

Willy Wonka: The Lean Case Study

The Right Approach, a column by Steve Williams
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Introduction

No matter where my travels take me, I hear a wide and limitless supply of excuses for why Lean will not work in “my” organization. One of my favorite ways of illustrating that Lean will indeed work anywhere is to take a Lean look at a very unlikely organization, Willy Wonka’s Chocolate Factory.

Why Willy Wonka

The inspiration for this case study came from one of my Lean Principles graduate students, who told me that while she was studying diligently one evening, her son was watching the video *Charlie and the Chocolate Factory*. She said, “Professor” (I love it when they call me professor!), “as I sat there listening to the underlying ideas behind the Chocolate Factory, I got distracted in my reading and realized I was watching a show that is formulated on the idea of creating a Lean factory.” As we discussed this in great detail, she presented a very compelling argument to support her position. So, that following weekend I purchased the DVD, and sat down with

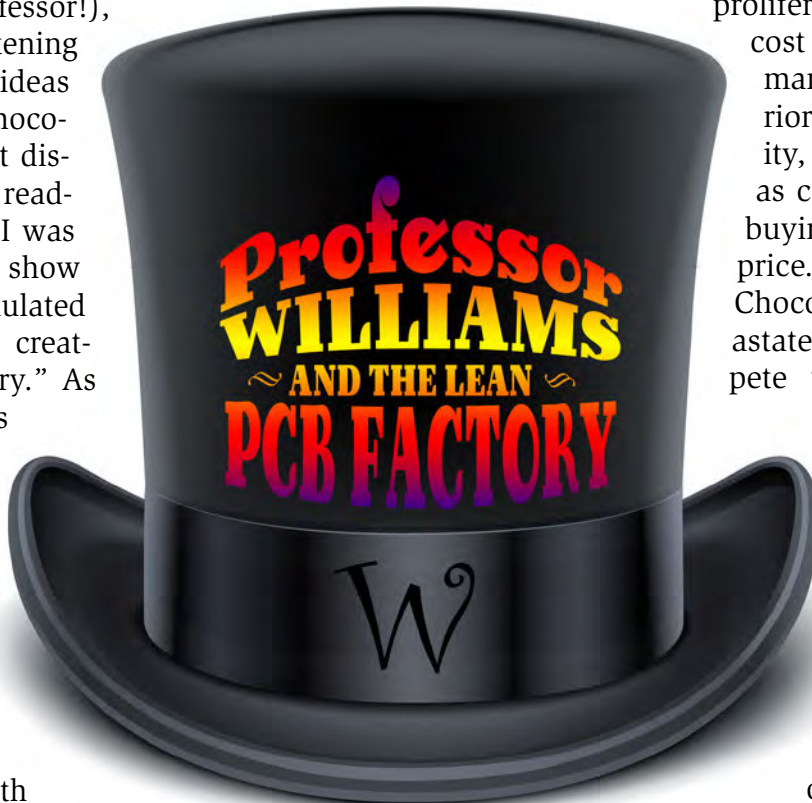
a bowl of popcorn, a cold Budweiser and my notepad and turned a critical Lean eye to Roald Dahl’s classic tale. What follows are the results of that session, which led to the development of a Lean case study that I now use both academically and professionally.

WILLY WONKA CASE STUDY

1 – The Need for Lean

Competition

The Willy Wonka Chocolate Factory was infiltrated by industrial spies trying to steal Wonka’s secret recipes and manufacturing technology. This espionage resulted in a proliferation of copycat low-cost products flooding the market, and while inferior to the Wonka quality, were quite successful as consumers made their buying decisions based on price. The Willy Wonka Chocolate Factory was devastated and could not compete with these low-cost candy bars, which resulted in the closure of the factory and loss of thousands of jobs, including Charlie Batch’s Grampa Joe. Grampa Joe was a lifelong employee of the Wonka factory



and approaching retirement when the factory closed down. In a related story line, Charlie's father was also recently downsized at the local toothpaste factory after being replaced by a robot to reduce costs. Consumer pricing pressure had certainly caused the Batch family to fall on hard times.

Side Note: This part of the story was based on personal experiences from Dahl's childhood. The two largest British candy firms, Cadbury and Rowntree, sent so many moles to work in competitors' factories that their spying became legendary.

