Sustaining a Lean Transformation in Complex Server Assembly and Test Organization

Nominee: Leadership Team, IBM Integrated Supply Chain Operations, Poughkeepsie, NY

Outline of Presentation

- **Problem Statement**
  - Burning Platform
  - Vision of Success

- **Path Forward to Business Transformation Overview**
  - Integrating Process Excellence and Cultural Transformation

- **Lean Deployment Framework**
  - Assessment and Hoshin Planning
  - SMART Lean Skills
  - 14 Lean principles and the Circumplex
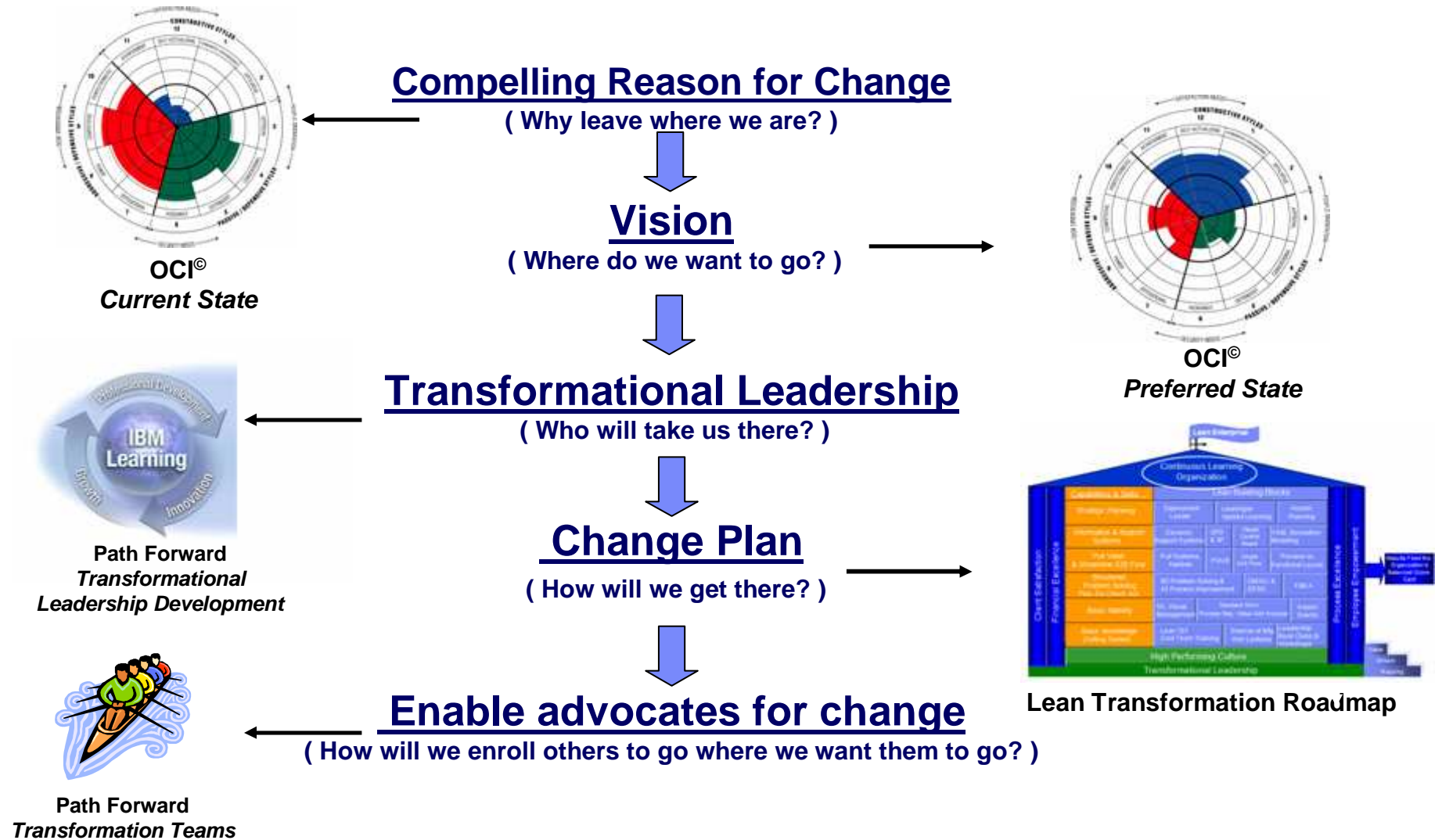
- **Lean Tools and Techniques employed**

