

**Building Discipline Around the  
DMAIC Methodology:  
*Tollgate Review Best Practices***

July 29, 2010

# Agenda

- Welcome
- Introduction of MBB Webcast Series
  - Larry Goldman, MoreSteam.com
- Building Discipline Around the DMAIC Methodology
  - Scott Sink, OSU College of Engineering – LeanSigma Certification Program
- Open Discussion and Questions

# MoreSteam.com – Company Background

- Founded 2000
- Over 250,000 Lean Six Sigma professionals trained
- Serving 45% of the Fortune 500
- First firm to offer the complete Black Belt curriculum online
- Courses reviewed and approved by ASQ
- Registered education provider of Project Management Institute (PMI)

## Selected Customers:



# Master Black Belt Program

- Offered in partnership with Fisher College of Business at The Ohio State University
- Employs a blended learning model with world-class instruction delivered in both the classroom and online
- Covers the MBB Body of Knowledge with topics ranging from advanced *DOE* to *Leading Change* to *Finance for MBBs*
- Go to <http://www.moresteam.com/master-black-belt.cfm> for more information about curriculum, prerequisites, and schedule

# Building Discipline Around DMAIC



**Dr. D. Scott Sink**

*Executive in Residence  
Director LeanSigma Certification  
Program*

*Department of Integrated Systems  
Engineering*

*College of Engineering at The Ohio  
State University*



# Introduction

- Data and Experience base supporting my Insights and Suggestions
- The From-To Creation Process for many belt candidates and how it can help establish more discipline in the DMAIC methodology
- What works for me in Tollgates, lesson's learned, best practices I've experienced

# Data/Experience Base

- 1978-1997—Academia, Professor, Director of Quality and Productivity Centers (OSU, Va Tech) Significant benchmarking via Virginia Senate Quality and Productivity Award Process
- 1997-2007 'Real World', VP Business Process Reengineering and Improvement for two different Global Firms in Boston and Toronto. **Global Deployment Leader for Integrated LeanSigma, designed, developed, took to prime a LS program.**
  - Trained 7 waves (~150 Belts at MDS) led them from no program to \$16M+ (headed to 12:1 B/B ratio) in annual hard benefits in 3 years
  - Successful deployment in 4 Business Units and also Enterprise Services (Finance, IT, HR, SCM)
- 2007-current OSU ISE, Executive in Residence and Director LS Certification, College of Engineering
  - 55 candidates, 33 achieved certification (4 Black Belts)
  - 150 Tollgates from September 2009 through June 2010!!

