Implementing Lean/Six Sigma in Complex Industries

A Rapid Deployment Success at Endicott Interconnect Technologies, Inc.




Brad VanBrunt, Vice President , Quality And Business Excellence

Terence T. Burton, President

Endicott Interconnect ®
Technologies, Inc.
Endicott, New York

The Center for Excellence in Operations, Inc.
Bedford, New Hampshire and Munich, Germany

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Agenda




Part I: Endicott Interconnect Technologies

Part II: Lean/Six Sigma Deployment and Results

Part III: Critical Deployment Success Factors

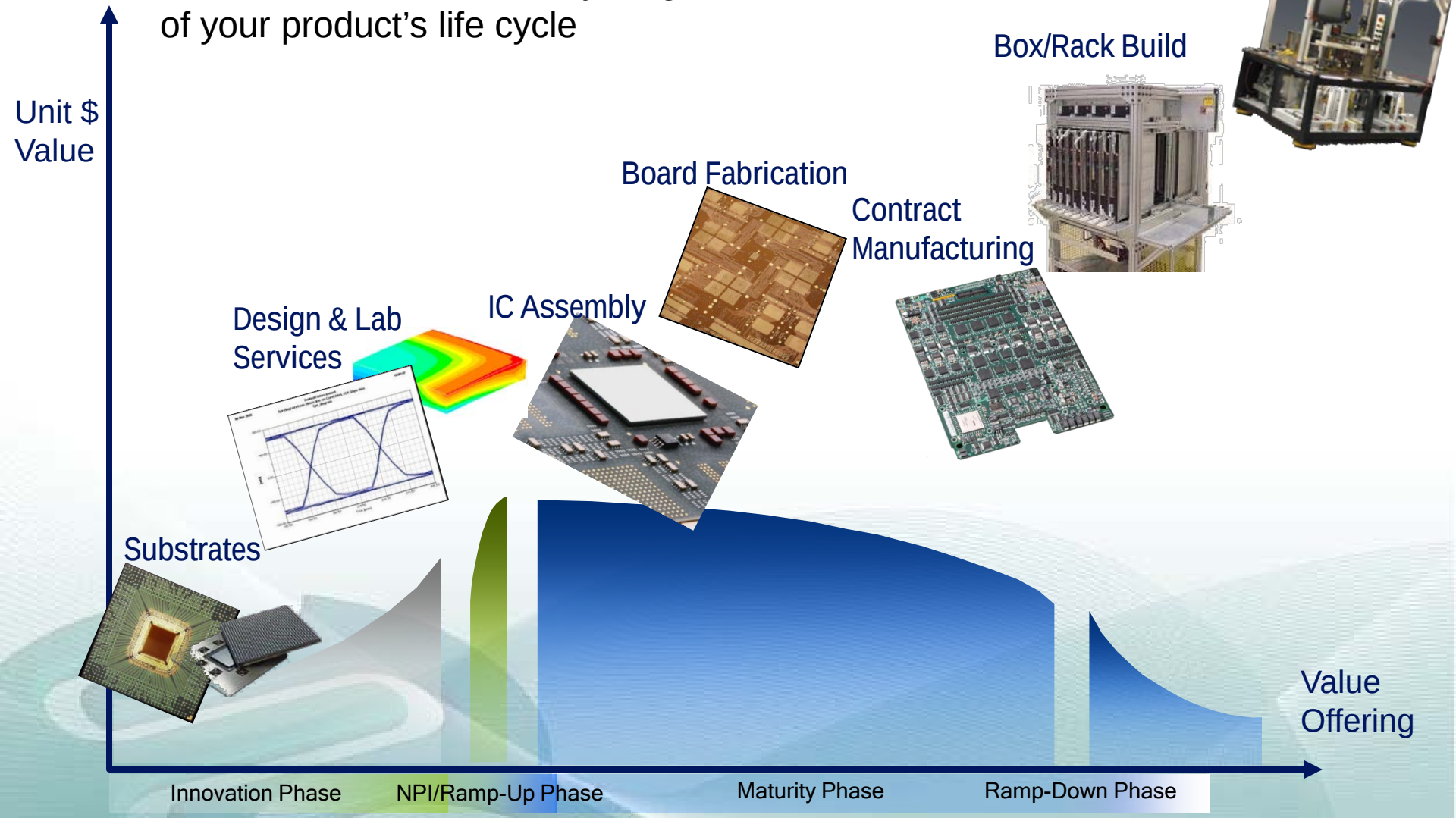
Endicott Interconnect Corporate Profile

Endicott Interconnect is a privately held, leading supplier of complex, high-performance, high reliability electronic interconnect solutions

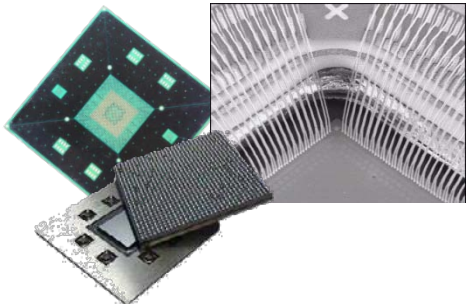
- Inception November 2002. Former IBM Endicott Microelectronics Division
  - Organic packaging center of competence
- A tradition of technical innovation
- 2,000 employees
- 1.6M + sq. ft. mfg. floor space
- Revenue: ‘07 $ 369M, 69% year over year growth
- R&D Investment: 4-5% of revenue

