

TIDEE

Transferable Integrated Design Engineering Education



Professional Development

Section 1: Team Development

This section includes:

- **Providing Data for Team Formation**
- **Creating a Team Identity**
- **Establishing a Team Contract**
- **Raising the Level of Team Performance**

These activities provide the necessary tools to evaluate and form effective teams. The first activity, *Providing Data for Team Formation* allows you the opportunity to examine your Hermann Thinking Quadrant preferences. This information is helpful in assisting with the composition of a diverse design team.

The second activity, *Creating a Team Identity*, involves creating a logo for your team. Although the design of a logo is important, the ability of your team to distill what makes your group unique is key to this exercise. Moreover, your cooperation as a collective unit sets the stage for collaboration on larger scale projects in the future.

Establishing a Team Contract develops an instrument that can provide checks and balances for the team. Group members write this contract together. As such, the “buy-in” from members is part of the process. Moreover, expectations about internal interaction as well as deliverables can be incorporated into the contract, thereby clarifying the roles each member is to perform.

The concluding activity, *Raising the Level of Team Performance*, familiarizes you with the stages of team development including forming, storming, norming, and performing in order for you to assess your current level of performance and prepare the way to increase your performance.

Activity: Providing Data for Team Formation

Appropriate team composition is crucial for team success. Teams must have expertise and member chemistry necessary for effective team function and competent completion of the team's assignment. For optimal team formation, relevant data must first be collected to understand capabilities, interests, and resources provided by each potential member. This activity guides data collection for team formation.

Objective: Participants identify requirements for composing effective teams and provide personal data necessary for making team assignments.

Tasks

1. As individuals, complete the Design Task Preferences worksheet and identify your thinking quadrant (A, B, C, and D) scores.
2. As individuals, review the list of potential projects available for team assignment.
3. In groups of two or three, develop a list of criteria for members assigned to a design project team. Members assigned to a design project team should:
 -
 -
 -
 -
 -
 -
4. As individuals, complete the Team Member Qualifications and Interests form.

Deliverables

1. Each group reports an important criterion for matching a person to a design team.
2. Each person reports an insight you gained from this activity.

Criteria for Success

- Participants are able to identify relevant criteria for placing people on design teams.
- Everyone gains a meaningful insight about themselves or team formation.

Resources

- Worksheet: Design Task Preferences (Hermann Model)
- Worksheet: Team Member Qualifications and Interests
- Your past experience in working on teams
- 5 minutes of group discussion time

Worksheet: Design Task Preferences (Hermann Model)

The **things you enjoy doing** determine how you work alone and with other team members. This worksheet provides you an opportunity to inventory your own task preferences.

For each half of the page, please hide the left (letter) column and **check up to 30 items** that in the right (descriptor) column that fit you and your interests with respect to design. Tally checks for each letter.

