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Reaching Your Potential as a Statistician and Leader

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ABSTRACT

In year's past, a popular question in interviews, mentoring sessions or goal-setting discussions was "Where do you hope to be in five or ten years?" Many statistical leaders will tell you that the path of their career was not what they planned, if there even was a plan. But they can tell you some skills and/or experiences that were instrumental in helping them achieve advancement and success. So, perhaps a better question is "How will you advance your skills so that you can grow as a statistician, take on new roles and challenges, and continue to contribute to your organization and/or profession in a way that is fulfilling and rewarding?" Simply put, "How will you reach your potential as a statistician and leader?" This presentation will provide insights and guidance to this question through personal experiences and leadership study. Concepts that will be discussed include networking, business acumen, strategic thinking and teamwork. The presentation will also provide ideas for actions you can take to move forward in reaching your potential as a statistical leader.

INTRODUCTION

Several years ago, I spoke to a group of graduate students on the topic of leadership study. These were very astute, enthusiastic learners who lacked professional experience but were obviously ambitious and driven. Since it is quite a leap for them to go from "student" to "leader", I described the career progression in Figure 1 which made sense to them.

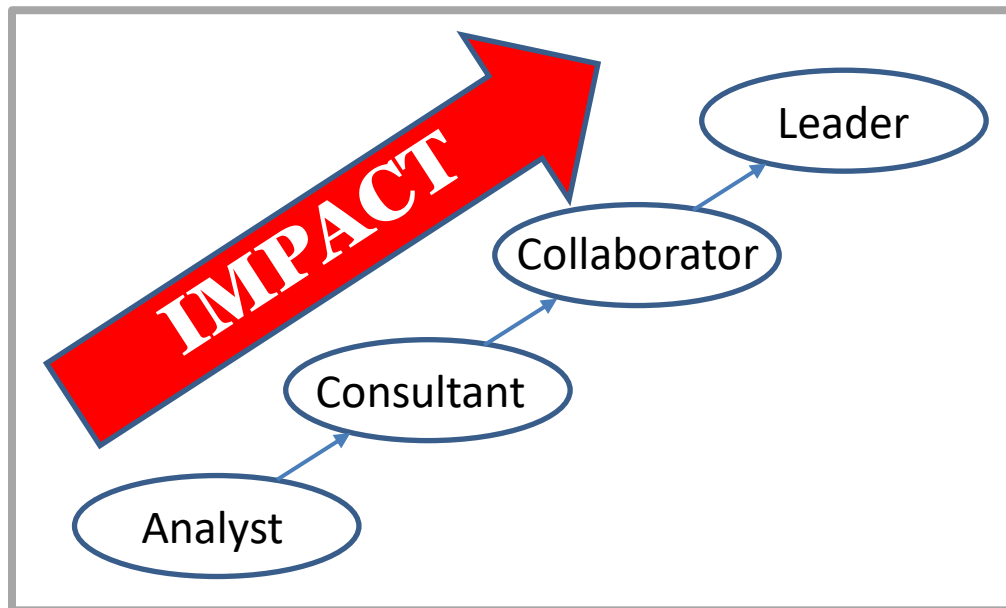


Figure 1. Career progression for statisticians.

I explained the statistical roles as follows:

- Analyst: Practiced in the analysis of data
- Consultant: Skilled in providing guidance upon request for the generation, analysis and interpretation of data
- Collaborator: Working jointly on an activity or project while also bringing expertise in the generation, analysis and interpretation of data

I intentionally left out the explanation of leader (for now) to make the following points:

- Most statisticians or data scientists understand the progression and can see the differences between the roles
- Most have probably gone thru some of this progression in their own careers. (I certainly did.)
- **Finally, reaching the role of "collaborator" in the eyes of your business partners is a strong accomplishment.**

But statisticians should – and many do – strive to be leaders. Several questions immediately come to mind:

- **What is a "statistical leader"? How is leadership defined?**
- How do you become a "leader"?
- How do you know if you even have that potential?

I will address all these questions in this paper but will particularly explore the second **question. And let me make clear that "leader" is not a title or something that you are granted.** Rather, it is something that you will work to achieve and to maintain. It is not "tenured". **I will warn you that the answer to becoming a "leader" is not anywhere near a well-defined equation or process, though there are specific steps that you can take.**

Ultimately, my goal is three-fold:

1. To de-mystify the concept of leadership
2. To accelerate your leadership pursuit
3. To help you reach your potential as a statistician and leader

I will do this by introducing concepts and skills that effective leaders possess, and I will explain these through observations, examples and experiences. Through these experiences, I will demonstrate that leadership lessons are on display most every day in your professional life. **The "school" of leadership is in clear view** – you just have to become a student: observe, experience, reflect, and act. I will finish with some guidance on leadership development and specific actions any statistician can take to reach their potential as a statistician and leader. Let us start with some basics of leadership and some deeper thinking about what leadership is.

