

## ***About Teams***

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*More and more, industry is recognising the value of teams in product development, and is therefore recruiting engineers who can function well within a team environment. A 1998 survey of over 700 engineers by EE Times revealed that over 80% of senior engineers are members of a development team, and the majority of those surveyed felt that a team approach resulted in a shortened design cycle and a higher quality product.*

### **Project activities for which teamwork is useful:**

- \* All project activities

### **Other tools that are useful in conjunction with teamwork**

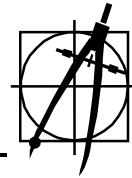
- \* Effective Meetings
- \* Work Breakdown Structure and Schedules

## **Introduction**

In industry today, teams are used to tackle increasingly complex design problems because the diverse knowledge, experiences and styles of individual team members can lead to more creative solutions. Moreover, the aggressive development schedules necessary to succeed in an increasingly competitive global marketplace necessitate the simultaneous rather than sequential execution of project tasks. Teamwork facilitates the learning of skills for each other, as well as an appreciation for different backgrounds and styles, that results in a more satisfying experience for the individual members.

When a group of individuals come together, they generally pass through four stages of development:

- The ***forming*** stage involves learning about each other;
- The process of coming to a mutual understanding of expectations and team processes is considered ***norming***;
- ***Storming*** is working through the inevitable conflict that occurs when working in a team; and
- The ***performing*** stage is the result of a successful team that exemplifies synergy, collaboration, co-operation, satisfaction and accomplishment.



### **Getting the Team Started**

In the forming stage, friends, strangers and enemies come together to create a team. It is important to take some time to learn something about each other before jumping into the project. This process not only reveals some potential areas of interest related to the project but may also highlight some commonalities between team members. People that have something in common tend to feel more comfortable with each other.

There are a number of ice-breaker exercises that can be used in the forming stage. One of the simplest is to develop a list of questions that is used to interview team members. Attachment A provides a sample list of questions.

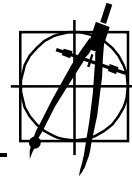
It is during the norming stage that the team begins to define roles and responsibilities, and to agree on team conduct. It is advisable that the team document their expectations in a “contract”, as this document may be useful in later stages if there is any conflict. All team members should sign this document to indicate their support of the contract.

### ***Identifying Roles and Responsibility***

Roles and responsibilities need to be defined early on in a project so there is a clear understanding of mutual expectations. Responsibility does not imply that an individual must execute all the work in their area but rather be responsible to ensure that it is addressed and completed. The following provides a non-comprehensive example of some roles that could be required for a project. Not all roles are necessary and members may take on multiple roles.

- Team leader
- Product design engineering
- Technical writing
- Manufacturing
- Software design
- Maintenance and repair
- Safety
- Scheduling
- Performance tracking
- Technical marketing
- Product management
- Material specialist
- Materials procurement
- Systems design
- Reliability engineering
- Human factors
- Budgeting
- Quality control
- Marketing communications
- Technical drawing
- Industrial designer
- Hardware design
- Test engineering
- Contract management
- Training
- Project management
- Stakeholder communications

The team leader can be one person or multiple persons as is done in some teams where the leadership comes from the most involved function in any given key phase of a project. For example, a marketing person may lead the project during the initial stages, then pass the leadership role onto a product design engineering during the design phase.



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This role is then passed on to test engineering and manufacturing in subsequent phases of the project. Some of the qualities to look for when selecting an effective leader include:

- a working knowledge of technical issues;
- process management skills including consensus building and conflict resolution;
- good communication, listening and interpersonal skills;
- assertiveness, determination and persistence; and
- creative and open to change.

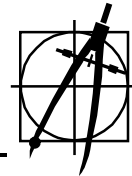
### ***Team Conduct***

There are numerous aspects of team conduct to consider when working together as a team. The aspects most relevant to the team should be agreed upon and included in the team contract. The team may find that the rules of team conduct need to be modified as the project progresses. This is acceptable as long as there is consensus on the modifications and they are documented. The following provides some examples of items to be considered:

- team product and project vision/goal;
- decision making including which decisions will be consensus-based;
- when and how to seek feedback from team members;
- time commitments;
- meeting times, conduct and attendance;
- methods of communication within the team and with key stakeholders outside the team;
- deadlines;
- when and how to get help;
- conflict resolution; and
- consequences if commitments are not honoured or the rules of team conduct are violated.