The Total Solution

Innovative solutions for any stage of your product's life cycle

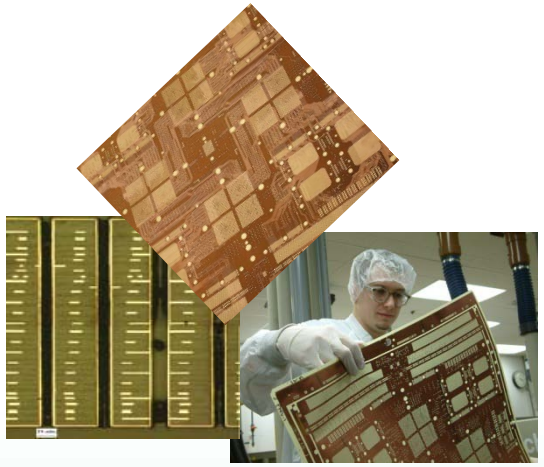


Core Technologies



Semiconductor Packaging

Organic substrate design and fabrication delivering exceptional packaging reliability



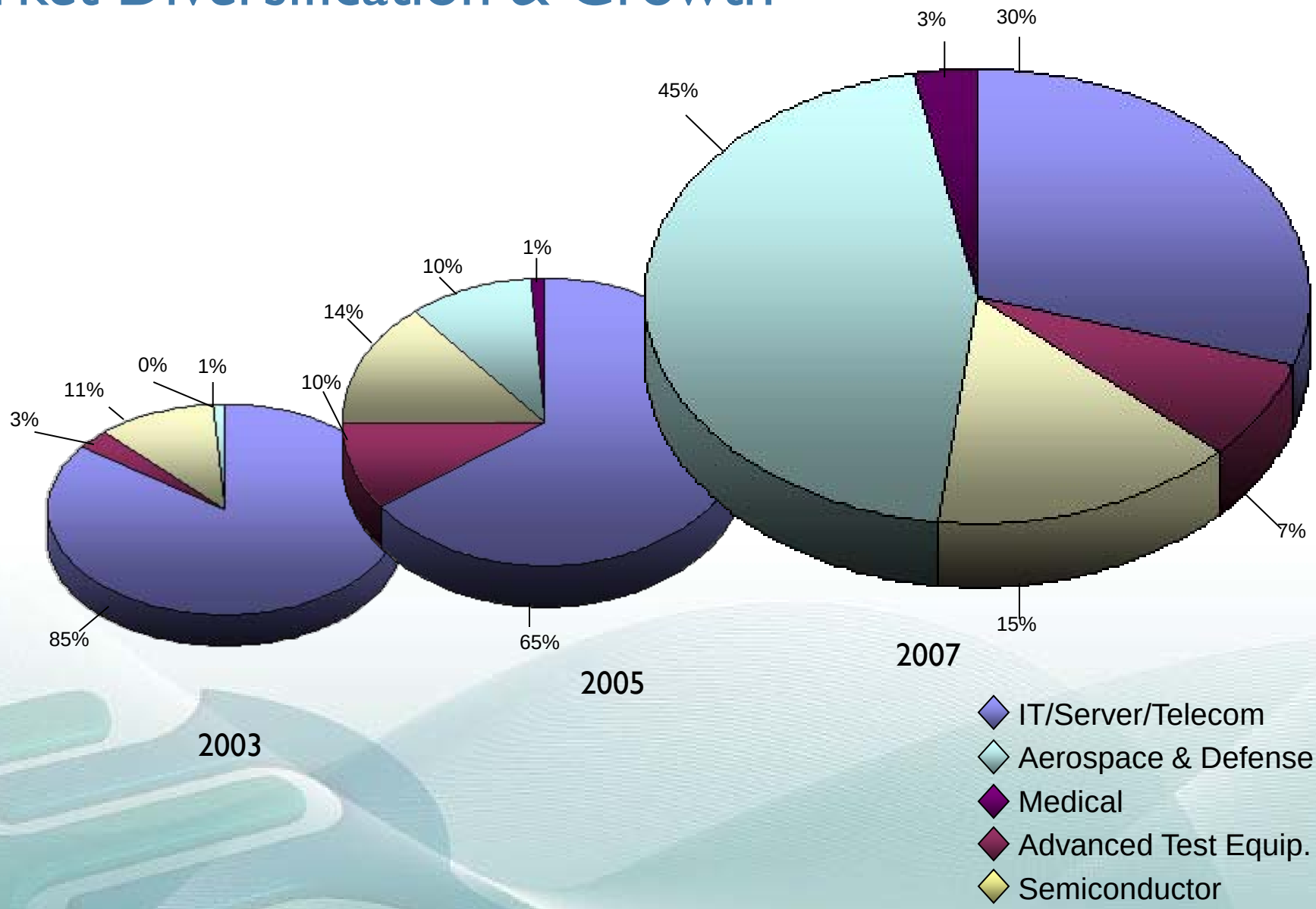
Printed Circuit Boards

A total solution for your printed circuit board fabrication needs

Complex Assembly Solutions

Electronic manufacturing services for a wide range of products from high end, mission critical to lower complexity board assembly

Market Diversification & Growth



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Endicott Interconnect ®
Technologies, Inc.

BUSINESS EXCELLENCE

improving how we improve

What is "Business Excellence"

- **Create a solid foundation and business/leadership process for managing improvement initiatives.**

- **Deploy more robust improvement tools for solving our critical and complex business challenges (20/80):**
  - **6 Sigma**
  - **Lean**
  - **Quick strike / teaming**
  - **Leadership / project mgmt.**

- **Use a disciplined improvement methodology**
  - **DMAIC : Define - Measure - Analyze - Improve - Control**
- **Invest in the future of EI's most valued resource - Our people.**
- **Build a Business Excellence culture that involves everyone.**
- **Results Driven**
  - **Profit**
  - **Growth**
  - **Customer Satisfaction**

