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Title: Multi-cultural Team Building

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Abstract: This project is to assemble relevant views on diversity and its effect on high-tech team building , covering current literature and interviews on industry trends. The results provide conclusions on proper management styles and a need for more relevant literature. Eleven engineering managers were interviewed about team building.

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Introduction

The rapidly changing demographics of America and move toward a global market is permanently changing the culture of American engineering. This trend toward a more culturally diverse work force demands a more thorough understanding of how it will effect team building. In an effort to assemble relevant views on diversity and its effect on high-tech team building a research project covering current literature and interviews on industry trends was performed. The results provide conclusions on proper management styles and a need for more relevant literature.

Team Building

The process of assembling a group of engineers into a cohesive organization is essential to any engineering manager. Research indicates a need for a thorough understanding of organizational structure, drivers and barriers of performance, and measures of performance. In order to succeed, a manager should grasp these principles as well as the model for managing team performance which ties these tools together.

Cultural Diversity

As a manager develops an understanding of team building he/she will realize that cultural diversity effects many relevant drivers and barriers of performance. Research into diversity provides a thorough understanding of verbal and nonverbal barriers common to multi-cultural environments. The need to understand the meaning of semantics, connotations, or jargon during verbal communication is essential to team performance. Diversity doesn't end with verbal communication a manager must also understand differences in values, body language, and space requirements to effectively manage multi-cultural teams.

Interviews

Eleven engineering managers were interviewed about team building. The interviews covered general team building, drivers and barriers of team building, measures of performance, and how multi-cultural teams changed their style. Review of the interviews developed a list of general trends and practices used in industry. The common style used with multi-cultural teams was to deal with employees individually and avoid immediate application of prejudices or stereotypes.

Conclusions

Based on the literature search and interviews it is apparent that multi-cultural team building is essential to the future of engineering management. The engineering manager should be aware of cultural diversity but learn to deal with problems as they arise. To assist in dealing with multi-cultural teams the engineering manager must develop high quality communication skills and a thorough understanding of nonverbal barriers.

It is also apparent that industry has a need for literature specific to team building of multi-cultural engineering teams, Current literature doesn't provide enough information about the combined subject of team building and the multi-cultural engineering team.

Introduction

Team building is a reality for engineering managers of today. Engineering managers must be able to build effective teams for projects or build teams out of the engineers they've inherited. In either case the manager must construct efficient, productive teams to meet the rising demands that engineering be more productive and faster in their product creation. To meet these demands the engineering manager must construct *and* maintain teams that work together to meet these high performance demands.

In the late 1980's the white male became the minority in the American work force. By the year 2000 it is estimated that new entries into the US work force will be 85 percent white women, immigrants, blacks, Hispanics, and Asians [5]. Cultural diversity will become a reality for all workers, including engineers. It is predicted that by the end of the nineties most new engineering hires will be women or black, Hispanic or Asian men [2]. Engineering managers will be faced with the complexities of managing this diverse work force and attempting to create productive engineering teams from this cultural mix.

This paper will investigate team building, especially as it relates to engineering. This paper will also look at some of the issues that cultural diversity in the work place will create. Potential factors that could become barriers to the successful performance of engineering team will be highlighted and discussed. The purpose of noting these areas of potential difference is not to give the engineering manager preconceived prejudices against any particular ethnic group but the alert the manager to the possibility of misunderstanding and conflict due to cultural differences.

We conducted a survey of professionals in management to get a industry perspective of team building and cultural diversity in engineering. Although the group surveyed was not large enough

to have statistical relevance, the results did highlight three factors that can help build effective engineering teams. These factors are: select team members with appropriate skills, divide project task to match the strength of employees with appropriate tasks, and use goal setting to clearly define the direction of the team. These findings correlate with what we found in the literature research we were able to on team building. The survey also had some interesting results with respect to multi-cultural team building. It was the consensus among the mangers we interviewed that managers should deal with team members as unique individuals and handle problems as they appear. Most mangers felt they should be aware of multi-cultural issues, but prefer to address problems through open communication. These thoughts run a little counter to what we were able to uncover about cultural diversity in the work place. The diversity experts suggest that managers should do a little research on the cultural background of his/her employees so that he would have an idea of were potentials problems could arise and be able to eliminate those problems before they happen.