A: _____ B: _____ C: _____ D: _____

√	Task Descriptor	√	Task Descriptor
C	Continuously teaching yourself/others new techniques	C	Cultivating enthusiasm
A	Comparing alternatives	D	Brainstorming wild and crazy ideas
D	Creating an imaginative work environment	C	Encouraging/training coworkers in new technology
A	Drawing inferences from statistical information	B	Synchronizing product and process design
B	Developing checklists	D	Redefining old problems with new insights
A	Formulating reasoned, analytical approaches	C	Enjoying teamwork
D	Conceiving new approaches to design problems	A	Computing benefits and costs of solutions
C	Working toward synergy rather than compromise	C	Maintaining ethics and values
A	Generating quantitative results	D	Framing problems in new formats
D	Drawing solutions from fields outside engineering	B	Tracking project expenditures
A	Taking principles and data to logical conclusions	C	“Seeking first to understand, then to be understood”
C	Sharing goals and experiences	C	Selling solutions and ideas
A	Verifying assumptions and arbitrary parameters	B	Debugging computer programs
D	Using crazy ideas as triggers to innovative concepts	C	Sensing customer needs
A	Writing project proposals and technical reports	D	Leading with vision; seeing the whole picture
B	Checking drawings for errors	B	Issuing change orders and tracking design changes
B	Checking specifications against codes	A	Separating factual data from opinions
A	Writing computer programs	C	Using senses and intuition to define the design problem
B	Drafting bills of material	D	Creating new models of system behavior
C	Communicating effectively at all stages of design	C	Involving implementers of solutions in their creation
B	Expediting design details	D	Leading teams to innovative solutions
D	Developing several competing design alternatives	A	Performing preliminary engineering analysis
B	Following design procedures	B	Producing “as built” drawings
B	Linking complex project plans and schedules	D	Looking for innovation and breakthrough ideas
A	Applying mathematical models	C	Developing environmentally benign concepts
B	Organizing and scheduling design projects	A	Calculating specifications
D	Sketching possible design solutions	D	Presenting results in imaginative ways
A	Generating predictions based on math models	B	Collecting and safe-guarding project records
B	Taking action to implement design plans	A	Solving mathematical equations
A	Evaluating and optimizing conceptual designs	D	Recognizing opportunities for improvement
B	Updating software; scheduling required training	C	Seeking win-win solutions that benefit all parties
C	Being sensitive to team members’ feelings	D	Visualizing new connections or arrangements
C	Brainstorming concepts with teams	A	Quantifying criteria for solution evaluation
B	Supervising design drafters	D	Synthesizing solutions from other engineering fields
A	Drawing physical and mathematical analogies		
D	Developing metaphors for projects and goals		
C	Building effective relationships with all customers		
B	Optimizing procedures		

Activity: Creating a Team Identity

Any team (or organization) has an identity – whether implicitly or explicitly stated. Oftentimes names, logos, taglines, and/or trademarks are used to create powerful images about the mission and/or quality of a team. These images “sell” the team to the outside world and can also help shape attitudes and actions of team members. In this activity, you will create identifiers that communicate important qualities, attributes, and values to represent your design team.

Objective: Teams create names and logos that define and communicate their collective team identity.

Tasks

1. Assign roles to members of your team to support this creative activity.
2. Read the attached handout for background about logos and their purposes.
3. List unique features about your team, including items such as:
 - a) The focus and scope of your team’s project mission
 - b) Team members’ interests, expertise, or personal experiences
 - c) Qualities or values important to team members
4. Select a team **name** that represents all members.
 - a) Brainstorm without judging to maximize creative ideas
 - b) Synthesize and/or select the name that best describes your team collectively
5. Develop a team **logo** to represent your team.
 - a) Brainstorm for symbols or logos that attractively depict the team and its name
 - b) Select and refine the logo that best represents your team

Deliverables

1. Reporter shares with the class:
 - a) A team name to represent your team in this project assignment
 - b) A logo concept that will represent your team
2. Reflector shares with the class an insight gained from this activity
3. Homework (team): A team name and refined logo, with explanation of their origins

Criteria for Success

Team name and logo are attractive, motivating, and representative of the team.

Resources

- Handout: Creating Logos
- 15 minutes to read background material, discuss ideas, and design logo

Handout: Creating Logos

Organizations from non-profit groups to multi-national conglomerates rely on a logo as part of their marketing strategy. A logo can serve as a very powerful symbol. For example, Nike, McDonald's and Coca-cola have successfully ingrained their logo in the minds of much of the world's populace. Nike, for its part, has such high brand awareness of the "swoosh" symbol that it often uses it by itself – *sans* the company name.

In the following figure, consider the logo for the Boeing Company. Identify characteristics of the logo that you believe convey key information about the firm. Why do you think the firm settled on this symbol? How does it connect with the firm's business?



As your team considers its own logo, it is important to convey your group's persona. What qualities and values about your team do you want to present? Are you adventurous, secure, expert, or artistic? What technology areas do you represent? Brainstorm attributes of your group to bring to the surface qualities that describe your individual members and the group as a whole. Keep in mind color and font styles. Both give an impression on how others perceive the logo. The credibility of a firm is one reason businesses spend effort and money on developing a symbol (and sometimes tagline) that provides a good reflection of the firm. As you examine your team, put your "best foot forward" to develop a logo that captures the team's essence.