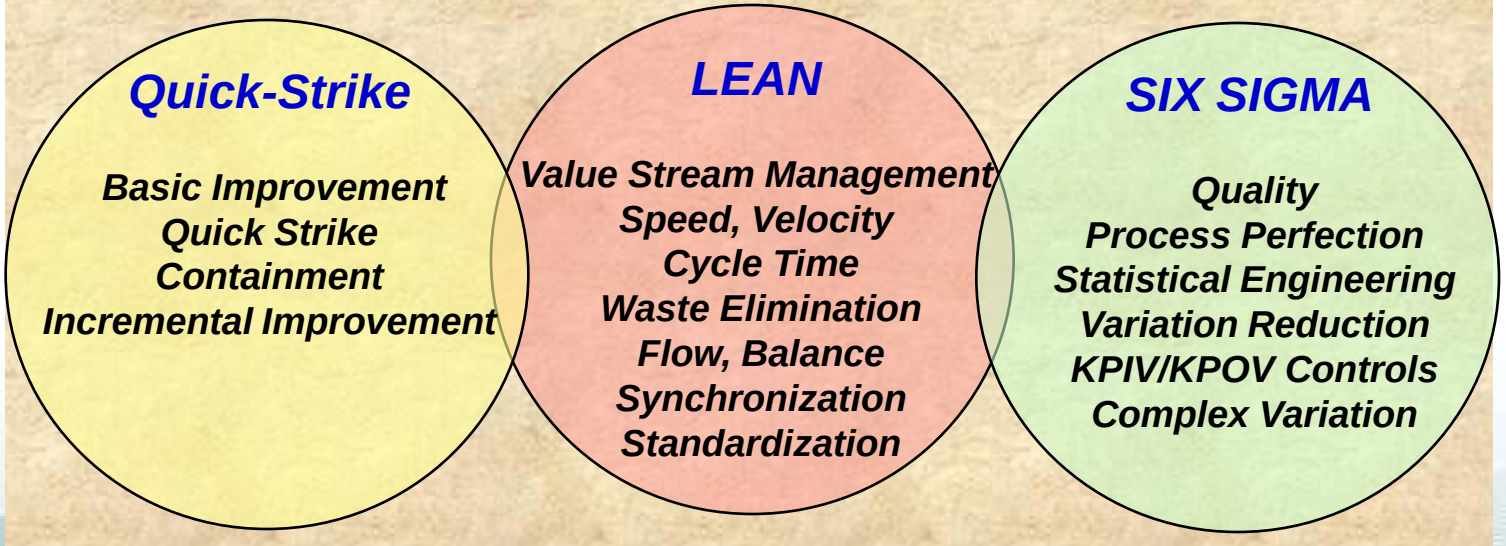
Business Excellence

CEO's Scaleable Lean/Six Sigma™ Deployment Model

Operations and Technology Excellence

Transactional Business Process Excellence

Integrating Quick-Strike, Lean, and Six Sigma



"The Foundation":

DMAIC Methodology

Management Ownership / Infrastructure

Business Excellence Deployment

STEERING COMMITTEE
- VP Business Excellence *Chair
- CFO
- VP SP Panels & PWB
- VP Complex Assembly
- VP HR
- VP Military/Defense Pgms.
- CEO, Inc.

Leadership
Management

PROJECT MANAGEMENT
- Brad VanBrunt, VP Bus Exc. / Quality *Chair
- Bus. Excellence (BB/MBB LSS)
- Terry Burton, CEO

Mentoring & Facilitation
Technical Advice
Daily Management

Mission Critical
Improvement Initiatives

Business Excellence

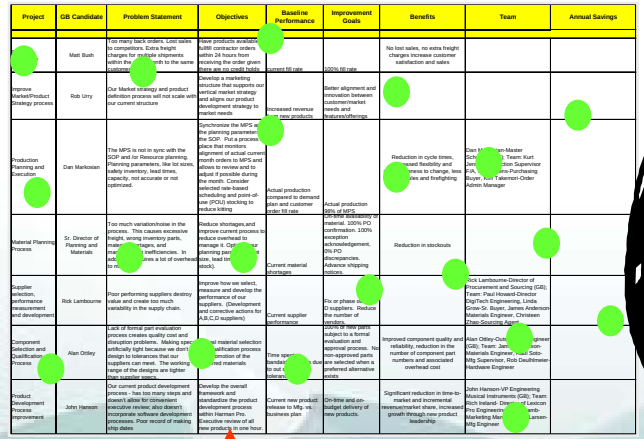
Continual Improvement Management Process

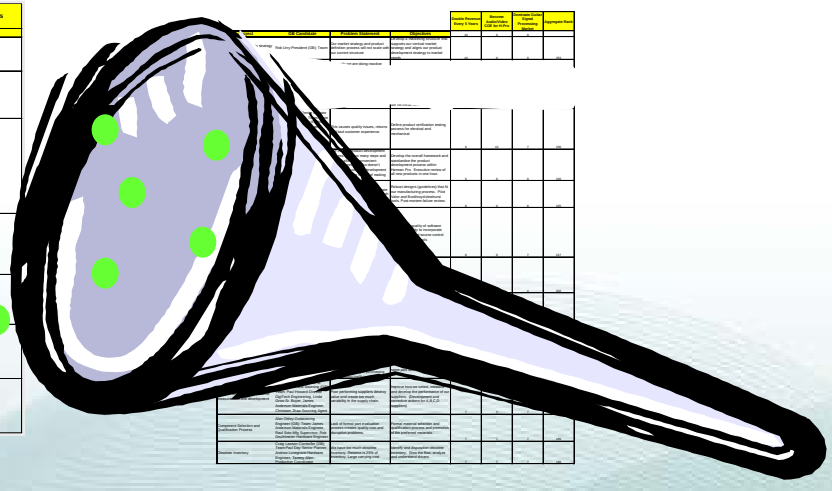
Business Performance Metrics

Business Excellence Steering Committee

Strategic Project Opportunities

Project Selection Model





Business Excellence Project Execution

Employee Involvement

"The Project Hopper"

The Center for Excellence in Operations, Inc.

