

Necessary qualities of technology leaders

by Michael Jennings

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These are some of the qualities required of someone who will be a consistently successful leader of technology projects.

Loyalty to the Team

The most important quality of a leader of a technological project is loyalty to the team. Everyone must act together to strengthen the team, including the leader, whose role is to be a coordinator.

Often people who lead companies develop habits that cause them to be poor team members. An extreme example is Gerald Levin, former CEO of Time Warner, who called himself an “*imperial CEO*”. Alone, Mr. Levin decided Time Warner should be bought by AOL, ignoring advice. At the time, there were even people with no technical knowledge who knew that AOL was not a reliable company. Some business analysts consider that the worst business decision ever. It is an example of what happens in the absence of healthy solidarity.

Politically important projects require special aspects of loyalty. When leading a technology project that has political importance, it is important that the technology leader stay neutral. He can define the options, but should continually make very clear that he does not set overall public policy. The idea is to do everything that would make issues clear, and nothing that would invite political attack.

Political attacks often confuse the issues. Some are designed to confuse the issues. A technology leader must handle the attacks that do occur in a socially and politically sophisticated manner.

Technical ability

Deep technological understanding is, of course, fundamental. Most large technology projects, and all alternative energy projects, for example, use technology in these four fields simultaneously: physics, electronic circuit design, computer programming, and mechanical engineering. A technology leader must have experience in those fields or he will lack credibility and will have little coordinating power.

A technology leader must have spent decades training himself to think in the rigorously logical and extremely detailed manner that technological projects require.

The culture we think of as normal and the technological culture have many very different elements. It is common that we think of someone as successful who graduated from a well-known university, has social connections, and has an interesting resume.

However, a suitable candidate for a highly technological leadership position must be an expert at teaching himself. He must already have taught himself far, far more than anyone learns at a university. And while social interactions are important in scientific research, strictly social connections have never solved a scientific problem.

Resumes tend not to have information that would be useful in knowing whether someone would be a good candidate to coordinate a technology project. As a hobby, the author of this article helped people write resumes and job-getting letters for over 30 years. Resumes tend to be most helpful when they explain an

extremely linear career. Resumes tend to be least helpful when looking for someone with a broad range of abilities who must adjust quickly to changing circumstances. The author was initially made aware of this by reading Carl Boll's book *Executive Jobs Unlimited*, and has found it to be true over decades of experience. (Carl Boll helped graduates of Harvard Business School get jobs for 27 years.)

Resumes aren't helpful and are sometimes very misleading when what is needed is the presence of dynamic mental processes that are well-established in the leader's mind. Mental processes generally aren't reflected in a resume.

It often happens that someone who was successful in one management position is not successful in a new management position. The new management position may require mental processes that weren't required in the old position, or the necessary thinking in the old position may have been done by someone else than the top manager. Leaders need mental flexibility, and resumes don't often indicate flexibility.

Zero defects: In most human endeavors, errors in communication or execution are spontaneously corrected or called into question by co-workers. In scientific endeavors, errors that seem very small may lead to loss of the entire project.

For example, seven lives were lost in the Challenger space shuttle disaster when managers forgot one small fact, that O-rings being used were not pliable at low temperatures. The Columbia space shuttle was lost because managers assumed that the wings were strong enough to resist damage from pieces of foam heat shield that often broke loose. There is a need for strict logic, rigorously applied, that is far beyond the education the average person gives himself or herself.

Be known as one of them. To manage a technology project successfully, it is necessary to be able to walk into a room of technology professionals and get their respect immediately. That doesn't mean knowing everything they know. It means being immediately recognized as someone who thinks in the extremely careful way they think and who focuses on the challenges in a way that is scientifically valid.

Technological idealism: It is important to understand that the space shuttle disasters mentioned were social failures, not technical failures. In both disasters there was adequate technical knowledge that was ignored.

The author of this article has studied this phenomenon for many years. People who are good technological leaders seem to be very rare. Successful technological organizations generally have one or very few such leaders, and those leaders act to help correct the mistakes of others.

The people who are most successful in leading a technological organization teach themselves rapidly and have habits of thorough, intense, relentless idealism. Those who merely remember the most technical facts are poor leaders.