Before we get into some leadership basics, let me briefly share a bit about my interest and expertise in this topic. I have been passionate about leadership development for statisticians for over 10 years. In 2009, I was charged with creating and sustaining a

leadership development program for our statistics function at Eli Lilly and Company, which I did thru 2017. Since that time, I have developed and administered multiple leadership training courses to hundreds of statisticians and other professionals on the topics discussed here as well as many others. I retired from Eli Lilly in 2017 and started my own business focused on leadership development for statisticians.

LEADERSHIP BASICS

What is leadership and what does it mean to be a statistical leader? Establishing an understanding of leadership is always a good starting place as it can provide direction for your study and learning, much like a vision statement. Much like an organization vision, a leadership definition is what you strive to attain in terms of a skill **and/or ability**. **Let's first start with the word leader. Most definitions state something similar to "a person who commands, directs or has authority over a group or team."** These definitions are more consistent with *assigned leaders*, which typically indicates a formalized role having a defined title along with some authority over people, money and/or resources. Examples include roles like Vice-President of Statistics & Data Science or Director of Statistical Services or Statistics Department Chair. But these roles are few in most organizations and the **definition of an assigned leader is rather narrow and doesn't apply to technical statisticians** whose responsibilities are not dominated by administrative tasks. 2012 ASA president, Dr. Bob Rodriguez, provides a **broader, more robust view of leadership in his President's corner** article from the Amstat News (February 2012). In it, Dr. Rodriguez states:

"Leadership ability is a prerequisite for the growth of our field because statistics is an interdisciplinary endeavor and our success ultimately depends on getting others to understand and act on our work."

Dr. Rodriguez shares a perspective on leadership that speaks more to what we call *emergent leaders*. Emergent statistical leaders are those who have no authority or command over people or resources but can still get their colleagues or teammates to buy into their thinking (i.e., a statistical approach, an alternative analysis or study design). In other words, for technical statisticians, leadership is about influencing your business partners. (See the inset below – "Failure is not an option" – for a more visual reference and depiction of emergent and assigned leadership.)

I would offer the following three definitions of leadership, from simplest to most comprehensive:

- The ability to influence without authority
- The ability to get others to understand and act on your ideas
- The ability to consistently deliver value to an organization or cause by inspiring others to take a specific direction when they truly have the freedom or choice to do otherwise

This last definition is one that was first created by our leadership development team at Eli Lilly in 2010 that I have updated in recent years. This brings us to an important premise for this paper: If, through your work over your professional career, you reach a point where you continuously demonstrate that you meet the conditions of this definition, you are not only a leader but you are achieving your potential as a statistician and likely pushing it to greater levels than you thought possible.

Failure is not an option: An illustration of emergent and assigned leadership

It's often better to show (or see) an example of a concept or skill rather than try to explain it. A great depiction of both *emergent* and *assigned* leadership can be seen in the 1995 movie "Apollo 13". The film is based on the true story of the aborted 1970 Apollo 13 lunar mission.

One of the famous scenes is remembered by the line "Failure is not an option." The phrase is spoken by Ed Harris, who played Flight Director Gene Kranz in the movie. In the scene, Harris, assigned leader, challenges his team of engineers by stating that, under the current conditions, the astronauts will not make it back to earth. John Aaron, an engineer played by Loren Dean, steps forward and offers a more **pessimistic outcome before proposing a radical solution. Watch as he "emerges"** literally and figuratively as a leader. (This engineer could pass as a statistician.)

For statisticians and quantitative scientists, the scene provides powerful imagery of **what emerging leadership looks like.** This type of leadership doesn't usually play out in one minute, but the scene does serve as a mini version of what can be required to influence and lead. Review the scene after reading the paper – it can be found easily on the internet ([LINK](#)) - and you will see several skills on display from both leaders. Remember that these types of scenes are frequently on display in your professional and personal experiences. You just need to look out for them.



