Conservation Measures

Lessons Learned from Corporate Black Belts

Compiled and Edited by:

Nick Salafsky
Foundations of Success
nick@fosonline.org

&

Katie Dolan
Executive Director of The Nature Conservancy's
Eastern New York Chapter
kdolan@tnc.org

Key contributors include:

- **Barbara Moss**, **Norman Kuchar**, and **Walter Berninger** – Current/former General Electric employees who have been deeply involved in the Six Sigma Process and are also Eastern New York (ENY) Board and Chapter Members
- **Tim Tear** – Previous Director of Conservation Science for ENY and current lead for advancing conservation measures across the Conservancy
- **Kent Redford** – Scientist with the Wildlife Conservation Society and ENY Board Member

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Over the last two years, a remarkable conversation was held among board members and science staff in The Nature Conservancy's Eastern New York (TNC ENY) Chapter. The group was initially brought together to be a catalyst for further improving the measures system in a chapter that already had strong science and measures program. Several board members came from General Electric (GE) where they were intimately involved in GE's Six Sigma approach to quality improvement. This experience left them with a passionate belief in the power of success measurements to dramatically improve the quality of products and services. The Nature Conservancy has its own approach to designing and managing its core business: Conservation Action Planning. How does the Conservancy's approach compare with Six Sigma? What lessons can the Conservancy learn from GE's experience? In this article, we provide excerpts from this ongoing conversation.

The Context: How to Measure Success in Conservation?

The conversation started when the board members and staff came together to visit one of the ENY Chapter's project sites at the Albany Pine Bush Preserve. In many respects, this is a relatively straightforward conservation project aimed at protecting a globally rare ecosystem that provides critical habitat endangered plants and animals including the Karner Blue butterfly. During this visit, the group began to discuss how success might be defined and measured in the context of this project.

Barbara: You've told us that the butterflies depend on a specific host plant and that this plant was in trouble because natural wildfires have been controlled. So part of your management actions involve controlled burns. But then you said there are other issues like the impact of roads and development, invasive species, and people using the site for recreation. So what I'm curious to learn is how do you know what actions to take? And how do you know whether these actions are making a difference?

Tim: That's a great question. We work hard to make sure we are doing the right thing, but success measurement is very challenging. We could track the numbers of butterflies over time, but suppose the butterfly population goes down for reasons unrelated to the lack of fire? Does that mean the controlled burns were a bad idea? It is often hard to tease out exactly what is responsible for some of the changes we see, and to be sure how our efforts fit in.

Kent: It's interesting that you should bring this up, because these are questions that many conservationists are starting to get very interested in. It's hard enough to answer these questions in a small preserve like this – but imagine trying to do this at the larger scales that we are all moving towards.

Norm: At GE, we have adopted a management system that helps us measure our success and use the results to improve our business processes – it's called Six Sigma.

Tim: Interesting, because at TNC we have something that sounds similar – we call it Conservation Action Planning.

Measures as a Driver of Process Improvement

The GE and Conservancy staff then go on to introduce their respective management systems and why their organizations adopted them. Although these systems involve measures of success, they ultimately go far beyond measures into improving business processes. See Box 1 for details.

Walt: The Six Sigma process was originally developed at Motorola in the mid and late 1980s and then spread to other companies including GE in the 1990s. It is about creating products that meet our customers' expectations for quality, and doing so in a way that minimizes internal waste. It starts by attempting to understand just what attributes the customers find important, and their relative priority. We then develop quantitative measures for those attributes which are used to drive every phase of product design and manufacturing in an attempt to meet them with as few *exceptions* as possible. The process is highly structured and data driven, and wherever possible internal decisions are tied directly to the measures.

The "Six Sigma" name comes from the language of statistics, and, in this context, refers to the number of exceptions that are actually achieved. The higher the sigma level, the fewer the number of exceptions. A Six-Sigma process has an exception level in the parts per million range. What does all this mean to a company? Well, if we meet our customers' quality expectations better than our competition, more people will buy our products. And, if we can do so with minimal internal waste, we can lower our product cost, and earn more. Pretty basic stuff. But the payoff can be enormous.