2 – Reducing Costs

Outsourcing

After closing the factory, Willy Wonka traveled the world looking for a low-cost country (LCC) in which to re-establish his business that would allow him to become competitive again. He was beginning to lose hope, but then Willy reached LoompaLand, where he discovered an entire population of highly skilled and dedicated workers, the Oompa Loompas, who were destined for extinction by the monsters of their native land. So, instead of bringing the factory to the low-cost country, Willy brought the low-cost country to the factory (reshoring)!

3 – Eliminating the Seven Deadly Wastes

Defect Waste

Jidoka built-in-quality was evidenced throughout the process, with my favorite example being the team of squirrels performing quality-at-the-source verification in the nut-shelling department. Years of continuous process improvement has resulted in the development of a chocolate waterfall that provides an automated, low-cost chocolate mixing system which produces Wonka's world-class "light and frothy" chocolate. Robust *statistical pro-*

cess control and capability study programs have allowed continuous process improvement that has resulted in the factory's ability to achieve and maintain the current six sigma level of performance.

Motion Waste

All the manufacturing processes were designed to be highly automated, with each having an advanced technology control center requiring minimal manpower to operate. Through the 6S methodology, all materials and tools are stored at the source to eliminate internal travel time waste. Every task within each control center has also been ergonomically designed for the Oompa Loompas so that every control, gauge, and monitor is within easy reach.

Waiting Waste

Given the vast size of the operation (the largest in the world), moving people and product around the factory is quite the task. Queue time (waiting waste) was virtually eliminated with the Wonka-invented flying elevator, which quickly transports employees and WIP throughout the factory. Lean practices are evident throughout the operation, and the art of chocolate making has developed into a continuous flow manufacturing process. A hovering spaceship sucks up thousands of gallons per hour of WIP from the chocolate river and transports it throughout the factory for real-time subsequent processing.

Overprocessing Waste

The factory was designed to produce only products featuring qualities that customers not only want, but are willing to pay for. Understanding customer needs and preferences was accomplished by performing a *critical to quality* analysis of Wonka's products based on voice of the customer feedback. The fantastical manufacturing technology employed by Won-



ka was all developed in-house in the Inventing Room, the organization's R&D lab. Driven by data mined from his *voice of the customer* program, Wonka was also concerned with eliminating waste for his customers as well. The invention of the Three Course Dinner stick of gum was intended to reduce waste in the home, as food, cooking time, and kitchens for that matter, are all eliminated by a single stick of gum!

Inventory Waste

Inventory has been minimized through the organization's just-in-time program, which has been implemented both internally and externally. All manufacturing processes utilize a *kanban pull system* that minimizes work-in-process inventory by only manufacturing what is needed, when it is needed. This system has also been implemented with Wonka's raw material suppliers, who have eliminated raw material inventory through electronic data interchange transactions and supplier-managed inventory programs. Kanbans have also been set up with Wonka's retail customers so that product replenishment is driven by consumption, not forecast.

Overproduction Waste

Overproduction waste is minimized in a variety of ways at the Wonka Chocolate Factory. First, the Wonka *voice of the customer* program assures that the factory is only making products that customers want, eliminating finished goods obsolescence. Next, the *kanban pull* continuous flow manufacturing system minimizes the work-in-process inventory that normally builds up between operations. Finally, the six sigma process performance level keeps defects to a minimum, and the *just-in-time* kanban systems eliminate raw material and finished goods inventory at the Wonka factory.

Transportation Waste

Transit time waste was greatly reduced by utilizing a very impressive global logistics system to distribute Willy Wonka candy bars from the factory to retail outlets throughout the

world. Order fulfillment is accomplished via a massive, well-oiled freight division that utilizes company-owned ground and air transportation. A cutting-edge "Television Chocolate" technology is also currently under development that will transport a chocolate bar through the TV to customers all over the world, thus eliminating transit time waste.

4 – Life Imitates Art

Or does art imitate life? In the end, Charlie's dad gets his job back at the toothpaste factory as a robot technician, keeping the machine that replaced him operating. One of the biggest fears people have of Lean is that they will no longer be needed. Charlie's dad was retrained and redeployed at a new position that was much more personally enriching, which happens every day in the real world. Willy Wonka's processes were environmentally friendly, with much of the by-products edible and biodegradable. The bottom line is that, yes, Willy Wonka was a Lean visionary and his Chocolate Factory a study in the ultimate goal of Lean: manufacturing perfection!