### **Decision-making**

There are many approaches teams can use to make decisions. The method used depends on the circumstances under which a decision has to be made. If it doesn't matter which option is chosen, leaving it to **chance** by flipping a coin is sometimes the quickest and easiest method. Some decisions are made by a **single person** because they have the authority to do so. Sometimes **democratic** methods are used where team members vote



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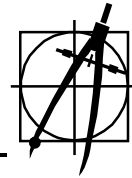
and the majority rules. If a decision is extremely critical, a **unanimous** decision may be warranted. In some situations, decisions are left to a **sub-set** of the team that has the appropriate expertise to make a decision in a given area. The decision-making method used by teams the majority of the time when faced with important decisions is **consensus**. Keep in mind that all decisions do not need to be made by consensus. It is best to adopt the most appropriate method for the decision that needs to be made.

### ***Decision-making by Consensus***

Decision-making by consensus can be more time consuming and difficult than other methods of decision-making. However, this method will result a decision that can be supported by **all** team members. Consensus is not unanimity and will not be optimal for each individual but will result in workable solutions. Consensus is the accepting of the final decision based on evaluating all the relevant factors.

The following are some guidelines that can be followed when attempting to reach a decision by consensus:

- Allow everyone to express their opinions in a clear manner while the rest of the team actively listens;
- Team members should ask questions of one another to ensure they understand each others' perspectives;
- Do not indicate support of a decision in order to avoid conflict or to reach an agreement. You must only agree if you do support the decision;
- Don't switch to another decision making process (e.g., democratic vote, chance, etc.) if there is difficulty reaching consensus. This will only result in a segment of the team that has to live with a decision that they don't support;
- If a deadlock is reached, employ creativity to develop other alternatives which everyone can support; and
- Don't avoid expressing differences of opinion. Healthy, non-personal conflict often leads to the discovery of more information and creative ideas which in turn leads to better solutions.



### **Resolving Conflicts**

*“Resolving these conflicts is a day-to-day part of any collaboration, and the vital thing to understand is that nobody has the monopoly on good ideas, and that almost any idea can be improved. If you keep the focus on the story as a whole, and making it as good as it can possibly be, then you’re willing to change or even abandon an idea when a better one comes along. Professionals don’t become emotionally attached to a plot twist”. (Author’s note by Larry Bond on his collaboration with Pat Larkin writing “Day of Wrath”).*

Although conflicts are often viewed negatively, they are inherent aspects of team work and provide benefit to the team. Healthy conflict helps reveal deficiencies in potential solutions and avoids wasting time on flawed solutions subsequently leading to superior designs. Conflict will also identify problems in project processes that, if addressed, will increase the performance of the team and the satisfaction of its members.

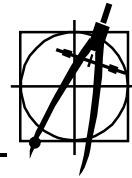
### **Using Conflict as an Advantage**

To use conflict effectively, consider the following guidelines:

- Don’t be confrontational or antagonistic when providing constructive feedback;
- Focus on the recommendations, not the person making them;
- Objectively view criticism as valuable input, not as a personal attack;
- Don’t use judgmental language (e.g., “That is a dumb idea”); and
- Above all, remember that the purpose of conflict is to develop the best ideas possible that will hold up under the scrutiny of people outside of the team.

### **Feuds**

Feuding or disagreeing for the sake of disagreeing is not healthy conflict and should be dealt with expediently. It may not be possible to end the feud because the source may be external to the team however it is important to find a way to prevent the feud from impeding the progress of the team. A good starting point is to let the feuding team members know the impact they are having on the team. You may want to enlist the help of someone external to the team, such as a supervisor. If the feuding is dominating team meetings, ask that these discussions take place outside of the meeting or employ a round-table approach to ensure everyone has a chance to contribute.



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### **Feedback**

Feedback can lead to conflict if it is not handled well. Exchanging useful feedback demonstrates that team members care about each other and are focused on improving the effectiveness of the team. The following points provide some guidance on providing feedback to team members.

