enabler?
4. When should a team member who is not performing properly and is not changing their behavior have to leave the team?
   a. Is it all right to have a team member who does not pull their weight, because they can't?
   b. Is it all right to have a team member who does not pull their weight, because they won't?
   c. What if the team member is an isolationist?
   d. What if the team member is an enabler?
   e. What if the problem team member is the leader?

7. References

[1] B. Oakley. It Takes Two to Tango: How "Good" Students Enable Problematic Behavior in Teams. *Journal of Student Centered Learning* 1(1), Fall 2002, pp. 19–27.

Management Strategies



#resource module: #teammanagementstrategies

Learning outcomes

By the end of this module, you should demonstrate the ability to:

- Describe several strategies that can be used to address common problems that arise in undergraduate (and professional) design teams
- Apply strategies to address some common situations that occur in teams

Recommended reading

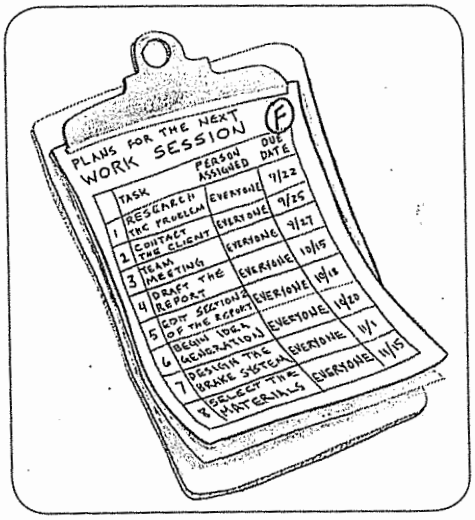
Before this module:

- **Implementing a Project > Working in Teams > 5. Managing Teams**

After this module:

- **Implementing a Project > Working in Teams > 7. Sample Team Documents**

1. Strategies for Dealing with Task and People Problems



This module will describe strategies for dealing with task problems and people problems on undergraduate design teams. In industry similar strategies are used to deal with task and people problems. Here we have adapted industry practices to address some of the most common issues that arise in undergraduate design project teams.

Problem: Everyone is responsible for everything, and nothing is getting done.

Strategy: Avoid the "6-year-olds-playing-soccer" problem (i.e., everyone running for the ball). Instead, play positions. Make sure you have a clear task list and each task has a lead person who is responsible. Others may help with a task, but you should have one person who is assigned to deliver on each task. When you develop

your action items for agendas think of them not just as assignment of tasks, but assignment of responsibility. Avoid task lists that read:

1. Researching the problem: everyone
2. Writing the report : everyone

Divide up these large tasks and make sure everyone has a defined piece to contribute. In industry there are many variations on project management methods related to this strategy. One example is a ***RACI matrix,*** which designates different levels of responsibility for each task: Responsible, Accountable, Consulted, and Informed.

Problem: Work delivered late.

Strategy: What to do if one (or more) of the team is delivering their work so close to a deadline that the team leader (or whoever is assigned to compile the document for submission) doesn't have time to do a good job? The most effective strategy is to move up internal deadlines. Everyone on the team needs to deliver their work even earlier. This puts ***slack*** in the schedule, which allows delays without catastrophic consequences. Consider these two scenarios:

Scenario #1: The team agrees to get their document together at 5:00pm the day before the deadline so they can edit and proofread the report before submission. However, one person is running late with their work. Their part took longer to write than expected and when their piece shows up 5 hours late it is not well written. The team is now in crisis. Arguments erupt over whether to rewrite this section, or just leave it as is. Everyone is tired, angry, and resentful. The problem was not with this one team member, the problem was the plan. The team's plan was overly optimistic. It left no room for delays or problems.

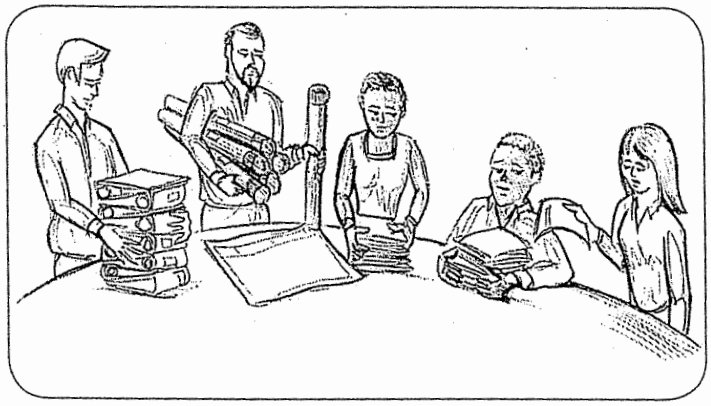
Scenario #2: The team agrees to get their document together at 5:00pm two days before the deadline so they can edit and proofread the report before submission. However, one person is running late with their work. The team rules say that the team will give the person a "final notice" (i.e., a warning that the work must come in now or the rest of the team will begin writing up the missing sections). The final notice is sent at 11:00pm. The person responds by sending a piece of work that is not well written. Now the team has at least 30 hours to decide what to do and remediate the situation. There is time to ask the person to rewrite their section, working with them to support the effort, or implement another plan to address the problem.

