Communicating Effectively Among Engineers

Cyron Anthony Soyza
Phoenix Training and Development Centre
cyronsoyza@hotmail.com

Karl Kolmetz
KLM Technology Group
kkolmetz@yahoo.com

ABSTRACT

Engineering is a subject that must be communicated correctly due to the important of the subject matter. Engineers make decisions in construction, from outer space to deep-sea space, which can have potentially negative consequences.

Communication is an interchange of thoughts, ideas, and opinions between people. True communication involves transmission, reception and comprehension of the ideas and subject matter. Every action, direction, discussion, or negotiation needs to utilizes the communication tools available; both written and verbal to reinforce the ideas and subject matter.

Effective Communication is a blend of many evolved learned skills. For effective communication to take place a person not only shares information with another person, but also ensure that the receiver clearly understands the information as it was intended; transmitting, receiving and understanding.

Communication can be broken down into several discrete parts:
- What the speaker intended to say
- What the speaker thought he stated
- What the speaker actually said
- What the recipient heard
- What the recipient understood.

How much an engineer can leverage their ability to increase productivity and utilize surrounding resources depends mostly on communication. Therefore, to focus on communication becomes critical to every engineer at any level.

INTRODUCTION

Engineering is a subject that must be communicated correctly due to the importance of the subject matter. Engineers make decisions in construction, from outer space to deep-sea space, which can have potentially negative consequences.

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BACKGROUND OF THE OBVIOUSNESS

Most engineers, and most people, believe that they see the world quite clearly, probably a little more clearly than most other people. They are amused or indignant when someone suggests that their perceptions may be distorted, that there may be something we cannot see, that our beliefs or assumptions may be invalid, or that there may be no basis for our expectancies.

We are quite convinced that our experience has proven that we were right most of the time, particularly about people, and we sincerely believe that we are open to experience and ready to change our beliefs, attitudes, or opinions or to modify our behavior as we learn about the world. Contrary to popular opinion, however, experience is not a very good teacher, unless we have learned how to learn from experience. Too often, experience serves only to reinforce existing beliefs, biases, attitudes and expectations.

It is selected, interpreted and distorted by each of us to maintain and be consistent with our individual and very personal worldview. Two people with different worldviews may, therefore, have quite different experiences in the same situation. Yet we refuse to listen to the other person or to try to view the world through his eyes, and we ridicule, denounce, or reject him for having a view different from our own.

Our experience is perhaps determined as much by personal characteristics, what we bring to a situation, as it is by characteristics of the situation itself, and is, therefore, never completely consistent with reality. But the experience is real to us and thus constitutes reality for us, and it is difficult for us to understand or accept the reality of another person.

This is perhaps our greatest source of interpersonal misunderstanding, disagreement and conflict. If we wish to reduce misunderstanding and conflict, it is important that one perception of reality be tested against another. We have learned to behave the way we do largely by trial and error, by the rewards and punishments we have received, by our perceptions of the reactions of others, and by modeling after others.

As we experience life, we develop a system of theories or hypotheses regarding human nature; we develop beliefs, values, attitudes, expectations, and behavioral patterns, all of which are interrelated, interdependent, and more or less valid, appropriate, effective, or functional.

But these become relatively fixed at an early age and subsequent experience serves more to support and reinforce than to expand, change, or modify. We develop a "style of life", as Alfred Adler called it. And as John W. Gardner said, "Each acquired attitude or habit, useful though it may be, makes him (us) a little less receptive to alternative ways of thinking and acting."

As we experience life, we form hypotheses, make assumptions based on these hypotheses, adopt beliefs and values, develop attitudes and expectancies, learn to act and react and to expect certain actions and reactions from others. We usually see what we expect to see and form our evaluations on the basis of our perceptions, all of which reconfirms our original hypotheses.

The more we traverse this circle, the more fixed and rigid it becomes; the more we resist or deny contradictory data; the less open we become to experience; the less adaptable we are to new, different, or changing conditions and situations; the more difficult it becomes to learn to grow, and to develop. The question is, how can we break out of this vicious circle, how can we begin to test the validity of our assumptions, beliefs, values, perceptions, and evaluations; how can we test the appropriateness or effectiveness of our attitudes and behaviors; how can we develop "awareness" and "openness to experience?"

Communication lies at the very heart of everything we do, all day, every day. In one form or another we speak, write, send or request information or deal with other people all the time. Communication is something, which everybody does. Some do it better than others, and we have all experienced both good and bad communication. A good communicator develops a wide range of communication skills in speaking, listening, reading, writing and using body language.

