5-2016

How Hospital ER Team is Sustaining Improvements through Tone in Collective System Design

David S. Cochran
Indiana University - Purdue University Fort Wayne, cochrand@ipfw.edu

Joe Swartz
St. Francis Hospital

Follow this and additional works at: http://opus.ipfw.edu/engineer_facpres

Part of the Engineering Commons

Sustaining Improvement through Tone in Collective System Design

Abstract ID: 1707

David S. Cochran
IPFW Systems Engineering Center
Fort Wayne, IN

Joseph Swartz
Franciscan St. Francis Health
Indianapolis, IN

Abstract

This paper presents a continuation of the research with St. Francis Hospital ER. It is a follow-up to Collective System Design research to develop the NowER system design requirements and corresponding physical solutions that comprise St. Francis Hospital's continuous improvement and lean initiatives. This paper discusses several principles affecting the underlying tone required to sustain the St. Francis Hospital ER system design. The new system design resulted in a patient satisfaction increase from 13th percentile to better than 65th percentile, nationwide. The tone of the redesign team not only made the new system design possible, it is the reason why the new NowER system is being improved and sustained.

Keywords
Enterprise System Design, Continuous Improvement, Sustaining Lean, Sustainability, Healthcare Systems

1. Introduction
Six sigma methodology advocates that sustainability of improvement efforts occur in the control phase of improvement. The approach is to measure the right things and to ensure that those measures remain within a set range. Whereas, those practitioners who have facilitated improvements for many years and have unlocked the secret to sustainability will tell you that sustainability starts with the tone that is set from the very beginning of the improvement work and continues consistently throughout the system design and implementation of work. The tone is said to influence the thinking in Collective System Design, which then defines and informs how the organizational structure and physical systems are implemented. In turn, the structure and physical systems (i.e., computer systems / software) ultimately influence or define completely how the work gets done within an enterprise.

2. Collective System Design: Diagnosis to Design
The St. Francis Hospital leadership team recognized that there was a problem. Admitting that a problem exists is the first step to system redesign. However, admitting that there is a problem is not the same as taking action to resolve a problem. The Collective System Design - Diagnosis to Design Process illustrated in Figure 1, is a methodical way to gain agreement about the root-cause of a problem which Diagnosis, going into the flame to full system understanding, as illustrated by the Flame Model of System Design in Figure1.

The Flame Model of System Design illustrated that what we see at the actions / work layer in an organization are problems that are the result of the underlying layers represented by the flame model: the tone, the thinking and the organization structure. For example, in manufacturing, we might see the shortage chaser or expediter in Henry Ford's Highland park facility in 1913 [1]. Part shortages were a result of the system design and not necessarily management. W. Edwards Deming said that 95 plus percent of all issues in an organization are due to the system not the person [2]. The tone and thinking are qualities that we do not see in an enterprise. What we see is a result of the tone and thinking. Diagnosis is a process of going from what we see at the work and structure layers, to what we don't see, the thinking

and tone layers, that are the root cause of problems and issues in the first place. Understanding root cause was articulated by Shigeo Shingo by asking "why" 5 times in order to understand root cause [3].

Diagnosis seeks to describe root cause in terms of the thinking, as a type of system design. Design is defined as the interplay of what we want to achieve called the Functional Requirement (FR) and how it is achieved called the Physical Solution (PS) [4]. Understanding an existing system design may rely on a process that diagnoses the existing system design by distinguishing what a system design team desires to achieve, i.e., the Functional Requirement (FR) and how the team proposes to achievement a design requirement in terms of a proposed Physical Solution (PS). This approach to express design intention and a corresponding solution to accomplish establishes a language and pedagogical construct to express the thinking about an existing system as if it were a design [5].

Once the what and how relationships are specified, a continuous improvement team investigates the type of design that the existing system is using and evaluates whether the current design is effective or not. In some cases, there may be one department, a Physical Solution (PS) in an organization, that is used to solve every problem (i.e., we have the hammer (PS) and everything looks like a nail). Or the existing system design may be *redundant*, because there are multiple departments trying to accomplish the same thing. Being able to understand the thinking that is the origin of an existing system's current state and to understand whether that thinking is creating predictable and repeatable results is key to accomplishing a continuous improvement activity that is sustainable.

