

Build an Embedded Systems Consulting Company (Part 3)

Axioms of a Successful Company

Previously, Bob presented some of the core values that make an embedded systems consulting company effective and profitable. This month, he presents some axioms that you'll do well to follow as you start your business.

By Bob Japenga

In the summer of 2008, our entire company attended a leadership conference. The material was so good at the previous conferences that we decided that the entire staff should go. It was no small thing to shut the company down for two days, but it was well worth it. The keynote speaker, Bill Hybels, introduced the following idea: "Winning leaders have winning points of view—succinct, practical, portable leadership proverbs that help them arbitrate decisions and rouse troops to action." He called these proverbs "axioms." Hybels wrote a book entitled *Axiom: Powerful Leadership Proverbs* in which he credits the idea to a man who finished third in the 2016 US presidential Electoral College vote. He wrote a book is entitled *The Powell Principles*. The author: Colin Powell. Both men have created a list of succinct proverbs that help them make decisions and motivate those they work with. Both contain excellent axioms for any business. Hybels's axioms include: Never Say Someone's No for Them; Know Who's Driving; Admit Mistakes; and so on. Powell's axioms include: Promote a Clash of Ideas; Establish Trust; Pick the Right People; and so on. If you are interested in hearing more about these or

how they live them out in their leadership, I recommend that you read the books. Both are a quick read, but worthy of careful thought. I would start with Powell's book if only because there are only 24 axioms while Hybel's has 76. Also, all of Powell's axioms stand alone and need very little explanation. Fifty or so of Hybel's don't easily stand alone.

While debriefing from the conference we realized that, as a company, we had a set of succinct, practical proverbs that help us make decisions and encourage us to be successful in our business. We wrote them down and put them on our website. This month we will look at a few of them and how we use them.

IF IT'S NOT TESTED, IT DOESN'T WORK

We have a new customer with a very creative Internet of Things device that we designed for him. The device uses an IR sensor for measuring the proximity of some material. The device is supposed to work from -20°F to 110°F. The IR sensor was good down to -40°F. The device was too large for us to put into our environmental chamber and so only the electronics were tested to the specification. However, when the cold winter

of 2016-2017 hit, the sensors mounted in the enclosure did not work as expected. As I said to one of our chief designers, “How often does this axiom have to be proven correct before we learn?”

Like you, we design complex devices with many specifications and millions of details. When we are in meetings early in projects working out our test plans (notice that these should be worked out real early), we have to keep this axiom ever before us. Pounding this axiom into our DNA has kept us out of a fair bit of trouble.

Perhaps the most embarrassing time where we failed to keep this axiom in front of us was when we designed a device for repetitively testing a device’s capability to successfully power up 1000’s of times. The device used a very simple 8051 and had a very simple power-on circuit. So simple, that we decided not to have the unit test itself; in other words for one power-on tester still in development to test that another power-on tester would successfully power up 1000’s of times.

We had shipped less than 100 of them when we were getting reports that sometimes the units failed to power up when power was applied to them. “Impossible!” we thought. The circuitry is so simple and the software is so simple. But “if it’s not tested, it doesn’t work.”

As a side note, we have found that there is a corollary to this axiom and that is: even if it is tested, it still may fail.

ALWAYS WEIGH THE “PERSONAL”

At our 2016 family Christmas gathering, I received a coffee mug that was inscribed with the essential ingredients of an engineer. I quipped that since I was retired it no longer applied. My daughter objected: “No Dad. Once an Engineer, always an Engineer. It’s not a vocation, it is a personality.” Sometimes as engineers we forget how different we are from other “normal” people. Earlier in this series I mentioned about how insensitive most of us engineers are—using Dilbert to make fun of us. This axiom is intended to stop and make us think about the personal side of what we do. It encourages to weigh other factors than just the technical side of things.

Let me illustrate this. Once we had a customer who created a device that was used in manufacturing glass bottles. We designed all of the software for these devices. When used in a 24/7 production line, it could create 400 bottles per minute or almost a half a million bottles per day. Our customer called us one day and reported that one such production line was shut down. Could we help diagnose the problem? The engineer who

worked on the project was just about to go to his newly adopted son’s first school event. Here was the dilemma.

If the call came in 10 minutes earlier, we wouldn’t be able to help. But now we could help, but he would miss the event. Do we cancel the new dad’s appearance and have him work with the customer over the phone getting this production line up and running? After all, there will be many such school events in this young boy’s life. Yes, the young son was just getting to know and trust his new father’s word—but there will be other opportunities. Not helping could cost this client his customer. We chose to let the father go to his new son’s event. It was not an easy decision and we knew it could be costly for us and for our customer. In this case, our customer’s customer solved the problem shortly after the call.

