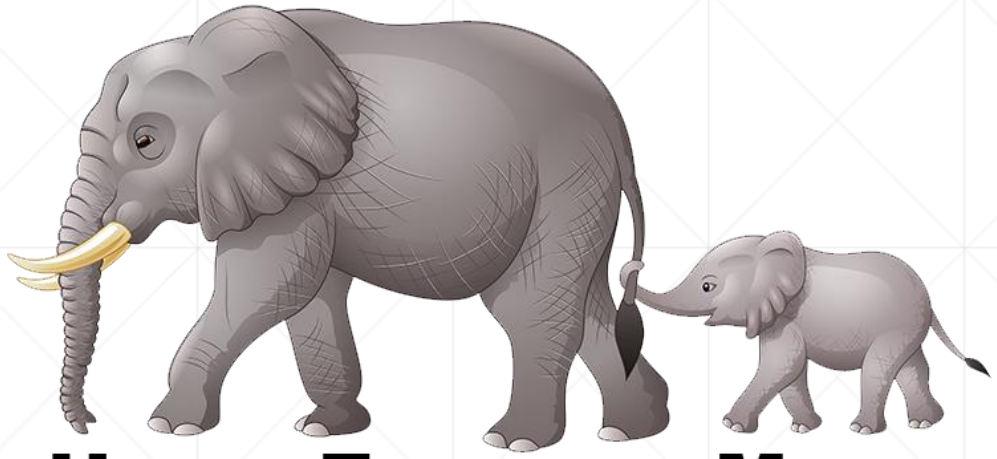
Thursday, July 23, 2020



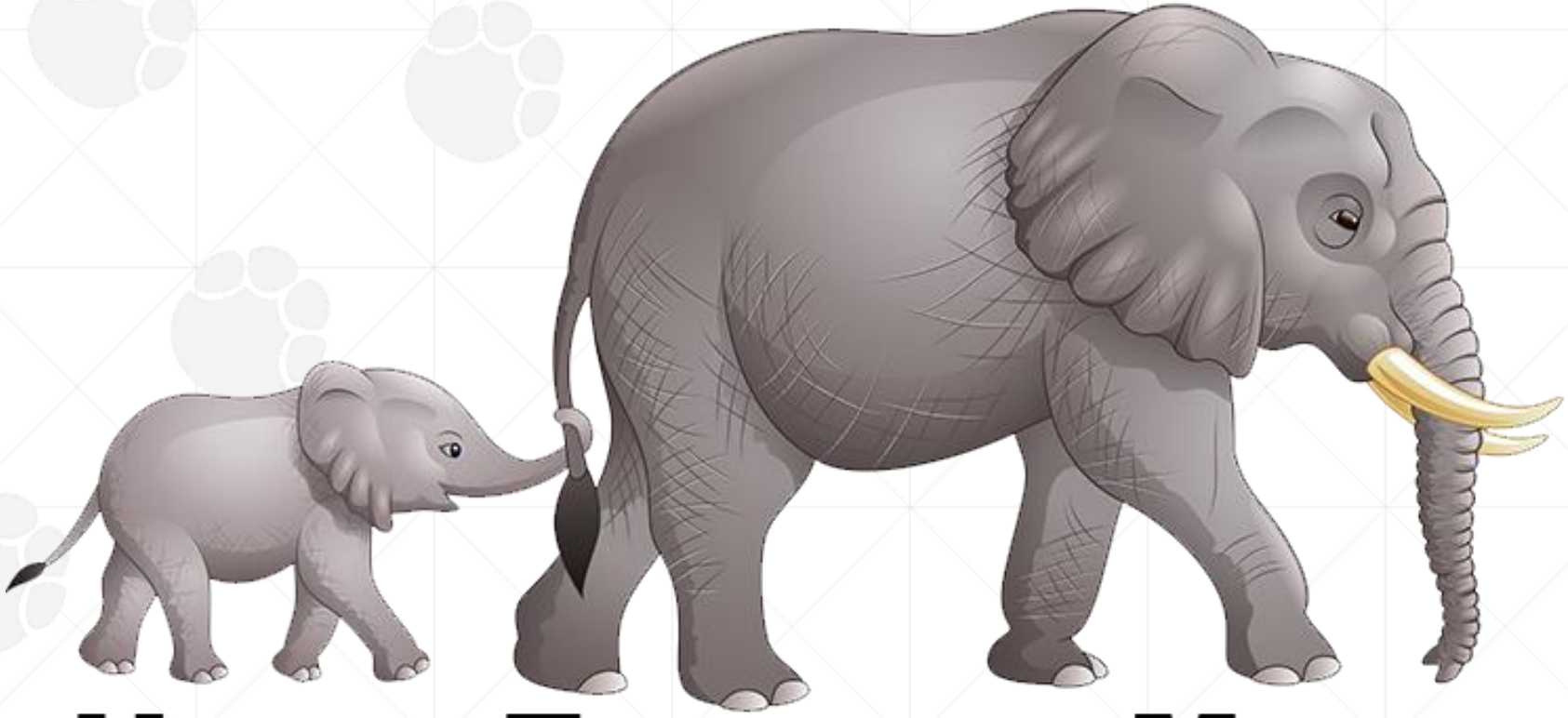
URBANELEPHANTMEDIA

~ PRESENTS ~

Lean Six Sigma and Sustainability

Featuring Brion Hurley, Lean Six Sigma Master Black Belt

Sponsored by Business Performance Improvement (BPI)



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PEER-TO-PEER LEARNING MADE EASY

Sustainability Training for Urban Designers and Policymakers

Randy Rodgers, Director of Big Ideas
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BUSINESS PERFORMANCE IMPROVEMENT

Helping businesses and organizations achieve "triple bottom line" performance using Lean and Six Sigma

https://www.BIZ-PI.com

Our Presenter

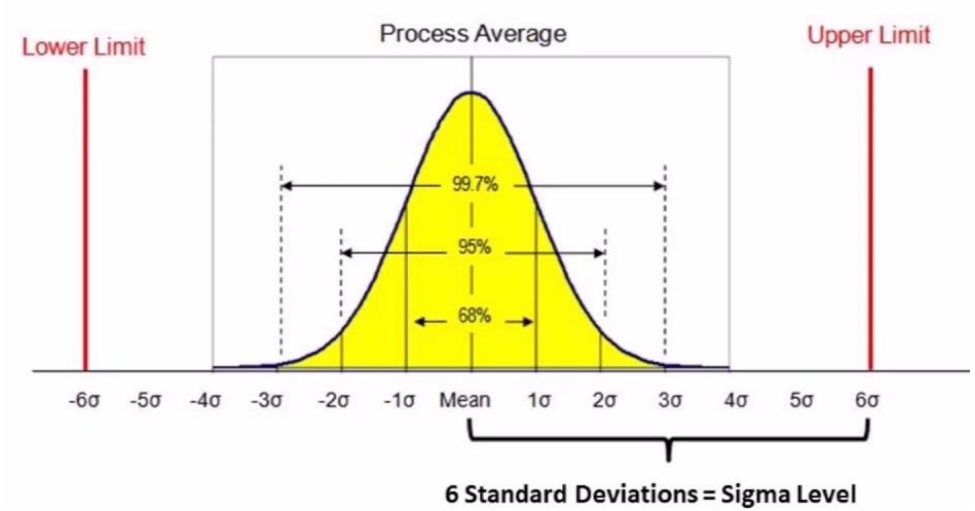
Brion Hurley
Lean Six Sigma Master Black Belt
Business Performance Improvement (BPI)
brion@biz-pi.com

Agenda

- What is Six Sigma?
- What is Lean?
- Sustainability
- Planet Examples
- People Examples
- Resources
- Q&A

What is Six Sigma?

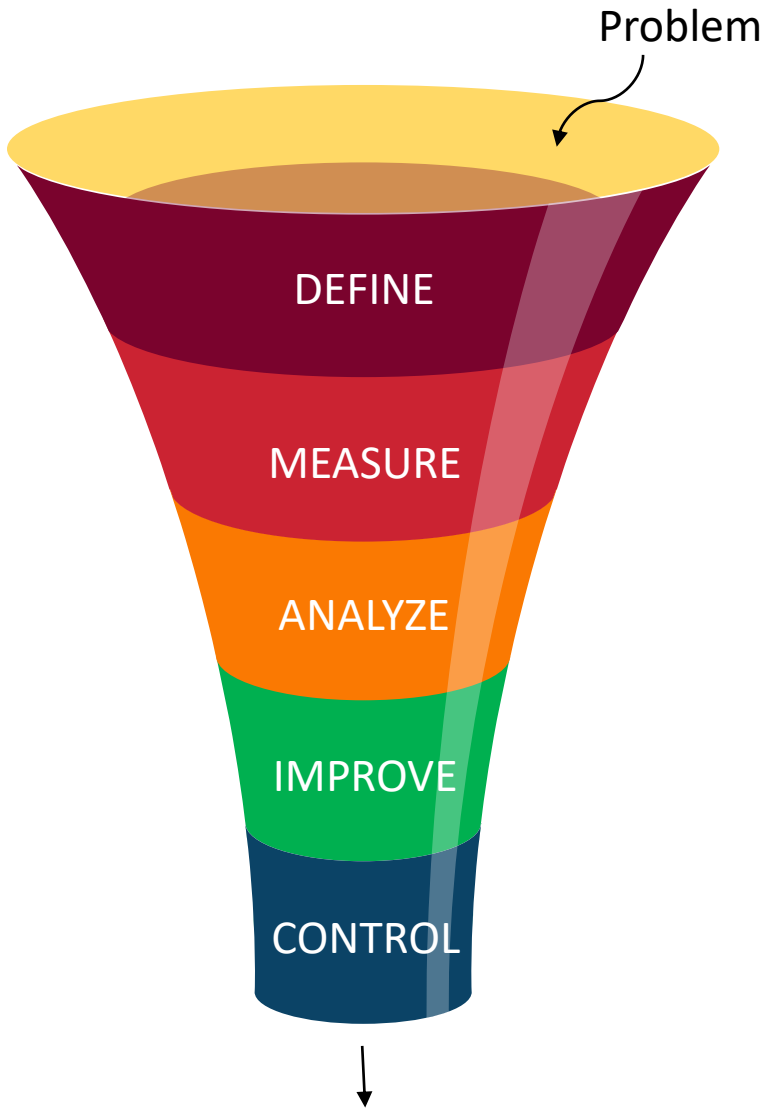
- Quality improvement program developed by Motorola in mid-1980's due to competition from Japan
  - Techniques were not new, packaged in new way under Motorola University
- Gained popularity from GE and CEO Jack Welch due to cost impact
- Technical answer refers to variation as compared to customer specifications