THE LEADERSHIP JOURNEY BEGINS

Where do you start on your leadership journey? If you are in a professional role with responsibilities of a statistician or data scientist, you have already started. And the leadership concepts and skills I will discuss are likely on display all around you. Some of them you will already be skilled at but most you will have to further develop. Most

statisticians learn these skills through their experiences – successes & failures, trials and tribulations, starts and stops, challenges and achievements. It will take time and there **isn't** a defined end to the journey. But by recognizing what leadership is, committing to its study, and reflecting on your observations & experiences, you can accelerate your learning and growth resulting in a more rewarding and impactful career.

I had a long, rewarding 28+ year career at Eli Lilly and Company that included multiple technical roles and management roles. But my path is not the one I want you to necessarily follow for a few reasons. First, every career is different, and every person needs to find their own way in their own way. Second, and more important, my recognition of leadership **and its importance didn't really start until the second half of my career. And my deep understanding & study of leadership did not occur until the final third of my career at Lilly, much later than I would recommend. Having said that, my career is also proof that it is never too late to begin that study. So, if you are past the middle of your career, it's certainly okay for your journey to begin now.**

What I will do in the sections ahead is to share leadership lessons, skills and concepts **through relatable experiences, even though, at the time of many of these, I didn't necessarily equate them to leadership. Rather, I saw it as the "right" way or the "most effective" way to resolve an issue, solve a problem, or move a group of people forward. Or, in some cases, the "wrong" way or "most unproductive" way. One of the more important points I will make is the power of observation and personal reflection in developing leadership skills. I will also recount for you the experience that truly enlightened me regarding leadership.**

In each section, I will clearly connect the skills & concepts to the definitions of leadership and will introduce insights that I gained later through personal study that support these connections and provide questions for your own reflection and study.

COMMUNICATION: THE FOUNDATION FOR LEADERSHIP

I was hired as a statistician at Eli Lilly and Company in 1989. I still remember my interview with my first supervisor. He was positive, direct, engaging, informative, listened attentively, asked good questions and gave thoughtful responses to my questions. He was a big reason I accepted the job. Was he a good interviewer, a skillful communicator or an effective leader? At the time, I thought he was just a good interviewer. Looking back, he



demonstrated all three during the interview process. Interviewing is an exercise in leadership – you are trying to convince someone to take a specific direction (i.e., hire into the company) when they have the choice to do otherwise. And communication is the primary skill involved in the process.

Communication is the foundational dimension of leadership. The example of my interview, simple as it may be, captures many aspects of communication that are necessary for effective leadership. You will see through all my examples and shared experiences, the importance of communication and the role it plays in leading. I will make a point to explain the

different facets of communication in some of the examples. But let me share some important aspects of communication here that will be seen throughout the paper.

When people hear “communication”, they immediately think of speaking. Can you explain your idea? Can you skillfully engage in a debate or discussion on an issue? Can you give a clear technical presentation or a convincing proposal? Yes, that is a part of communication. But the other aspects of communication, which are just as critical as speaking, are listening, writing and actions – small and large. Let me share a question for reflection on each:

- Do you listen in a way to truly understand the intentions, needs and emotions of your customer, collaborator or business partner?
- Does your writing (and speaking, for that matter) reflect a careful consideration of the knowledge and position of your audience, and does it strive to appropriately “move” them to your thinking (i.e., get them to change their thinking or adopt your idea)?
- Are your actions consistent with your spoken or written word and, more importantly, do they model the leader you are striving to be?

In his book, *The Power of Communication*, Fred Garcia writes, “**The only reason to engage an audience is to change something, to provoke a reaction. Effective communication provokes the desired reaction; ineffective communication doesn't.**” If you reflect on the three definitions of leadership I shared earlier, this view of communication is consistent with all three. This underscores the importance of communication in effective leadership, including interviews.

Let us move on to some examples and experiences that highlight the other critical leadership skills and concepts.

THE POWER OF TRUST

My first role at Lilly was as a statistician supporting product development and manufacturing. This is not the typical role for a statistician in the pharmaceutical industry as most statisticians support some aspect of clinical trial design and analysis. It was atypical enough that I was referred to by what I was not, rather than what I was – a Nonclinical Statistician. In this role I consulted with scientists, engineers and production specialists to help them optimize processes, resolve manufacturing problems, or analyze/interpret data to support regulatory filings or submissions. I want to share an experience that emphasizes the importance of communication and trust as the foundation for influence and leadership.