Tim: Well that's intriguing. The roots of the Conservation Action Planning process in the Conservancy also go back to the 1990s. In its early days, The Conservancy focused on acquisition and stewardship of land parcels and we measured our success in "bucks and acres." In the 1990s, however, we realized that the health of individual species – and of entire ecosystems – is threatened by larger scale conservation problems that land acquisition alone could never solve. An increasing investment in the conservation of freshwater and marine biodiversity also drove changes in our overall conservation approach. We needed to think much bigger, and got involved in much larger scale assessments of ecoregions, and got involved in larger, more complex sites. These changes challenged us to better define measures of success and improve the effectiveness of our actions.

Box 1. The Basic Steps in Six Sigma and Conservation Action Planning

The following table shows the basic steps in each of the processes. Although the terms and sequences are a bit different, overall the two processes are remarkably congruent.

GE's Six Sigma	TNC's Conservation Action Planning
1. Define – Identify the problem clearly, define critical-to-quality characteristics, and set goals	**A. Defining Your Project** – Identify the scope of and people involved in the project
2. Measure – Identify key internal processes that influence the critical characteristics and measure defects generated relative to them	**B. Developing Your Conservation Strategies and Measures** – Set specific goals, identify factors that affect your ability to reach these goals, determine strategies for accomplishing these goals, and determine how you will measure effectiveness
3. Analyze – Analyze data to understand why defects occur and develop causal hypotheses about key process variables that are root causes of defects	**C. Implementing Your Strategies and Measures** – Implement your project and measure the results
4. Improve – Develop and test ideas to remove root causes of defects and then modify processes to implement these ideas	**D. Analyze, Learn, Adapt & Share** – Analyze data to learn what worked and what did not and share these findings with relevant individuals
5. Control – Establish controls to insure that the key process variables stay within the acceptable ranges and correct problems as needed	

The starting point of the Conservation Action Planning methodology involves defining the conservation site and getting managers to select a limited set of *conservation targets* to best represent the vast array of biodiversity we want to conserve. When we work in large areas, it is hard to choose a small set of targets that are broad enough to represent biodiversity at the site, yet be specific enough to focus management actions. For example, on the Hudson River, our targets include healthy tributary streams and migratory fish. The methodology then helps our planning teams develop very specific – and often quantitative – statements of the current and desired future condition of key attributes of each of these targets. I think these are analogous to the customer outcomes or goals that you have described – although I'm not sure we know enough about our systems to describe desired outcomes down to fractions of a percent.

Norm: I think that is right. Although, in our case it is vital to have not just a measurement of the final goal – what we would term a "lagging indicator" – but also to measure "leading indicators" along the way. These are measurements of the independent variables that contribute to our final goal. We found that these leading indicators are what enable us to make changes along the way in a more dynamic fashion. Measuring the leading indicators, and acting on these measurements, enables us to achieve the final goal.

Tim: Actually, I think that we have something similar. Some of the target attributes identified can act as leading indicators, as they may respond to active management. After specifying the desired goal for our target, we then look at the threats that are affecting the target and develop measures as well – they represent a critical set of leading indicators. Threat reduction is not our ultimate goal, conserving biological diversity is, but it gives us information to make more immediate management decisions. Finally, we also state the activities we think will be necessary to achieve these goals – and these are also useful as leading indicators of progress, although they are different type of output than actually reducing a threat or altering some aspect of a target's health.

Benefits of Quality Improvement Systems

The group discusses the key benefits of setting up a performance measures system.

Norm: There are numerous benefits to using a Six Sigma approach. It can help reduce costs, improve productivity, improve the quality of products, and increase customer satisfaction. For example, one of GE's first Six Sigma-designed products, a new CT medical scanner, not only achieved better image quality for earlier, more reliable diagnoses, but did this with 3 to 9-fold faster scanning rate that improved both patient comfort and clinical productivity. This new scanner also had a 10-fold improvement in reliability. A radiologist called it the "biggest breakthrough in CT in a decade."