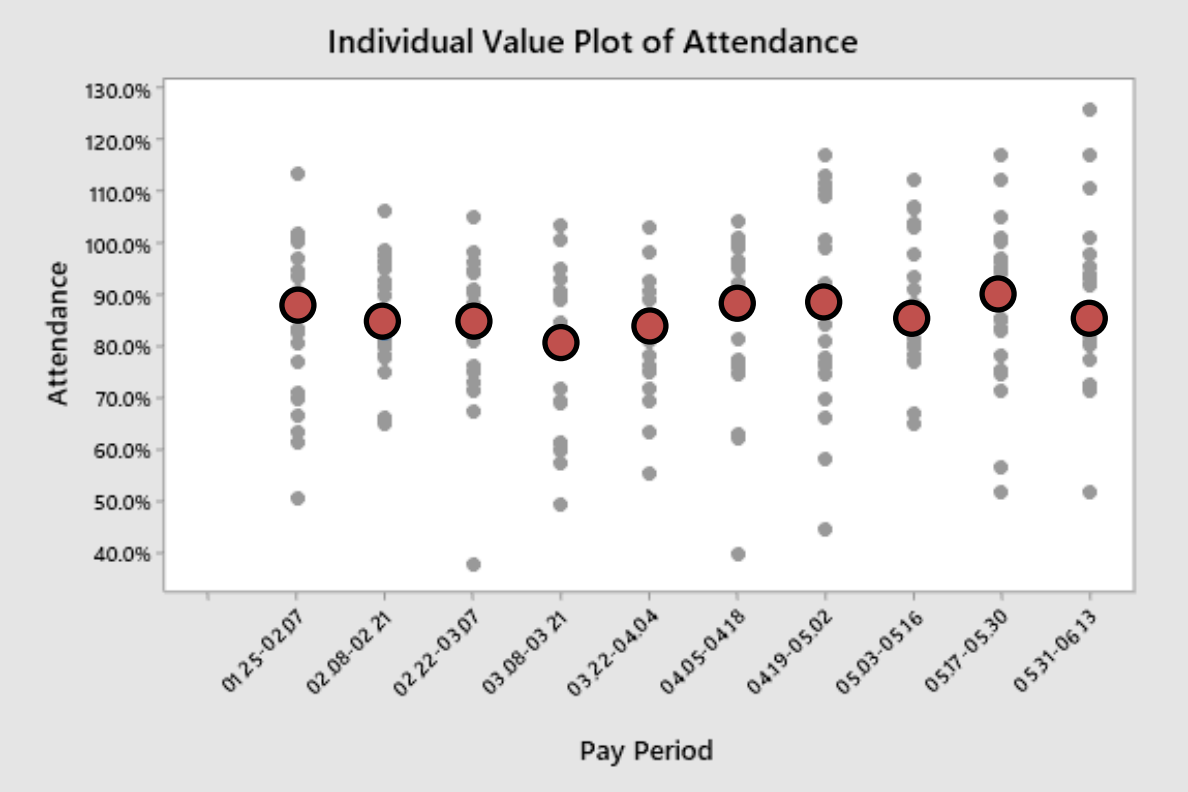
http://www.leansixsigmadefinition.com/glossary/six-sigma/

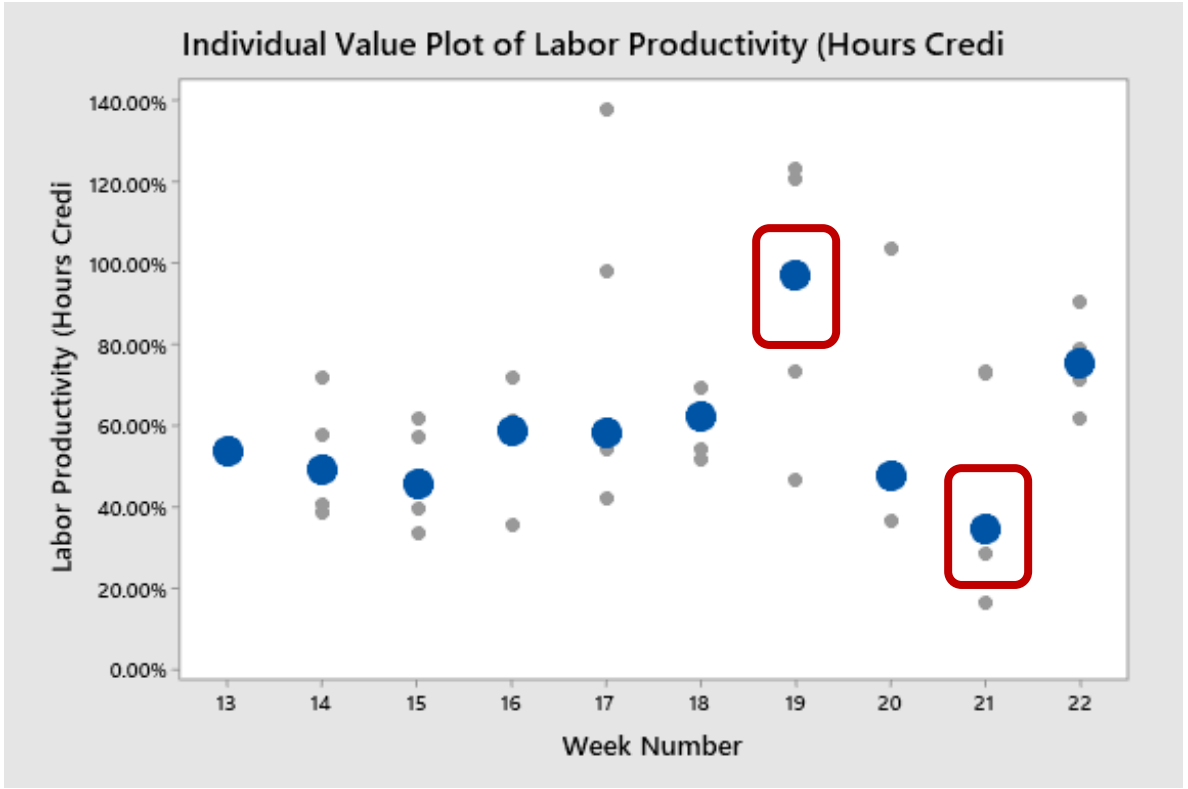
Principles of Six Sigma

- DMAIC model used for structured problem solving
- Certification levels to show proficiency and provide guidance
  - White, Yellow, Green, Black, MBB
- Strong emphasis on statistical analysis, quality systems and prevention tools
- Data-driven decision making
- Projects require hard and soft financial savings



Six Sigma: Attendance and Productivity





What is Lean?

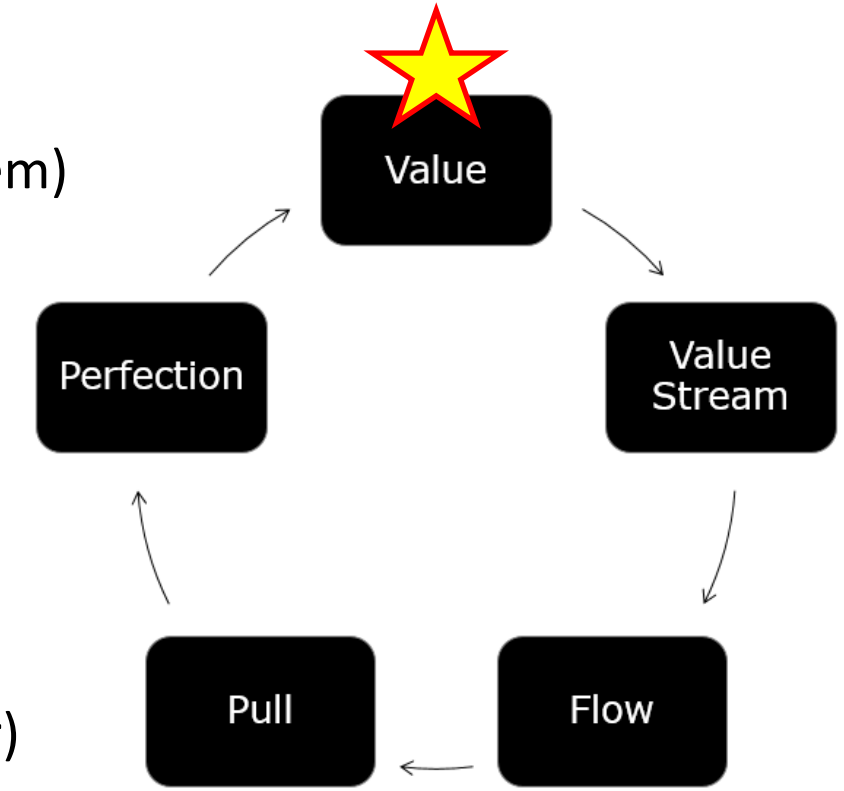
- Popular approach developed from best practices of American and Japanese productivity techniques
- Term coined after researchers compared American automakers with Japanese automakers
  - Formally called Toyota Production System
- Methods focus on finding and solving problems quickly using teams to make work simpler, easier and more organized