Endicott Interconnect

Business Excellence Status

- Wave 1 project results
  - 21 teams across all business units
    - Lean and Six Sigma projects
      - Operational
      - Transactional
  - Project Savings to bottom line
    - Operating Income Improvement ~ $7,000,000 (12 mos. run rate)
      - Reduced scrap
    - Cash Flow improvement ~ $ 143,000
      - Reduced inventory
      - Reduced billing errors
    - Revenue Growth opportunity improvement ~ $862,000
    - Improvements in numerous operational areas that can positively benefit
      - OTD performance
      - Cycle Time
      - Customer Satisfaction

EI Business Excellence Wave 1 Projects

Bus Area	Project	Operating income	Cash Flow	Revenue Growth	Soft Savings
CXA	2nd level assembly IC test (1st pass yield)				
CXA	CXA SMT set up reduction (Lean)				
CXA	Release to floor improvement (Lean)	$ -	$ -	$ -	$ 35,531
CXA	Receiving inspection (Cycle time reduction)	$ -	$ 63,875	$ -	$ -
CXA	2nd lvl Asm. - Post Solder and Finals (Productivity)	$ -	$ 17,260	$ -	$ -
CXA	1st level yield improvement (Module Assembly)	$ 3,571,000	$ -	$ -	$ -
CXA	CXA rework reduction [1st/2nd projects]	$ 160,000	$ -	$ -	$ -
General	Maintenance mgmt. systems/Process/Spares	$ -	$ -	$ -	$ 120,000
General	Determining product profitability	$ -	$ -	$ -	$ -
General	SAP/Data package optimization (Productivity/Cycle time)	$ -	$ -	$ -	$ 84,725
General	Billing errors reduction	$ -	$ 62,400	$ -	$ 25,000
General	Customer returns process (cycle time)				
General	Selling & customer service process (service)				
General	Performance mgmt. dashboard				
HBGA	HBGA yield improvement	$ 2,056,000	$ -	$ -	$ -
HBGA	IPC lot conformance (Lean)	$ -	$ -	$ -	$ 59,580
HBGA	Core EZ yield improvement (6 Sigma)	$ 340,000	$ -	$ -	$ -
Panels	Drilling throughput improvement (Lean)	$ 39,157	$ -	$ 861,716	$ -
Panels	Operator excellence				
Panels	Drill bit cost reduction (6 Sigma)	$ 785,272	$ -	$ -	$ -
Panels	PWB yield improvement - (largest scrap cost)				
		$ 6,951,429	**$ 143,535**	**$ 861,716**	**$ 324,836**

Deployment Positives / Lessons Learned

Highlights

- Project selection process
- JIT Training of key process owners
- Facilitated process / project reviews
- Shared Data Base
- Executive Ownership of projects

Lessons Learned

- Infrastructure / support
  - Middle Management support / involvement
  - Data - never enough
- Site wide communication
- Stronger, Narrower Project definition needed
- Finance Involvement needed earlier.

Business Excellence - Next Steps

Wave 2 projects

- 1Q08 kickoff

Business Excellence: “Basic Improvement”

- Target: All employees
- Basic Lean Skills for department continual improvement
  - B.E. basics
  - Quickstrike
  - Lean (Waste, 5S, Visual Factory)
  - Team work
- Dept Project Hopper
- Manager leadership / ownership
  - Middle Mgmt Champions
- Pilot kick off in Feb 08
  - 16 mgrs/teams started

Agenda

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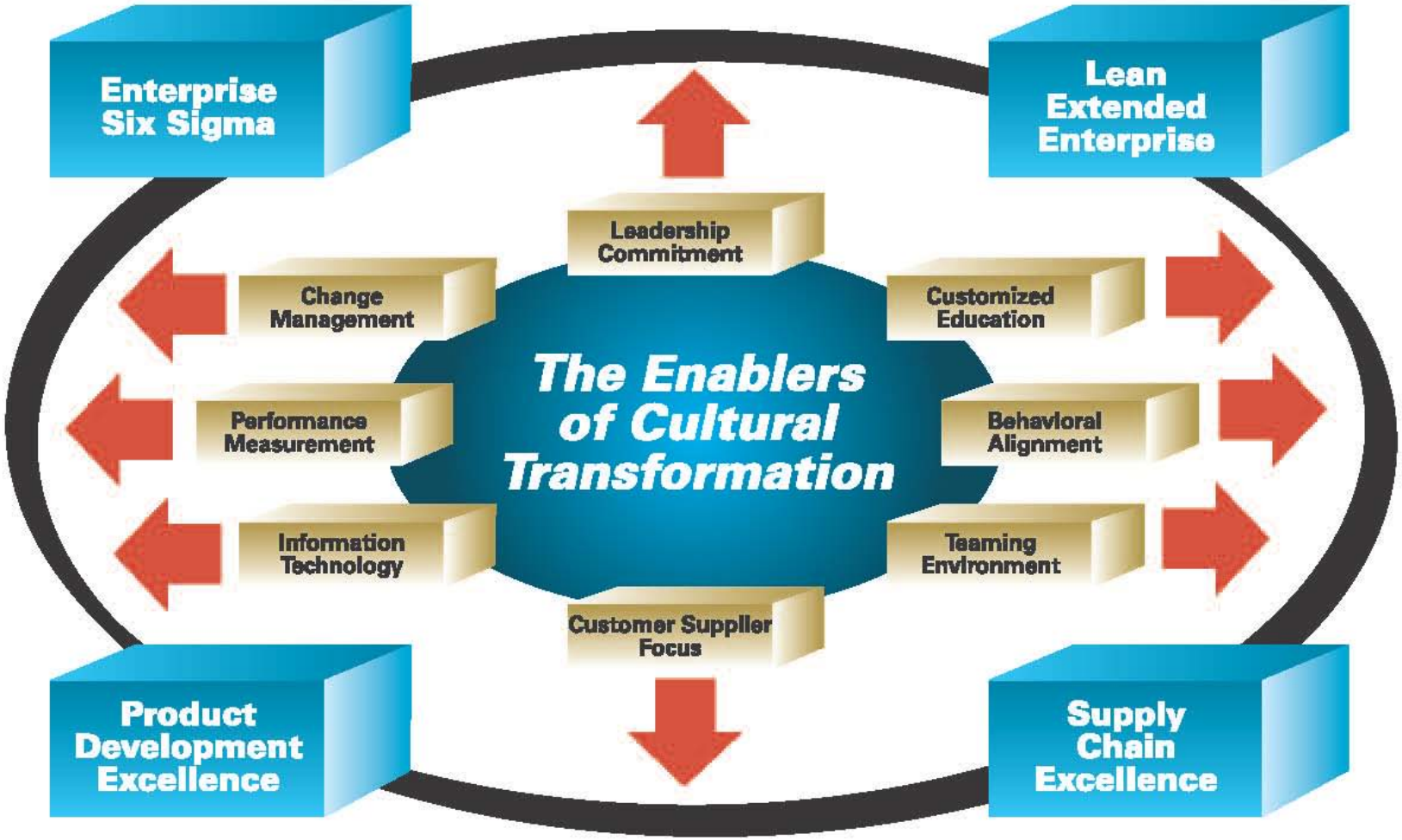
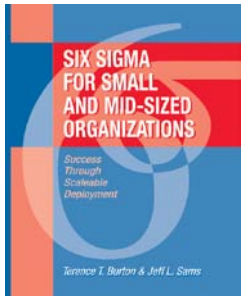
Business Excellence Framework