As a result of the literature research that we did and the survey of engineering managers we formed several conclusions. Team building is a skill that engineering managers will need to be proficient in, he/she will have to develop the leadership, administrative, organizational, and technical skills that are necessary to fabricate and maintain an effective team. The engineering manager will also have to be aware of the increasing cultural diversity in the engineering work force. This will require the engineering manager to develop improved skills in communication, both verbal and non-verbal, and to be able to respect the culture of each individual he/she manages. Our group also felt that more research could be done in the area of cultural diversity in the engineering profession. Much has been done in the general business environment, however that all of what has been uncovered in that research would be applicable to the engineering environment.

A. Literature Research on Team Building

Teams

To be able to discuss team building, it is first necessary to describe what a team is, and the concepts that define it:

> "A team is a small number of people with complementary skills who are committed to a common purpose, set of performance goals, and approach for which they hold themselves mutually accountable [3]."

> "A team...is people whose collective success grows out of their interdependence, not a collection of people who happen to work near one another [11]."

Katzenback and Smith offer the following characteristics of teams [3]:

- Shared leadership roles
- Individual and mutual accountability
- Specific team purpose that the team itself delivers
- Collective work-products
- Encourages open-ended discussion and active problem-solving meetings
- Measures performance directly by assessing collective work-products
- Discusses, decides, and does real work together

A common commitment creates a team, and with this commitment the members can become a unit of collective performance. The best teams spend effort on shaping and exploring a purpose

that belongs to them collectively and individually. A common purpose is then translated into specific performance goals. When commitment is combined with a common purpose and goal, the team is able to achieve high performance. When a team produces definable work-products through the joint contributions of their members, it makes possible performance levels greater than the sum of all the individual bests of the team members.

The Importance of Team Building

According to engineering management researchers Thamhain and Wilemon,

> "Team building is the process of taking a collection of individuals with different needs, backgrounds, and expertise and transforming them into an integrated, effective work unit....The goals and energies of individual contributors merge and support the objectives of the team [9]."

Team building can thus be viewed as the process of creating a team with the characteristics described in the preceding section. Team building is especially important in the context of engineering teams:

> "The outcome of (engineering) projects critically depend on carefully orchestrated group efforts, requiring coordination and integration of many task specialists in a dynamic work environment with complex organizational interfaces. Therefore, it is not surprising to find a strong emphasis on team work and team building practice among today's managers...[9]."
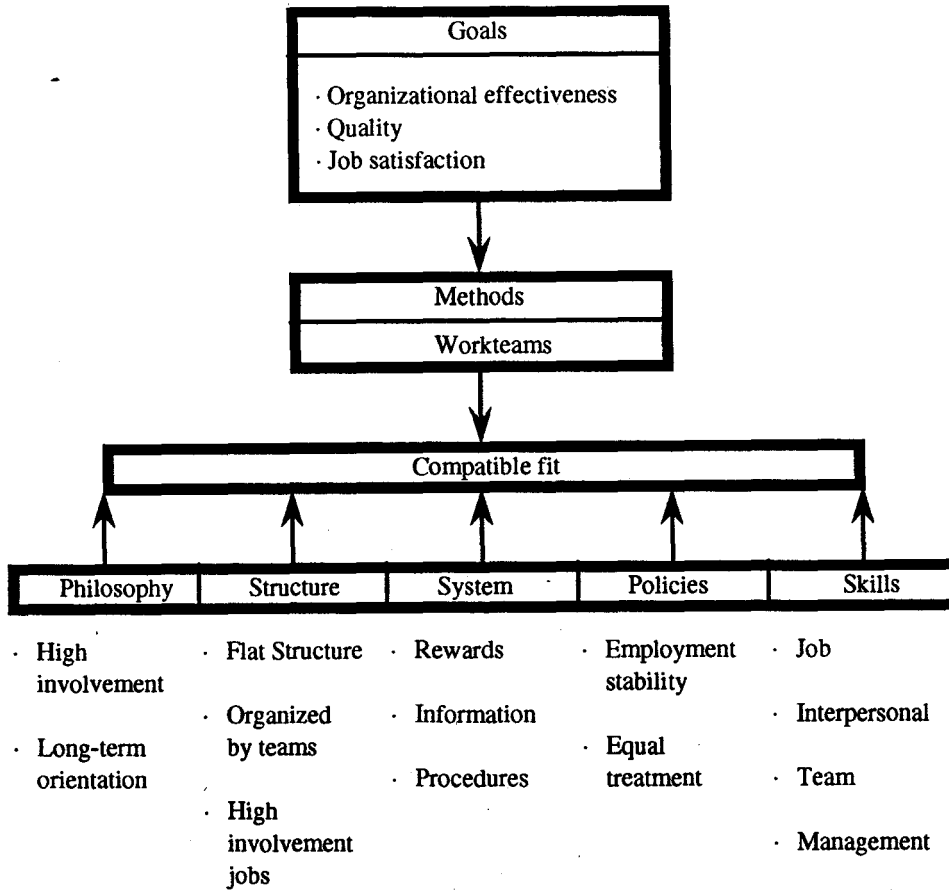
Building Teams