# The Sponsors



Office of  
Student Life

Limitedbrands



**B A E S M A N**



*Diamond Innovations*

smiths medical  
bringing technology to life



PPG Industries



OHIO STATE UNIVERSITY  
Medical Center

**BIG  
LOTS!**



Mid-Ohio Foodbank



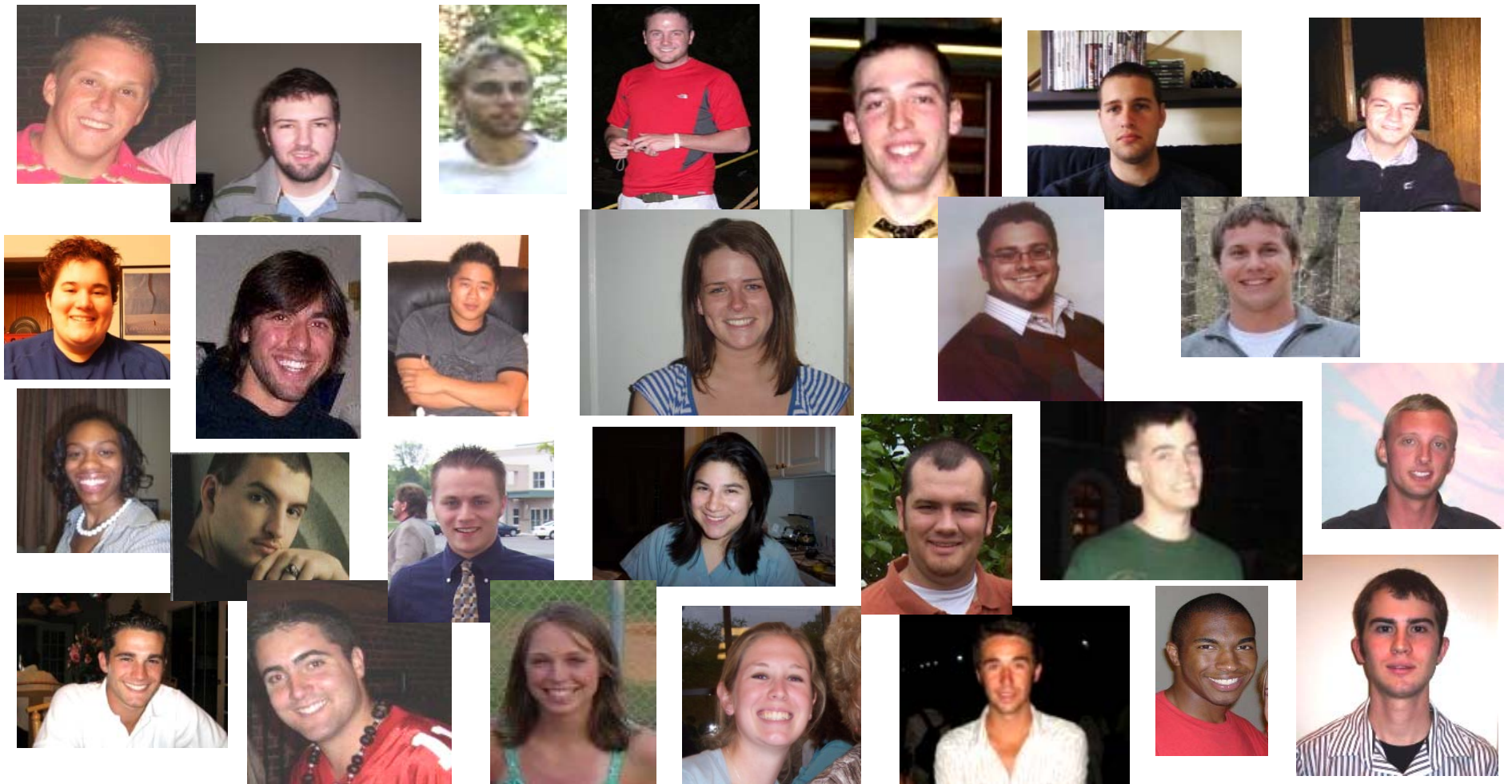
KEYSTONE FOODS LLC

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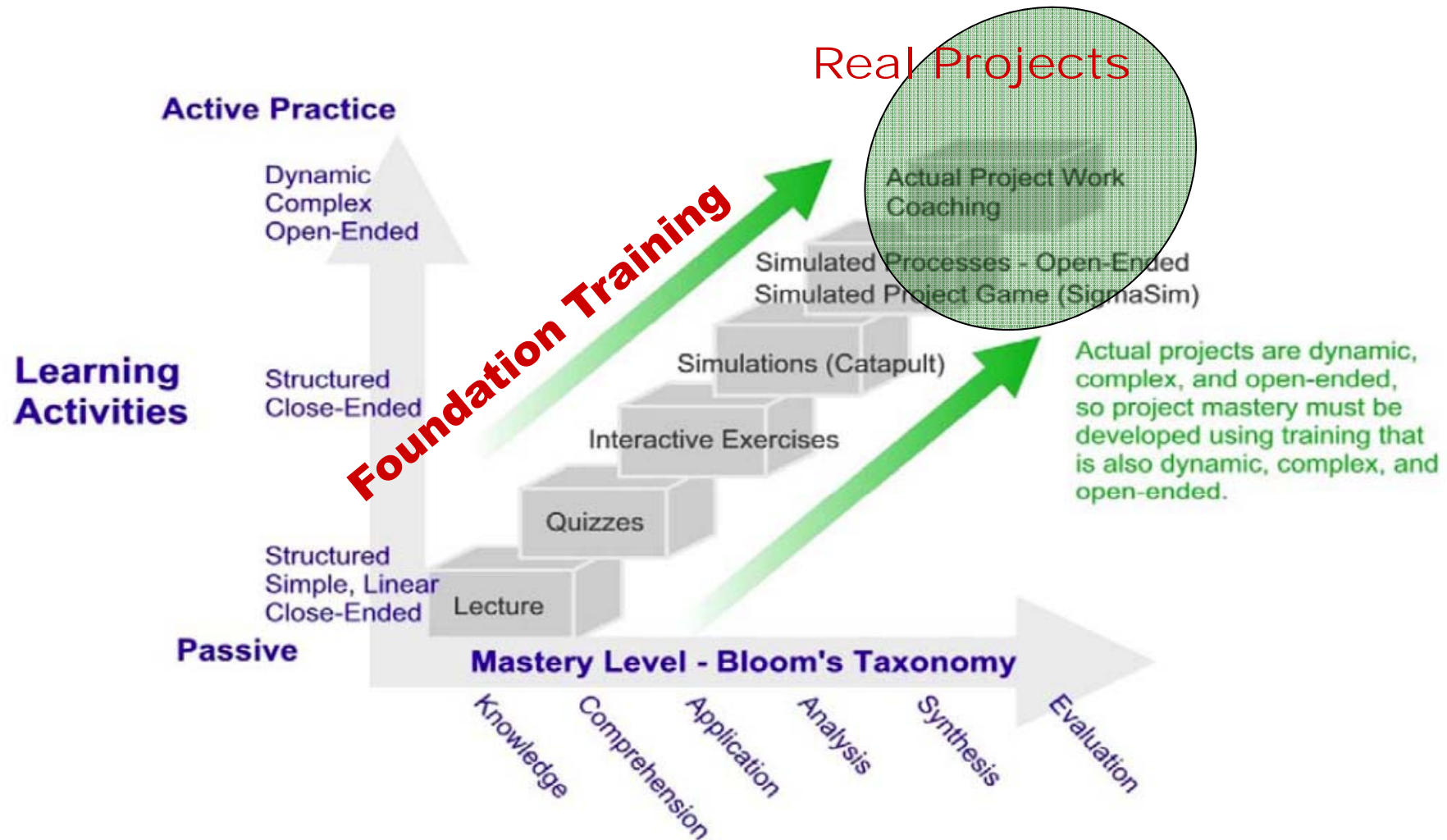
**\$3M in Hard Benefits in 2 years!**



# The Candidates



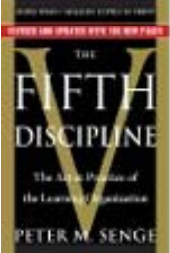
# From Learning to Producing Results





Greatness is a lot about disciplined people (thought, word, deed)

Disciplined about what?