Success Equals 80% Leadership / 20% Tools



Leadership's Roles in Lean/Six Sigma Success

PLAN

1. *Establish Recognition of the Need*
2. *Provide Leadership Commitment and Support*
3. *Develop Six Sigma Strategy and Deployment Plan*
4. *Incorporate Enterprise-Wide Scope*

EXECUTE

12. *Manage Controversy and Confrontation*
13. *Demand Frequent Measurement and Feedback*
14. *Implement a Structured Project Close-Out Process*
15. *Provide Recognition and Rewards*
16. *Leverage Successes and Stay the Course*

DEPLOY

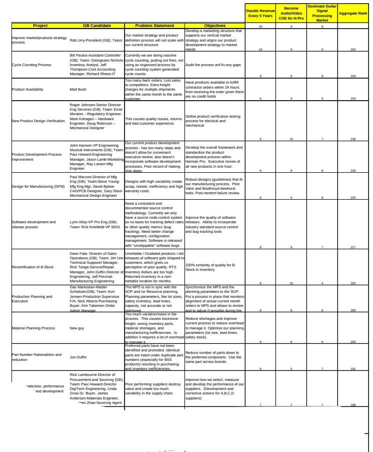
5. *Mandate Linkage to Business Plan*
6. *Make Proper Investment in Resources*
7. *Develop Communication and Awareness Effort*
8. *Focus on Customers and Results*
9. *Structure Around the Organization's Needs*
10. *Implement Regulated Program Management*
11. *Build Teaming and Employee Involvement Culture*

Business Excellence
Implementation & Deployment Planning

"Macro Charter"

Project	GB Candidate	Problem Statement	Objectives	Baseline Performance	Improvement Goals	Benefits	Team	Annual Savings
Product Availability	Matt Bush	Too many back orders. Lost sales to competitors. Extra freight charges for multiple shipments within the same month to the same customer.	Have products available to fullfill contractor orders within 24 hours from receiving the order given there are no credit holds	current fill rate	100% fill rate	No lost sales, no extra freight charges increase customer satisfaction and sales		
Improve Market/Product Strategy process	Rob Urry	Our Market strategy and product definition process will not scale with our current structure	Develop a marketing structure that supports our vertical market strategy and aligns our product development strategy to market needs	Increased revenue from new products	Better alignment and innovation between customer/market needs and features/offerings			
Production Planning and Execution	Dan Markosian	The MPS is not in sync with the SOP and /or Resource planning. Planning parameters, like lot sizes, safety inventory, lead times, capacity, not accurate or not optimized.	Synchronize the MPS and the planning parameters to the SOP. Put a process in place that monitors alignment of actual current month orders to MPS and allows to review and to adjust if possible during the month. Consider selected rate-based scheduling and point-of-use (POU) stocking to reduce kitting	Actual production compared to demand plan and customer order fill rate	Actual production 98% of MPS	Reduction in cycle times, increased flexibility and responsiveness to change, less reschedules and firefighting	Dan Markosian-Master Scheduler(GB); Team: Kurt Jensen-Production Supervisor F/A, Nick Athens-Purchasing Buyer, Kim Takemori-Order Admin Manager	
Material Planning [illegible]ess	Sr. Director of Planning and Materials	Too much variation/noise in the process. This causes excessive freight, wrong inventory parts, material shortages, and manufacturing inefficiencies. In addition it requires a lot of overhead to manage it.	Reduce shortages,and improve current process to reduce overhead to manage it. Optimize our planning parameters (lot size, lead times, safety stock).	Current material shortages	On-time availability of material. 100% PO confirmation. 100% exception acknowledgement, 0% PO discrepancies. Advance shipping notices.	Reduction in stockouts		
		Poor performing suppliers destroy value and create too much [illegible] the supply chain.	Improve how we select, measure and develop the performance of our suppliers. (Development and corrective actions for A,B,C,D suppliers)	Current supplier performance	Fix or phase out C & D suppliers. Reduce the number of vendors.		Rick Lambourne-Director of Procurement and Sourcing (GB); Team: Paul Howard-Director DigiTech Engineering, Linda Grow-Sr. Buyer, James Anderson-Materials Engineer, Christeen Zhao-Sourcing Agent	
					100% of new parts subj[illegible]			