Be creative and professional in your design. As an engineer you might not be called on to take the lead in marketing. Even so, your ability to distill the attributes of a group or a product into important points will serve you well. In the activity, *Creating a Team Identity*, build a logo for your group – keeping in mind some of the tactics that high profile organizations have used to capture the eyes and minds of the public.

Activity: Establishing a Team Contract

Teams perform best when everyone understands and commits to fulfilling their responsibilities to a team. To this end, a team contract provides a valuable tool for defining member responsibilities, gaining commitments to responsibilities, and establishing procedures to ensure that responsibilities are met. In this activity, you will work with your team to establish a contract that supports success for your project.

<p>Objective: Develop a team contract that establishes a framework for member performance and accountability in concert with the team's objectives.</p>

Tasks

1. Assign team roles that support this activity.
2. Consider for a moment any teams you have observed closely or teams on which you have participated. With other members of your present team, list attributes of teams that made them successful or unsuccessful. Record these on the Attributes and Motivators for Teams worksheet.
3. On the same worksheet, list conditions, incentives, or values that serve as motivators for team members to fulfill (or not fulfill) their responsibilities to a team. Refer to the NSPE codes of ethics handout and any personal codes/creeds that guide your behavior.
4. Using the Outline for Team Contract worksheet, identify the principal points that your team plans to include in your team contract. Refer to the Contract Issues to Consider handout.

Deliverables

1. The team Reporter presents:
 - a) A 2-minute summary of your team contract's "high points"
 - b) Team homework (due at next class): A Team Contract, signed by team members.
2. The team Reflector reports:
 - a) A benefit of this activity accrued to team members
 - b) An insight gained personally through this activity.

Criteria for Success

- Consensus member expectations that support team success are articulated clearly.
- Team members recognize the value of having expectations stated.
- Team members gain increased understanding of teamwork.

Resources

- Personal experiences with teams and accountability
- Worksheet: Attributes and Motivators for Teams
- Worksheet: Outline for Team Contract
- Handout: NSPE Code of Ethics
- Handout: Contract Issues to Consider
- 15 minutes of team time

Worksheet: Attributes and Motivators for Teams

ATTRIBUTES OF SUCCESSFUL/UNSUCCESSFUL TEAMS

Successful

Unsuccessful

MOTIVATORS OF SUCCESS

Team Motivators

Personal Motivators

Other Motivators

Worksheet: Outline for Team Contract

Statement of Team/Project Objective

Core Values of Team

Project Stakeholders and Relationships

Performance Expectations

Response to Noncompliance

Handout: NSPE Code of Ethics

National Society of Professional Engineers: Code of Ethics for Engineers

Preamble

Engineering is an important and learned profession. As members of this profession, engineers are expected to exhibit the highest standards of honesty and integrity. Engineering has a direct and vital impact on the quality of life for all people. Accordingly, the services provided by engineers require honesty, impartiality, fairness and equity, and must be dedicated to the protection of the public health, safety, and welfare. Engineers must perform under a standard of professional behavior that requires adherence to the highest principles of ethical conduct.

NSPE Code of Ethics for Engineers Engineers' Creed

As a Professional Engineer, I dedicate my professional knowledge and skill to the advancement and betterment of human welfare.

I pledge:

To give the utmost of performance;

To participate in none but honest enterprise;

To live and work according to the laws of man and the highest standards of professional conduct;

To place service before profit, the honor and standing of the profession before personal advantage, and the public welfare above all other considerations.

In humility and with need for Divine Guidance, I make this pledge.