# Focus on Better Managing this Equation



$$TR = \frac{P * Q * CfS}{t}$$

TR = Timely Results

P = Pick the Right Belts & Projects

Q = Quality of Solution

CfS = Conditions for Success  
and  
**Discipline for Execution**

t = Cycle Time

*Adapted from Making Six Sigma Last by George Eckes*

$$Y \text{ (Timely Results)} = f(x)$$

**X1** = the 'Belt'

**X2** = the MBB (coach's ability to be a 'Gordon Ramsay' so to speak)

**Distant next x's:**

- Project, Sponsor, Process Owner, etc.

# Picking the Right Belts

1. **Passion** for Improvement, (personally, professionally and organizationally), Operational Excellence, LeanSigma
2. Intellectual, Analytical and Technical **skills** for this type of work
3. Process orientation/Systems Thinking/Creation Skillful/Creative Problem-solver
4. Business Process and Content **knowledge**
5. Ability to spend required **time**
6. **Customer Focus** and Creation of Franchise Value orientation
7. **Respected** by the Organization
8. Training, Coaching, Communication Skills
9. **Leadership** Values, Core Competencies, Skills
10. Ability to catalyze and cause change through influence
11. Business Acumen, Functional competencies

# Personal Mastery Issues (a.k.a. Battle Scars)

## Initial 'Condition'

### PERSONAL MASTERY

- Don't listen well
- Action junkies
- Don't stay focused, can't juggle multiple balls well
- Don't communicate well
- Victim behavior
- Judgment mode common
- Parent-child lingering, still, with Teacher-Student, which will carry over to boss to subordinate if not corrected

### PROFESSIONAL MASTERY

- Do not exhibit ideal learning behaviors
- Do not understand what it takes to succeed in the 'real world' or produce tangible results and benefits for 'real, tough leaders/managers'
- Struggle mightily to 'reduce to practice', sloppy, undisciplined practice
- Can't manage projects successfully
- Do not manage relationships proactively
- Cannot produce results, lose sight of the end-game
- Have heard the talk on 'ethics' and values but don't have the foggiest idea how that translates to trust and team and working effectively together

Leads  
To

## Developed 'Condition'

1. Projects that drag out or fail and hence important business benefits are delayed or never realized
2. Poor coordination with core teams and key stakeholders and frustration, lack of trust in process with key employees
3. Avoidance behavior
4. Lack of trust between champion and process owners and the accountable belt
5. Friction and conflict between the belt and the MBB/BBB
6. Poor modeling, developmental issues that don't get addressed and linger and grow and become a foundation/culture of mediocrity (pretty good is good enough)

# Transforming 'Belts' is the Job of a MBB

## Starting Conditions

### PERSONAL MASTERY

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ISE 500: Initial Exposure

ISE Core Curriculum:  
Essential Foundation  
for Systems Improvement

"The New Offering"  
LeanSigma Foundations + ISE Capstone Senior Design

## Ideal Belt Behavior

### PERSONAL MASTERY

- Can deep listen, can active listen, **seek to understand**
- **Plan before acting**, Context, Possibilities, Action
- Practiced focus and persistence with something difficult for 6+ months
- **Communication skills (written, oral, body language) enhanced for success**
- Spend less time in judgment more time in evaluation and difference, **consciousness about tendencies**
- Made the switch of Adult to Adult

### PROFESSIONAL MASTERY

- Improved consciousness and practice with 'ideal learning behaviors'
- Clear understanding of 'flat world', competitive World requirements for success, more **real world savvy**
- Lots of opportunities for perfect practice
- **Demonstrated program and project management skill to gain certification**
- **Relationship management skill development initialized, understand importance**
- Capable of producing results in timely fashion with understanding in context of the system or higher good
- Have had to walk the talk on ethics and values