Photos courtesy of Toyota-Global.com

http://www.leansixsigmadefinition.com/glossary/lean/

Principles of Lean

- Invest in people to increase engagement
- Define value, everything else is waste
- Solve problems at the gemba (where the work is done)
- Map the value stream from the customer perspective (system)
- Create continuous flow (finish what you start)
- One thing at a time, minimal batching
- Pull when the customer wants it (JIT)
- Problems are good, find them quickly
- Respect for people
- Blame the process, not the people
- Simple, low tech solutions are better
- Make the work simpler and visual (work smarter not harder)
- Learn by experimentation
- Improvement never ends (strive for perfection)



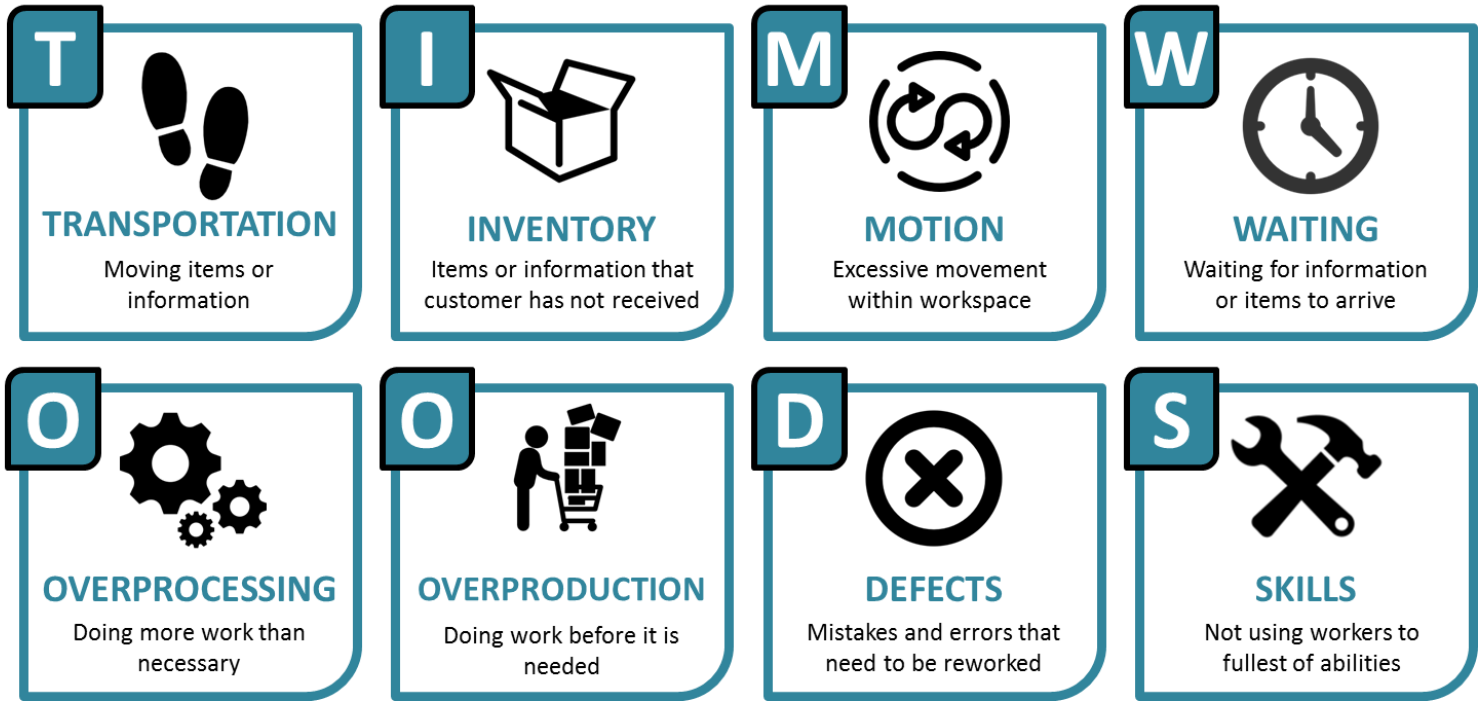
Lean at Denver DHS

- Had long waiting lines and frustration from citizens and workers
- It took about 5 days to complete a single application
- 6 months of **kaizen** events conducted
- Setup **flow cells** to bring resources together in same area
- Now takes a couple of hours to complete a single application

https://vimeo.com/134769673

TIM WOODS (8 Wastes)

- Waste = Non-value added
- Find and eliminate these 8 forms of waste in your processes



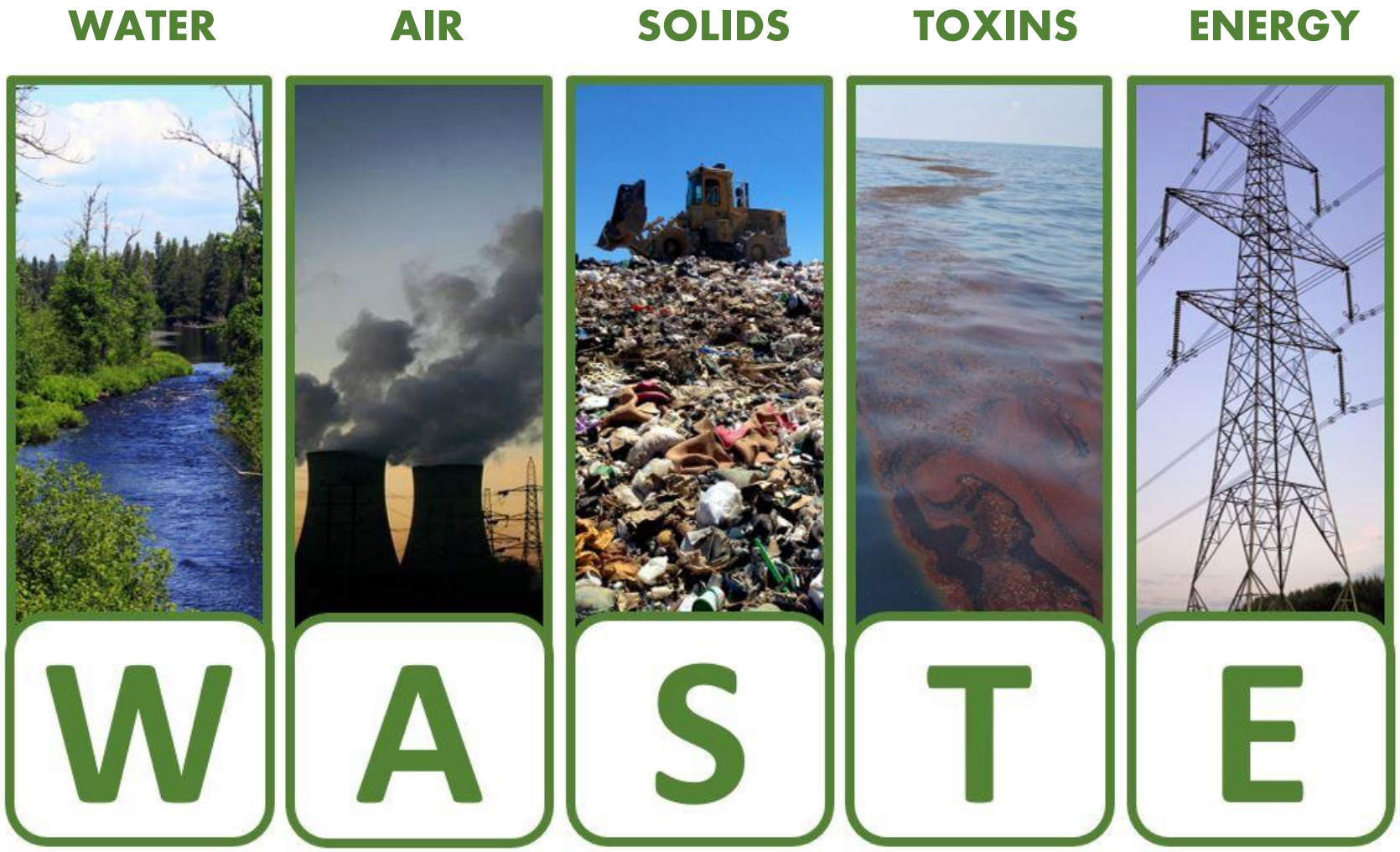
https://www.biz-pi.com/product/tim-wood-lean-wastes-slides/

Waste tied to environment

	Waste Type	Environmental Impacts
O	Overproduction	• More raw materials consumed in making the unneeded products • **Extra products may spoil or become obsolete requiring disposal** • Extra hazardous materials used result in extra emissions, waste disposal, worker exposure, etc.
I	Inventory	• More packaging to store work-in-process • Waste from deterioration or damage to stored WIP • More materials needed to replace damaged WIP • **More energy used to heat, cool, and light inventory space**
T M	Transportation and Excessive Motion	• More energy use for transport • Emissions from transport • More space required for WIP movement, increasing lighting, heating, and cooling demand and energy consumption • **More packaging required to protect components during movement** • Damage and spills during transport • Transportation of hazardous materials requires special shipping and packaging to prevent risk during accidents
D	Defects	• Raw materials consumed in making defective products • **Defective components require recycling or disposal** • More space required for rework and repair, increasing energy use for heating, cooling, and lighting
O	Over Processing	• More parts and raw materials consumed per unit of production • Unnecessary processing increases wastes, energy use, and emissions
W	Waiting	• **Potential material spoilage or component damage causing waste** • Wasted energy from heating, cooling, and lighting during production downtime

http://leansixsigmaenvironment.org/index.php/environmental-impacts-of-waste/

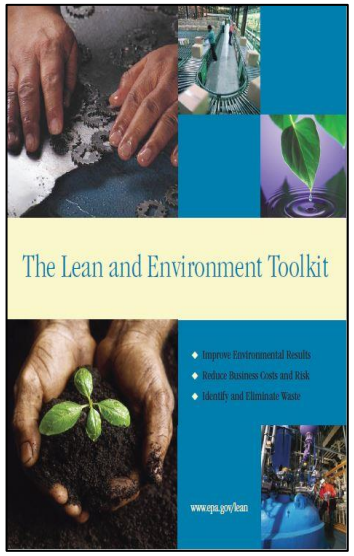
W.A.S.T.E.