Strategic Project Opportunities and Benefits

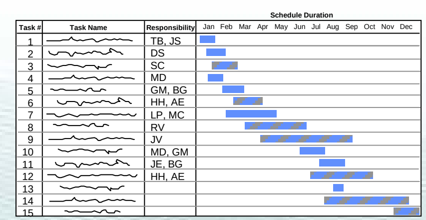


Project Selection Model

Project	Improve market/products strategy process	Cycle Counting Process	Product Availability	New Product Design Verification	Product Development Process Improvement	Design for Manufacturing (DFM)	Software development and release process	Recertification of B-Stock	Production Planning and Execution	Material Planning Process	Supplier selection, performance measurement and development	Component Selection and Qualification Process	Obsolete Inventory
James Anderson										X			
Matt Bush			X										
Dave Fata								X					
Frederick Gabriel													
John Hanson					X								
Hema Heimuli													
Roger Johnsen				X									
Kelly Kightly													
Rick Lambourne											X		
Craig Lawson													X
Paul Marconi						X							
Dan Markosian									X				
Alan Ottley												X	
Bill Paulos		X											
Mick Quigley													
Randy Thorderson													
Steve Townsend													
Rob Urry	X												
Elpitha Votsis													
Verner Pekarek			X							X			
Lynn Alley							X						
Tammy Allen													X
Dean Athens													
Nick Athens									X				
Rob Boatright													
Teresa Brinkerhoff													
Bob Planken													
Heather Cowdell													
[illegible] Bybee						X							
[illegible]													
[illegible]													
[illegible]													X
[illegible]												X	

Cross-Functional Candidate/Team Selection

Customized Education
- Green Belt
- Yellow Belt
- 4 Hour Drills
- 4 Hour BE Basics
- Basic Improvement



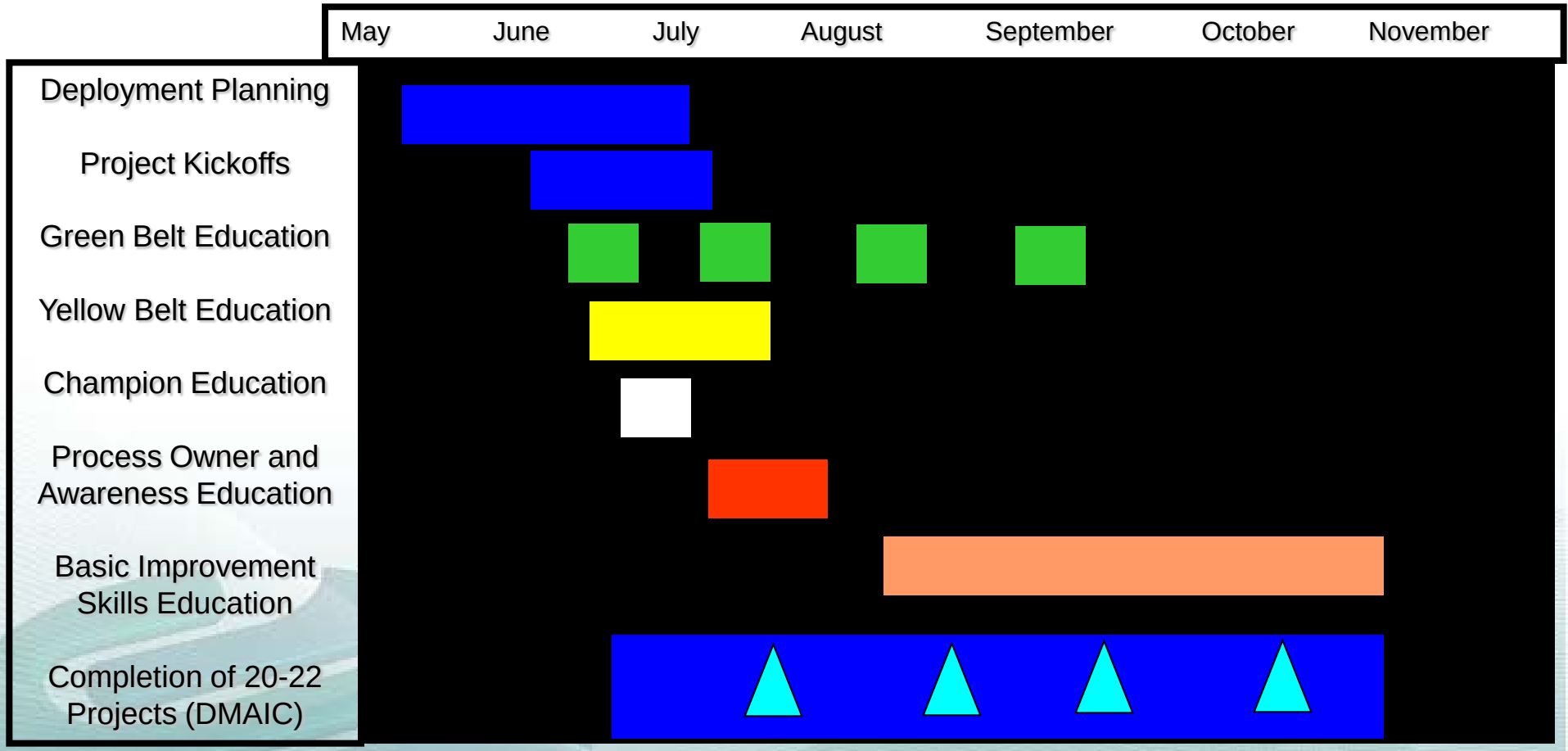
Deployment and Implementation Plan

CEO The Center for Excellence in Operations, Inc.