This kind of quality improvement happens because Six Sigma requires engineers to constantly measure the leading indicators which contribute to the final product quality all through the product development. Based on these early measurements, the final product quality can be predicted, and appropriate design changes can be made well before the final product comes together. In essence, Six Sigma allows a development team to better manage its design iterations and "get it right the first time."

Measurement all along the way is a key, since it allows rational decisions to be made based on real data, rather than "gut feelings" or wishful thinking. GE established a series of checkpoints – we called them tollgates – that each new product development has to go through. Tollgates force engineers to critically examine assumptions periodically in the light of actual measurements and enable management to modify or even kill the project if necessary. I heard of another company that actually gave out "tombstone awards" recognizing the importance of killing projects that weren't going to work out.

Katie: This may be an area where conservation differs from industry – I suspect that we are less willing to let go of a project site – it's not like a product line that you can abandon. We often have donors who have invested in particular places, making it more difficult to abandon sites. On a more

local project level, however, we often shift monitoring priorities if a conservation threat changes significantly or if we have made enough progress in a given strategy and can better use the resources on a new issue or different threat. For example, at Mianus Gorge in Eastern New York – the first preserve ever purchased by The Nature Conservancy, the initial idea was to protect a beautiful area from development – in particular a spectacular hemlock ravine. Over time, our monitoring told us that this preserve is threatened by a new invasive pest – the hemlock wooly adelgid – that threatens to kill the hemlocks in this preserve. We thus shifted our attention to trying to reduce this new and very different threat.

Tim: Our process also encourages laying out the links between the targets we want to conserve, the problems they face, and the actions we will take to reduce these problems. Sometimes these connections can be quite complex, and show that we have a lot of assumptions that separate our actions from our intended impact. These assumptions are like Norm's tollgates. However, the more tollgates we have, the harder it is for us to test all these tollgates because of the scarce resources we have in conservation for this type of testing. I suspect this is another area where conservation is different than industry.

Barbara: One of the important things that Six Sigma gave to GE management was a common metric, defects per million, across all of its businesses which allowed first for the appropriate prioritization of goals and then the ability to compare the effectiveness of the efforts to achieve those goals. At the same time each individual business could define the key variables, such as "a defect", in the way that was most appropriate for its business processes.

Kent: We've found in the conservation world that this learning can also extend across organizations. For example, there are now interesting learning opportunities between staff members at The Wildlife Conservation Society, the Conservancy, and other organizations because we now have comparable data about our conservation efforts.

Katie: The process also lets us bring different stakeholders together to address complex conservation problems. On the Hudson River, where the conservation issues are very clearly complex and complicated, we used the Conservation Action Planning process to convene a series of meetings involving dozens of different individuals and organizations. The process gave us a common language to talk about our problems and to develop joint solutions. This was what the participants told us was one of the Conservancy's greatest contributions to conservation in this area, as it has helped to launch truly collaborative conservation efforts like never before.

How to Institutionalize a Measures System

The discussion turns to challenges of getting an organization to adopt a rigorous planning and measures system.

Tim: We're now challenged with getting the CAP system rolled out across the Conservancy. There are leaders in the organization such as Katie who grasp the importance of measures and support its use within their program. But we also have managers and scientists who have little or no experience with systems like this and are reluctant to change, worry that it will cost too much, or are weary of responding to what they perceive as endless new unfunded mandates from headquarters. Investing in a system of measures requires investment in skills and in partnerships, and these have real costs that have to be reckoned against the benefits of the investment. What was the experience of GE in getting the rank-and-file members of the company to adopt the Six Sigma System?

Norm: Support from top leadership is critical to rolling out a system like Six Sigma. If company leaders don't get behind the idea and articulate why it is important, it will never get implemented. In the early stages of Six Sigma at GE, company heads were required to include a Six Sigma implementation chart in their regular annual review processes. Early on, one of the company heads came to a review meeting with our CEO Jack Welch without a Six Sigma chart – and Jack made it clear that this was unacceptable. As you can imagine, word got around quickly and all the company heads developed their charts! It is clear that "stick-based" incentives work – in GE, early on, up to 40% of the bonus for a Vice President was tied to institutionalizing Six Sigma results within their division.