With a system design language that distinguishes Functional Requirements (what we want to achieve) from Physical Solutions (how we propose to achieve a requirement), we are able to develop system designs that have predictable and repeatable results on paper prior to implementation… the fundamental goal of any engineering discipline.
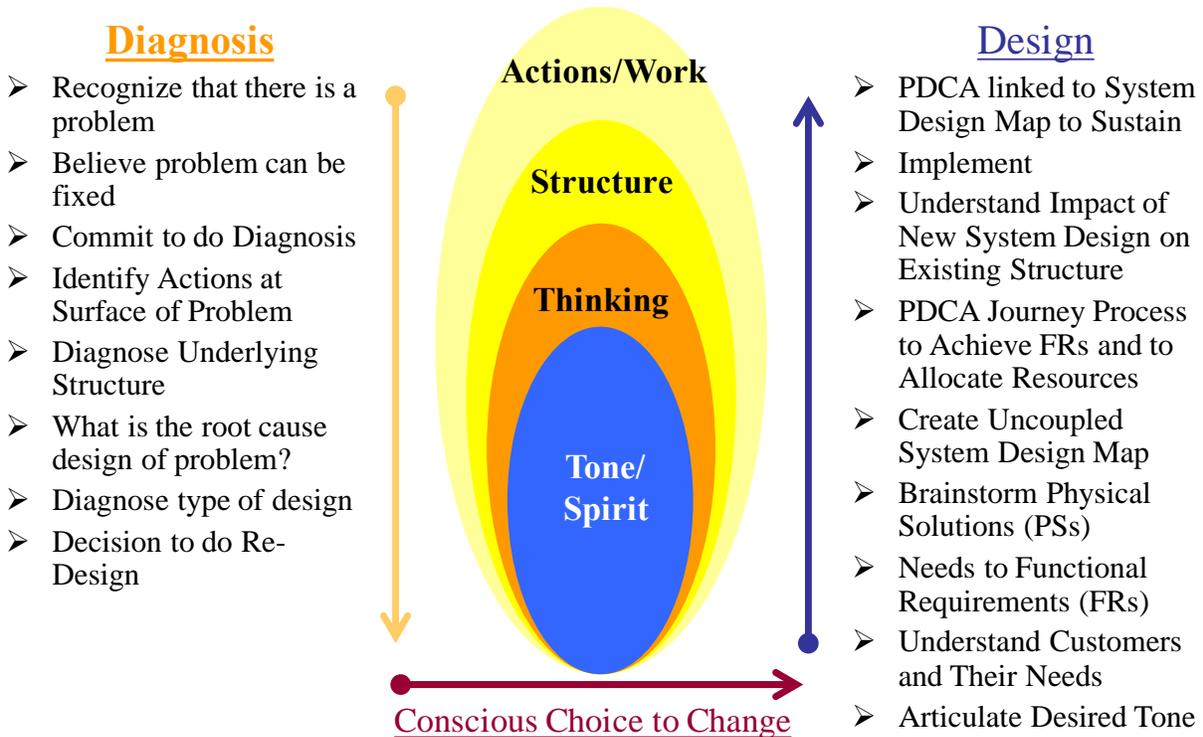

Figure 1. Flame Model of System Design -
Collective System Design Diagnosis to Design Process

Another root-cause design issue is described as a coupled design in which one organizational entity undoes the benefit of another organization [6]. For example, a Hospital may have the Office of Charitable Donations that is charged with bringing in funds to the enterprise; while a research arm of the Hospital Enterprise may have an Office for Research, charted to bring in research dollars. A coupled design describes the case where the work of the Charitable Donations

office, undoes the work of the Office for Research and vice versa. Diagnosis provides a formal language to describe the relationship of existing solutions in the achievement of organizational requirements.

To make change that is sustainable, there must be a conscious choice to change, based on collectively held belief that there is a need to change. The change must start viscerally and mentally. System redesign starts by the leadership of an enterprise making a conscious choice to change and then recognizing the tone that they are practicing and desire to practice within their organization. The organizational structure is a result of the system design thinking that is expressed in the form of a collectively-developed system design map (or decomposition) developed based on collective agreement about the functional requirements that the enterprise must achieve to meet customer needs and proposed solutions intended to achieve the requirements. Standard work is used to implement all solutions identified in the system design map. When a problem occurs, the standard work of the existing solution may be changed and importantly, to avoid point solutions that are out of context with an enterprise system as whole, the Collective System Design map may be changed.