Technically qualified leaders present fewer social challenges. When a technological organization has a non-technical manager, contact with the manager is filled with social difficulty. What should be said to the manager? Will he be unhappy if an explanation accidentally exposes his ignorance? Does he expect that the people who work for him help him hide his ignorance? Will he disapprove of those who say things he can't understand? How much effort should there be to teach him? Will he accept being taught? Is the situation so hopeless that it is better to let him make poorly informed decisions?

Social ability

A technology leader must not only have extensive familiarity with technological issues, he must also be very comfortable with people.

He must be someone who is able to sense the sociological health or problems of any group instantly. He must have a strong ability to get people to like being coordinated.

In general, however, it often happens that people who have chosen to concentrate on technological issues have poor social skills.

Psychological health

It is generally understood that stress reduces immune system response. That makes it important that leaders not try to do too much. Leaders must feel comfortable delegating. They must help other people do their best, not make themselves and their own needs the focus of their organizations, as so often happens.

Be a professional communicator.

A large part of the work that needs to be done in politically sensitive technological projects is to aid in helping citizens make their own choices, without causing them to feel pushed by politics or considerations of profit for big business. That means that the head of a politically sensitive technological project must be a professional communicator.

Perhaps the biggest challenge now facing the human race is to find alternative methods of supplying energy. Meeting that challenge is far, far more difficult because there is an enormous amount of misunderstanding of energy issues. There is general ignorance. There have been enthusiasts who ignore faults in their solutions. There have been people wanting to make a

profit who misled others deliberately. Almost every article in magazines or newspapers contains error or misleading elements or gives insufficient warning of the difficulty of the challenges.

In this context it is good to remember that Hilary Clinton's health care initiatives failed partly because the collection and consideration of information was not sufficiently explained to the public. Certainly she had no ill intent; she was apparently overwhelmed by the difficulty of arranging clear communication of the issues, many of which were medical and technological.

The difficulty of creating sufficient openness must not be underestimated. There are cases in which there are initiatives to make alternative energy research proprietary in a way that slows research and actually reduces profit. Good leadership can reduce that tendency.

Be multi-cultural.

Being multi-cultural means being the kind of person who brings people of different cultures together, rather than making them especially aware of their differences.

A leader of a large technology project must be respected in laboratories around the world. Many of the issues surrounding energy supply, for example, require world-wide technical coordination.

Understand and resolve conflicts easily.

To be effective, a technology leader must be comfortable handling all kinds of conflict: conflicts of ideas, interpersonal-conflict, conflict of needs, and others.

Social issues surrounding technological projects can be very complex. Rather than discussing the issues at length, it seems best to give an example.

Example of social conflict about technical issues: Al Gore and the Internet.

The controversy that surrounded then-Senator Al Gore's statement about his contribution to the Internet is one example of the complexity of social conflicts about technical issues. In 1999 Senator Gore said: *"During my service in the United States Congress, I took the initiative in creating the Internet."*

Link: <http://www.cnn.com/ALLPOLITICS/stories/1999/03/09/president.2000/transcript.gore/index.html>

Investigations of the facts surrounding that statement by the news media almost always resulted in misunderstanding. The error is such a good example that it is worth a few paragraphs of explanation.

As computers were developed, it took many years to develop ways to interconnect them. Initially computers could be connected with each other only if they were located together in the same site.

Eventually, what might be called multi-site network access was developed. In the U.S., the initial drive to network sites together was by DARPA, Defense Advanced Research Projects Agency. DARPA was limited to work having direct military applications by the 1973 Mansfield Amendment to the 1970 Military Authorization Act.

The technology of connecting computers together over long distances was called ARPAnet. Access to ARPAnet was limited to those with U.S. government contracts, which restricted it

to universities and military research centers and corporations like Tektronix, then a well-known electronic instrument manufacturer.

Those who had access to the ARPAnet often did not want it to become a public utility. During that time, the author of this article visited a friend at Tektronix. The friend talked intensely about why ARPAnet should not allow public access. He said that everyone with access with whom he had talked agreed with him. That was generally how those privileged users felt then. They didn't want ARPAnet to become "commercialized."

It is often difficult now for people who are technically knowledgeable to understand how technically ignorant most people were before the development of the Internet. For example, back then it was common that CEOs didn't know how to type; their secretaries did the typing. Most CEOs did not use a computer.

At present those heavily involved with technology are often called geeks and nerds; both words have very negative meanings about the often limited social ability of technically knowledgeable people. Those words are also sometimes used to dismiss the importance of their contributions.