- **Implementation and Results**
  - Success Stories and Benefits of the Lean Deployment

Background of Domain

- **High-end server assembly and manufacturing**

  – Fabrication-fulfillment environment

    Combines *build-to-plan* with *make-to-order* operations

  – Continuous quest for decreasing time to market and cycle time

  – Components extremely expensive, high inventory carrying costs

  – Extreme demand skews, constant engineering changes, long lead-times

  – Assembly/manufacturing process has high energy requirements

    e.g.: Cooling water, thermal chambers requirements

  – *Short product life cycle – new product introduction challenge*

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Approach to a Successful Change Initiative*

OCI©
Current State

Compelling Reason for Change
(Why leave where we are?)

Vision
(Where do we want to go?)

OCI©
Preferred State

Path Forward
*Transformational
Leadership Development*

Transformational Leadership
(Who will take us there?)

Change Plan
(How will we get there?)

Lean Transformation Roadmap

Enable advocates for change
(How will we enroll others to go where we want them to go?)

Path Forward
Transformation Teams

Reference: Adapted form Dr . Marvin Washington

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Problem Statement – Burning Platform

- What is our burning platform – Why leave where we are?

  – Highly competitive marketplace coupled with the economic downturn in 2008-09

  – Multiple new products introduced; varying complexity of design
    Inefficient and non-adaptive processes for these products causes delays in prototyping and launch

  – Increasing cost to maintain facilities and infrastructure, with the constant business pressure to reduce operational costs

  – Customers expectations are increasing for more performance, cost and quality

  – Problems observed during design and manufacturing were dealt with as they appeared (reactive) versus being proactive

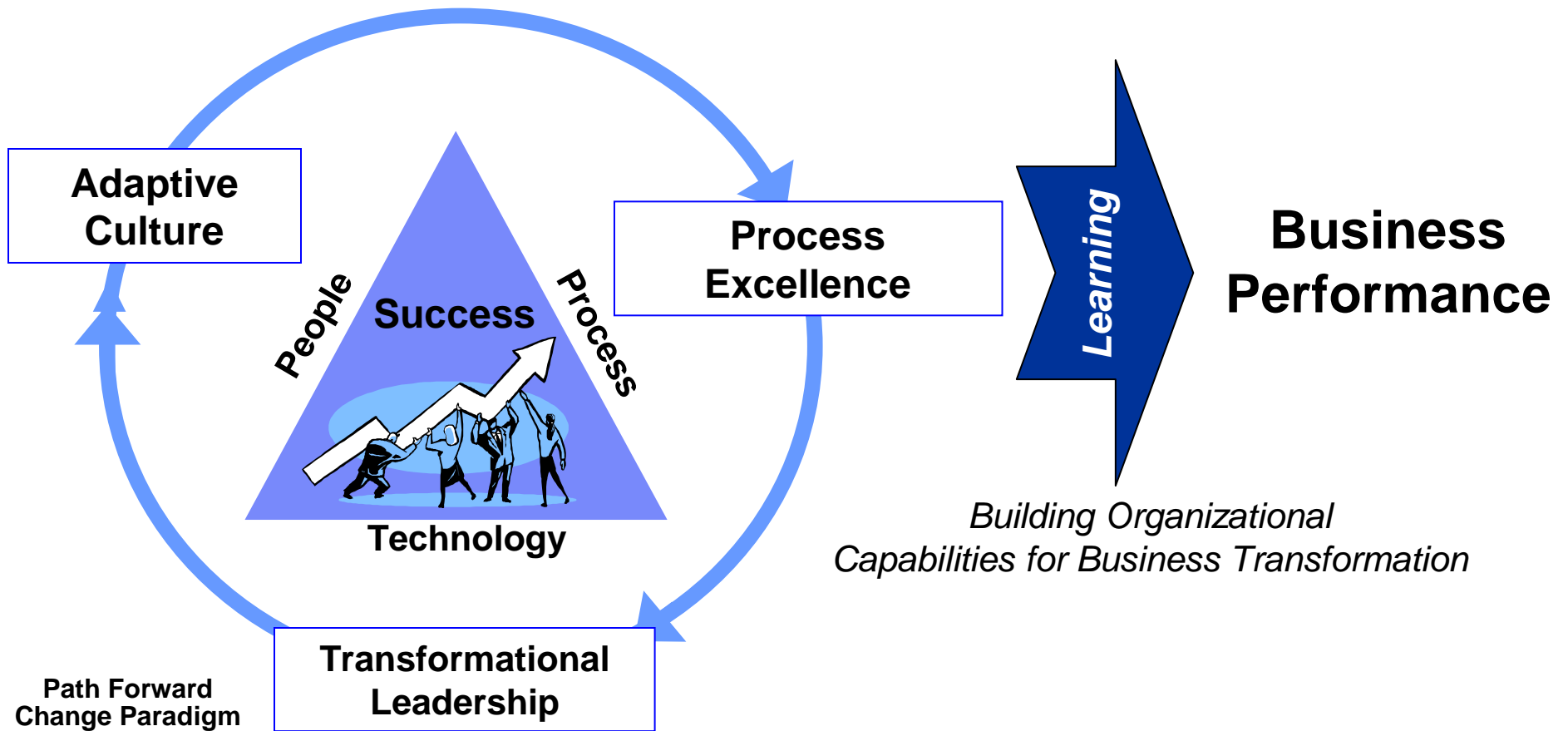 – Employee morale and engagement declining