One of the first significant projects I worked on was to optimize a tablet formulation for a weight loss drug (which never made it to the market). To understand the critical factors at a large scale, our formulation team traveled to a manufacturing site where we planned to execute a Plackett-Burman screening design to understand the effect of various process factors on tablet properties. **I didn't fully understand the cost of this study at the time – more on that later – but it was probably close to 0.25M \$ when you accounted for materials, people resources and equipment.** The day before we had planned to begin the study, the process technician, who I had come to know well, asked if we could discuss the study. He had never applied experimental design in any formulation study and he went on to tell me **that several of the dozen or so experiments wouldn't work. In other words, they would produce material that could not be compressed into tablets so we would not be able to measure chemical and physical properties.** In statistical terms, the experiment would have a significant amount of missing data. In small experimental designs, this creates issues

with correlation and variability in model estimates. We proceeded to adjust the factor levels so that, according to his expertise, we would get results – and we did. The experiment was a success.

On the surface, this is unlike many interactions that occur between statisticians and their business partners. But, upon reflection years later, I would offer the following questions:

- **What if the technician hadn't come to me with his concerns?**
- Was he sure that I would listen to him? Why did I?
- Was I leading him or was he leading me?

As I mentioned earlier, I came to know the technician well before this critical study took place. We met for lunch and coffee often and discussed any number of topics ranging from statistics and formulation to organizational politics and personal principles. We came to know and trust each other. Would he have come to me regardless? Perhaps. But when trust is present, we believe that others will act in our best interest or the collective interest of the group. Our trust in this situation provided mutual benefits. First, the process technician trusted me to the point that he would use a method he had never used before on a \$250,000 experiment. He did not have the total authority to refuse to, but he probably could have **convinced the others that we shouldn't. He had 20 years of experience and I had less than two.** And I trusted him to change the levels of some experimental factors on a study that was reviewed and approved by several of his peers, some more senior than him.

Trust is an essential component of effective leadership. Trust is business currency. It gains you access, speeds decisions, creates honest dialogue, affords risk-taking and allows you to **make mistakes. How do you convince someone "to take a specific direction when they have the freedom or choice to do otherwise"? You get them to trust you first. If you want someone to "act on your ideas", start by winning their trust. How do you do that? Through your actions (i.e., your communication as explained above), you demonstrate the following:**

- Competence – are you skilled in your field or the area of mutual interest?
- Care – can you help them achieve their goals first?
- Character – are you principled, ethical and consistent in your approaches & beliefs?

Here are some questions for reflection:

- Have you earned the trust of colleagues and business partners?
- If not, what do you have to do or change to earn that trust?
- What role does each aspect of communication play in building trust?

THE IMPORTANCE OF NETWORKING AND BUSINESS ACUMEN

About five years into my career, I took a role providing statistical support to the Bioprocess Research & Development organization. This was a group of 150+ scientists and engineers who were responsible for taking a large molecule (an active biologic) that showed promise in treating a disease in animals and developing a process to make it in larger quantities to support human clinical trials and ultimately, if all went well, to make enough formulated drug to support the market place. The organization included a wide range of people including molecular biologists, micro-biologists, analytical chemists, bio-chemical engineers,

protein chemists, process engineers, and process technicians. My responsibilities were to help them design studies, analyze and interpret data and provide training as needed.

There were two experiences in this role – both **personal “failures” to a different extent** - that helped me move toward being an emergent leader. These highlight the importance of networking and business acumen in emergent leadership.

When I began this role, I had some contacts and regular customers from my previous role – a much broader one – and they kept me busy for about a year. As those projects completed or those customers moved on, I felt that my services were being underutilized. In any given week, there were dozens of experiments being conducted and hundreds if not **1000’s of data points being generated. Why weren’t people knocking down my door? I** gave presentations on the benefit of statistical methods that were well-received, but that **didn’t change much. Since the projects weren’t coming to me,** I realized that I needed to find them – to network. I needed to go out and talk to individual team leaders, senior scientists and even managers to understand what they were doing, what problems they were trying to solve, and convince them to let me try to help. I thought my communication skills were good – I could answer questions, present analyses, and teach methods – but this was taking it to another level, much like being a salesperson. That was well outside my comfort zone. I was and am an introvert. **I never signed up for having to go out and “sell” my services and ideas to customers, but that’s what I needed to do to be successful.** I struggled but kept working at it and eventually got to a point where (1) I was comfortable managing a conversation with a scientist that could go in any number of directions, and (2) I was able to get myself into more team meetings where I could learn the science and start to influence study designs. Most importantly, doing this challenged my communication skills – **especially listening and speaking “on the fly”** – and made me a much better communicator. As time went on, I became involved in most of the major projects in the organization and worked at one time or another with the majority of scientists and engineers in the organization.