Notice that we did not say “Always favor the ‘personal.’” But rather to weigh it. Be mindful of it. Bring it into the equation. Know that our personalities are going to lean in the other direction. Weigh the impact of the personal in all of your business and technical decisions. The personal impact on you, on your customer, and on the user.

I was listening to a Podcast recently (Freakonomics) and they were interviewing Charles Duhigg about his current book. You might be surprised at how important the personal and relational are to productivity. The number one tool that he found to increase productivity is motivation. Not making checklists. Not staying on point. But making sure people are motivated. One startling statement that he makes (that contradicts Colin Powell) is that: “Who is on a team matters much, much less than how a team interacts.” This is where, as engineers creating all of these fun devices, we have to keep the personal in mind in all decisions. We are all about getting the job done. The meeting over. Getting down to business. Listen to what Duhigg says: “But study after study shows that if we spend a couple of meetings with that [personal dimension], 5 minutes of getting to know each other, over time, our group will actually be much, much more productive. So sometimes it’s about sacrificing the short-term efficiency for the long-term productivity.” Much, much more productive. I like that. Perhaps a new axiom at your company could be “sacrifice short-term efficiency for long-term productivity.” I like that one too.

ASK FOR HELP

Last Christmas Eve, I participated in our 33rd Annual Grandpa Claus outing. This is where I take the grandchildren out to buy a



ABOUT THE AUTHOR

Bob Japenga has been designing embedded systems since 1973. In 1988, along with his best friend, he started MicroTools, which specializes in creating a variety of real-time embedded systems. With a combined embedded systems experience base of more than 200 years, they love to tackle impossible problems together. Bob has been awarded 11 patents in many areas of embedded systems and motion control. You can reach him at rjapenga@microtoolsinc.com.

present for their parents. It is a great idea. It gets the kids out of the house and gets their minds on giving rather than receiving. Now most of my grandkids are grown up. Getting them out of the house is not important. But they all love to come. They have a great time with their cousins. I let them handle just about everything—what to get, where to get it, etc. As we wandered around very busy shopping malls looking for those special gifts for their parents, I was interested to observe how reluctant they were to ask for help. We would wander up and down isle after isle and escalator after escalator. And they still wouldn't ask for help. I tried to stay out of the loop and see how long they would go before they would ask for help.

Self-reliance and independence are great traits to have in an employee, especially in a small embedded systems design firm. But we all need to know when to ask for help. I have found that engineers are some of the hardest people to get to ask for help. Even harder than my grandkids! Often, we are absorbed in some question or problem when the answer is just a phone call or office away. Building the "Ask for help" axiom into our environment is absolutely critical if you are going to succeed. We need to cultivate an environment where we can freely admit our weaknesses and lack


of knowledge and ask for help.

Admitting our weaknesses is hard for all of us. Engineers and non-engineers alike. Many factors contribute to our inability to admit our weaknesses. I know that I want to be seen as one who is knowledgeable and competent. Sometimes when I ask for help, the other person comes in and in 5 minutes points out the obvious thing I missed for the last 5 hours. That is embarrassing. Not only do I look like I lack knowledge and competency in the asking for help, but when the help uncovers an obvious mistake I look even more incompetent. That is hard to take. But take it we must! Asking for help is what separates the competent and knowledgeable from the proud and ignorant.

Recently, I was noticing that our director of operations was spending a lot more time with our employees—helping them before they asked for help. That is a good thing for a manager to do—but it doesn't breed the kind of inter-dependence that is healthy for the team. They need to get help from each other. I understand why he is doing this since everyone else is so busy. But now his job isn't getting done.

"But I am too busy to help someone else." Perhaps you are too busy because you haven't asked for help.

AXIOMS MATTER

The business of creating embedded systems is so demanding and so intense, I often wonder how we do it. But creating simple axioms can help us to stay on track, to keep us motivated, and to make up for our deficiencies. Next time we will look at more of these axioms. But of course, only in thin slices. 



circuitcellar.com/ccmaterials

RESOURCES

S. Dubner, "How to be more Productive," Freakonomics.com,

2016, <http://freakonomics.com/podcast/how-to-be-more-productive/>.

C. Duhigg, *Smarter Faster Better: The Secrets of Being Productive in Life and Business*, Random House, 2016.

O. Harari, *The Powell Principles: 24 Lessons from Colin Powell*, McGraw-Hill Education, 2002.

B. Hybels, *Leadership Axioms: Powerful Leadership Proverbs*, Zondervan, 2012.