3. Setting the Tone for Nursing Engagement
Franciscan St. Francis Health (St. Francis) is a three-hospital system located in Indianapolis, Indiana and is part of the Franciscan Alliance, a 14-hospital system located in Indiana and Illinois. In 2007, the Emergency Room (ER) had a 28% nursing turnover rate; it was having difficulty hiring enough nurses. The remaining nurses were overburdened. Leadership wanted to define the problem statement as a lack of nursing supply. That was indeed one of the problems. However, if an improvement team were to focus on just this idea, they might be led to try to influence the supply of nurses in the marketplace, which would be a difficult thing to do because the team would have limited ability to control the supply of nurses. That problem statement stemmed from the incorrect belief that inadequate nurse supply levels was the root cause of the problem.

A more accurate root cause of the problem was a pay cut that a consulting group had recommended and leadership had recently enacted (in the 2007 timeframe). Another root cause of the shortage in nurses was a measurement system that focused on hours per patient day and the number of employees rather than total labor cost. That measurement system focus caused managers to choose to hire highly experienced nurses to do most of the work on a nursing unit. The system had evolved to achieve the performance measures, rather than in meeting the needs of the customers: both patients and nurses. To reduce hours per patient day and total number of nurses, more experienced nurses had been hired. Then, when the pay cut occurred, several highly experienced nurses quickly found better paying jobs elsewhere.

In order to set a better tone, the leadership team at St. Francis, shifted their focus from evolving to physical solutions to achieve arbitrarily defined performance measures not related to customer needs, to a Collective System design approach that provided mutually beneficial opportunity [7]. The opportunity was to redesign and simplify how the nursing work gets done in order to create overall value for the hospital (benefits/cost) by creating benefit for everyone involved. That shift in tone from the Hospital's leadership enabled the team to reframe their thinking, and enabled them to design a team approach to nursing that allowed the organization to hire nursing assistants to work alongside nurses. The improvement team, that consisted of nurses, lab personnel, radiology personnel, a supply coordinator, a manager and two improvement facilitators also focused on reducing the frustrations and streamlining of the work the nursing teams did. This engagement of the nursing teams set the right tone for the ER work, which has been sustained to this day… 10 years later.

The Donkey Whisperer
> *"You might measure your approach to a horse the same way as your approach to people because*
> *there are going to be some horses, like some people, who might be inclined to tune you out."*
> – Buck Brannaman, Horse Whisperer [8].

Extraordinary horse and donkey trainers have shown that equine respond better to love and respect better than they do to fear and punishment. Donkeys in particular are an extreme case. When paired with a good trainer, they have many good attributes. They are sure-footed, steady, affectionate, obedient and reliable. However, they are often perceived as stubborn and unreliable. This perception stems from how they were designed. In a natural setting, donkeys can't outrun many of their predators, so when they see a predator or feel fear, they freeze and remain motionless with the hope of not being noticed. Their response to fear is to tighten up. So, imagine that you need to have a donkey do some work moving some objects for you. If you whip the donkey to get it to move forward, what would be his natural

response? To freeze, right? What would happen if you get frustrated and whip the Donkey more violently in order to get him to move? He would freeze even more! Donkey's also have a good memory and remember those who mistreat them. The next time you wouldn't have to whip the Donkey, if he were to sense any frustration or anger in you, he would simply freeze without provocation.

Horse whisperer Buck Brannaman believes we have a lot to learn from equine. He said, "*All your horses are a mirror to your soul. Sometimes you won't like what you see, sometimes you will*" [9]. To some extent each person has been mistreated at some point in his or her life. In many cases, people will react to you with the memory of that mistreatment. Those feelings tend to surface when the pressure is on and when there are people with power over others in intense discussions that could affect their future, like we often have in improvement work, people can shut down and freeze up if they feel fearful. People are different than equine, but the lessons do apply to people. Those we lead will submit to our leading to the extent that they trust that we are out for their best interests, and to the extent that we have delivered on those best interests consistently. The way we lead stems from our tone or approach to leading others. For example, if we believe people are generally lazy our tone will be different than if we believe people want to give their very best.

4. Setting the Tone for Physician Engagement
"If you let him do it, he likes it and then it's his idea!" – Ray Hunt, Horse Whisperer [10].

The St. Francis improvement team was struggling to get physician engagement in the ER improvement work and were not sure why it was so difficult. The physicians were fine with the improvements during the first three years of the improvement work as long as they didn't have to change how they practiced. The team worked around the physicians and focused on nursing, registration, lab and radiology improvements. It wasn't until the Doctors repeatedly saw how the improvements were benefitting them that they became more engaged. Then, the team found a hospital that had made an improvement that we were all interested in. A few physicians from our ER physician group flew to Ochsner Health in New Orleans to see a process model they called "Q-track" [11]. The physicians spent two days looking at what Ochsner had developed. At the conclusion of the two days, one of our physicians, Dr. Michael Russell said, "I went to New Orleans for the Cajun food, but I think this new process model could work for us." It was the first indication of engagement; the Q-track at Ochsner health became the physician's idea and passion to implement that he took back to his group.