# *Tollgate Reviews & Intervention Strategies*

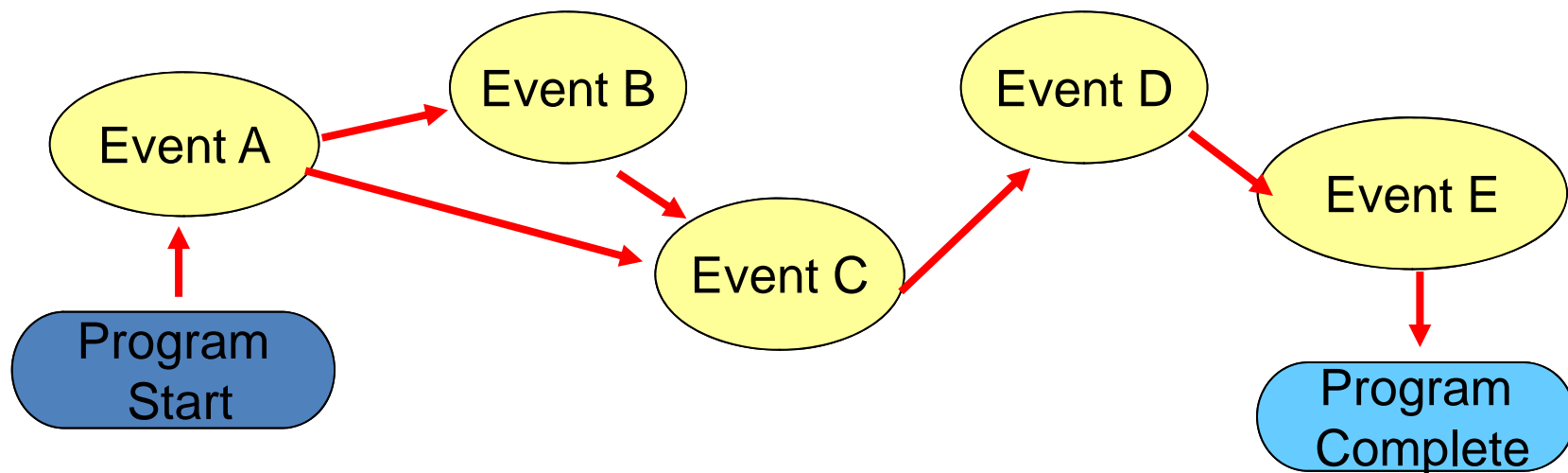
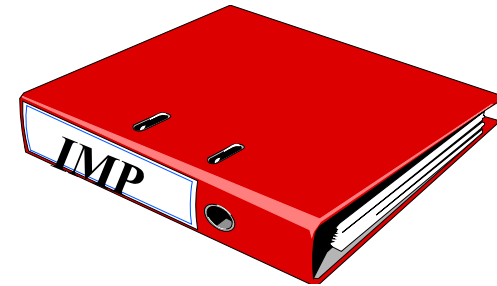
- How Tollgates can be utilized as an opportunity to continue to develop 'Belts' and improve discipline with the DMAIC methodology
- MBB to Belt developmental interventions that work
- Content-related Tollgate tips (things that have worked for me and the Belts that I have coached)

# Tackling X1's and Instituting DMAIC Discipline

1. Establish, internalize difference between pretty good and great (organization, team, individual), **create a pull for GREAT**
2. Establish what they 'want' to create with their life's energy—**purpose, why am I doing this?**
3. Operationally define **DONE** for the project
4. Determine their view **on what it 'takes'** to achieve great, to **achieve DONE**, to be successful—introduce the importance of trust (operationally define)
5. Introduce and internalize difference between **creation skillful** (Fritz, Senge) and creative problem solving, get them to **create 'pull' from DONE** with the core team
6. **Define and Specify the Current State** and Practice intellectual honesty (data/facts) regarding the 'current state'—**CREATIVE TENSION**
7. Introduce Feedback as a tool to understand current state/reality
8. **Utilize 'Program Planning' approach** (IMP) and that language and those concepts to improve project management to ensure timely results

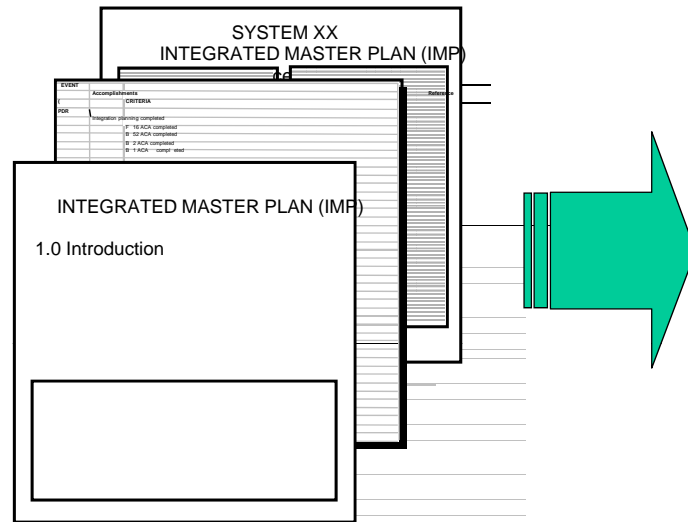
# What is an Integrated Master Plan -- IMP?

- An event-driven plan for executing the program
- Tollgates are the Events!



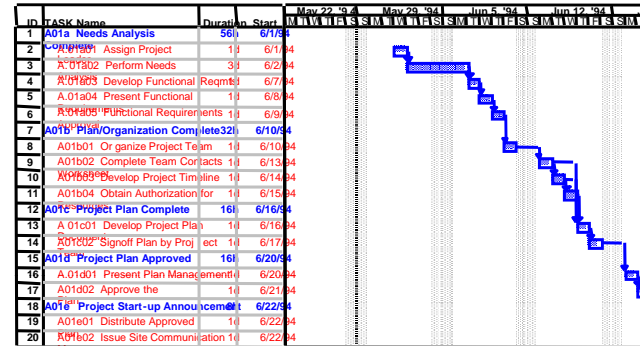
- Not a calendar based plan
- Becomes a contractual document (or Commitment/Promise in our case)