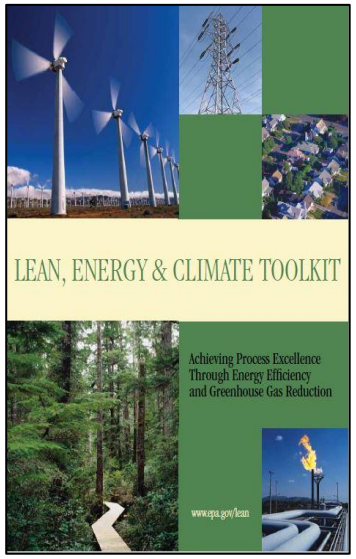


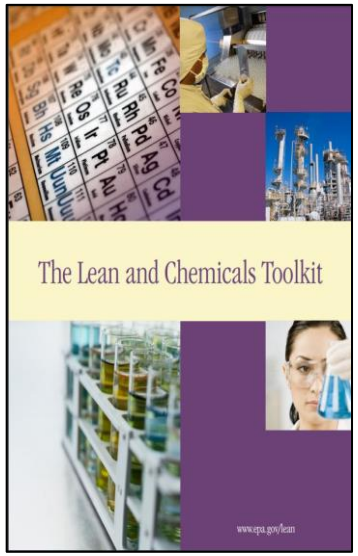
http://business-performance-improvement.thinkific.com/courses/lean-six-sigma-and-the-environment

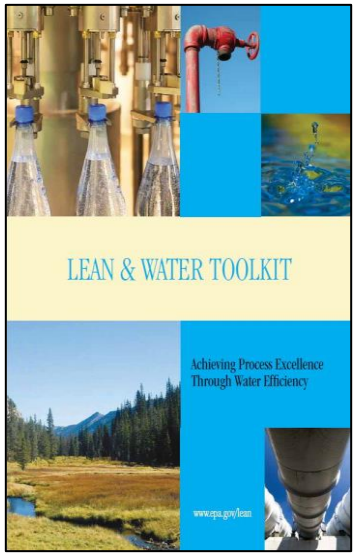
U.S. Environmental Protection Agency Toolkits

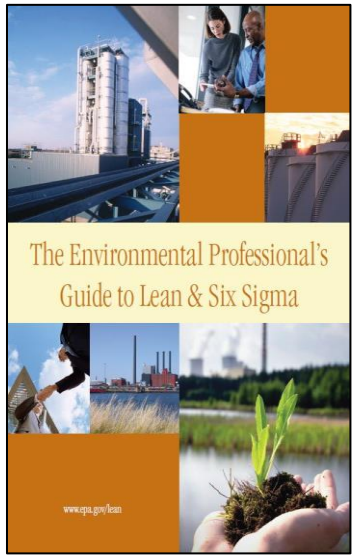
- The Lean and Environment Toolkit
- The Lean, Energy & Climate Toolkit
- The Lean and Chemicals Toolkit
- The Lean & Water Toolkit
- The Environmental Professional's Guide to Lean & Six Sigma