However, the ER physicians were dragging their feet for some reason. Joe Swartz learned that if at any point of the process you inject fear you might have to restart developing trust. We needed to dig deeper. When we probed with the ER physicians what was really important we discovered that the profitability of their physician group was important to them. Profitability had been decreasing over the last number of years due to a number of factors, including increased competition and insurance companies paying less. When we went on a site visit to a Banner Health hospital in Phoenix to see a similar process model, we deliberately set aside time to meet with their physicians to discuss their profitability before and after the process model change that consisted of what they called their "Split-flow model." Once our physicians felt assured that the new process model would give them a boost in their profitability without harming quality and patient satisfaction, they agreed to implement what we called our "NowER" model. As improvement coaches, the team had to understand the needs of their customers in the improvement process, in this case the physicians, and learn what was important to them, and to help them see how what the improvement team offered could help them, and then to ensure that the physicians were able to achieve the benefits of the change.

The improvement team conducted a series of seven Lean Six Sigma projects over the years 2007 to 2014 in increasing complexity and impact. The projects focused first on simplifying nursing work, then improving flow for lower acuity patients, then redesigning the triage process, then improving radiology and laboratory flow, then the "NowER" redesign, and finally some facility modifications. Through the series of projects the improvement team leaders consciously morphed the tone, thinking, structure and actions described by Collective System Design toward what was needed to achieve the future state process intent. The nursing thinking was radically altered. As in the NowER part of the process, the nurses were part of a radical change in system design that more effectively meets the needs of patients. The nurses enabled and supported the re-design of the system so that they no longer see patients throughout the process but rather only during parts of the Emergency Room (ER) process.

5. The Launch

The day the new ER process model was launched, St. Francis permanently closed one ER, opened a brand new one, and merged two ER's into one in a period of one day. It was a lot of change, but it went very smoothly because we had planned the launch for more than a year and the improvement team had engaged people from both ERs (one located in Beach Grove and the other located in Southport) in the design. Because we maintained a Tone of respect for everyone throughout the project, and we engaged key people from both ERs in the creating the new process model, people from both ERs felt a sense of collaboration and ownership in the final process. *The team had become Whisperers who were conscious of their own tone in the process of change through system redesign.*

6. Results

St. Francis improved their Door-to-Doctor times from 45 minutes in 2007 to 12 minutes in 2014, which resulted in a 73% reduction. The work of the redesign team also improved patient total length of stay time in the ER of patients who were treated but were not admitted to the hospital from 180 minutes to 130 minutes. The design team reduced the percentage of patients who decided to leave instead of waiting from 2.8 percent to less than a one-half percent (see Table 1).

Table 1. ER Re-Design Team Project Improvements

Measure	Before	After
Door-to-Doctor (Median)	45 minutes	12 minutes
Door to Discharge (Median)	180 minutes	130 minutes
Left Without Treatment	2.8%	< 0.5%
Patient Satisfaction	13th percentile	> 60th percentile