Back in the days of ARPAnet there was no need for special words; those involved with technology were mostly ignored or sometimes praised in a way that communicated mental distance.

Surprisingly, then Senator Al Gore both knew about network technology, recognized its importance, and used his power as a U.S. senator to get government backing for making multi-site network access a public utility, available to everyone. Against strong objections, Al Gore caused ARPAnet to become the utility we know today as the Internet.

To understand the enormity of that achievement, it is helpful to realize that present-day legislators sometimes propose laws that show they don't understand the technology behind what they propose. Senator Gore understood back then what many present-day politicians don't understand now.

Why did the stories of Senator Al Gore's contribution become so confused? It appears that there were two main reasons: 1) One man's desire to continue being praised, and 2) Al Gore's lack of ability in dealing with conflict.

By the time the stories became popular, Senator Gore had become vice president of the United States. Many of the people who did research asked Vinton "Vint" Cerf for his opinion. Mr. Cerf had been a program manager for DARPA and had helped develop the methods of connecting computers that we use now.

The author of this article first recognized that there was something wrong with the stories about the birth of the Internet because of wondering about the indirect language used in the explanations. Why weren't the explanations using simple, direct language? The author found an email address for Mr. Cerf and asked him directly in a private email to explain Senator Al Gore's contribution. Mr. Cerf's reply contained language that also seemed to contain unnecessary complexity.

Mr. Cerf worked for an organization that, even at present, has only the one goal of making the military more effective. The understanding of the author of this article, developed over the years but possibly not perfect, is that Mr. Cerf accepted that role. There seems to be no evidence that he expressed an opinion.

Mr. Cerf did apparently nothing to make multi-site networking a public utility. At the time of

the development of multi-site network connection technology, Mr. Cerf accepted the idea that the inter-networking would be available only to the military. He didn't help promote the internet as a public utility until Al Gore made that possible and popular.

Mr. Cerf was called the "*father of the Internet*" by those who wrote articles for the public press. Actually, he was only one of the creators of the technology that was later used to build the internet. Apparently the purpose behind Mr. Cerf's oddly constructed explanations was to continue to enjoy the praise he got from the news media, more praise than he would have gotten if the full story were generally known.

The contribution of those who developed the technology was excellent. But Mr. Cerf and others only developed the technology; writers for the media apparently did not want to take the time to understand. With a partial lack of discouragement from Mr. Cerf, writers called him the "*father of the Internet*" even though he was only one of the fathers of the technology that is used in the Internet.

When people are impressed by the Internet, they are usually not thinking about the technology. They are usually impressed by the 24-hour world-wide public connectedness. It was Senator Al Gore who foresaw the enormous advantages to the whole human race of making it easy to get and share information. That improvement in the quality of our lives came because of the insight and foresight of Al Gore when he was still a senator. Mr. Cerf was one of the originators of the network protocol. Senator Gore was the father of what people directly admire.

Unfortunately, although Vice-president Gore had important understanding of technology, he was not as able to deal with conflict. At the time

of the stories about his claims of creating the Internet, he was running for president. He had served as vice president with president Bill Clinton for 8 years. It is perhaps surprising that as Vice-president Al Gore didn't learn a little of Bill Clinton's sometimes amazing smoothness in handling conflict.

When attackers began calling Vice-president Gore's statements about the Internet into question, his response was very weak, allowing the attacks to have credibility.

That wasn't the only example of Gore's weakness in dealing with conflict. One way of interpreting events is to observe that Mr. Gore lost his bid for the presidency because he didn't handle the conflict over abortion rights well. When pressed, he made an unnecessarily strong statement that alienated those against abortion rights. He made that statement even though a U.S. president doesn't decide that issue. Because of that one statement, which was widely publicized by the opposition, many voters, including the author's mother, voted for George W. Bush, a vote she now regrets. Gore narrowly lost the election.

That story about Al Gore illustrates the requirements. A technology leader must:

- 1) recognize conflicts,
- 2) gather facts, some of which may be first made noticeable through subtle social evidence,
- 3) be willing to examine and try to understand conflicts; many people habitually avoid being aware of conflicts and,
- 4) know how to resolve conflicts. Often resolving conflicts adequately requires the skills of a professional communicator.

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Links: The links mentioned in this article are available at:

http://futurepower.net/leadership/articles/Necessary_qualities_of_technology_leaders.html

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