Adopted by National Society of Professional Engineers, June 1954

I. Fundamental Canons

Engineers, in the fulfillment of their professional duties, shall:

1. Hold paramount the safety, health and welfare of the public.
2. Perform services only in areas of their competence.
3. Issue public statements only in an objective and truthful manner.
4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.
6. Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

II. Rules of Practice

1. Engineers shall hold paramount the safety, health, and welfare of the public.
 - a. If engineers' judgment is overruled under circumstances that endanger life or property, they shall notify their employer or client and such other authority as may be appropriate.
 - b. Engineers shall approve only those engineering documents that are in conformity with applicable standards.
 - c. Engineers shall not reveal facts, data or information without the prior consent of the client or employer except as authorized or required by law or this Code.
 - d. Engineers shall not permit the use of their name or associate in business ventures with any person or firm that they believe are engaged in fraudulent or dishonest enterprise.
 - e. Engineers having knowledge of any alleged violation of this Code shall report thereon to appropriate professional bodies and, when relevant, also to public authorities, and cooperate with the proper authorities in furnishing such information or assistance as may be required.
2. Engineers shall perform services only in the areas of their competence.
 - a. Engineers shall undertake assignments only when qualified by education or experience in the specific technical fields involved.
 - b. Engineers shall not affix their signatures to any plans or documents dealing with subject matter in which they lack competence, nor to any plan or document not prepared under their direction and control.
 - c. Engineers may accept assignments and assume responsibility for coordination of an entire project and sign and seal the engineering documents for the entire project, provided that each technical segment is signed and sealed only by the qualified engineers who prepared the segment.
3. Engineers shall issue public statements only in an objective and truthful manner.
 - a. Engineers shall be objective and truthful in professional reports, statements, or testimony. They shall include all relevant and pertinent information in such reports, statements, or testimony, which should bear the date indicating when it was current.
 - b. Engineers may express publicly technical opinions that are founded upon knowledge of the facts and competence in the subject matter.
 - c. Engineers shall issue no statements, criticisms, or arguments on technical matters that are inspired or paid for by interested parties, unless they have prefaced their comments by explicitly identifying the interested parties on whose behalf they are speaking, and by revealing the existence of any interest the engineers may have in the matters.
4. Engineers shall act for each employer or client as faithful agents or trustees.
 - a. Engineers shall disclose all known or potential conflicts of interest that could influence or appear to influence their judgment or the quality of their services.

b. Engineers shall not accept compensation, financial or otherwise, from more than one party for services on the same project, or for services pertaining to the same project, unless the circumstances are fully disclosed and agreed to by all interested parties.

c. Engineers shall not solicit or accept financial or other valuable consideration, directly or indirectly, from outside agents in connection with the work for which they are responsible.

d. Engineers in public service as members, advisors, or employees of a governmental or quasi-governmental body or department shall not participate in decisions with respect to services solicited or provided by them or their organizations in private or public engineering practice.

e. Engineers shall not solicit or accept a contract from a governmental body on which a principal or officer of their organization serves as a member.

5. Engineers shall avoid deceptive acts.

a. Engineers shall not falsify their qualifications or permit misrepresentation of their or their associates' qualifications. They shall not misrepresent or exaggerate their responsibility in or for the subject matter of prior assignments. Brochures or other presentations incident to the solicitation of employment shall not misrepresent pertinent facts concerning employers, employees, associates, joint venturers, or past accomplishments.

b. Engineers shall not offer, give, solicit or receive, either directly or indirectly, any contribution to influence the award of a contract by public authority, or which may be reasonably construed by the public as having the effect of intent to influencing the awarding of a contract. They shall not offer any gift or other valuable consideration in order to secure work. They shall not pay a commission, percentage, or brokerage fee in order to secure work, except to a bona fide employee or bona fide established commercial or marketing agencies retained by them.

III. Professional Obligations

1. Engineers shall be guided in all their relations by the highest standards of honesty and integrity.

a. Engineers shall acknowledge their errors and shall not distort or alter the facts.

b. Engineers shall advise their clients or employers when they believe a project will not be successful.

c. Engineers shall not accept outside employment to the detriment of their regular work or interest. Before accepting any outside engineering employment they will notify their employers.

d. Engineers shall not attempt to attract an engineer from another employer by false or misleading pretenses.

e. Engineers shall not promote their own interest at the expense of the dignity and integrity of the profession.