Endicott Interconnect

Business Excellence

Accelerated Deployment Plan



Multiple Phase/Peer Review Points

Communication and Awareness

What? Why? Who? When? Where? How?

Establish Recognition of Need

- Burning Platforms, Pain Points
- Consequences on No Action
- Benefits of Change

Create Business Excellence Awareness

- Consistent unified Message
- Trickle Down, Executives to Operators
- Continuous Reminders, Hits
- Publicize Successes
- “Stay Tuned” (What’s Next)
- Internal/External Customer Updates

Use Multiple Media for Different People

- Town Meeting format
- Email
- Mailers in Payroll (Reference Cards)
- Storyboards
- Video, Signage, Posters
- Newsletter
- Performance Metrics


AUGUST 2007

6 SIGMA LEAN QUICK STRIKE

Business Excellence

improving how we improve

PRESIDENT'S CORNER

WHAT IS BUSINESS EXCELLENCE?

Endicott Interconnect

Performance Measurement: Driving the Right Behaviors to Achieve the Right Desired Results

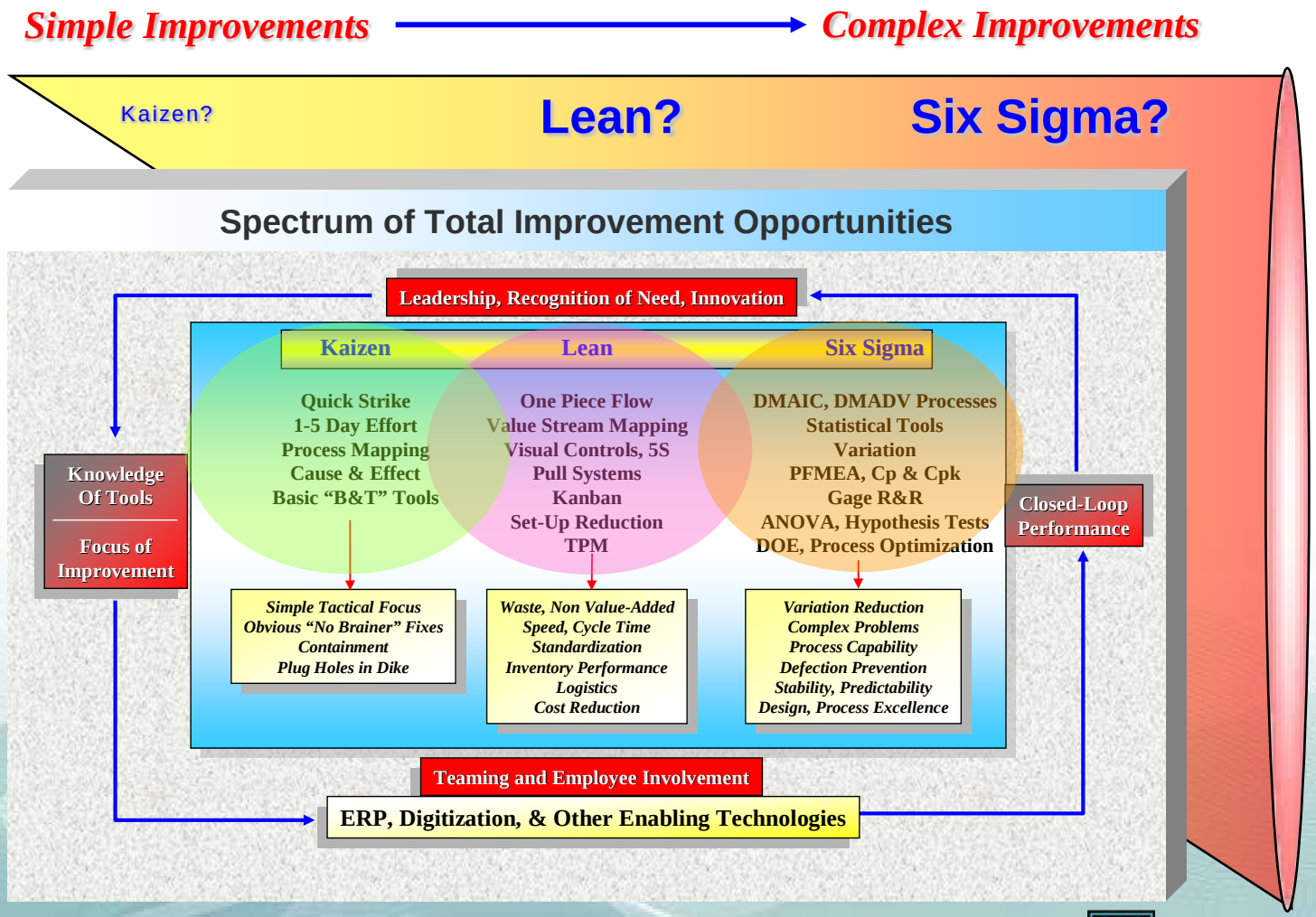
- **Balanced Scorecard Approach**
- **Use the "SMART" process**

S = Specific
M = Measurable
A = Attainable
R = Relevant
T = Timely

- **Walk-Around or Good Day-Bad Day Metrics**
- **Role specific dashboard approach, visual daily metrics (At A Minimum)**
  - **Moving toward real time, event-driven metrics**
  - **Sense, Interpret, Decide, Act, Measure**
  - **Standardized, Uniform Approach**
- ***"You get what you measure"***
- ***"Everything begins and ends with performance measurement"***
- ***"Be careful what you measure, you might just get it!"***