# Simple Overview of the IMP/IMS Relationship



**INTEGRATED MASTER PLAN  
(IMP)**

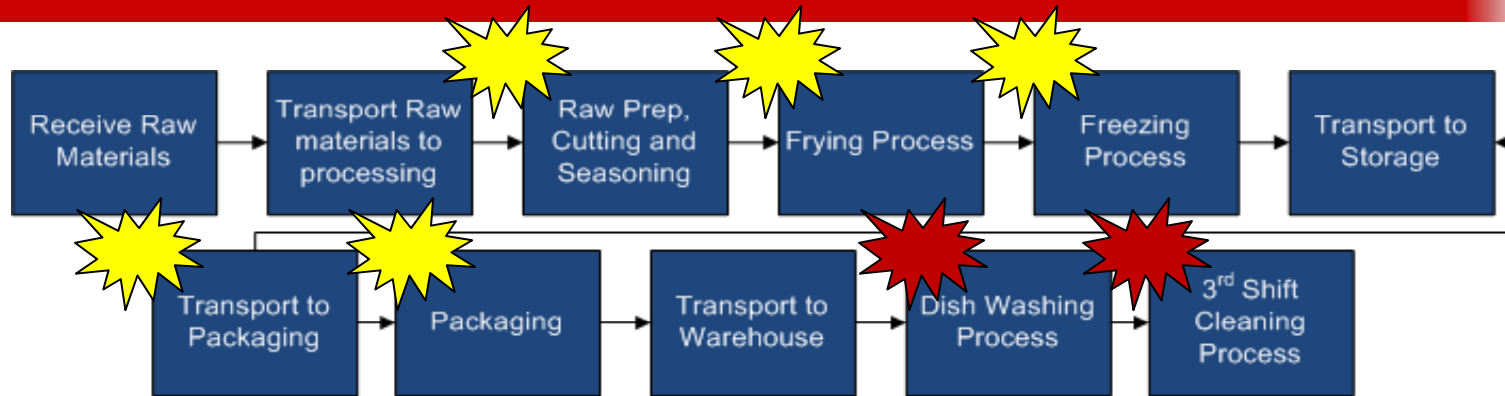
- *EVENT based Plan*
- *“Contractual” document*
- *Relatively top level*



**INTEGRATED MASTER SCHEDULE  
(IMS)**

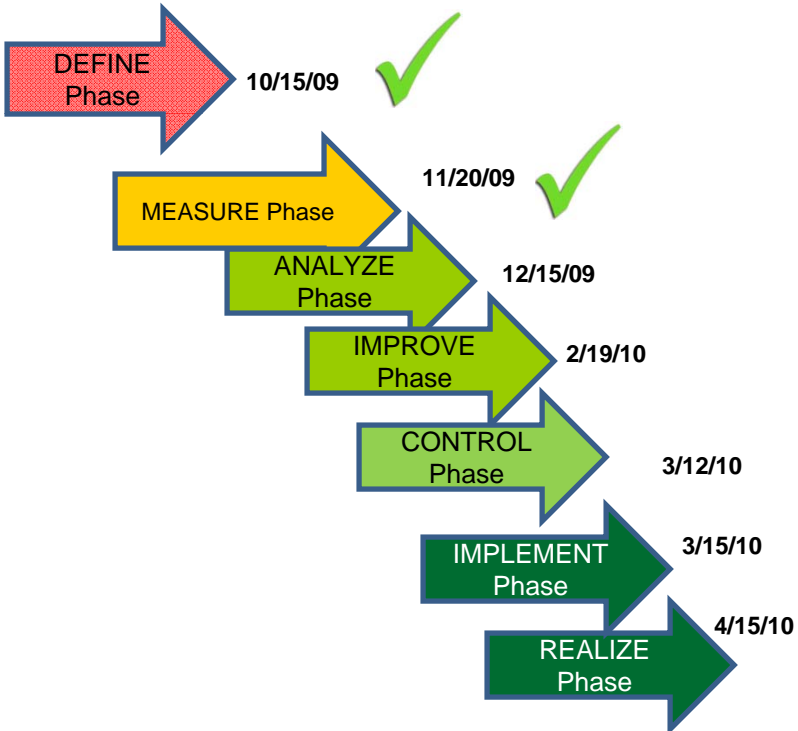
- *TASK & calendar based Schedule*
- *Level of detail necessary for day-to-day execution*

# An Illustration



**Current State:**

- BOD 3867 mg/L >> Allowed Max
- TSS 1994 mg/L >> Allowed Max
- Incapable of meeting customer spec
- \$190,000 in extra strength surcharges / year
- No current measurement system for Solid waste measurement
- Ineffective drains and solid separator
- No formal maintenance program for grease interceptor pumping/cleaning



**Potential Future:**

- BOD/TSS levels cut at least 50%
- BOD -- <<1800 mg/L
- TSS -- << 850 mg/L
- System Capable of reaching long term target of 250 mg/L BOD 300 mg/L TSS
- Surcharges <<\$85,000 with strong downward trend
- Problem attacked at root causes without need for \$\$\$ pre-treatment
- Improved solid separation and more effective drains
- Interceptor maintenance program