It is important that the whole team take responsibility for putting together their work earlier, not just the person who is "always late." Everyone has things that go wrong in their lives from time to time. There will be a time when you are running late with your work too. It is important that you build in some buffering to your team schedule to account for the realities of life. In project management in industry this is called building in slack time and it basically removes from the ***critical path*** tasks that are likely to experience delays.

Problem: Poor quality work is delivered by a team member.

Strategy: We have two suggested strategies for coping with poor-quality work. Both revolve around the philosophy that the person who delivered the poor-quality work should not be rewarded. In engineering school, one of your most valuable resources is time; you never have enough to do everything. A person who delivers poor-quality

work is hoping to save some of their time, at the cost of your time (if you are the person who is expected to "fix" their work).



Strategy #1: ***Time blocking.*** Arrange team work sessions that are 3 or 4 hours in duration. Hold them in a location where people can have access to computers, or can plug in their laptops. Agree on a realistic set of fixed goals for the session (e.g., everyone needs to finish a first draft of their section). If the team all meets the goal early, trade around work, start editing, and then reward yourselves by ending the work session early. Ideally, everyone arrives with their work already done, or partially done, and you can all go home early. But if people are not done, then everyone stays until the work gets done. This type of work arrangement mimics a common strategy used in engineering design companies: the ***war room.*** A war room is a common team workspace used to motivate creativity and productivity. It is based on evidence ***team collocation*** is an effective development strategy [1].

Sometimes when you use time blocking for the first time the team uses the time to build social relationships instead of working. Social relationships are important to team cohesion and shouldn't be underestimated. But it is important to have clear goals to accomplish during the time block, and hold the team to substantial progress on those goals. By practicing this technique repeatedly you will find that the social side becomes secondary to the work productivity as the team moves into norming and performing.

Strategy #2: ***Out-loud editing.*** This is how out-loud editing works: Team member Alice gives her work to team member Bob for editing. Both sit together and Bob starts going through the work explaining, out loud, what his impression of the work is and what needs to be fixed. Bob must do this in a respectful and constructive way. Bob makes changes to the first few paragraphs to demonstrate the process for Alice. After a few paragraphs Bob hands the work back to Alice. Alice now knows what Bob "sees" as he is reading her work. She is given some time to fix it up before submitting it. Bob should also have his work out-loud edited by someone else. Overall this process improves both the writing and the editing skills of everyone on the team. This strategy is based on best practices in feedback techniques. It utilizes specific, constructive feedback to help the writer improve. Ideally (time permitting), each person on the team would go through several out-loud editing sessions during the development of the project.

Notice that in both of these strategies people who produce poor-quality work are neither rewarded (with more free time) nor punished. They are given support to help them accomplish the team goal, and treated with respect. Everyone needs support of this kind at one time or another in their career. Engineers are constantly teaching one another and learning from one another; it is an important part of the profession.

If you have a teammate who is not the best colleague or writer but who is really trying, give them credit for their effort. Make sure you praise your teammates for what

they are doing, and for the energy they are putting into the project. You will work with plenty of people who have a poor attitude and don't make an effort, so make sure you show your appreciation when you work with good people. All of us have areas of strength and weakness, but bringing a good attitude and a willingness to work to a project should be supported.

2. Warning and/or Firing a Team Member

Not all instructors will allow you to fire a team member. However, if they do then firing a team member should be a strategy of last resort. All fair and reasonable attempts should be made to keep the team functioning and keep all of the members actively participating. However, if remediation fails and a team concludes that a member is causing substantial difficulty or repeatedly not contributing, that member can be fired. Typically firing can only occur with the approval of the instructor and must follow a specific procedure. This is the procedure we recommend:

1. The team will issue a warning letter to the person informing him or her of the situation (i.e., that the person will be fired from the team unless change occurs). This letter should be reviewed by the instructor before being sent to the team member. The letter must use a professional tone and cite specific behaviors that the person must change in order to remain part of the team.
2. After the warning letter is sent, the instructor will meet with the team together and, if appropriate, separately with the person who is under warning. The goal of these meetings is to:
   a. Determine what, at a minimum, the team member must change to be retained. The instructor will act as a mediator in this discussion, but will also be allowed to veto requested behavior changes if he or she feels the request by the team is excessive or inappropriate (i.e., vindictive).
   b. Work with the person under warning to develop strategies to allow him or her to meet this minimum (and preferably exceed the minimum) requirements necessary to remain on the team. Identify if there are underlying problems (personal crisis, health problems) that are affecting the person, and help them to connect with appropriate services on campus.
   c. Determine if the person does not intend to change the behavior that is causing the problem.
3. If the person refuses to meet with the instructor, or ignores requests for a meeting, the team may proceed with the firing procedure subject to approval by the instructor.
4. If the situation persists, or if the person has refused (or ignored) the request to change the behavior, the instructor may approve the firing. This approval shall be in writing and shall be copied to other administrators if necessary.
5. The team may then inform the person that he or she is fired. This is done in a letter copied to the instructor. The letter shall be reviewed with the instructor prior to sending it. The letter must have a professional tone, and should be short and to the point. The letter shall state the specific date on which the team member is officially fired. The letter shall briefly cite the reasons for the dismissal.