The patient satisfaction scores rose from 13th percentile to greater than 60th percentile [12]. Percentile is a comparison with other hospitals. A 13th percentile means that 13 percent of hospitals across the country performed worse than St. Francis and 87 percent performed better. St. Francis now performs better than 65 percent of the hospitals in the United States (see Figure 2).
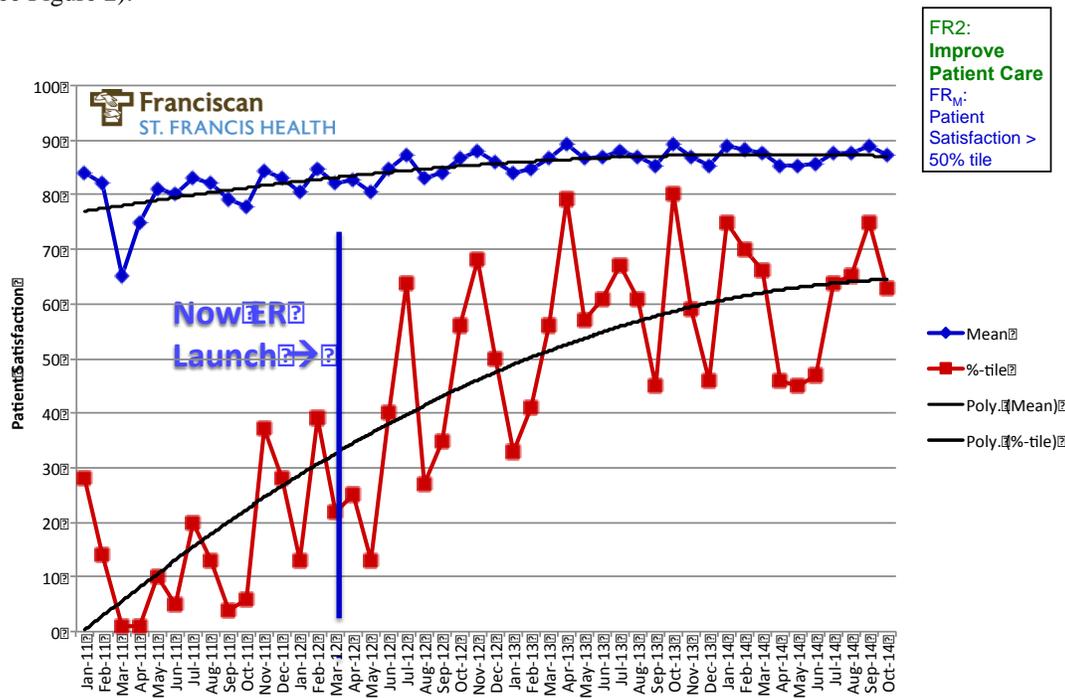

Figure 2. ER Patient Satisfaction

In 2014 St. Francis's ER was awarded the Emergency Nurse Association's Lantern Award. The Lantern Award is a recognition award given to emergency departments that exemplify exceptional practice and innovative performance. Only one other ER in Indiana has ever received this award. Also in early 2015 St. Francis was named a top 100 hospital by Healthgrades, which ranks St. Francis in the top 2% of all hospitals in the United States for overall quality.

7. Conclusions / Summary

St. Francis Hospital was able to transform their ER from an underperforming organization to a high performing organization in seven years (2007 to 2014) through the efforts of many people using the precepts of Collective System Design that were integrated into their continuous improvement and redesign efforts. The work demonstrates that sustainability starts with the Tone that is set from the very beginning of the improvement work and must continue consistently throughout the improvement process. The Tone influenced the thinking of the team, which determined how the physical systems and organizational structure was designed, which ultimately influenced how the work is done daily in the St. Francis ER.

References

1. Horace Lucien Arnold and Fay Leone Faurote, *Ford Methods and the Ford Shops* (Boston: Adamant Media Corporation, 2006; facsimile reprint of 1919 Engineering Magazine Company version).
2. Deming, W. E., 2000, Out of the Crisis, MIT Press.
3. Shingo, S., 1989, Study of the Toyota Production System from an Industrial Engineering Viewpoint, Productivity Press, Cambridge, MA.
4. Suh, N. P., The Principles of Design, New York: Oxford University Press.
5. Cochran, David S., March/April 2006. "Detaching from Management Accounting Requires System Design," *Journal of Cost Management*, pp. 20-28.
6. Cochran, D. S., 2007, Chapter 11, "The Need for a Systems Approach to Enhance and Sustain Lean," ed. J. Stenzel., Lean Accounting, Wiley and Sons.
7. Cochran, D. S., and Swartz, J., May 2015, "Collective System Design of St. Francis Hospital ER," IIE Proceedings of the 2015 Industrial and Systems Engineering Research Conference, Nashville, TN.
8. Cohn, B. "Buck Brannaman: Robert Redford's Real-Life Horse Whisperer," Santa Monica Mirror, July 8, 2011, http://www.smmirror.com/articles/Life-and-Arts/Buck-Brannaman-Robert-Redfords-Real-Life-Horse-Whisperer/32453 (accessed January 30, 2016).
9. Cedar Creek Productions LLC, 2011, "Buck" (Documentary Film)," http://buckthefilm.com/content.htm, (accessed January 30, 2016).
10. Hunt, R., 1978, Think Harmony with Horses, Pioneer Publishing Company.
11. Guarisco, J. "qTrack: Re-engineering ED Workflow," Ochsner Health Systems, https://www.iienet2.org/uploadedfiles/SHS_Community/Membership/qTRACK%20-%20Re-engineering%20ED%20Workflow.pdf (accessed January 31, 2016).
12. St. Francis uses Press Ganey to conduct patient satisfaction surveys. http://www.pressganey.com/ (accessed January 31, 2016).