September 23<sup>rd</sup>, 2009



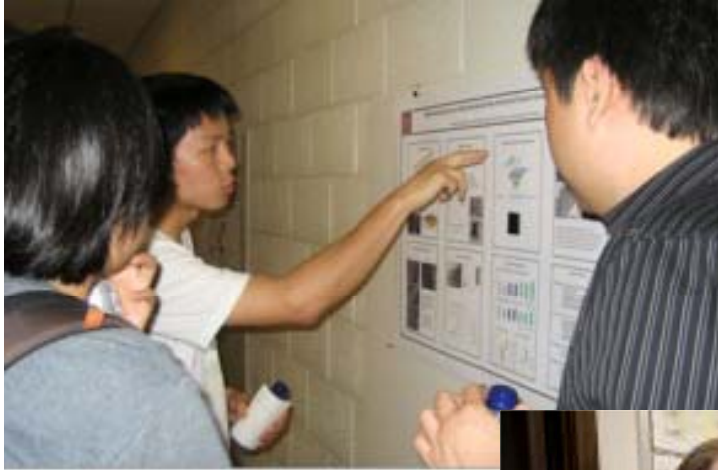
March 15<sup>th</sup>, 2010

# *Tollgates are Critical Moments of Truth*

Keep TG's (the events) tight, best in class meetings (SIMPLE TIPS)

- Go backwards to go forwards
- Keep front matter short, sweet, to the point, focused on answering focal questions for the stage
  - Stay focused in the front matter on answering the 'fundamental questions' for each stage (e.g. in M, what is the current state process capability, just answer the question!! Don't drag the TG audience through the mud, belts like to 'show/talk about how they got to an answer, managers just want the answer!!)
- Develop back matter in anticipation of drill down conversations
- Facilitate the meeting, know what DONE for the meeting looks like and when it's done stop!! Know what you want them to know, what you want them to provide, what you want them to decide, and how you want them to feel at the end.
- Have a summary slide at end of TG deck that captures key issues, questions and answers, decisions made, etc. and use this as the post TG memo.

# Examples from Actual Tollgate Reviews





# Agenda

- **Purpose of the meeting:**
  - Display steps taken to arrive at root causes
  - Present and discuss solution element suggestions/plans
- **What DONE looks like**
  - Discuss Improvement Possibilities
  - Develop Implementation and Control Plans
- **Key Modules to cover (time boxed)**
  - Context (12:00 – 12:05)
  - Findings and Recommendations from MSA and Improvement (12:05 – 12:15)
  - DOE Analysis—Executive Summary (12:15 – 12:25)
  - Findings (what the RC isn't) and Pursuits (hot leads) (12:25 – 12:40)
  - Where do we go from here? (12:40 – 12:45)
  - Discussion (12:45 – 1:00)





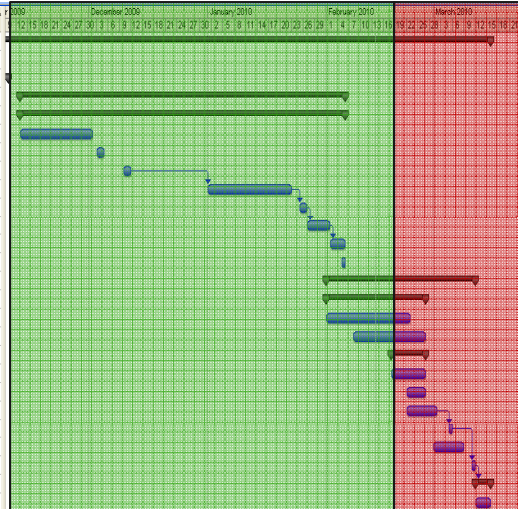
# Current State Update/Report



### Current State September 2009

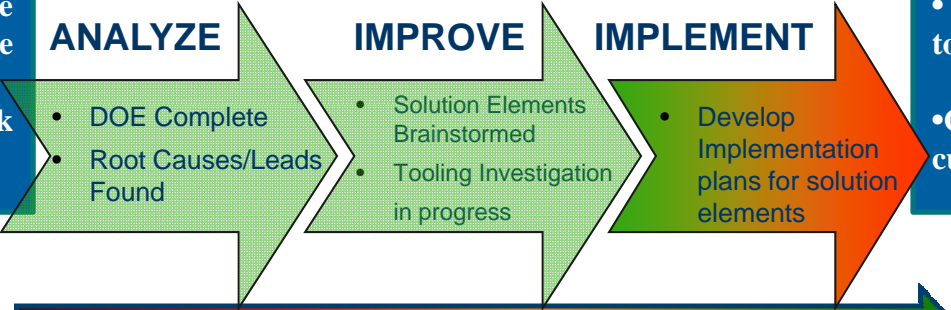
- $x\%$  of all defects in 2008 due to FFP
- Varying visual inspection methods
- At any given time there are  $x-xx$  orders delayed because of 100% sorting.
- \$xxx,xxx lost annually due to waste
- Defects represent risk