2. Engineers shall at all times strive to serve the public interest.

a. Engineers shall seek opportunities to participate in civic affairs; career guidance for youths; and work for the advancement of the safety, health and well-being of their community.

b. Engineers shall not complete, sign, or seal plans and/or specifications that are not in conformity with applicable engineering standards. If the client or employer insists on such unprofessional conduct, they shall notify the proper authorities and withdraw from further service on the project.

c. Engineers shall endeavor to extend public knowledge and appreciation of engineering and its achievements.

3. Engineers shall avoid all conduct or practice that deceives the public.

a. Engineers shall avoid the use of statements containing a material misrepresentation of fact or omitting a material fact.

b. Consistent with the foregoing, Engineers may advertise for recruitment of personnel.

c. Consistent with the foregoing, Engineers may prepare articles for the lay or technical press, but such articles shall not imply credit to the author for work performed by others.

4. Engineers shall not disclose, without consent, confidential information concerning the business affairs or technical processes of any present or former client or employer, or public body on which they serve.

a. Engineers shall not, without the consent of all interested parties, promote or arrange for new employment or practice in connection with a specific project for which the Engineer has gained particular and specialized knowledge.

b. Engineers shall not, without the consent of all interested parties, participate in or represent an adversary interest in connection with a specific project or proceeding in which the Engineer has gained particular specialized knowledge on behalf of a former client or employer.

5. Engineers shall not be influenced in their professional duties by conflicting interests.

a. Engineers shall not accept financial or other considerations, including free engineering designs, from material or equipment suppliers for specifying their product.

b. Engineers shall not accept commissions or allowances, directly or indirectly, from contractors or other parties dealing with clients or employers of the Engineer in connection with work for which the Engineer is responsible.

6. Engineers shall not attempt to obtain employment or advancement or professional engagements by untruthfully criticizing other engineers, or by other improper or questionable methods.

a. Engineers shall not request, propose, or accept a commission on a contingent basis under circumstances in which their judgment may be compromised.

b. Engineers in salaried positions shall accept part-time engineering work only to the extent consistent with policies of the employer and in accordance with ethical considerations.

c. Engineers shall not, without consent, use equipment, supplies, laboratory, or office facilities of an employer to carry on outside private practice.

7. Engineers shall not attempt to injure, maliciously or falsely, directly or indirectly, the professional reputation, prospects, practice, or employment of other engineers. Engineers who believe others are guilty of unethical or illegal practice shall present such information to the proper authority for action.

a. Engineers in private practice shall not review the work of another engineer for the same client, except with the knowledge of such engineer, or unless the connection of such engineer with the work has been terminated.

b. Engineers in governmental, industrial, or educational employ are entitled to review and evaluate the work of other engineers when so required by their employment duties.

c. Engineers in sales or industrial employ are entitled to make engineering comparisons of represented products with products of other suppliers.

8. Engineers shall accept personal responsibility for their professional activities, provided, however, that Engineers may seek indemnification for services arising out of their practice for other than gross negligence, where the Engineer's interests cannot otherwise be protected.

a. Engineers shall conform with state registration laws in the practice of engineering.

b. Engineers shall not use association with a non engineer, a corporation, or partnership as a "cloak" for unethical acts.

9. Engineers shall give credit for engineering work to those to whom credit is due, and will recognize the proprietary interests of others.

a. Engineers shall, whenever possible, name the person or persons who may be individually responsible for designs, inventions, writings, or other accomplishments.

b. Engineers using designs supplied by a client recognize that the designs remain the property of the client and may not be duplicated by the Engineer for others without express permission.

c. Engineers, before undertaking work for others in connection with which the Engineer may make improvements, plans, designs, inventions, or other records that may justify copyrights or patents, should enter into a positive agreement regarding ownership.

d. Engineers' designs, data, records, and notes referring exclusively to an employer's work are the employer's property. Employer should indemnify the Engineer for use of the information for any purpose other than the original purpose.

Handout: Contract Issues to Consider

Contracts are important in that they establish the “rules” for team responsibilities as well as the criteria for evaluating successful project completion. The list that follows is a resource to consider in regards to developing your team contract.