Although this is obviously a tongue-in-cheek look at a fictional company, the concepts and theory liberally applied by the author's imagination are technically sound and based in fact. It then follows that, if Lean can be successfully implemented in the fantastical setting of Willy Wonka's Chocolate Factory, it most certainly will work in your company.

Conclusion: Lean Works

I would be willing to take it a step farther and state that I can guarantee that Lean will work in any industry, in any organization if the following two conditions are met: (1) Senior management must fully buy in to the program, and (2) it is implemented correctly. As with any new program, initiative, or philosophy, management buy-in and commitment is mission critical.

Lean is not free, or even cheap, when you consider the time and human resources that must be expended on a regular basis. *It takes money to save money*, and an organization

can't realistically expect to significantly improve performance without investing in training, organizational infrastructure and cultural evolution. Sure, it costs money to implement any training program, but the initial training is only the tip of the iceberg. The major expense in a Lean program is the ongoing cost of human resources.

If management is not willing to allocate the appropriate time for their employees to work on Lean projects, the program is sure to fail, and fail spectacularly. The good news is that the hard dollar payback of a solid program can be equally spectacular. Fortune 500 companies have saved billions of dollars through Lean, but even the mom-and-pop small business that make up most America's jobs can see tremendous benefit through Lean practices.

My closing advice would be to *do something now!* Waiting for a plan to be perfect will only ensure that it never begins; doing something now is always better than doing something later. I will close with a quote from Karen Lamb, courtesy of my friend Tom Peters: "A year from now you may wish you had started today." And remember, *it's always about the dollars.* **PCB007**



Steve Williams is the president of The Right Approach Consulting LLC. To read past columns, or to contact Williams, [click here](#).

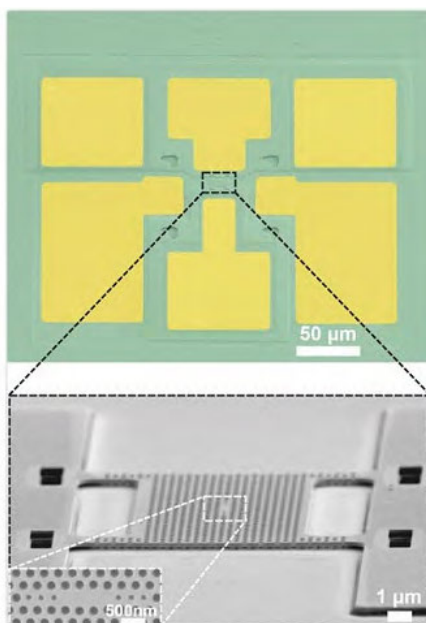
Micro-Spectrometer Opens Door to a Wealth of New Smartphone Functions

Use your smartphone to check how clean the air is, whether food is fresh or a lump is malignant. This has all come a step closer thanks to a new spectrometer so small it can be incorporated easily and cheaply into a

mobile phone. The sensor developed at TU Eindhoven is just as precise as the normal tabletop models used in scientific labs. The researchers present their invention in the journal Nature Communications.

The researchers developed an ingenious sensor that can make such precise measurements in an entirely different way using a special 'photonic crystal cavity,' a 'trap' of just a few micrometers into which the light falls and cannot escape. This trap is contained in a membrane, into which the captured light generates a tiny electrical current, and that is measured. PhD student Zarko Zobeni-ca made the cavity so that it is very precise, retaining just a very tiny frequency interval and therefore measuring only light at that frequency.

Professor Andrea Fiore expects it will take another five years before the new spectrometer gets into a smartphone because the frequency range covered is still too small. At the moment, the sensor covers just a few percent of the most common spectrum, the near-infrared. So his group will be working on extending the detectable spectrum. They will also be integrating an extra element with the micro-spectrometer: a light source, which will make the sensor independent of external sources.



The upper picture shows the entire device; the large yellow areas are contact pads. The lower picture shows the perforated membrane, and the inset zooms in on the photonic crystal cavity (the area without holes). (Image: Eindhoven University of Technology)