Task Name	Duration	Start	Finish	Predecessors	Resources
GB Project	122 days?	Fri 9/25/09	Mon 3/15/10		
Define	16 days?	Fri 9/25/09	Fri 10/16/09		
Measure	16 days?	Mon 10/19/09	Mon 11/9/09	8	
Analyze	61 days?	Fri 11/13/09	Fri 2/5/10	15	
BOE	61 days?	Fri 11/13/09	Fri 2/5/10		
Determine Layout	13 days?	Fri 11/13/09	Tue 1/21/10		
Factors and levels	2 days?	Thu 1/20/10	Fri 1/24/10		
Run the DOE in Molding	2 days?	Thu 1/21/10	Fri 1/21/10		
Inspect parts	18 days?	Fri 1/1/10	Fri 1/22/10	20	
Assemble Parts	2 days?	Mon 1/05/10	Tue 1/06/10	21	
Inspect Parts	4 days?	Wed 1/07/10	Mon 2/1/10	22	
Analyze Results	4 days?	Tue 2/02/10	Fri 2/05/10	23	
List root causes	1 day?	Fri 2/05/10	Fri 2/05/10		
Improve	29 days?	Mon 2/1/10	Thu 3/11/10		
Investigate root causes	29 days?	Mon 2/1/10	Fri 2/26/10		
Visual Inspection System	18 days?	Mon 2/01/10	Mon 2/22/10		
Tooling Rebalancing Effort	15 days?	Mon 2/08/10	Fri 2/05/10		
Develop Improvement Strategy	7 days?	Thu 2/18/10	Fri 2/26/10		
Plan for Visual Inspection	7 days?	Thu 2/18/10	Fri 2/26/10		
PM Schedule/Reqs	5 days?	Mon 2/02/10	Fri 2/05/10		
Benchmarking	6 days?	Mon 2/02/10	Mon 3/01/10		
Develop financials/Cost per	1 day?	Fri 3/05/10	Fri 3/05/10	33	
Begin Control Plan	6 days?	Mon 3/01/10	Mon 3/08/10		
Implementation plan	1 day?	Thu 3/11/10	Thu 3/11/10	34	
Control	2 days?	Fri 3/12/10	Mon 3/15/10	36	
Control Plan	2 days?	Fri 3/12/10	Mon 3/15/10		



### Potential Future State March 2010

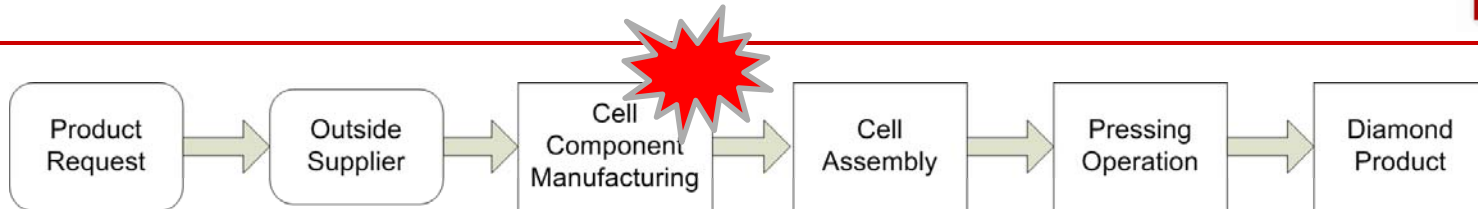
- $<x0\%$  of all defects annually due to FFP
- Standardized and effective visual inspection system
- Reduce delayed orders by  $xx\%$
- Reduce scrap produced by  $x\%$  to save \$xxx,xxx
- Create a safe product and take customer satisfaction to the max



September 17th, 2009

March 19th, 2010

# Project From - To



## Current State:

**Oct '08**

- 0.x% percent yield loss due to inhomogeneous grit lava, in the form of compromised cells, \$x0,000 yield loss
- 200 Compromised Cells with less than ideal product output
- \$XXX,xxx Carbide loss
- y Catastrophic Failures - \$x0,000 due to AA bushing .
- Information about homogeneity and inter-part characteristics is limited.
- Unable to track processing conditions by batch

## Root Causes:

- Current molding process makes parts vary.
- Press pressure not repeatable
- **Moisture spec is too wide**
- Moisture is difficult to control
- **Powder composition varies.**
- Batch tracking info. thrown out by outside contractor

## Conceptual Solutions

- Improve/Redesign molding (net shape forming)
- Improve/Redesign pressure control
- Narrow spec for optimal pressing conditions
- Revise POCl to improve sampling
- Measure grit lava input
- Put info. into Datamyte