Kaizen vs. Lean vs. Six Sigma

Let the Improvement Opportunity drive you to the right methodologies and tools



Deployment of the right methodologies and tools is driven by process/problem complexity

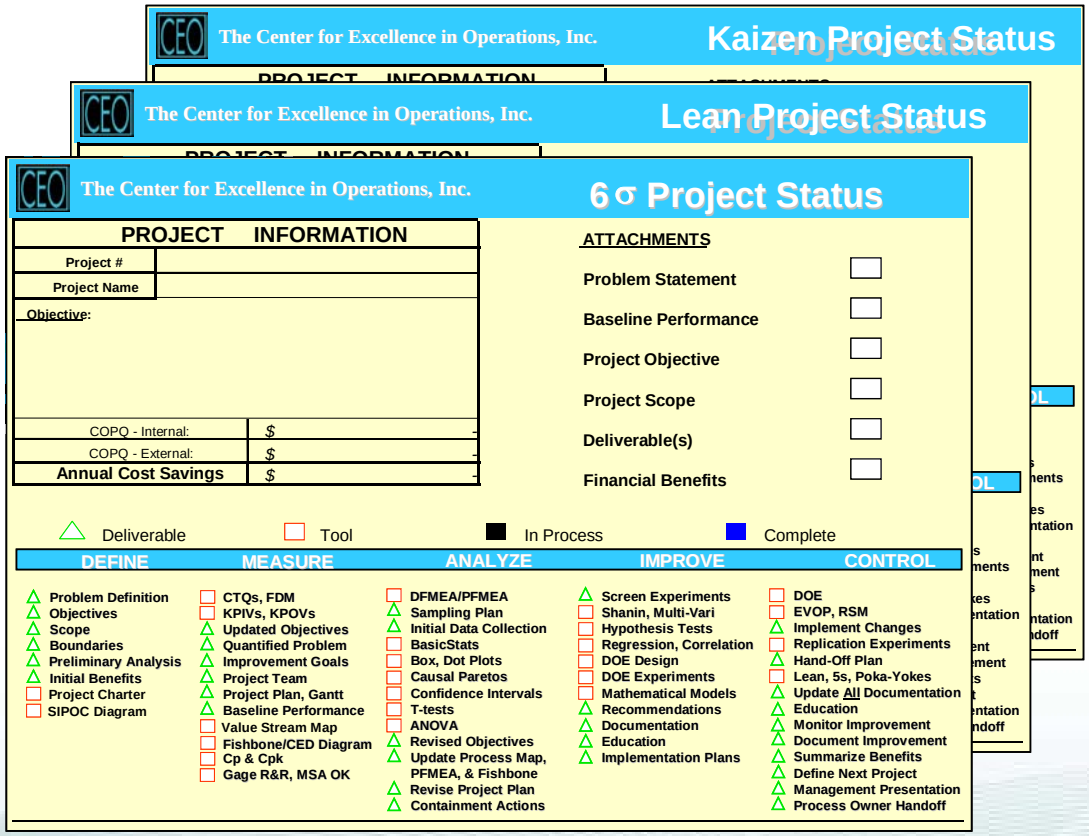
DMAIC: The Common Language of Improvement

Stop feeding your organization 6 flavors of the same thing – It confuses people.

Stick to DMAIC as the common structured language of improvement.

Consistency of the approach is critical to success.

Integrate Kaizen, Lean, and Six Sigma – Deploy the right tools to the highest impact opportunities.



CRITICAL SUCCESS FACTOR

Standardized Improvement Structure and Discipline

Endicott Interconnect Technologies, Inc.

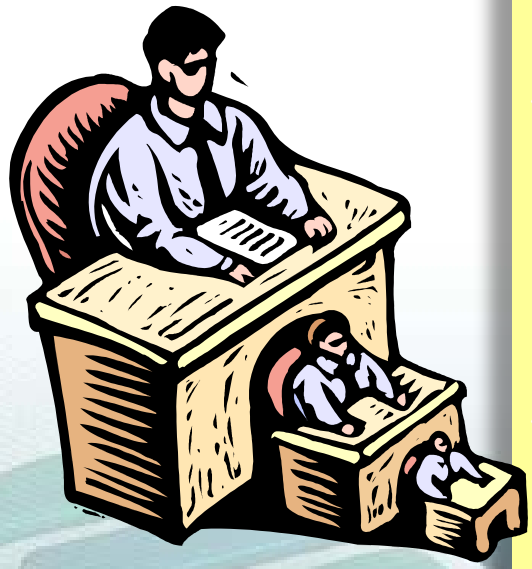
DMAIC Problem-Solving Methodology

Define	Measure	Analyze	Improve	Control
What is the problem? What is your project objective? What is the improvement goal? What are the benefits? What are your next steps?	What is the current or baseline performance? Have you confirmed the problem with data and facts? What are the financial benefits of changing?	What are the major root causes of the problem? What are the options for change? What is the best option? What is the schedule for implementing the change?	Are there any barriers to your plans for change? What metric(s) will you monitor to measure success? Do you have buy-in and support from all parties?	How will you measure results after change? Does the change solve your problem? Are other actions necessary? How will you sustain the improvement?

Common "*thoughtware*" for Kaizen, Lean, and Six Sigma

The Business Excellence Culture

Without data, you are just another person with an opinion . . .



Unless you are placed at a level at which your opinion becomes data and facts.

If you are fortunate enough to be at this level and you lead your organization this way, you and your people make many incorrect decisions without data and facts.

EI is experiencing this "first hand" through their Business Excellence deployment.

"You don't know what you don't know."