While all members contribute to the process of team building, the responsibility for building excellent teams ultimately lies with the manager:

> "Teams can be effective...and teams can be ineffective. The role of the manager is to increase the effectiveness of teams. ...The manager's role is to take good individuals and make a superb team [11]."

There have been changes in concepts regarding team building, and one of the most significant has been the increased emphasis on helping teams achieve results. In the past there may have been an inappropriate amount of attention paid in early stages to the relationships between people. This led to a possible neglect of work matters. "Now in a team building program, most team facilitators and managers will make sure the team looks both ways: how people are working together and how work is getting done [1]."

Organizational Structures and Processes

The secret to success in implementation of team-based efforts, as identified by James H. Shonk, include organizational structures and processes that support the operation of teams [6]. The following model identifies the culture that is needed as a support foundation for development of teamwork's goals. The top box represents organizational goals, while the next box indicates that teams are used to accomplish the goals. The items represented in the bottom boxes are meant as support of teams and should be compatible with one another. See Figure 1.

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                    ┌─────────────────────────────┐
                    │          Goals              │
                    ├─────────────────────────────┤
                    │ · Organizational effectiveness │
                    │ · Quality                   │
                    │ · Job satisfaction          │
                    └─────────────────────────────┘
                                 │
                                 ▼
                    ┌─────────────────────────────┐
                    │         Methods             │
                    ├─────────────────────────────┤
                    │        Workteams            │
                    └─────────────────────────────┘
                                 │
                                 ▼
          ┌─────────────────────────────────────────────┐
          │              Compatible fit                 │
          └─────────────────────────────────────────────┘
            ▲        ▲          ▲          ▲         ▲
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Philosophy	Structure	System	Policies	Skills

· High involvement	· Flat Structure	· Rewards	· Employment stability	· Job
	· Organized by teams	· Information		· Interpersonal
· Long-term orientation		· Procedures	· Equal treatment	· Team
	· High involvement jobs			· Management

Figure 1

source: TeamBased Organizations: developing a successful team environment

Drivers and Barriers of Team Performance

In his 1992 engineering management text book, Hans Thamhain reports the following key drivers
and barriers of team performance [8]:

Drivers:	Barriers:
Interesting work	Unclear objectives
Recognition/accomplishment	Insufficient resources
Experienced Eng. manager	Power struggle & conflict
Good direction & leadership	Uninvolved management
Qualified team personnel	Poor job security
Professional growth	Shifting goals & priorities

The earlier research on which the above is based mentions mutual trust, security, and open communications, as well as good interpersonal relations among team members as additional statistically relevant drivers of team performance. Furthermore, poor communications was found to be a barrier to team performance.
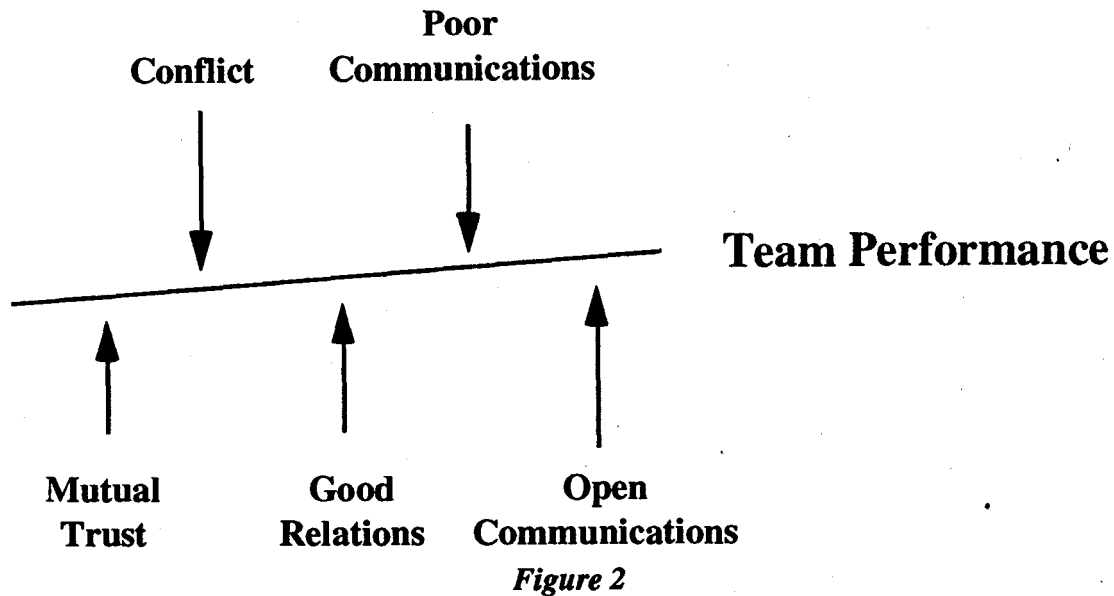
Team Performance and Success