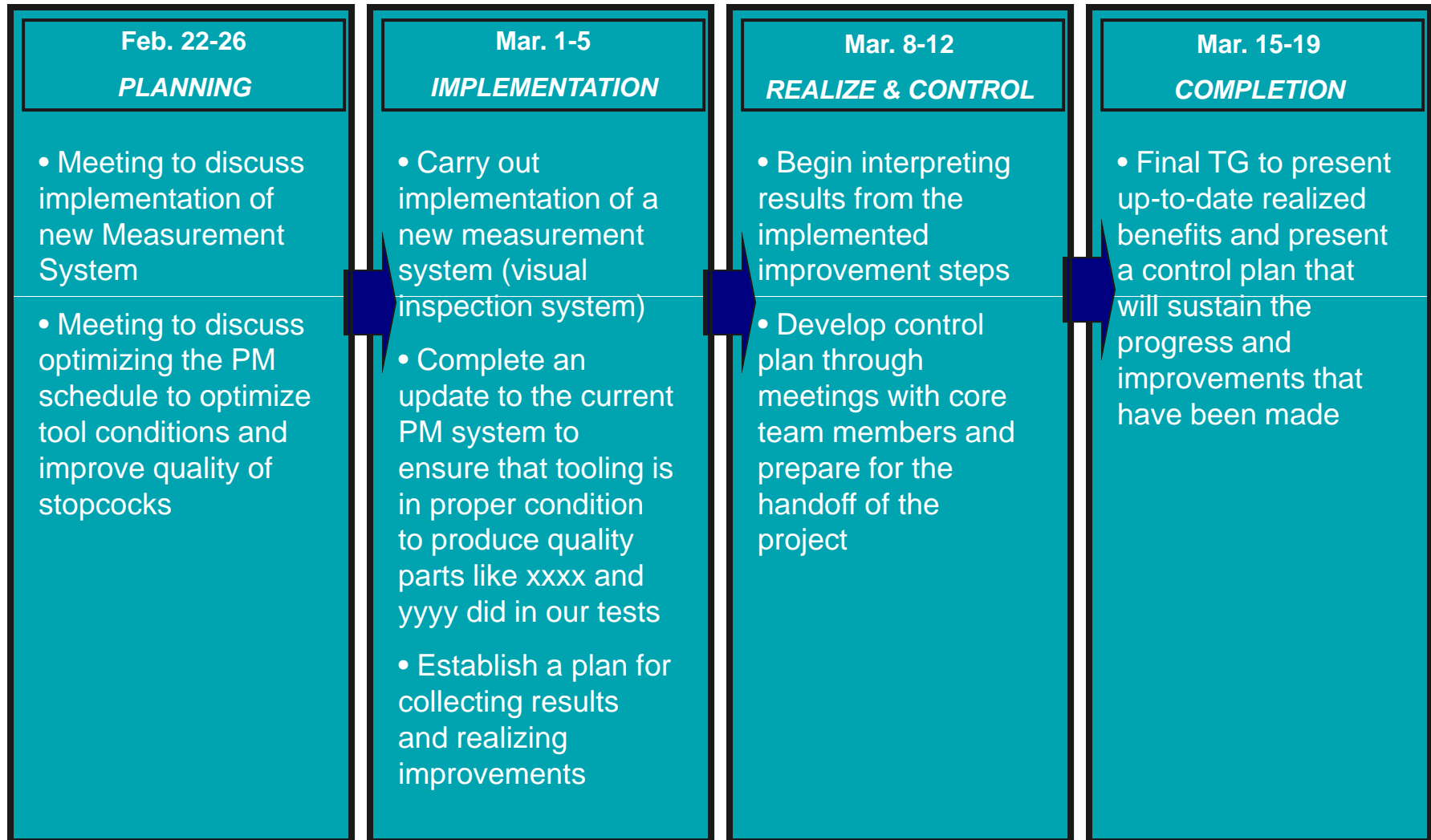
## Future State:

**Mar'09**

- 0.x% reduction in carbide loss, \$x0,000 Carbide Savings / yr
- xxx more cells / yr, \$xx,000 Gain in product yield / yr
- Reduction in press blow outs
- Reduce variation of the three most erratic sub-processes (Grit Mixing, Isopressing, Firing)
- Sets stage for future improvements
- Process Improvement Crossovers
- Improved Process Controls/Maturity



## Through → DONE Plan





## Questions to be Answered in Implement/Control

- What is the new standard process – PM/Tool Rebuilding/Measurement System?
- Who owns the new processes?
- Where are the process documents located and who will maintain them?
- How will the process performance be evaluated and measured to ensure it is working?
- What savings have been realized to date?
- How will the new process ensure consistent performance in the event of any changes with production, customers needs, etc?

# *Great Tollgates Require Ideal Behaviors*

1. Be clear about what DONE is and when it has to occur—  
commitment to results
2. Be 'intentional' about getting to DONE, no excuses, creation skillful
3. Utilize resources effectively, especially 'cockpit' time with MBB
4. Manage key stakeholder relationships
5. Leverage Tollgates to offset entropy

*Thank you for joining us*



# Resource Links and Contacts

**Questions? Comments? We'd love to hear from you.**

**Dr. D. Scott Sink, Executive in Residence and Director LeanSigma  
Certification Program - The Ohio State University College of Engineering**  
[ssink@jumpcurves.com](mailto:ssink@jumpcurves.com)

**Larry Goldman, Vice President Marketing - MoreSteam.com**  
[lgoldman@moresteam.com](mailto:lgoldman@moresteam.com)

## ***Additional Resources:***

Archived presentation: <http://www.moresteam.com/presentations/webcast-lean-six-sigma-tollgate-review.cfm>

Kahiki Foods Final Tollgate: <http://www.moresteam.com/green/downloads/kahiki-foods-case-study.pdf>

Master Black Belt Program: <http://www.moresteam.com/master-black-belt.cfm>

# Upcoming MBB Webcasts

**Join us for the remaining sessions of the summer series:**

**“Core Process Pull: Little's Law in Action”**

Dr. Lars Maaseidvaag

Thursday, August 12<sup>th</sup> @ 1:00 PM (EDT)

<http://www.moresteam.com/presentations/webcast-lean-pull-systems-webcast.cfm>

**“The Transactional Dilemma: Understanding Regression with Attribute Data”**

Smita Skrivanek

Thursday, August 26<sup>th</sup> @ 11:00 AM (EDT)

<http://www.moresteam.com/presentations/webcast-regression-analysis-attribute-data.cfm>