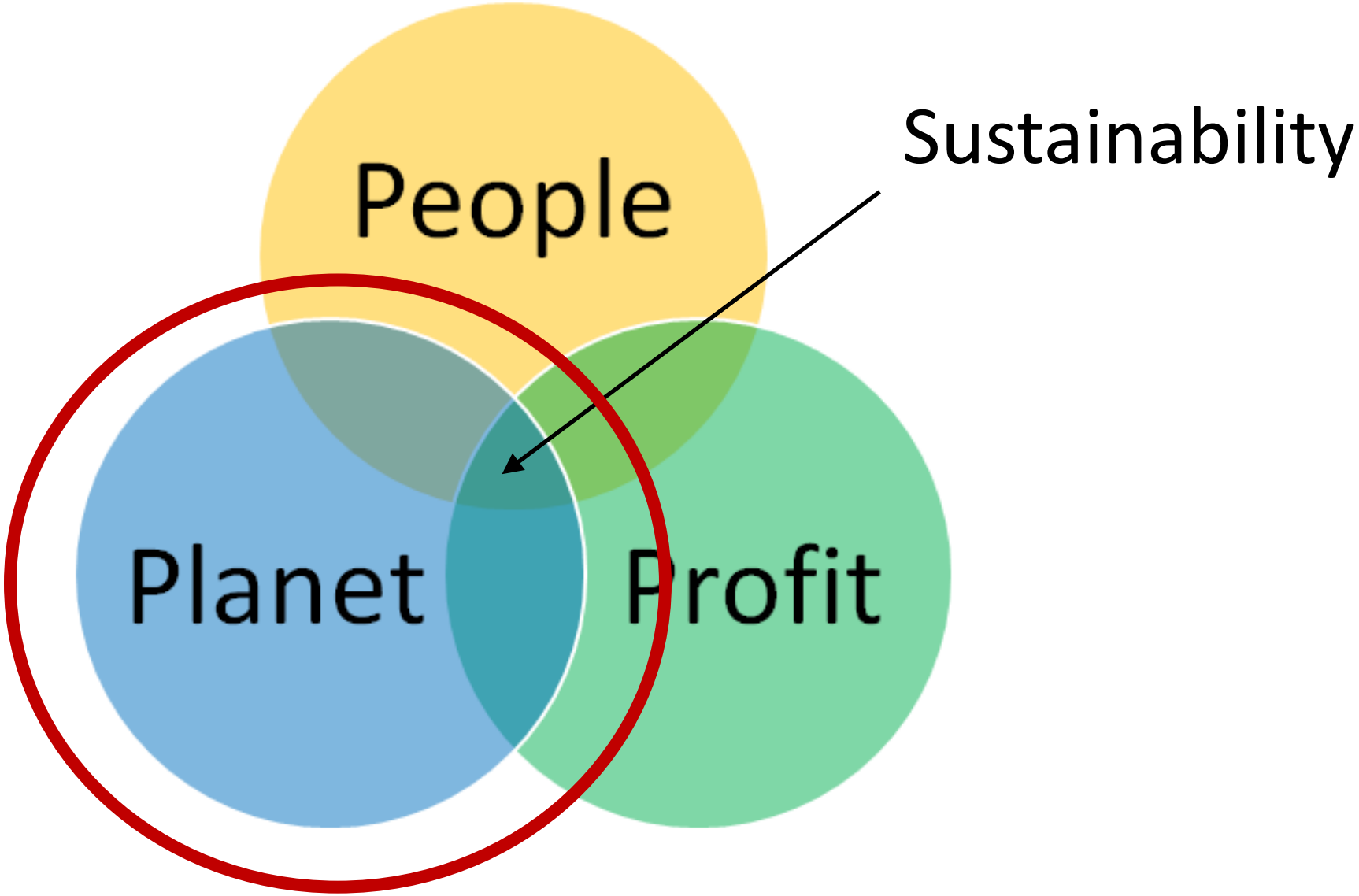








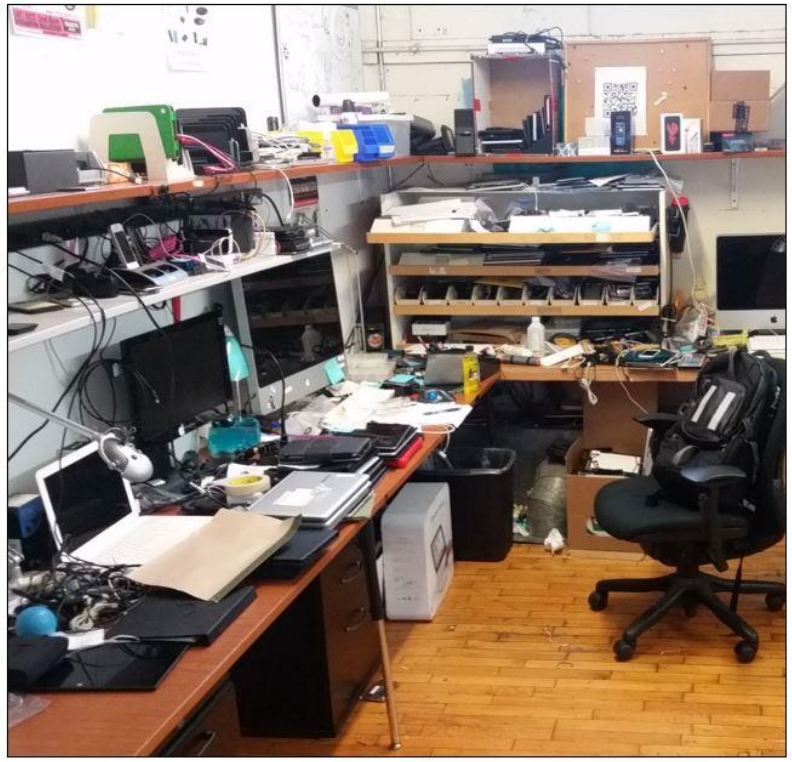


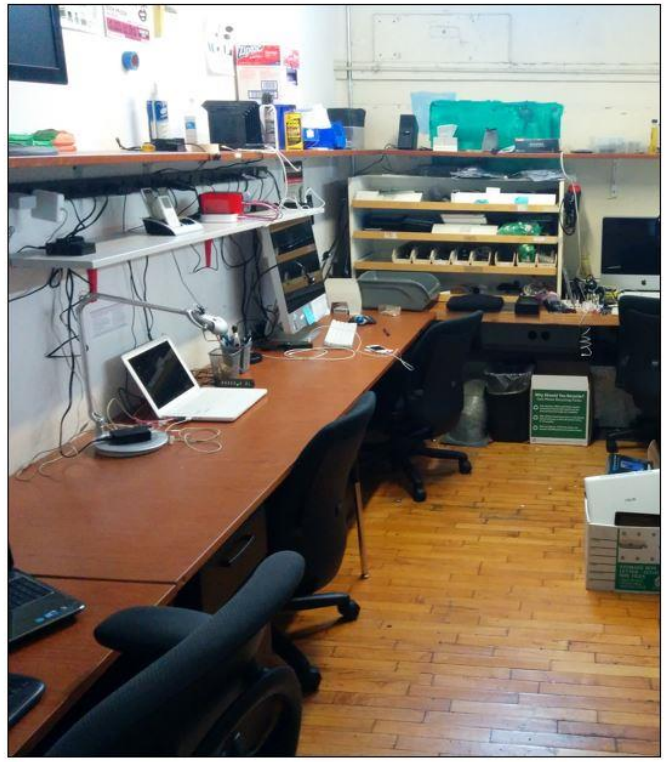

People
Sustainability
Planet
Profit

Lean: Material Avoidance

Good for business, good for the environment

Lean: Mobile Device Reuse





BEFORE

AFTER

5S Workplace Organization

Lean Six Sigma: University of Iowa

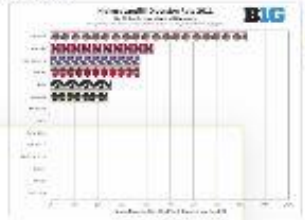
Going to the Gemba

Problem: Increase diversion rate at Kinnick Stadium from 25% to 50%	Owner: Brion Hurley	Date: Fall 2012	Approved: Damien Simcox

DEFINE

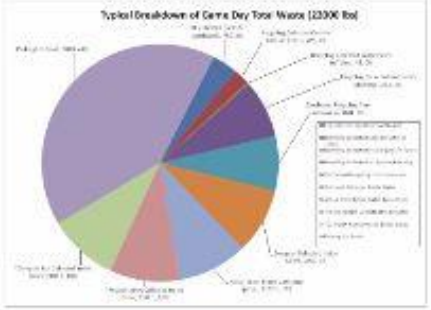
Too much trash is going directly to the landfill during Iowa football games. Results from Michigan game were 25% of trash was recycled (includes inside and outside stadium). Most waste sorts show that 50-75% of trash is recyclable. Current landfill costs are about $1000 per game flat fee. Future landfill costs at IC are going up $10 per ton next year. This project will help UI achieve 60% waste diversion goal by 2020.

MEASURE



Only half the teams in the Big 10 conference track diversion, but Iowa only 25%, and has not spent much effort on increasing diversion rate

ANALYZE



Waste audit performed near end of season, to determine [illegible] amount of potential recycling and composting within stadium. Limitations on recycling and composting within stadium

IMPROVE

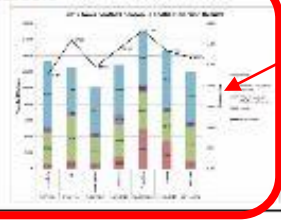
Volunteers placed outside of stadium prior to game (provided handout sheet for reference), and clean up volunteers educated on what can be recycled. Plastic bottle recycling bins co located near trash bins to help increase diversion within stadium.

CONTROL

Delta Tau Delta fraternity has taken over the recruitment and responsibility for the pre game recycling program

Data Analysis

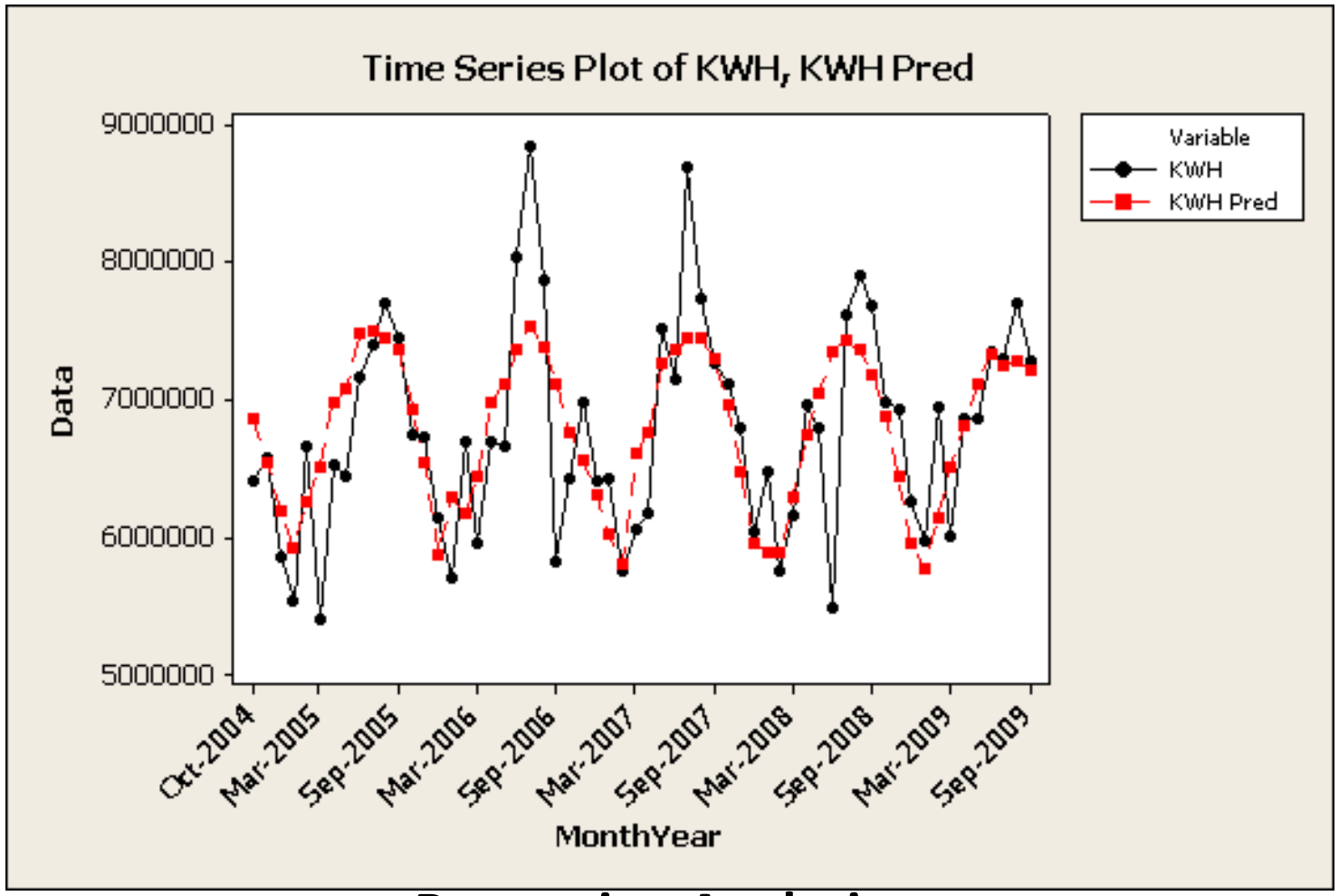
RESULTS

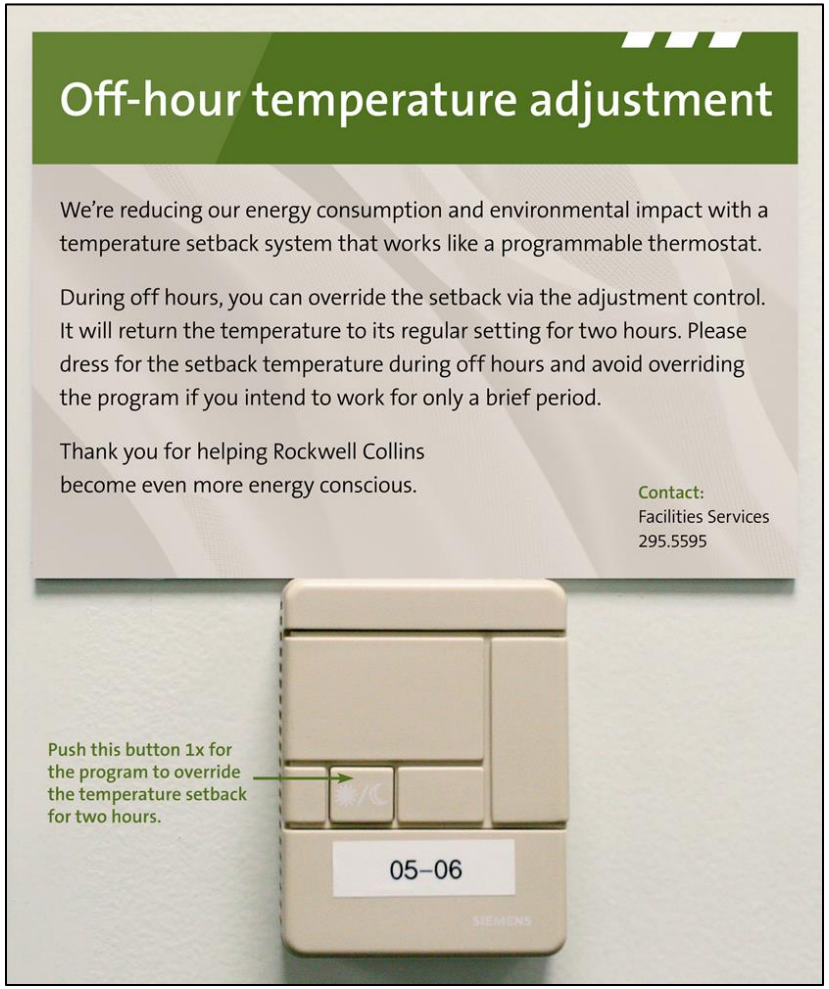


Diversion rates were 40-60% during the 2012 season, up from 25% from one game in 2011. Great visibility for university

http://leansixsigmaenvironment.org/index.php/ec-053-six-sigma-project-to-improve-stadium-recycling/