Note: For the purposes of this procedure, a "letter" may be a properly formatted email

We recommend: Allowing a student who is fired from a team to be be hired by another team in order to finish out the course. However, it is the responsibility of the student to find a team willing to hire him or her. The student will receive a **zero** for any assignments that were not accomplished because the student was not part of a design team after being fired. Work submitted for a team assignment that has been developed solely by the fired student, in the absence of the team's contribution, will not be acceptable.

We have found that a clear, well-written warning letter is often sufficient to get a person back on track and contributing, at least minimally, to the project.

3. Quitting a Team

Not all instructors will allow you to quit your team. However, if they do then quitting a team is a strategy of last resort. All fair and reasonable attempts should be made to keep the team functioning and keep all of the members actively participating. However, if remediation fails and you have substantial cause, you can quit your team. You can only quit with the approval of the instructor and must follow a specific procedure. Here is the procedure we recommend:

1. You will issue a warning letter to your team informing them of the situation (i.e., that you are ready to quit the team unless change occurs). This letter shall be reviewed with the instructor before it is sent. The letter must use a professional tone and cite specific behaviors that the team must change in order for you to stay.
2. After the warning letter is sent the instructor will meet with the team together and, if appropriate, separately with the person who is considering quitting. The goal of these meetings is to:
   a. Determine what, at a minimum, the team must change to retain the team member. The instructor will act as a mediator in this discussion but will also be allowed to veto requested behavior changes if he or she feels the request is excessive or inappropriate (i.e., the instructor will act as the judge of what is reasonable).
   b. Work with the person who is considering quitting to develop strategies that allow him or her to have needs met within the team.
   c. Determine if the team does not intend to change the behavior that is causing the problem.
   d. If the team is unwilling to change to retain the team member, the team member may quit, subject to approval by the instructor.
3. The approval from the instructor shall be in writing and shall be copied to other administrators if necessary.
4. The team member may then inform the team that he or she is quitting and give a specific date when this will occur. This is done in a letter copied to the instructor. The letter shall be reviewed with the instructor prior to sending it. The letter must have a professional tone, and should be short and to the point. The letter shall briefly cite the reasons for the departure.

Note: For the purposes of this procedure, a "letter" may be a properly formatted email.

We recommend: Allowing a student who has quit a team to be hired by another team and finish out the course with the new team. However, it is the responsibility of the

student to find a team willing to hire him or her. The student will receive a **zero** for any assignments that were not accomplished because the student was not part of a design team at the time of the assignment due date. Also, the quitting student must leave copies of any work developed for the project up until their departure date with their team to use.

Work submitted for a team assignment that has been developed solely by an individual student, in the absence of the team's contribution, will not be acceptable.

4. Conclusion

Remember, a team is not simply the sum of its parts. Highly successful teams are able to leverage the differences in people's abilities and styles to be productive. Working in teams can be a challenge but they can also be a fun and effective way to produce high quality work. The strategies provided in this module should help you and your teammates work together effectively. Learning team skills will provide you with valuable knowledge for success in university or college and in your career.

KEY TERMS

RACI matrix **slack** **critical path**
time blocking **war room** **team collocation**
out-loud editing

5. Questions and activities

1. Try using time blocking with your team. How does working together for a few hours change the team dynamic? Did the focused activity allow you to get more done?
2. Analyze your work breakdown schedule (WBS), (i.e., your list of tasks to complete a project):
   a. Are the tasks small enough? Is there one person who is the lead, responsible for making sure that task is completed?
   b. If you are working with project management tools, such as a Gantt chart, check the resource allocation to make sure work is evenly distributed across the team.
   c. Check the Gantt chart or your schedule; have you built slack into the schedule to allow for late work delivery? Does the team have a strategy (i.e., team rules) for dealing this possibility?
3. Use out-loud editing with a teammate and then listen while they out-loud edit your work. When listening, don't argue about the points they are making, just listen. When necessary, ask clarifying questions to make sure you understand clearly their perspective.
   a. What did you learn about your writing?
   b. List one or two things you learned that you can use in your writing in the future.

5. References

[1] There are many articles on the effect of team collocation on productivity. One example is S.D. Teasley, L. Covi, M.S. Krishnan, and J.S. Olson, "How Does Radical Collocation Help a Team Succeed?" *Proc. ACM Conf. Computer Supported Cooperative Work (CSCW '00)*, December 2000, pp. 339–346.