Issues to Address

- Responsibilities to others
- Responsibilities to team
- Commitment to clients
- Public interest
- Professional conduct

Handling Information

- Integrity or honesty
- Quality of records
- Information sharing
- Confidentiality
- Credit/ownership

Team Improvement

- Intellectual improvement
- Positive criticism
- Actions to Consider

Resolving Conflicts

- Personal confrontation
- Team confrontation
- Class/project action

Information Management

- Define ownership
- Establish legal records
- Post information regularly

Team Growth Plan

- Identify needs for growth
- Schedule specific actions
- Follow through
- Document growth

Activity: Raising the Level of Team Performance

Teams often progress through a series of stages from the time they are formed until they reach high performance. These stages of development— forming, storming, norming, and performing— reflect early inadequacies that produce conflicts, followed by adjustments that yield synergistic improvements. In this activity, you will assess your team's present stage of development and plan actions to produce positive growth in team performance.

Objective: Determine your team's current stage of team development and devise a plan to produce positive changes and improvements in performance.

Tasks

1. Assign team roles that support this activity.
2. As a team, list on the Descriptors of Your Team worksheet any words or phrases that reflect how well your team is performing.
3. Review the Stages of Team Development handout, noting differences between successive stages. As a team, identify the stage that best describes your team.
4. On the Steps Toward Team Development worksheet, identify five actions that your team can implement to facilitate team growth in areas most needed.

Deliverables

1. The team Reporter presents:
 - a) Your team's stage of development
 - b) Steps to facilitate needed team growth
2. The team Reflector reports:
 - a) Any areas of team growth that your team has not previously considered
 - b) An insight you gained personally through this activity

Criteria for Success

- Teams recognize the stage of their team's development.
- Teams are able to articulate specific actions that will grow their team's performance.
- Team members increase their understanding of team development.

Resources

- Personal experience in working on this team
- Worksheet: Descriptors of Your Team
- Handout: Stages of Team Development
- Worksheet: Steps Toward Team Development
- 15 minutes of team time

Worksheet: Descriptors of Your Team

Identity and Purpose

Roles and Responsibilities

Attitude and Climate

Resource Management

Reflection and Celebration

Other

Handout: Stages of Team Development

	Forming	Storming	Norming	Performing
<i>Identity and Purpose</i>	The team has a name/identifier but its purpose is unstated or vague.	The team has a name/logo and a general purpose that is not fully agreed upon or owned by members.	The team has a name/logo that fits the team and its assignment; goals are defined by consensus.	The team name/logo focuses and energizes performance; members fully embrace challenging, measurable goals.
<i>Roles and Responsibilities</i>	The team lacks leadership and roles that ensure documentation of results.	The team identifies individuals to lead and to record; expectations are not defined; other roles are not assigned.	The team defines expectations for leadership, recording, and other important roles; members are assigned to roles; members perform roles responsibly.	The team defines roles to support team effectiveness and growth: leader, recorder, reflector, etc. Members serve dependably and skillfully and facilitate other role contributions.
<i>Attitude and Climate</i>	Members may be complacent, disrespectful, or contentious.	Members are generally positive, passively accepting, but may be contentious at times.	Members maintain a positive attitude, encouraging others, being respectful, and avoiding potential conflicts.	Members are inspiring, energized, productive, synergistic; they build others up and turn potential conflicts into growth opportunities.
<i>Resource Management</i>	The team does not use all members, wastes time, and fails to tap available resources.	The team involves all members to some extent, sets deadlines to allocate time; uses of obvious resources.	The team engages all members in important tasks, schedules and monitors tasks for on-time completion, and accesses necessary resources.	Members are assigned for strengths and supported to grow; team and member schedules are set, reviewed, revised; the team taps and focuses varied resources.
<i>Operating Procedures</i>	The team has no defined procedures, has no incentives for quality improvement.	The team defines general procedures to maintain productivity, but has little buy-in from members.	The team defines procedures that guide productive interaction and encourage goal achievement; members comply.	Members embrace, review, revise processes for achieving goals; team and individual rewards are used to encourage quality and improvement.

Worksheet: Steps Toward Team Development

STEPS FOR TEAM GROWTH

Action to Implement

Responsible Person