Since communication takes up almost 100% of our working day, development of effective communication skills is Top Priority.
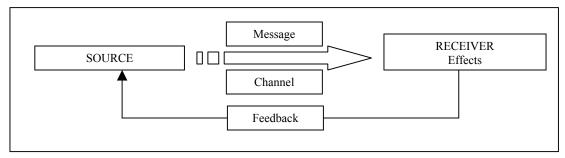
Because we communicate from the moment we are born, we tend to take our ability to do so for granted, but it is a skill that can be studied and continuously improved. However to improve we need to measure and then take action.

COMMUNICATION MODEL

The evolution of the communication model

Communication is a process-that is, a continuous sequence of actions through time. Various models of communication have been proposed which attempt to explain what communication is. Aristotle specified the speaker, the speech and the audience as constituent elements of the communication act. In the late 40's, Harold Lasswell, Clude E. Shannon and Warren Weaver added elements to Aristotle's model. In the 50's Wilbur Schramm and Westley and MacLean complemented these using feedback and experience. These led to David Berlo's S-M-C-R model that basically is a synthesis of these pioneering models.

This model was linear consisting of the source, the message, the channel, and the receiver. It's often referred to being the "**S**ource-**M**essage-**C**hannel-**R**eceiver" model.

1. Source is a person or persons responsible for message preparation
2. Message is the stimulus transmitted which involves encoding a conceivable idea containing appropriate message and decoding ability through ideas, images and thoughts that give meaning to

the message based on past receiver experience. The message can be brought across by verbal or non-verbal means.
3. Channel refers to the message path either interpersonal or by mass media. The former facilitates feedback.
4. Receivers are the single most important element in the model.
5. Effects include changes in receiver's knowledge, attitude or overt behavior. Usually effective in that order too.
6. Feedback is a response by the receiver to the sources message. It may be positive or negative.

As described earlier an individuals experience is continuous, so the meaning of the same symbols will change over time. Many failures to communicate are due to mistaken assumptions by source or receiver about the meaning of the symbols they have exchanged. Therefore meanings are relative and open to subjective interpretations. This fact led Berlo (1960) to state: "meanings are in people, not in the message". The degree to which there is similarity in terms of attributes such as beliefs, education or social status is Homophily. The more similar the more easily effective communication can occur. This concept lends itself to orientation and icebreakers. This bridges the gap and allowing highest probability for success.

Furthermore a source often forgets receivers are the objective. Some sources are too source orientated; an example is textbook authors who go over the heads of their student readers; another example is an expert that cannot express his knowledge (encode) in an interpretable manner. Sometimes the back to basics approach is necessary. The source must not take the receivers understanding for granted.

Another means to break communication is into several discrete parts.

- What the speaker intended to say

The speakers intention of speech is only known to himself . . . unless the speaker takes the extra time needed to set the context of his statement. An Engineer could ask an operator about a reading in the field. However, the context of that question is only known to himself. It could be in a context of investigation, it could be in a context of follow-up, it would be in a context of new design. Each context . . . although has no effect on the "fact" of what pressure reading may be . . . . Has an absolute effect on the communication that takes place between the engineer and the operator.

- What the speaker thought he stated

Effective communication is achieved only if the correct response or effect takes place. The source makes a call whether he has come across in an understandable and convincible manner. This internal audit can be verified. In a face-to-face situation we can observe the receiver and judge his response by his 'total behavioral set', i.e. changes of facial expression and more subtle body movements that communicate anger, disbelief, impatience etc.

- What the speaker actually said

The vocabulary used by a speaker has absolutely no bearing on the effectiveness of the communication. Back to our inquisitive engineer . . . if the context of his question about a pressure reading is one of investigation that might incriminate an operator . . . it is irrelevant how many kind "words" he uses.   The dynamics of the communication would be one of adversary.

- What the recipient heard

In human communication the words that are transmitted come within a context for the speaker . . .   and similarly . . . the words that are received arrive within a context for the listener.   It is like a Spanish music radio station transmits and my radio receives a news program in English.

- What the recipient understood.

The listener's capacity to understand the speaker is strictly dependant upon two main factors : 1 – The Background Of Obviousness (BOO) shared between the speaker and listener or earlier described as Homophily. 2 – The mood (context) in which the listener (not the speaker) is receiving the communication. In many companies the first factor is not addressed and the second factor is ignored.

COMMUNICATION IMPROVED

We believe that communication can be improved. This paper stresses the need for two-pronged involvement; Source and Receiver.