The second experience (and failure) started with an idea I had to apply experimental design concepts broadly within the area to establish robustness and deeper understanding of our processes before scale-up and transfer to manufacturing. It was a good idea, but I had no clue how to move it forward. I mistakenly believed that I simply had to share it with my senior director – the head of BR&D – and, if he thought it was good, he would take it forward. When I met with him, he had some questions and seemed to support my general approach. I left the meeting feeling good and waited for next steps on his part – the formation of a team, communication of the idea, or some call to action. Nothing happened and I just figured there were other **priorities and projects, and this didn’t rise to that level. Only years later did I realize that it was not my senior director’s responsibility to take the project forward** – it was mine! But I lacked the skills – the leadership skills to be specific – to do that. I needed to first build broader support for the idea with technical leaders in my organization. I then needed to network the idea with technical and administrative leaders in manufacturing. Gaining sponsorship with senior leadership was also necessary as well as putting together a strategic plan including potential benefits & value, timing, a proof of concept proposal and a communication package. This would have been an exercise in the very definition of leadership: Convincing others that this idea was worthwhile and would

deliver value, and that they should dedicate their time and resources to it. I did not have the skills or the capability to take this on, specifically skills in networking, business acumen and strategic thinking.

As you develop as a statistical leader, you will be challenged to deliver value for your organization in more impactful ways. Recall the progression of statisticians from analyst to consultant to collaborator to leader. Making this progression requires a deeper and deeper **understanding of your "business"** – and I use that word very broadly. Depending on your sector this translates to some of the following: science, financials, policies, processes, operations, regulations, politics, and culture. Some organizations may provide training or education in these areas but for most statisticians, it is up to you. Even if you work for the government, academia, or a non-profit, you still need to understand and be able to answer the following questions:

- Who are your customers and stakeholders? Do you meet with them individually – separate from busy team meetings - to understand their interests, priorities and challenges?
- Does your network reach beyond your immediate customers and collaborators? Which senior leaders or external partners would be beneficial to connect with?
- What are the goals of your organization at multiple levels – group, function, department, company? How does your work and the product and/or service of your team contribute to those goals – at all levels?

Answering these questions requires regular networking to gain strong business & organizational acumen. This provides you a breadth of understanding that allows you to impact at more than a tactical level. You can determine how your skills and knowledge can best contribute to solving problems and addressing challenges at more strategic levels of **your organization**. **Finally, it gives you enough knowledge of the "business" to convince** stakeholders and business partners of your ideas and approaches, and ultimately gain their support. This is high-level leadership.

LEADING PEOPLE AND UNDERSTANDING POTENTIAL

Most people see assigned leadership as being different from emergent leadership. But an effective assigned leader uses the same skills as an emergent leader. I would rather statisticians see these roles as presenting different challenges than some type of advancement. Taking on an assigned role, which usually includes people responsibilities, is a way of challenging yourself and can be a good way to understand and grow your potential. But it should not be seen as a path for everyone. I will share my experience transitioning to an assigned role but want to talk first about potential.

Early in my career, I had no interest in supervising people and even said as much. But after 10+ years as a technical statistician and individual contributor, I developed an interest in supervising people and managing an organization. It opened up a new set of challenges for me and helped me tap into and develop new skills. I also was able to leverage the experiences I had as a technical statistician and applied them in this role.

I will talk more about that below, but there are two points to emphasize about my decision. First, I became a supervisor not because I saw it as a stepping stone but because I had an interest, perhaps a growing passion, in wanting to lead others in a way where they could depend on me to coach them, challenge them, and help them be successful. When I took the role, it was no longer about me but about them. Second, I also saw the role as a way of challenging myself and going beyond the potential I had as a technical statistician. And this is the important point. There were other ways to take on a new challenge. I could have

taken a role as a clinical statistician. I could have moved into a non-statistical function and used business knowledge I had gained, perhaps as a project manager. I could have moved into a different non-clinical statistician role to learn a new science or field. The point is that I took on a role that would challenge me in new ways, and by doing that I opened up new potential for me – **a potential I didn't see in myself five or ten years earlier.**

After almost thirteen years as a technical statistician, I moved into an assigned leadership role, taking the position of manager for manufacturing statisticians. The lessons I had learned and shared above as a technical statistician were readily applicable in my assigned leader role:

- **Skillful communication ... all aspects** – with reports, business partners, and functional colleagues
- **Building trust ... with my direct reports** and business partners
- **Networking ... with business partners,** but also making this an expectation for my reports
- **Business Acumen ... understanding** priorities, processes, and challenges of manufacturing and gaining knowledge of how we create value for the company
- **Strategic thinking ... for projects both** small and large, thoughtfully using the knowledge and resources at my disposal to deliver value for manufacturing



Though I had no experience supervising people, I again used my observations and experiences as a technical statistician as preparation:

- Before becoming an assigned leader, I had six different supervisors. They all provided examples of good leadership – and some bad - that I was able to learn from. I used this learning to determine my principles for leading others based on both what I saw as best practices and my own personality.
- I had collaborated with hundreds of people at varying levels from many different functions. Developing a rapport with my reports would be similar to collaborating with my clients – I could leverage critical skills like communication, trust, and reliability.
- As I had substantial experience as a technical statistician, I could coach my group on techniques and skills to help them grow and have impact.
- Finally - and this is relevant to all technical statisticians – in many ways you are a **service provider. At times, that's a disadvantage as we want to be seen as equal** partners and collaborators. But we establish trust by serving others. This provides a good foundation for being an effective supervisor or assigned leader of people.

Whether you follow a technical path, take the administrative path, or move into a new organization or new company, the leadership skills you learn as a technical statistician will help you succeed in your next role. And every new role you take will change how you look at your potential.

CREATING OPPORTUNITIES

What can happen when you develop these leadership skills and apply them together? I share the following example to show how these skills can be collectively used to first identify opportunities to add value to your organization and then to provide the leadership to move the opportunity forward and see it to fruition. I share this not to be boastful – I certainly missed many such opportunities earlier in my career – but to show what impact a statistician can have by investing in and proactively applying these skills. (In hindsight, I wish I had gotten to this point in my career faster, and that is one of the reasons for my commitment to leadership: to accelerate the development of these skills in other statisticians.)

Even though I was now in an assigned leader role with people responsibilities, I still saw part of my role as looking for opportunities for my group to deliver value to the organization. A year into this assigned leader role as manager of manufacturing statisticians, I had developed a network of business partners who I would meet with regularly. At one such meeting, I was talking with the head of Parenteral operations, an organization that did the final product delivery and packaging of large molecule products (e.g., insulins) in the Indianapolis area. One of the questions I would typically ask in these meetings was, **“What are the biggest challenges you are facing?”** (Note: I was careful not to ask, **“How can my statistics group could help your organization?”** because I might get a specific answer based on that individual’s view of our role, which could be narrow or limited.) His response was fairly immediate: **“Deviations are killing us!”** I knew a fair bit about the processes that deviations triggered and gained a more thorough understanding after networking with some other areas – operations, quality, and regulatory:

- When a measured property on a final product went outside the control limits, it triggered a deviation. In most all these cases the measured property was within its specifications, which were wider than the control limits. Hence, the product was acceptable but atypical relative to previous batches of product.
- For each deviation, a root cause investigation was performed by a technical services associate and had to be documented when complete.
- Most deviations came back without a specific assignable cause due to a time lag and/or backlog. In other words, because the deviations were being investigated days or weeks **after they occurred, it was difficult to discern a cause because operators simply couldn’t remember what happened and records weren’t detailed enough.** (More on this below.)
- The intent of recording and investigating deviations was good – find a cause and correct or adjust course to improve the process & product. But due to the backlog and lack of specific causes, there was little to no value being gained.
- The control charting was owned by operations, but my group of statisticians calculated and updated control limits.

After additional thought and discussion, I proposed that we just stop control charting for the following reasons:

- **First, the control charts weren’t being reviewed in real time.** The measured properties were reported and charted several days or more than a week after the process was completed. This was not unusual as the assays of the product samples took several days.
- Second, as stated above, because of the delays - in the measured properties, in the review of the charts, and in the root cause investigations - the entire exercise was not adding value.

- Finally, the exercise was costing money because personnel were spending their time on pointless root cause investigations while they could have been making improvements to the products and process in other ways.

The problem was that established procedures mandated that control charting take place. Why was it mandated that we had to control chart? After some research by my team and I, we found that the procedure was created in response to an FDA inspection report many years prior that stated there was no process for investigating atypical results. Since the inspection report required a countermeasure, the control charting was put in place.

I now had the backstory which allowed us to move forward on a solution. After getting approval from the key stakeholders – operations, quality and regulatory - we were able to stop the control charting for 80% of the final properties. The stakeholders decided to keep control charting for the most critical properties as the reduction would eliminate the backlog and allow real-time assessment for fewer properties. The work improved our regulatory standing and freed up a significant number of people resources in manufacturing, quality and statistics, who could then focus on truly improving processes and products.