- Give feedback at an appropriate time and place. Timely feedback has more impact than if it is delayed. If feedback is positive, it is appropriate to recognize the recipient in the company of the rest of the team. Negative feedback should be expressed in private with adequate time to allow the recipient to respond;
- Treat the recipient with the same degree of respect you would desire for yourself;
- Describe the specific circumstances or behaviour;
- Don't generalise or exaggerate;
- Speak for only for yourself; and
- Talk first about yourself, not the recipient (e.g., "I feel that the last two team meetings were getting disruptive because of unrelated issues being discussed and causing us to become side-tracked from what we need to accomplish" versus "You are always talking about other stuff in our meetings and we can't get anything done").

### **Team Check-up**

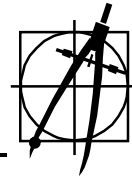
All teams should periodically perform a team assessment within the first couple of months of coming together. The absence of problems in a team does not guarantee that it is running as effectively as possible and a self-assessment will help the team continuously improve. This assessment is important for diagnosing specific problems if the team is dysfunctional in any manner. Attachment B provides examples of effective and dysfunctional teams and Attachment C provides a team assessment checklist.

Before completing the team assessment checklist, determine within the team if the comfort level is such that the members feel comfortable discussing their answers with one another. If this is not the case, ask an impartial third party to collect the checklists, and provide collated results for each question and for the survey as a whole.

Considering the responses to the checklist and relevant examples, use the observation/discussion guide questions to identify team strengths and weaknesses. Identify and agree upon action items that will increase the effectiveness of the team. Maintain a record of the "check-up" as a baseline to compare to subsequent uses of the checklist to evaluate the progress of the team.

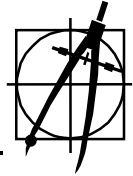
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### References

- Bellinger, Robert, *Working Together*, EE Times, 1997.  
<http://www.eetimes.com/salarysurvey/teams/teams.html> (Retrieved February, 2002)
- Consensus Decision-Making*, DRM Associates.  
<http://members.aol.com/drmassoc/consensus.html> (Retrieved February, 2002)
- Newstrom, John and Scannell, Edward, *The Big Book of Team Building Games*. McGraw-Hill, U.S.A., 1998.
- Parker, Glenn M., *Cross-Functional Collaboration*.  
<http://www.deming.eng.clemson.edu/pub/tqmbbs/tools-techs/crosfun.txt> (Retrieved February, 2002)
- Parker, Glenn M., *Cross-Functional Teams: Working with Allies, Enemies & Other Strangers*. Jossey-Bass Publishers, San Fransisco, California, 1994, pp. 61-65, 161-163.
- Parker, Glenn M., *Quick Team Check*. <http://www.glennparker.com/Freebees/quick-team-check.html> (Retrieved February, 2002)
- Popick, Paul R. and Sheard, Sarah A., *Ten Lessons Learned from Implementing Concurrent Engineering and IPTs*, INCOSE Technical Proceedings, 1997.
- The Team Memory Jogger™*, GOAL/QPC and Joiner Associates Inc., 1996.
- Tool and Manufacturing Engineers Handbook - Volume 6: Design for Manufacturability*, (Editor: Bakerjian, Ramon). Society of Manufacturing Engineers, Dearborn, Michigan, 1992. pp. 4-2 – 4-3.
- Ullman, David G., *The Mechanical Design Process*, McGraw-Hill, USA, 1997. pp. 79-81.
- Willard, Bob, *Ideas on Teams and Teamwork*, IBM Canada Ltd., 1993,  
<http://www.strategyZreality.com/resources/teamresources.html> (Retrieved February, 2002)



**Attachment A**

**Team Icebreaker Exercise**

***Getting to Know Your Team Members***

*The team members interview each other in turn to discover the information as outlined in the list below. When everyone has been interviewed, pick the most interesting thing about each person and use this to introduce each of your team members to the rest of the class. For this exercise, team members should take turns being the Interviewee, Interviewer, Note taker and Introducer.*

Name

Engineering “Speciality”

Job (if applicable)

Hometown

Hobbies

Favourite Course

Favourite (or Dream) Vacation

Best Accomplishments

- Childhood
- At University
- Work or extracurricular

Most Memorable Moments

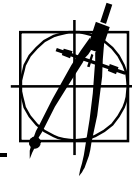
- Childhood
- At University
- Work or extracurricular