Effective communication is a lot more than the gift of gab. All of us have learnt at a very young age, that people sometimes say one thing while meaning another. Sometimes when they do this, they actually believe they're telling the truth. Simply because they look convincing, and maybe we wish we could always be assured of looking that way when we have something important to communicate.

The most effective and persuasive communication occurs when verbal and non-verbal signals are in perfect sync.

The result   -   Communication Synergy

We present a special set of tools to help you build your verbal and non-verbal vocabulary, the looks and gestures by which we telegraph our 'real' message.

<u>VERBAL COMMUNICATION</u>

Vocabulary, which increases communication effectiveness, should be used more. The 50 words every Communicator should know and use. Lets begin with the building blocks of communication: the words. The first three are ridiculously easy words.
1. We
2. Us
3. Our

Communication is essentially an exchange between *you and I*. Even as communication attempts to bridge the gap separating the *I* from the *you*, it continually defines and reiterates that gap. *I* want this and *you* want that.

The most basic step you can take to begin effective communication is to translate the I and the you into a we. Wherever possible and however possible, begin by defining areas of **common interest, concern and benefit**.

Why? The person you are talking to is more interested in what he or she needs and wants than in what you want or need.

So? As such a more realistic goal is to find common ground, the places where interest, needs, and wants can be seen as mutual. This is a powerful basis for all communication, especially in business that is rooted in the exchange of value for value.

From we, us and our the next word is rapport.
Rapport
- A relationship of mutual trust or emotional affinity
- Typically develops over a long period of time between friends, business partners, teachers and students
- However many or most business relationship are brief exchanges and you will have to move quickly
- The quickest way to create rapport is to use we, us and our instead of I, me and you

We, Us and Our are words of inclusion, cooperation, coordination and alliance, the very essence of rapport.

Basically all language that divides and limits, that defines a winner and loser, that pits an I against a you. That welcomes problems as Challenges and Opportunities. The object is not to avoid reality or disguise problems.

NON-VERBAL COMMUNICATION

A 1971 study by psychologist Albert Mehrabian has found when listeners judge the emotional content of a speech;

55%	depends on speaker's facial expression and body movement
38%	depends on vocal qualities
7%	depends on usage of words

Therefore Movement, Expression and Tone speak volumes, regardless of the words that are being used. Easy rapport building can be established by using vocabulary in a manner at which the receiver is most at ease. Notice the subtle gestures like the use of words like 'you know', 'really', 'understand' repetitively made. This 'intuition' or ability to sense is less apparent.

Here we include another 12 essential basic rules to develop non-verbal vocabulary.
1. Make an effective entrance
2. Walk tall
3. Enter with a purpose
4. Smile
5. Make eye contact
6. Give a great handshake
7. Think before you sit
8. Convey relaxed energy
9. Use your head (and face)
10. Use your hands
11. Stick to the basics when speaking in public
12. Communicate with clothes

SUMMARY

How much an engineer can leverage their ability to increase productivity and utilize surrounding resources depends mostly on communication. Therefore, to focus on communication becomes critical to every engineer at any level. Effective communication can be achieved through a good knowledge of the communication cycle, an awareness of the barriers which exist and by carefully considering these factors:-
1. 4 W's –
   What is the aim of the communication? Is it to give information, to persuade, to request to inform?
   Who will receive the communication? What is the recipient's background, knowledge, experience and culture?

What are the circumstances? Is the situation urgent, serious, dangerous, emotive, informative? **What** will the recipients reaction be? How will the message affect the recipient? How can I make it achieve the desired aims?

2. **Think and plan** before you speak or write?
3. **Listen** intelligently. Communication is a two way process. Listening is a two way process. Listening is just as important as speaking. Similarly try reading your written message as if you were the recipient. Consider if it is appropriate.
4. **Appropriate language**. Use clear, simple language that will be understood, and appreciate the same used by others.
5. Be **open-minded**. Consider other peoples viewpoints, be willing to adopt and change methods or procedures if necessary.
6. Select **appropriate media**. Consider carefully the method for communicating the message. It should be appropriate to achieve the desired aim.
7. **Time** your communication carefully. Consider the best time for the communication and how long it should take.
8. Obtain **feedback**. Feedback is essential to find out if the communication has been effective. If the message is not understood, do not blame the recipient. Ask yourself why the communication failed and how it could have been improved.
9. **Read**. Extend your knowledge of language by reading.
10. Finally**, Aim High**. Set and maintain high standards of language and presentations in all your methods of communication.

This model is undergoing constant reevaluation and will be further developed to enable us to better understand and use communication.

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Said does not mean heard
Heard does not mean understood
Understood does not mean agreed.
Agreed does not mean applied
Applied does not mean retained.

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