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Vision of Success

- We are an organization of Self-Driven and Personally Motivated Employees deeply engaged and bought in to Key Lean Initiatives (5S, Kaizen, Gemba, etc) and local, everyday Lean Implementation which drives continuous improvement and achieves strong business results; which include:

    - Broad and Effective Training that reaches the entire Mfg Organization as well as extending into supplemental employees, sub-contractors, Engineering, and other Support Groups

    - Public, consistent, and timely recognition system that reinforces and rewards Lean progress and success

    - The plant is formally recognized as the most Lean/Cost effective site in the Supply Chain

    - Restructuring our internal management systems and Advanced Manufacturing Science tactics to proliferate LEAN at a working level and "lower the center of gravity" for core skills

    - A Common, Shared Alignment and Understanding of LEAN Goals and Cost Objectives across all Organizations

    - Improved Morale and Trust across the Organization

Defining the Change Plan

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The Path Forward Approach to Business Transformation

Adaptive Culture

Process Excellence

Learning

Business Performance

People

Success

Process

Technology

Building Organizational Capabilities for Business Transformation

Path Forward Change Paradigm

Transformational Leadership

Innovation and continuous improvement enabled through process excellence and high performing organization culture

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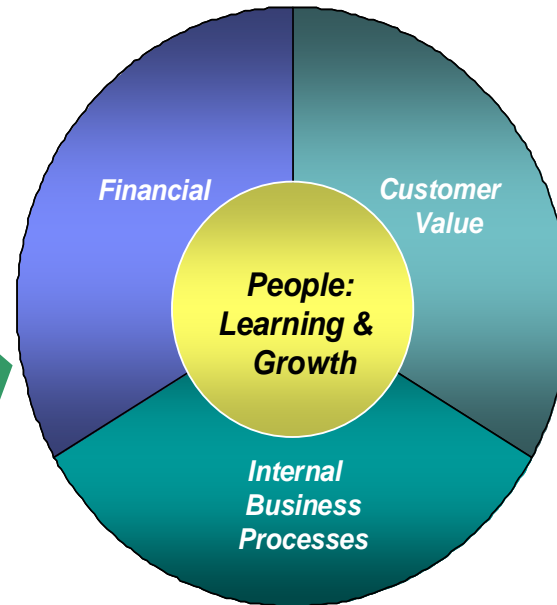# Aligning the Organization to Achieve the Vision