I learned one additional leadership lesson in this exercise along the lines of strategic thinking. One question that was likely not asked before the control charting was instituted: What is the cost of implementation and the cost of maintaining this new approach/system? Had this question been asked and carefully researched, I doubt that control charting would have been fully implemented. This was a lesson I carried forward and would advise that you do as well. For any proposal, change, or new process, ask questions about implementation, maintenance, and unintended consequences. This will stop nonvalue-adding work from starting or assure that the solution is piloted on a smaller scale before fully implemented.

This is an example of how leadership skills can be used by statisticians to identify value-adding ideas and then drive them to completion. Here are a few questions to consider or reflect on:

- Think about a project or initiative in your organization or company, perhaps one you are a part of. What leadership skills have you or your team members demonstrated that have been critical to the progress of the project or initiative? How many can you come up with?
- Do you have ideas and/or possible improvement that could add value to the business beyond your tactical responsibilities? How could you move those ideas forward? What would it take from a standpoint of communication, networking and strategic thinking?

THE HIGH-PERFORMING TEAM

One important topic we have not covered is teamwork. Most all statisticians work on teams – whether project teams, functional groups, or special initiatives. What are the keys to a functioning and productive team? How do leadership and leadership skills play a role? Let me share an example to emphasize some key concepts.

Later in my career, I was fortunate enough to be promoted to the role of Senior Director for Nonclinical Statistics. In this role, I had responsibility for statisticians who worked with discovery research, product development, and manufacturing. I became part of the Global Statistical Sciences leadership team that, under the leadership of a new Vice-President, would be pursuing a strategy based on innovation and leadership. The leadership team was comprised of eight people, most of whom had worked together in some capacity.

Before the organization became official, the Vice-President – the assigned leader of the team – held a four-day off-site meeting for strategy development and teambuilding. I was indifferent to teambuilding at the time, but I saw it as a way to get to know my colleagues better and that was a plus. The team building part was a bit more intense than I expected as it involved several exercises and activities that were new and different. For example, in one exercise we had to meet with each person privately and tell them any issues we had with them in the past – perhaps they had unintentionally offended, or misled, or gone back on their word. If such an event happened, we had to share it with them. In addition, we also had to share what we admired about them, something they had done which we appreciated or saw to be especially going above and beyond. I always believed in being direct and honest with people, **so the exercise wasn't difficult for me. As the new** organization became official, we continued to have periodic off-sites which included different team-building events. Only later did I realize the purpose, and much of it had to do with building trust within the team. Although our Vice-President **didn't** really say this, she very well could have as it captured the essence of her approach to building this team:

"We are pursuing a very aggressive strategy, unlike anything the statistics group has done in the past. It will require your commitment to this team and to one another. As we proceed, we will have many important discussions and will need to make the best decisions on a variety of issues. In order to do that, I will need you to trust each other, to be honest, and not hesitate to share your perspective on issues and situations. We must be comfortable having difficult discussions. This will help us make the best decisions and determine the best path for moving forward on any issue. Even if we don't all agree, once we have decided on a path forward, we will collectively support it. We will not leave the room and second guess. We will hold each other accountable to the actions and goals we set. If we can do these things, we will be successful as a team and achieve great things."

About a year after this team formed, I had an issue with one of my colleagues on the team. He had acted in a manner that I felt was undermining my organization. I went to my Vice-President and shared the situation. She **didn't take sides and asked a few questions before saying what I knew she was going to say: "Now go resolve it with him."** I expected nothing less, and we resolved it. This team was the most productive and rewarding team I was ever a part of.

Leading naturally involves moving people toward a goal or inspiring them to support a cause or initiative. When assigned and emergent leaders can establish a trusting environment, their team has productive discussions which result in better ideas and decisions. This

reinforces commitment, creates accountability and delivers value to the organization. (See the inset below for a reference for a more in-depth understanding of teamwork.) Without trust, discussions can be superficial, decisions are sub-optimal or second guessed, team commitment suffers, and goals are not achieved.

In his book, *The Five Dysfunctions of a Team*, Patrick Lencioni provides a simple, powerful framework for building a high-functioning team. Like most of his leadership books, he uses a fictional story to show the concepts being applied in a believable situation and then defines and summarizes them in an understandable way.