Six Sigma: Electricity Reduction

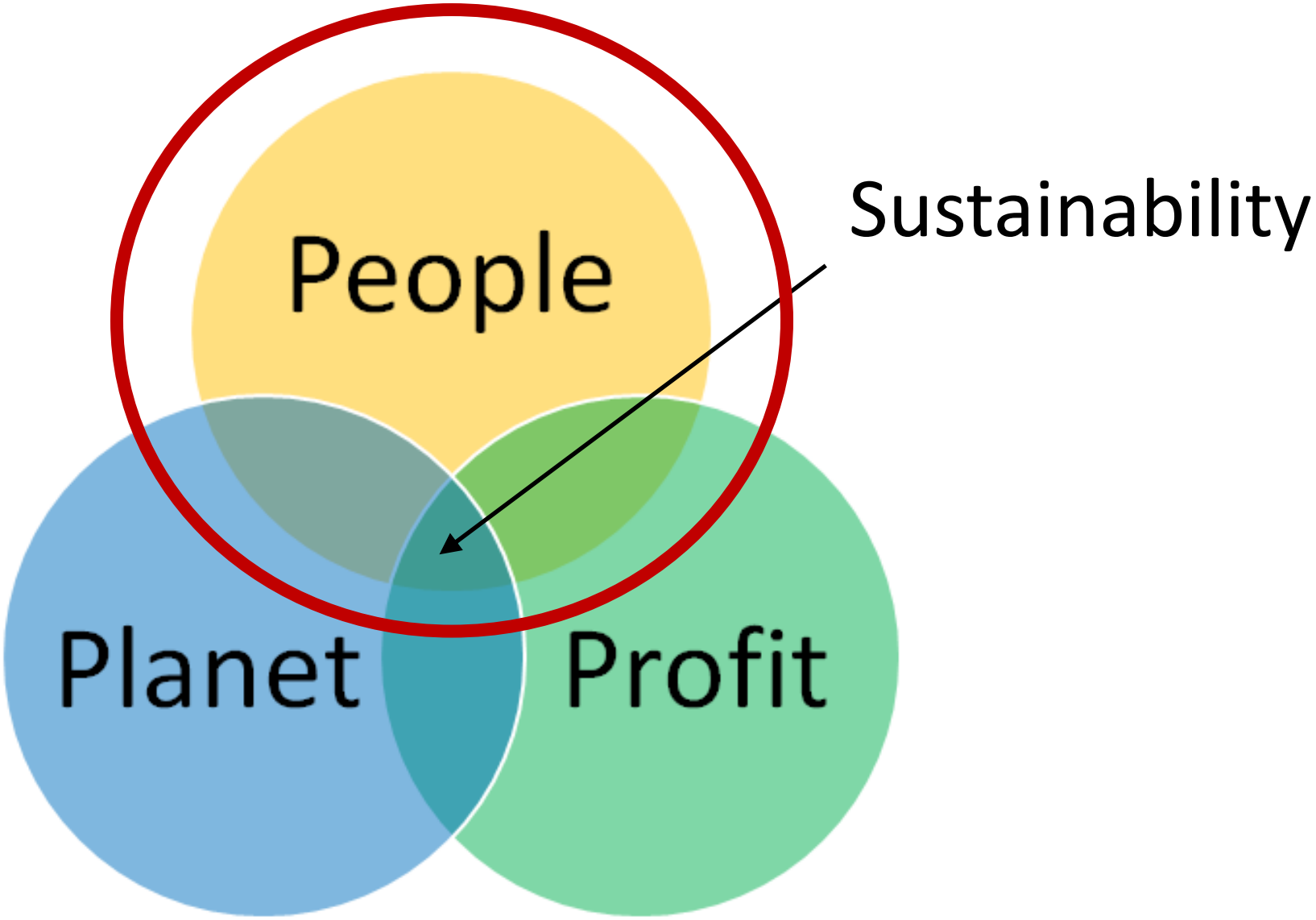




Regression Analysis

http://leansixsigmaenvironment.org/index.php/reducing-electricity-in-a-large-facility-or-company/

http://leansixsigmaenvironment.org/index.php/predicting-and-reducing-electricity-consumption/


People
Planet
Profit
Sustainability

Six Sigma: Football Player Retention

	Sum of Finished Career	Sum of Did Not Finish	All
Black	32	45	77
	38.25	38.75	
	1.020	1.006	
White/Non-Black	43	31	74
	36.75	37.25	
	1.061	1.047	
All	75	76	151

Cell Contents
Count
Expected count
Contribution to Chi-square

Chi-Square Test

	Chi-Square	DF	P-Value
Pearson	4.134	1	0.042
Likelihood Ratio	4.153	1	0.042

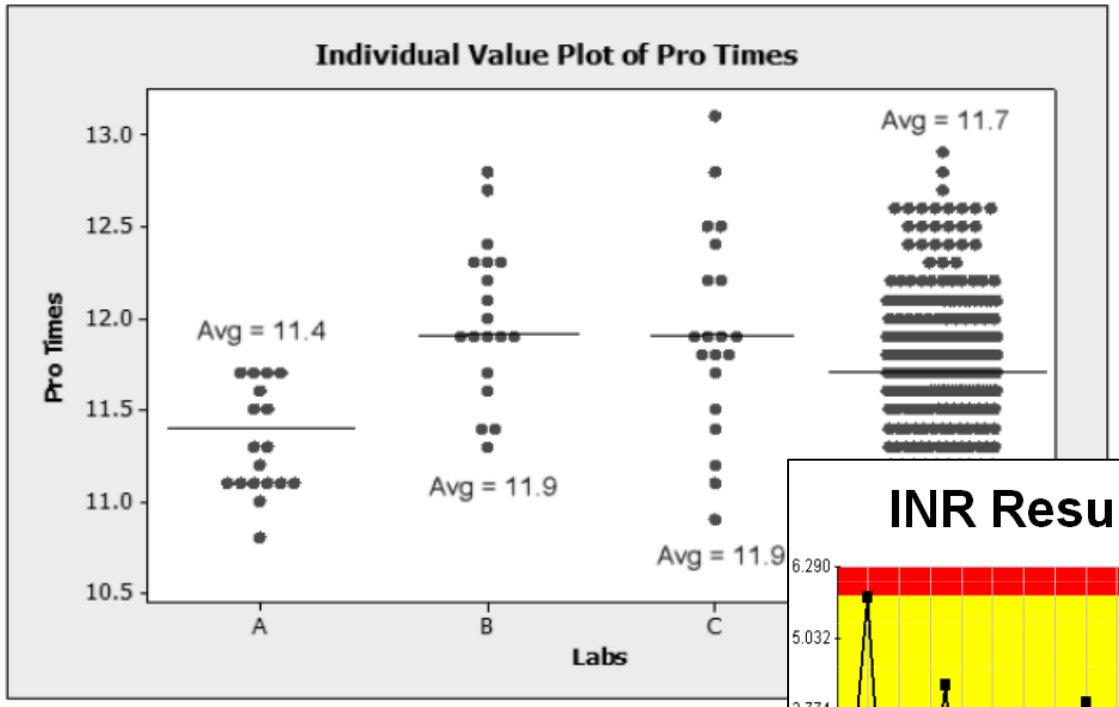
Player Groups	Finished Career	Did Not Finish	% Finished
Black	32	45	41.6%
White/Non-Black	43	31	58.1%
Overall	75	76	49.7%