There is a belief that teams and good performance are conjoined and that you cannot have one without the other. To be considered successful, teams need to produce results that directly link team goals to business objectives.

In research conducted during the mid-1980s, Thamhain and Wilemon found that 90 percent of 500 engineering professionals interviewed mentioned three measures as the most important criteria for measuring team performance: **(1) technical success, (2) on-time performance, and (3) on-budget/within resource performance** [9].

A Model for Managing Team Performance

For an engineering manager striving to build high performance in his or her team, the drivers and barriers of team performance can be considered in a force field model (see Figure 2) as shown below. By enhancing the drivers and/or removing the barriers, managers can influence team performance in a positive direction.

Poor
Conflict **Communications**

Team Performance

Mutual **Good** **Open**
Trust **Relations** **Communications**
Figure 2

B. Literature Research on Cultural Diversity

Culture

Culture is defined as a complex whole which includes knowledge, beliefs, art, morals, laws, customs, and any other capabilities and habits acquired by man as a member of a society. The notion of culture is acquired through the process of learning. All cultures in the world, despite many differences, face a number of common problems and share a number of common features.

As we encounter the many different cultural patterns found throughout the world, there is a natural tendency to become overwhelmed by the magnitude of the differences and overlook the commonalties. Perhaps the greatest single obstacle to understanding another culture is ethnocentrism, which is the tendency of people to evaluate another's behavior by the standards of one's own culture and to believe that one's own culture is superior to all others. Cultures should be thought of as integrated wholes that it is, cultures are coherent and logical systems, the parts of which to a degree are interrelated. If we can view cultures as integrated systems, we can begin to see how particular cultural traits fit into the integrated whole. Two particular systems that would affect the relationships among engineering team members are communication, verbal and non-verbal, and cultural values.

Verbal Communication

A common definition of communication is that is the exchange of meaning [7]. Meaning and understanding must be shared by both parties before it can be said that accurate communication has taken place. Any time two or more people are working together on a project or towards achieving a common goal, emphasis is made on the importance of good communication between the involved individuals. Effective communication does not assure the success of a team project, but it has been identified as one of the more significant barriers to team performance. Good and frequent communication between team members enhances team performance, while poor communication is detrimental and often results in poor or failing team performance.

Differences in culture have been identified as a primary source for differences in communication. Language difficulties represent one of the biggest barriers to cross-cultural communication. Some of these difficulties have been identified as slang and jargon, semantics, and connotation. As a result, poor communication is often more pronounced with multicultural teams than it is with teams where team members are from the same culture.

Semantics

One of the first potential barriers of effective communication has to do with semantics. Certain words' meaning can not be literally translated from one language to another. For example, "free market" may require a few sentences of description when an attempt is made to translate it to the language whose culture has not had a free market system and does not have a specific word for it in their language.

Connotations

Another level of language problems has to do with implications of words, or "connotation". For example, a word that may be translated in the English dictionary as meaning "yes", may mean "yes, I am listening," rather than "yes, I agree." If a person is coming from a culture where saying "yes" simply means that you are paying attention to what somebody is saying, an affirming answer such as "yes" does not mean that the person agrees with what is being said or that he or she is agreeing to do what is being asked to do. This has a potential for creating confusing situations in engineering teams, where a team leader may think that he or she got a commitment of a team member, but that team member was simply saying "yes, I am listening to what you are saying."