In my reflections on teams, I have found that the degree to which teams are unproductive and ineffective is directly tied to number and level of the five dysfunctions. I also agree that establishing trust between team members is a necessary first step toward strong team performance. The book is an easy read and is always one of the first books I recommend to aspiring leaders.

The role of communication in effective teamwork is also clear, especially the aspects of listening, speaking and actions. Building and maintaining trust depends on effective communication. The success of every subsequent team meeting depended on every facet of communication. And every communication either strengthened or weakened the trust. Additionally, the ability of the assigned leader to listen, speak and act was paramount. She had to set the tone, provide the example, and act in a way that reinforced her plan and expectations.

Here are some questions for reflection:

- What are the best and worst teams you have ever been a part of? What made them good or bad?
- Are your current teams productive? What is the level of trust on those teams? Are there opportunities to build greater trust?
- What role can you play in doing that?

LEADERSHIP TRAINING

What role does formal leadership training play **in a statistician's** development? Let us first consider how a statistician develops technical expertise in a specific methodology (e.g., Bayesian methodology). What ultimately makes a statistician a Bayesian expert is a combination of the following:

- Formal graduate training
- Coaching
- Application
- Professional training (e.g., short courses)
- Personal study (literature, books, articles, presentations)
- Peer discussion
- Applied research

There may be other activities not captured here. To develop deep expertise in a statistical subject, a statistician needs to commit to personal study and learning over a long period of time. Here is a similar list of activities for leadership development:

- Professional leadership training
- Observation
- Experience
- Reflection
- Mentoring
- Personal study (books, articles, presentations)
- Peer/Group discussion

Training is always a good place to start. Courses and programs that I have taken, developed and instructed focus on foundational concepts, specific skills, exercises, personal reflection, discussion and action planning. Training can provide a good overview and a direction for initial study no matter where you are in your career.



I took my first leadership training twenty years into my professional career. It was a corporate course which included professionals from across the company and was a week-long off-site program. The program focused on a few specific topics but also included case-studies from both company leaders and community leaders. The program also included team exercises, plenty of table discussions and individual assignments. In addition to the learning on the topics and the case studies, I came away with three important lessons from the training:

- Effective leadership is critical to the success of any organization or cause. Organizations, no matter how small or large, ultimately thrive or struggle depending on the quality of their leadership.
- Time spent reflecting on observations and experiences is a crucial component of leadership development. To truly learn from experience requires deep reflection to understand the concepts and skills in play, followed by some action or effort to put the learning into practice.
- The best leaders are life-long learners **and true "students of leadership"**. No single course, experience or role can make you a complete leader. Rather, a leadership endeavor requires a willingness and desire to be a continuous, lifetime learner.

After taking this course, I began to reflect on my past experiences – **some I've** shared here – and understood the leadership lessons they provided. From that point forward, I viewed most every experience thru a leadership lens, always looking for a leadership lesson, a helpful technique, or an idea as to how to be better. Whether a team meeting, a crisis situation, or an interaction between colleagues, I could usually find some leadership learning related to any number of the concepts that I discussed in this paper.

CONCLUSION

Everyone has the potential to be a better leader. Only by making the effort to study and improve will you know how much potential you have. I have discussed many of the necessary skills statisticians must acquire to advance their leadership abilities and emphasized the benefits of experiential learning and reflection. I offer the following guidance on how any statistician can realize their potential as a leader:

- Identify the 2-3 skills required to be successful in your current and future role
- Commit to improving at least one leadership skill for six to twelve months
- Find one or two mentors who can help you by assessing your skills and suggesting actions you can take to improve those skills.
- Look for training as a way to gain deeper leadership understanding and improve specific skills.
- Form a small leadership discussion group to share leadership experiences and benefit from the learning & perspective of others.
- Practice, practice, practice – take action to apply what you learn and then reflect on the experience to continuously improve.
- Start **now!** **It's never too early or too late.**

Vince Lombardi, a famous American football coach is quoted as saying, **"Leaders aren't born, they are made. They are made by hard effort, which is the price which all of us must pay to achieve any goal which is worthwhile."**

I agree with Coach Lombardi and will close with the following points:

- Some people are born with more leadership potential than others, but to realize any potential requires effort. **I've seen** "lower" potential people become better leaders than "high" potential people by working harder at developing their leadership.
- To re-iterate, leadership for statisticians is a goal worth achieving as it will provide a rewarding professional career filled with challenges and achievement.
- Achieving leadership requires a commitment of personal study and lifelong learning.

Good luck on your leadership journey!

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