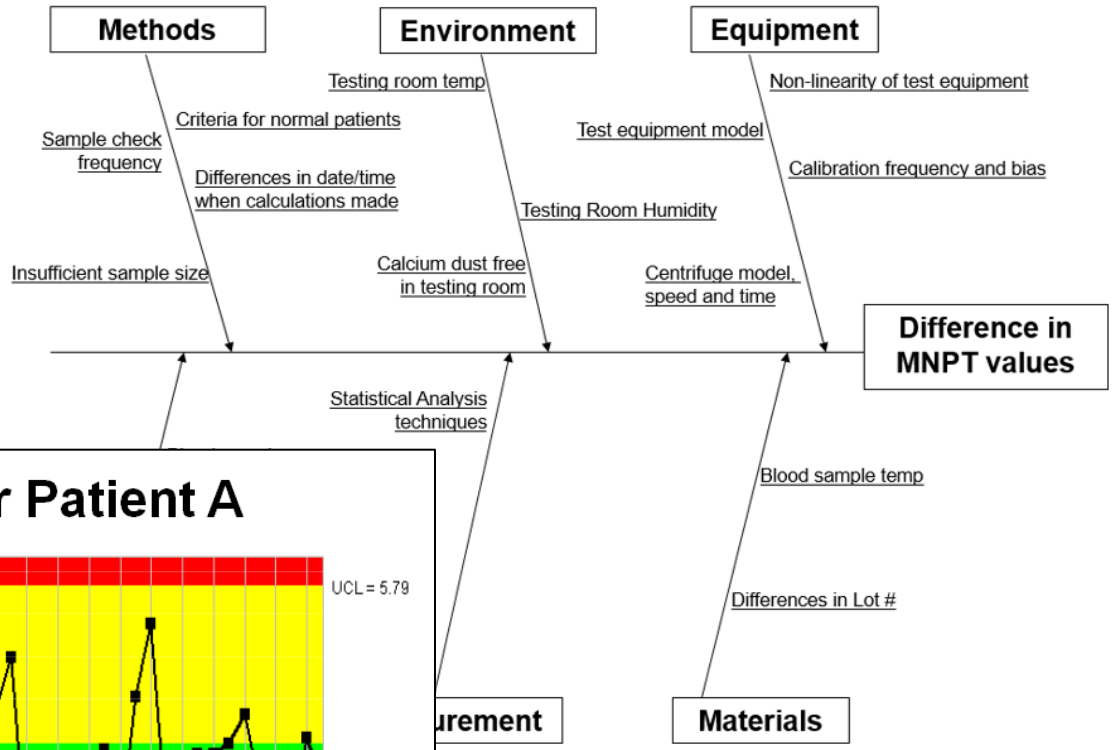
*From 2009-2015

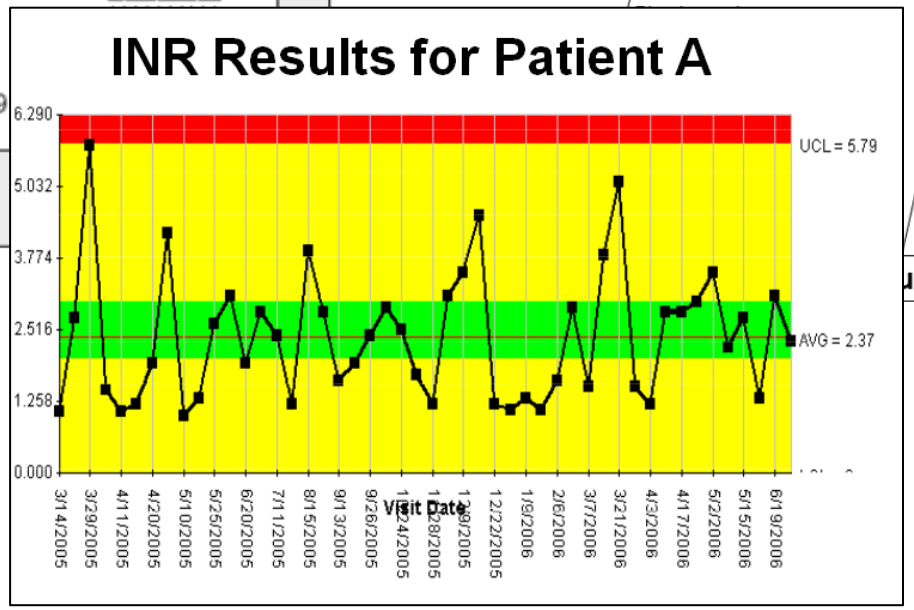
There is a statistical difference between Blacks and White/Non-Blacks finishing program (41.6% vs 58.1%)

http://www.leansixsigmaforgood.com/racial-differences-in-football-player-retention-at-the-university-of-iowa/

Lean Six Sigma: Healthcare Clinic







https://www.ahrq.gov/downloads/pub/advances2/vol3/Advances-Hurley_55.pdf

Lean: TSSC and NY Food Bank

- Increased number of boxes that fit on the truck from 840 to 1260
- Redesigned the workflow for packing the boxes, from 3 minutes to 11 seconds
- Cut distribution time from 3 hours to 1.2 hours

https://www.tssc.com/projects/nfp-fbny-vid.php

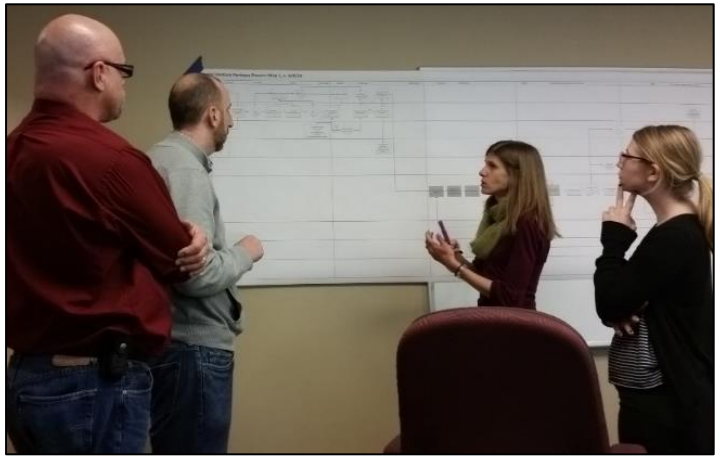
Volunteer

IISE Sustainable Development

SustainableEngineer.org

Lean Portland

- Benefit LLC committed to developing leadership skills of members and local non-profit organizations through project-based volunteer work that lead to continuous improvement



LeanPortland.com

Resources

Lean Six Sigma in Government*

- **States**
  - Arizona
  - Washington
  - Iowa
  - Connecticut
  - Ohio
  - Nebraska
  - New Hampshire
  - Wisconsin
  - Minnesota
  - New York
  - Vermont

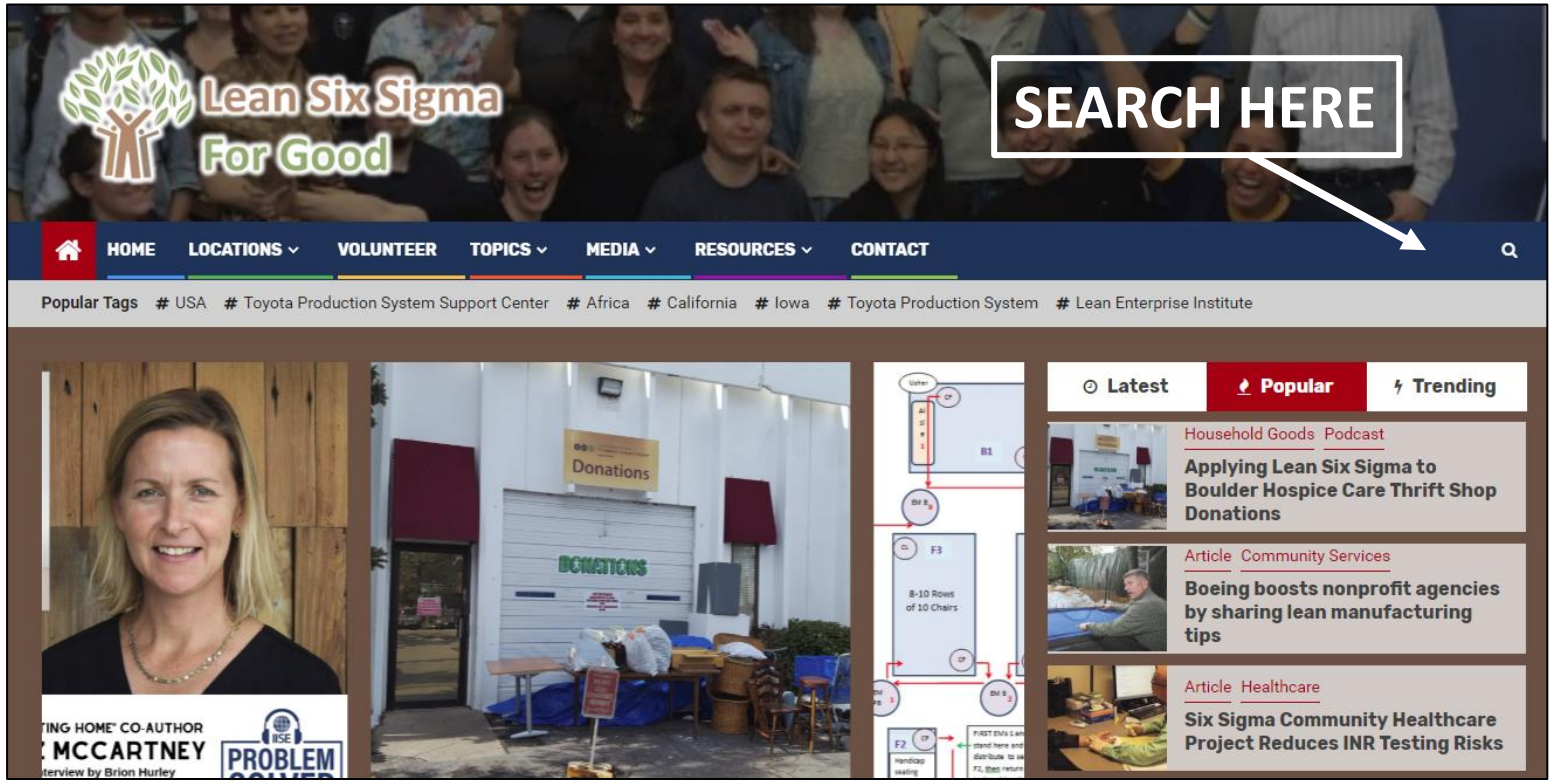
- **Cities**
  - El Paso (TX)
  - Irving (TX)
  - Denver (CO)
  - Cape Coral (FL)
  - Ft Wayne (IN)
  - Grand Rapids (MI)
  - Jacksonville (FL)
  - Louisville (KY)
  - Detroit (MI)

- **Agencies**
  - EPA
  - Armed Forces (Army, Navy, Air Force)
  - BLS
  - Local MEP organizations