Jargon, Slang, and Dialects

The language differences that two people may have are heavily influenced by their cultural background. Every culture has its own jargon, slang and dialects that are unique to them [4]. So, it is often that cultures speaking the same language, English for example, can have misunderstandings and "language problems". Engineers in the United States use a lot of jargon

which may not be understood by engineers coming form different cultures, especially if they did not get their engineering degree from a U.S. institution.

Nonverbal Communication

The relevant problems in verbal communication caused by language, accent, and context differs may be apparent to most managers. Nonverbal barriers created by body language, eye contact, or personal space may be unapparent or harder to grasp for most managers. Simple gestures or acts of serving with the wrong hand may be far more offensive to other cultures than any problems created by verbal communication. The manager should become aware of nonverbal barriers and how to deal with them.

Body Language

Studies have shown that body language constitutes as much as 50 percent of the entire communication process [10]. In addition, body language is more important as a communication tool to people from other cultures than to "mainstream" Americans. For example, the standard greeting at business meeting or other event is often a handshake. This not only serves as a greeting or fulfillment of etiquette but also provides a first impression. Since we often form opinions off first impressions, the brisk handshake of a Australian or gentle handshake of a Middle Eastern may leave miss leading impressions. Managers should realize that the handshake is an expression of cultural styles and not a reflection on the employees personality. If understood for its actual meaning, a handshake can be used to match the cultural styles of his employees. Adjusting the strength or style of a handshake can make both parties more comfortable [10]. Common gestures used in America are often viewed vary offensive by other cultures. A manager displaying an "OK" sign, the "thumbs-up" signal, or a "V" for victory maybe shocked by the

reaction of other cultures who find these very offensive. All three signs have sexual connotations for groups as varied as Soviets and Hispanics [10].

Eye Contact

Eye contact creates one of the most interesting context controversies in etiquette. How many times have we heard "it's impolite to stair" or "look at me when I am talking to you." These could be contradictions in terms except for the intended context. The issue of eye contact, how long it should be, and what context it should be in varies throughout the world. Americans generally look to maintain eye contact for 1 second but Hispanics, French, and southern Europeans advocate very direct sustained eye contact. The Asian, native American, and East Indian cultures find it more appropriate to make very minimal eye contact. The average manager should simply realize the cultural context of eye contact and avoid trying to adjust the behavior of an employee or his team [10].

The Meaning of Space

Have you ever had the feeling of your "space" being invaded? The overwhelming sensation that somebody is too close has happened to most people and nobody really enjoys it. This area we maintain around our bodies derives from our natural desire to create and maintain control over who gets near us. The area of space acceptable to most cultures varies from 0 tO 3 feet. Americans seem to land in the middle with a range of 18 inches to 3 feet taking to consideration who is invading the space. Middle Eastern males and Mediterraneâns tend to require the least distance, 0 to 18 inches and Asians require 3 0r more feet. This concept of space is one of the most important nonverbal cultural barriers but fortunately is very easy to understand and respect for most managers [10].

Values

Values form the core of a culture. It is from values that other elements of a culture arise; etiquette, lifestyle, even language are shaped by the values of a society. Some values are consistent among cultures. Few would deny, for example, that the desires for physical comfort and human companionship are universal. Other values are, if not unique to one people, at least ranked differently in its hierarchy of concerns (see figure 3). It is important to have an understanding of culturally diverse values, although we cannot be certain that all members of a group share the same values. However, these differing values can have profound effects on how individuals from different cultures relate to one another.

U.S. Culture	Cultural Contrasts
Individualism	Collectivism
Precise time reckoning	Loose time reckoning
Future oriented	Past oriented
Doing (personal achievement)	Being (personal qualities)
People controlling nature	Nature controlling people
Informality	Formality
Competition	Cooperation
Youthfulness	Old age
Relative equality of sexes	Inequality of sexes

Figure 3

Thinking Patterns

The culture from which a person comes from influences the patterns according to which that person thinks. Literature identifies three main patterns of thinking that different cultures may exhibit: inductive, deductive and relational. These patterns can have significant ramifications in the workplace, especially in the areas of problem solving, which is the basis on engineering work.

interviewee through a discussion of team building and their drivers and barriers. The questions started with a discussion about how team building was performed. This initial conversation would provide information on the understanding and use of team building concepts. After initial conversations about team building, the drivers and barriers commonly encountered were addressed. Team performance and how it was measured was the final subject before multi-cultural issues were addressed. The final questions addressed the whole picture of team dynamics just discussed and how they changed or were affected by multi-cultural teams. The interview questions were provided to each subject at least one day in advance to allow them to prepare for the interview (see Figure 4). Each interview was performed in a one on one format in the interviewees office.

