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# INTRODUCTION

In the first book on *Critical Thinking for Engineers*, we delved into analytical skills—the ability to examine something carefully, whether it is a problem, a set of data, or text. People with well-honed analytical skills create richer, better solutions to real-world challenges. Let’s continue building upon analytical skills, but now in the context of a team, department, or larger organization—where *communication skills* will play a vital role in your success as an engineer. Often, you will need to share your thinking and conclusions with your employers, or with a group of colleagues. You might also need to engage in critical thinking as a group—where both oral and written communications will be essential to group effectiveness in achieving a specific goal. This e-book focuses on the key elements of communication skills to advance the critical thinking of a group-at-large. We will cover the following:

1. Asking important questions
2. Active listening
3. Expressing opinions and ideas
4. Managing conflict
5. Written communication
6. Presentation
7. Running a team meeting
8. Collaborating on a project
9. More on managing conflict

# ASKING IMPORTANT QUESTIONS

**E**ric Schmidt, CEO of Google, stated in an interview with *Time*: “We run the company by questions, not by answers. So, in the strategy process we've so far formulated 30 questions that we have to answer.”<sup>1</sup> A *Harvard Business Review* article, “*The Surprising Power of Questions*,” asserts that “questioning is a uniquely powerful tool for unlocking value in organizations: It spurs learning and the exchange of ideas; it fuels innovation and performance improvement; it builds rapport and trust among team members. And it can mitigate business risk, by uncovering unforeseen pitfalls and hazards.”<sup>2</sup> In my first e-book on *Critical Thinking for Engineers*, I discussed how to ask thoughtful questions, as it relates to an engineering problem needing solving.<sup>3</sup> Let’s now look at three ways to pose questions to fellow engineers and management, when discussing an engineering challenge:

- Use a friendly tone to elicit better responses. If you ask a question with a cynical, judgmental, or an accusatory tone, it immediately sets up an ineffective team dynamic—defensive, rather than expansive and productive. Instead, ask questions from a place of genuine curiosity and exploration. You’ll find people will open up and bring more of their full creativity to the exercise.
- Ask open ended questions. The broader the line of thinking and discussion, the more likely your team will devise a breakthrough, and come up with an elegant solution. Try questions such as the following:
  - What problem are we trying to solve?
  - What new possibilities are we opening up?
  - Why is this important to address? What’s at stake here?
  - What criteria do we use to evaluate solutions?
  - What inputs or data do we need to make a team decision?
- Dig deeper. Follow up with questions to explore further—before you move on to another solution or topic. Clarify and confirm assumptions that will

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1 Source : <http://content.time.com/time/business/article/0,8599,1541446,00.html>

2 Link to eBook *Critical Thinking for Engineers* chapter on “Asking Thoughtful Questions”

3 Source : <https://hbr.org/2018/05/the-surprising-power-of-questions>

affect engineering decisions. Often, this step of checking assumptions will flag differing strategies and disconnects among team members that can, if undetected, lead to wasted cycles downstream—due to re-work, missed deadlines, and incomplete solutions.

**Tip: Spend time upfront asking questions. Being conscious of the way you pose questions and propose answers can affect team dynamics.**

# ACTIVE LISTENING

Engineers spend a great deal of time in meetings, on conference calls, and in ad hoc discussions, hearing and giving presentations; and in general, being in a team setting. Honing your listening skills will prove to be one of the greatest keys to your effectiveness as an engineer in advancing good ideas, recommendations and solutions. In such a team context, listening must move the ball forward, as this *Harvard Business Review* article encourages, "...the highest and best form of listening comes in playing the same role for the other person that a trampoline plays for a child. It gives energy, acceleration, height and amplification. These are the hallmarks of great listening."<sup>4</sup>

Let's break down the different archetypes that listeners may fall into, and how that might affect critical thinking and team effectiveness.

- **The Critic:** Listening from a place of "Do I agree with this?" or "Is this right or wrong?" The Critic listens from a place of judging the value of what's being said, whether it's logical or justified, and perhaps even going so far as assessing the speaker themselves. While it's not a good idea to judge the person, it may be an appropriate mode—when you are there to make a final decision on behalf of the group. Just be careful that this mode does not limit rich thinking and discussion.
- **The Expert:** Do you find yourself saying to yourself within the first 30 seconds, "Yeah, I already know this, and I think...?" You might be making a premature judgment, and missing out on the rest of what your teammate has to say, which may not prove to be highly insightful. Since expressing a snap judgment can shut down teammates from speaking up, it's better to hold your comment. Allow the discussion to unfold fully.
- **The Challenger:** Some team meeting participants may be listening from a place of preparing a counter argument, or a dismissive comment, to advance their own agenda—rather than hearing out the person's point of view. Doing so will either shut down the speaker, or lead to a potentially combative debate—neither of which will lead to the group's best outcome. If posed as a nonthreatening question, however, a challenging assertion—delivered politely—may move the group's thinking to greater clarity.
- **The Student:** Listening from this place means absorbing what's being said as useful information. It requires a bit of humility and refraining from judgment,

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4 <https://hbr.org/2016/07/what-great-listeners-actually-do>

evaluation and critique. Feel free to formulate questions in your mind, as most students do when learning.

- **The Observer:** Oddly, this one is still about listening—but it’s about using your eyes and ears to note the person’s nonverbal cues. As the *Harvard Business Review* article notes, cues such as facial expression, gestures, body language, etc., are thought to make up more than 80 percent of communications. Note also how the speaker delivers their comments in terms of the underlying emotion, tone and confidence. All of these can affect the team dynamic, and your own inferences on the topic at hand.

Clearly, we all flit between these different archetypes when listening to someone—whether one on one, or in a group context. The key is being self-aware enough to catch which mode we are in at any given moment, and adjust as necessary to best serve our purpose in advancing the engineering effort. Of course, being so highly self-aware is neither easy nor realistic. Here are three tips that might help:

1. **Breathe**—If you notice you are getting frustrated, anxious, or generally uncomfortable when listening—then just take five slow breaths, counting to five as you inhale each time. This breath work will help calm any reactivity, so you can listen better.
2. **Talking stick**—Sometimes a team dynamic occurs in which too many people are talking at once, or perhaps one or two people are dominating the discussion. Suggest a “talking stick”—which can be a whiteboard eraser, pen, or any object that grants the floor to the holder. This tool enables everyone to slow down and listen better.
3. **Take a break**—Sometimes engineering meetings reach a place where you may notice that some team members are withdrawing a bit from their active participation, or you sense that engineers are not listening well enough to what’s being said. At this point, it’s helpful to suggest a brief recess (stretch break), or even schedule a follow-up meeting to revisit the topic with a fresh start.

See the “Art of Listening”<sup>5</sup> for additional helpful tips on how to encourage more active listening in group settings.

**Tip: Active listening requires being aware of the filters we may have on (e.g., the critic, the expert, the student, etc.), and using questions to encourage understanding.**

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5 <https://blog.lifeway.com/womenallaccess/2014/10/21/the-art-of-listening/>