Katie: I wonder if there may be a difference in how new ideas play out in corporate cultures versus non-profits. I've seen, in both health care and in conservation, that initial experiments with outcomes and measurement systems may be initiated by radical thinkers, but then must eventually move into the core operations of an organization by getting a needed push from the top managers. If members of our board understand the importance of this and sell this to other Conservancy boards, we can work with Tim to get it moving in the organization as a whole.

Norm: GE also had luck with positive "carrot-based" incentives – it's about creating a culture where this type of approach is valued. For example, we awarded karate-style Green Belts and Black Belts to people as they become more proficient in Six Sigma, and gave stock options to our Black Belt "gurus." We also had celebratory "all hands" meetings to announce someone's promotion to being a coach or Master Black Belt in the Six Sigma process. I am still proudly a Master Black Belt.

Tim: TNC may have adopted more of this approach than I originally thought. With the support of a generous donor, the Conservancy developed the Efroymson network to roll-out and support its Conservation Action Planning program with sponsors, franchise leaders, and coaches. Maybe we should give them Black Belts as well.

Kent: I'm familiar with the planning approaches of the major conservation organizations and think the Conservancy has invested far more in its system than others. And yet there is clearly still a long way to go.

Katie: Hey, didn't you publish a big article on that subject, Kent? We need to give you a belt as well!

What We Have in Common

At the end of the discussion, both sides agree that there are many commonalties between the Six Sigma and Conservation Action Planning processes.

Walt: I'm a member of the Conservancy because I support its mission, and I like its cooperative, practical, and science driven approach. Our mission is to preserve biodiversity, and collectively this is a gift we all give to future generations. The one thing that has always struck me as missing was accountability in the language of that mission. How are we doing in our preservation? How will we know if we're making progress? To me, this is why measures are so critical, and I'm happy to see the increased energy being devoted to this subject. Show me the numbers!

Barbara: Success stories are critical to convincing the skeptical. When Six Sigma was first brought to GE's financial services businesses there was huge cultural resistance to having to adopt practices that had been developed by people who designed medical equipment, light bulbs and refrigerators. But Six Sigma was successfully implemented in those resistant businesses because people who had had success in the GE industrial businesses came to work with us. Their energy, enthusiasm and advice helped us to find our own industry-specific opportunities to take out costs, reduce stress, and improve customer satisfaction.

They also taught us the need to look at improvement from "Wing-to-Wing." As you can probably tell that came out of our aircraft engine business. They put a lot of effort into improving their own plant processes, but the customer was not feeling the full benefit of the improvements. Staff came to understand that process improvement could only be fully realized if it included at all the processes that carried that engine from GE's plant to its final location on an aircraft's wing.

Katie: This smart group of trustee/business leaders has, over the past few years, pushed our chapter program ahead in many ways. The chapter adopted

many of the lessons from this conversation, including making a strategic commitment to top-notch measures work, creating a strategic plan with defined measures, active staff participation in CAP workshops so that we have in-house measurement experts, telling the story through peer reviewed articles, and investing resources in the long, slow, hard work – everything from selecting a new site to developing a plan to measure and celebrating success – needed to build and sustain these programs. The GE experience shows that it doesn't happen over night, but when it happens right, it's transformative!

For More Information

- For a basic summary of Six-Sigma at GE:
  http://www.ge.com/en/company/companyinfo/quality/quality.htm

- For a basic summary of the Conservation Action Planning process: *Conservation Action Planning: Developing Strategies, Taking Action, and Measuring Success at Any Scale.* Available at:
  http://conserveonline.org/workspaces/cap/TNC_CAP_Basic_Practices_v_17_Jun_05.pdf

- For an example of the application of the Conservation Action Planning process to a multi-stakeholder process on the Hudson River:
  Workshop Products:
  http://conserveonline.org/workspaces/hrew.conserve/HREW%20product%20report.pdf
  Workshop Process:
  http://conserveonline.org/workspaces/hrew.conserve/HREW%20workshops%20%20process%20report.pdf

To Provide Comments or Continue the Discussion

Please contact:

Katie Dolan
Eastern New York Chapter
The Nature Conservancy
kdolan@tnc.org