Interview Questions

1. **How do you "build" your engineeering team?**
2. **What factors enhance team effectiveness?**
3. **What problems have you encountered?**
4. **How do you measure team performance?**
5. **Does your team building approach vary depending on the age, race, sex, national origin, etc., of the individual members?**
6. **How so?**

Figure 4

Eleven interviews were performed with personnel from varying areas of industry. The group chosen consisted of eight first level managers, one second level manager, one consultant, and one university professor. They were all chosen because of their experience with multi-cultural teams.

Results and Discussion

You can present a much more detailed discussion of the interview results

Eleven interviews were performed on a person-to-person basis with the notes tabulated for future analysis. The results of each interview are available in Appendix A. Review of the eleven interviews display several underlying trends about team building, multi-cultural teams, and how industry currently deals with them.

The results of our interviews has indicated several general trends in team building. Given the opportunity to choose the members of the team it is a general consensus that employees with appropriate skills and temperament for the required tasks. If a team is inherited then the general consensus is to define the teams mission and provide a division of work appropriate to the strength of each team member. Goal setting in context with the teams mission assures the focus of the team and dividing of work in conjunction with strengths helps boost satisfaction.

The primary trends in enablers used in industry are goal setting, ownership, and good communication. Strong goal setting is viewed as defining a strong cohesive task for a team. After goals are set then delegation of authority of subtasks is viewed as providing ownership which causes members to want to keep on track. These two enablers along with strong inter-team communication are viewed as the most effective drivers for a good team.

Current trends on common barriers seem to be either individuals members or communication within the group. Individuals provide a common source of barriers for any group. The common practice seems to form good relationships with all team members and make sure their individual need are satisfied. As a group barrier the overwhelming view is communication. This seems only logical that communication which is critical to a functional group would be a major driver and/or barrier.

Performance seems to be measured by the old industry standards of time and money. The consensus is that a team is performing well if it provides a project on-time and under budget. Some of the managers also indicated that team satisfaction was another metric for performance. This leaves open the subject of harmony and whether performance of a team can be based on output alone. It makes since to suggest that harmony or satisfaction does warrant some examination as a possible performance measure.

The questions of cultural diversity and how it effects team building styles provide some interesting trends. The managers seem to appreciate cultural diversity and do not change their team building style because of it. It seems that the avoidance of stereo typing is a key to properly handling diversity since individuals may vary drastically in the same culture. The consensus does agree that managers do need to be aware of cultural differences in communication, leadership styles, personal space, etc. and learn to deal with them. The best approach to cultural diversity is to deal with everybody as individuals and become aware of their specific needs. If a manager is open and willing to communicate about differences then the whole group will benefit. As long as a manager facilitate the understanding of cultural differences between team members than an integrated multi-cultural group should be easily formed. Industry seems to be embracing the multi-cultural work force and as long as we are open to change it should strengthen us.

Summary and Conclusions

From the literature research that we did and interviews of current engineering managers in industry we were able to make several observations that would be important for new engineering managers or those aspiring to engineering management. Team building is a way of life in the engineering world today. This trend should continue as Japanese management techniques and

concurrent engineering practices are assimilated into current engineering management practice. This will require the engineering manager develop leadership, administrative, organizational, and technical skills to construct and lead the project teams. He/she will also have to understand the structure and climate of the organization and be able to enlist support from top company management to help the team succeed. Cultural diversity is also a way of life in the engineering world. Engineering managers should be aware of cultural diversity but not develop stereotypes of any cultural group. He/she should get to know each individual and respect each individual's cultural differences. To assist in working with multi-cultural engineering teams the engineering manager will need to improve their communication skills. Skills such as listening effectively, giving useful feedback, and being non-judgmental will be needed.

More research in multi-cultural engineering teams building would also assist the prospective engineering manager. There is a lot of research and many publications in the area of cultural diversity, however there didn't appear to be any research of cultural diversity or multi-cultural teams in the engineering world. A lot of what has been written about cultural diversity in the work place can be applied to engineering situations, but, as many publications have point out, engineering is different from the rest of the business world. It would be useful to have some information and data on cultural diversity in engineering so that the appropriate leadership, team building, and communication skills could be developed.