Favourite Color

Favourite Holiday

Favourite Food(s)

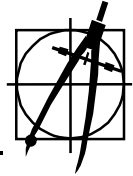




**Attachment B**

**Characteristics of Effective and Dysfunctional Teams**

<b>Effective Teams...</b>	<b>Dysfunctional Teams...</b>
<ul style="list-style-type: none"><li>• are committed to clearly understood and shared goals/vision</li><li>• have members appropriate to the team's purpose</li><li>• cultivate a trusting and comfortable environment</li><li>• promote open and honest communication</li><li>• recognize and express appreciation for superior performance</li><li>• share ideas to improve any aspect of project processes</li><li>• respect one another</li><li>• share pride in accomplishments</li><li>• constantly strive to learn and improve</li><li>• encourage creativity and risk-taking</li><li>• openly address conflicts and resolve them in a civilized manner</li><li>• make decisions by consensus</li><li>• have clear expectations about the roles assumed by each team member</li><li>• distribute work equitably</li><li>• share leadership</li><li>• embrace the value of diversity in styles (contributor, collaborator, communicator, challenger)</li><li>• periodically assess the effectiveness of the team and address any issues</li><li>• plan and conduct effective meetings</li></ul>	<ul style="list-style-type: none"><li>• cannot easily describe the team's goals</li><li>• have unproductive or uncomfortable meetings</li><li>• have lots happen with little accomplished</li><li>• talk a lot but communicate little</li><li>• don't confront conflict and discuss differences in side meetings</li><li>• usually have decisions made primarily by a subset of the team</li><li>• have a lack of trust that impedes open communication</li><li>• are often confused or in disagreement regarding responsibilities</li><li>• have too many members with the same style</li><li>• may have hindered progress due to stakeholders outside the team not co-operating</li><li>• don't perform periodic team assessments</li></ul>



Attachment C

**Team Assessment Checklist\***

**Directions:** Please review each factor. Then indicate the extent to which you agree that it is true about your team according to the following scale:

1. *Strongly Disagree*
2. *Disagree Somewhat*
3. *Neither Disagree nor Agree*
4. *Agree Somewhat*
5. *Strongly Agree*

Place the number of your response in the space to the left of the statement.

- \_\_\_\_\_ 1. Goals: We have clear performance objectives.
- \_\_\_\_\_ 2. Climate: The atmosphere is informal and relaxed.
- \_\_\_\_\_ 3. Roles: Everyone is clear about what is expected of them on the team.
- \_\_\_\_\_ 4. Participation: Everyone participates in team discussions and decisions.
- \_\_\_\_\_ 5. Resources: The team has sufficient resources to do the work.
- \_\_\_\_\_ 6. Communication: Members feel free to express themselves on all issues.
- \_\_\_\_\_ 7. Support: Management provides a sufficient degree of support for the team.
- \_\_\_\_\_ 8. Meetings: Team meetings are well planned and carried out.
- \_\_\_\_\_ 9. Interfaces: The team has effective relationships with key people outside of the team.
- \_\_\_\_\_ 10. Conflict: Disagreements among team members are resolved quickly and effectively.

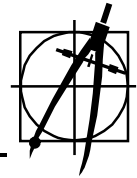
Total Score: \_\_\_\_\_

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\* Used with the permission of Glenn M. Parker

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### ***Interpreting Your Results***

#### *37 - 50=High Performance*

The internal dynamics of the team are positive and should be continued. However, the enemies of high performing teams are complacency and stagnation.

Therefore, your team should spend some time identifying the factors (e.g., leadership, training, support) that produced these excellent results. Then, plan to invest in these factors.

#### *23 - 36=Average Performance*

The team is doing well, but performance improvements are needed. Analyze the specific results for each of the ten areas. Identify the areas where your scores were low, analyze the causes of the situation and develop a plan to address the issues.

#### *10 - 22=Below Average Performance*

The team needs to take a hard look at the results. Develop a plan that includes short-term actions that can produce immediate results and provide incentive to address the long-term issues dealing with the team's fundamentals.

### ***Observation and Discussion Guide***

- 1.What do we do well? What things should we preserve?
- 2.What needs to be improved?
- 3.What should we do about the things that need to be improved?