* Not all-inclusive

LeanSixSigmaForGood.com

- **380** articles across **11** topics
- Topics:
  - Community Services
  - Discussion
  - Education
  - Environment
  - Equity
  - Faith Based
  - Food Bank
  - Government
  - Healthcare
  - Household Goods
  - Natural Disasters

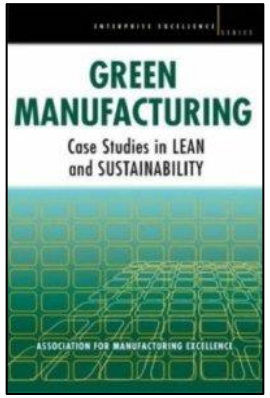


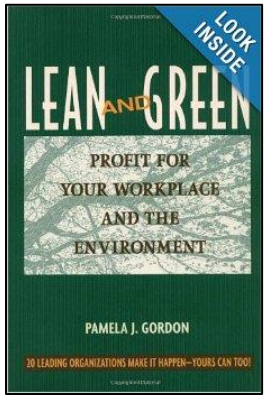
http://www.leansixsigmaforgood.com/

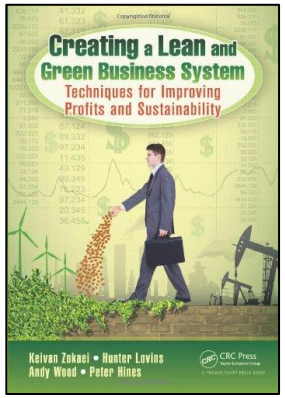
Free Resources

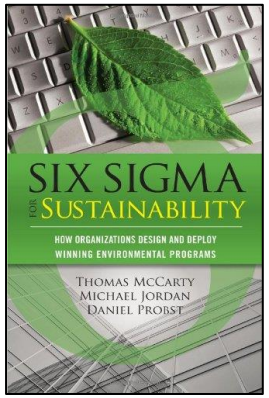
- FREE Online Courses: http://business-performance-improvement.thinkific.com/
  - Lean Six Sigma and the Environment
  - Lean at Home
- LeanSixSigmaforGood.com
  - Book series
  - Podcast
- LeanSixSigmaEnvironment.org
- LeanSixSigmaHomes.com

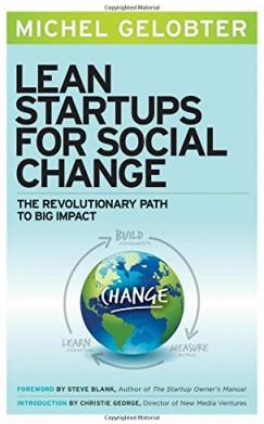
Books


GREEN
MANUFACTURING
Case Studies in LEAN
and SUSTAINABILITY
ASSOCIATION FOR MANUFACTURING EXCELLENCE


LOOK INSIDE
LEAN AND GREEN
PROFIT FOR
YOUR WORKPLACE
AND THE
ENVIRONMENT
PAMELA J. GORDON
20 LEADING ORGANIZATIONS MAKE IT HAPPEN—YOURS CAN TOO!


Creating a Lean and
Green Business System
Techniques for Improving
Profits and Sustainability
Keivan Zokaei • Hunter Lovins
Andy Wood • Peter Hines
CRC Press


SIX SIGMA
FOR SUSTAINABILITY
HOW ORGANIZATIONS DESIGN AND DEPLOY
WINNING ENVIRONMENTAL PROGRAMS
THOMAS MCCARTY
MICHAEL JORDAN
DANIEL PROBST


MICHEL GELOBTER
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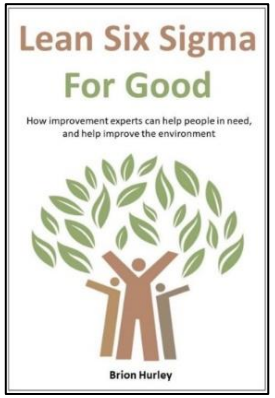
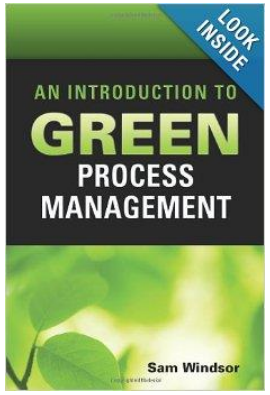
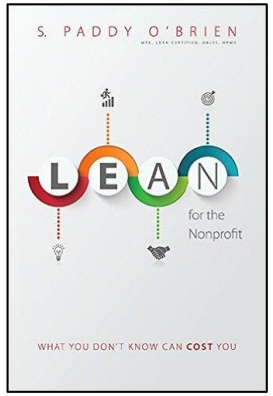
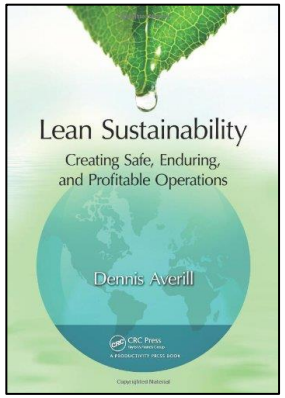
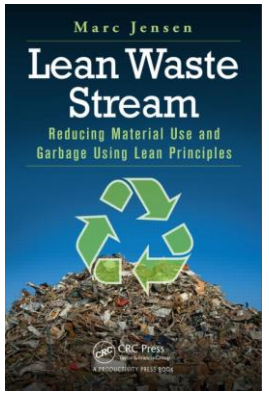
STARTUPS
FOR SOCIAL
CHANGE
THE REVOLUTIONARY PATH
TO BIG IMPACT
BUILD
CHANGE
LEARN
MEASURE

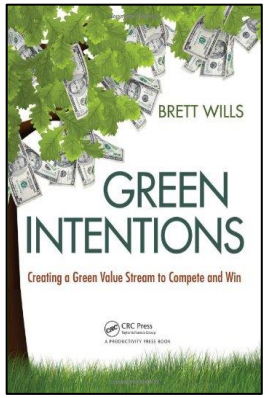

Lean Six Sigma
For Good
How improvement experts can help people in need,
and help improve the environment
Brion Hurley


LOOK INSIDE
AN INTRODUCTION TO
GREEN
PROCESS
MANAGEMENT
Sam Windsor


S. PADDY O'BRIEN
LEAN
for the
Nonprofit
WHAT YOU DON'T KNOW CAN COST YOU


Lean Sustainability
Creating Safe, Enduring,
and Profitable Operations
Dennis Averill
CRC Press


Marc Jensen
Lean Waste
Stream
Reducing Material Use and
Garbage Using Lean Principles
CRC Press


BRETT WILLS
GREEN
INTENTIONS
Creating a Green Value Stream to Compete and Win
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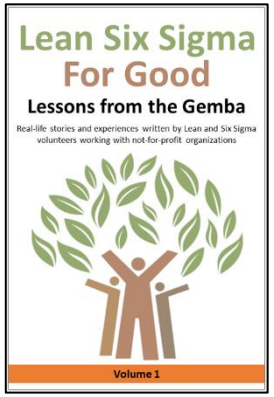
Lean Six Sigma
For Good
Lessons from the Gemba
Real-life stories and experiences written by Lean and Six Sigma
volunteers working with not-for-profit organizations
Volume 1

Summary

- Lean and Six Sigma have been used for decades to improve the bottom line of for-profit organizations
- These methods can be used to address the UN Sustainable Development Goals by assisting nonprofits, government agencies and partnering with schools and for-profit businesses

Questions?

Contact

Brion Hurley

Lean Six Sigma Master Black Belt

Business Performance Improvement

Portland, Oregon (USA)

brion@biz-pi.com

321-271-5361

LinkedIn

Instagram

@brionhurley

facebook

@brionhurley

What is Business Performance Improvement?

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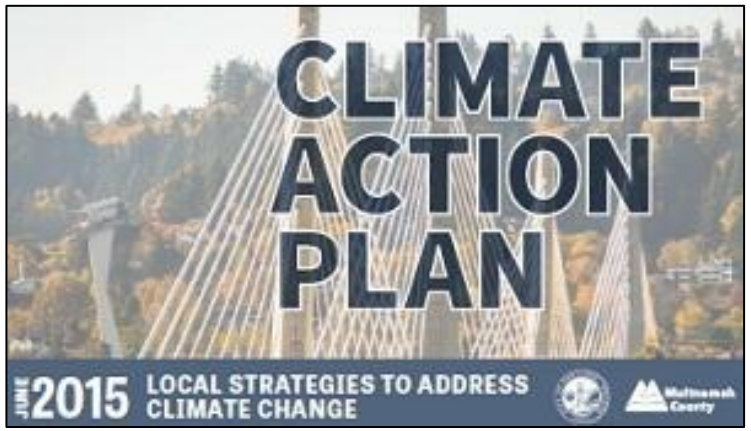
SUSTAINABLE DEVELOPMENT GOALS

17 GOALS TO TRANSFORM OUR WORLD

1 NO POVERTY · 2 ZERO HUNGER · 3 GOOD HEALTH AND WELL-BEING · 4 QUALITY EDUCATION · 5 GENDER EQUALITY · 6 CLEAN WATER AND SANITATION · 7 AFFORDABLE AND CLEAN ENERGY · 8 DECENT WORK AND ECONOMIC GROWTH · 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE · 10 REDUCED INEQUALITIES · 11 SUSTAINABLE CITIES AND COMMUNITIES · 12 RESPONSIBLE CONSUMPTION AND PRODUCTION · 13 CLIMATE ACTION · 14 LIFE BELOW WATER · 15 LIFE ON LAND · 16 PEACE, JUSTICE AND STRONG INSTITUTIONS · 17 PARTNERSHIPS FOR THE GOALS



1% FOR THE PLANET — MEMBER —

Think Globally **Act Locally**