Kaplan and Norton, 2002
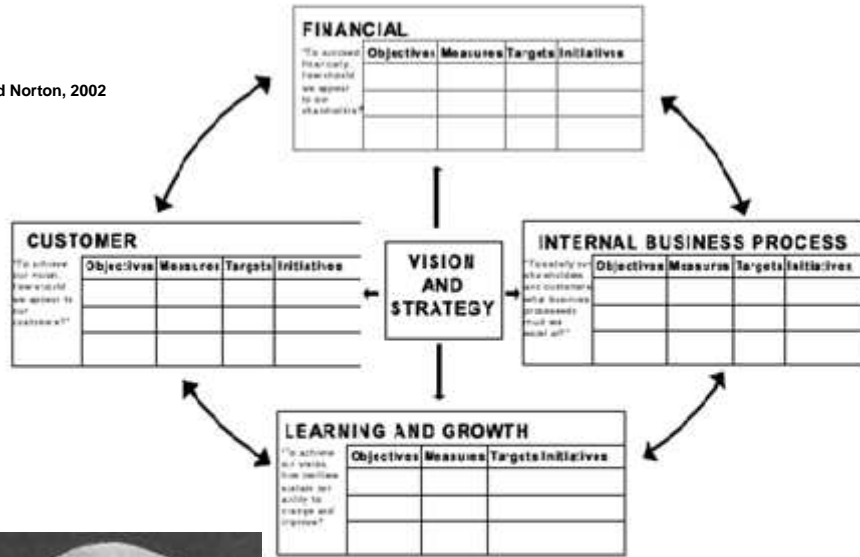
The Path Forward approach works with the senior leadership team to implement a 'People-centric' Balanced Scorecard
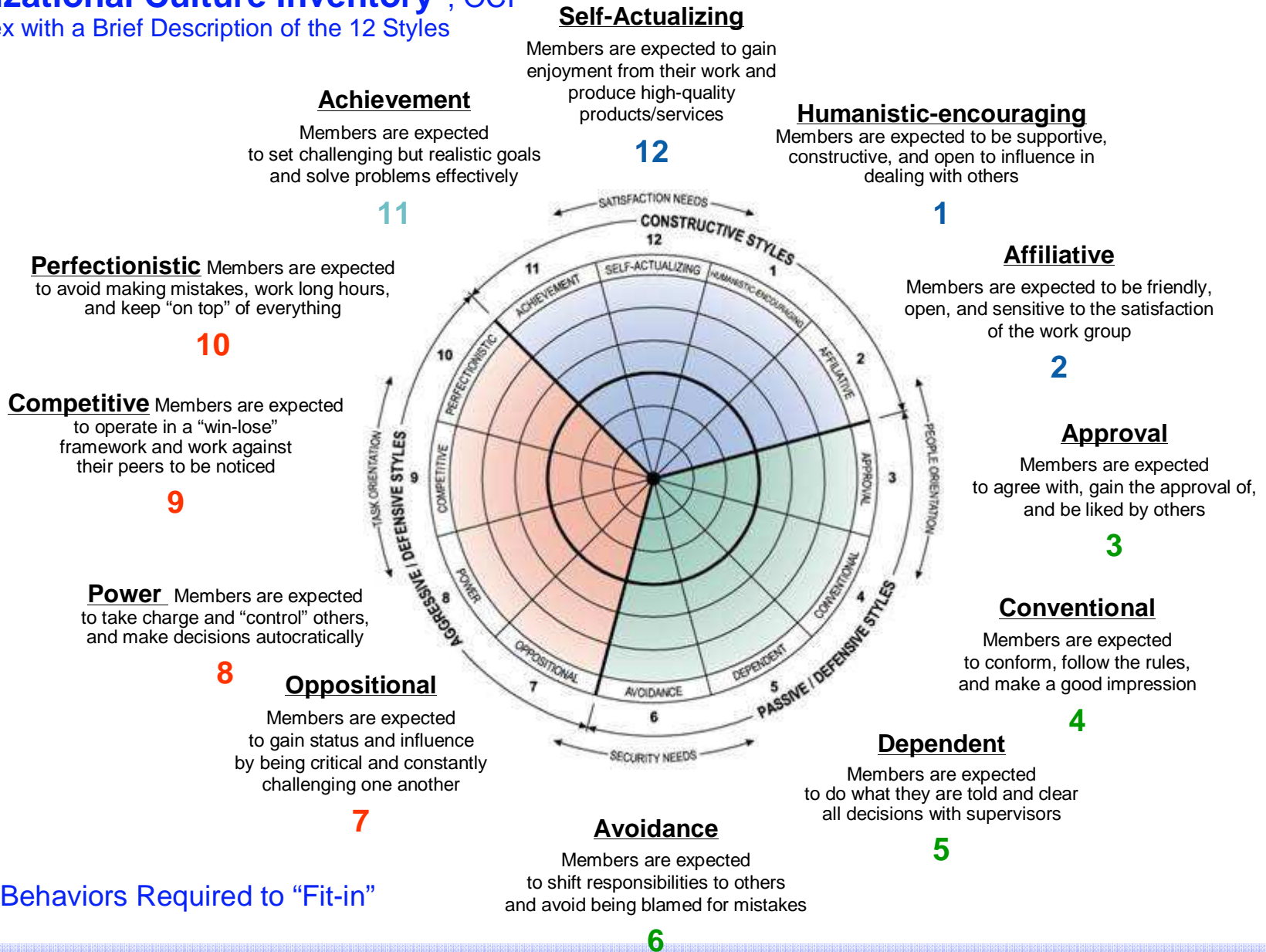
Thomas J Watson (1947)

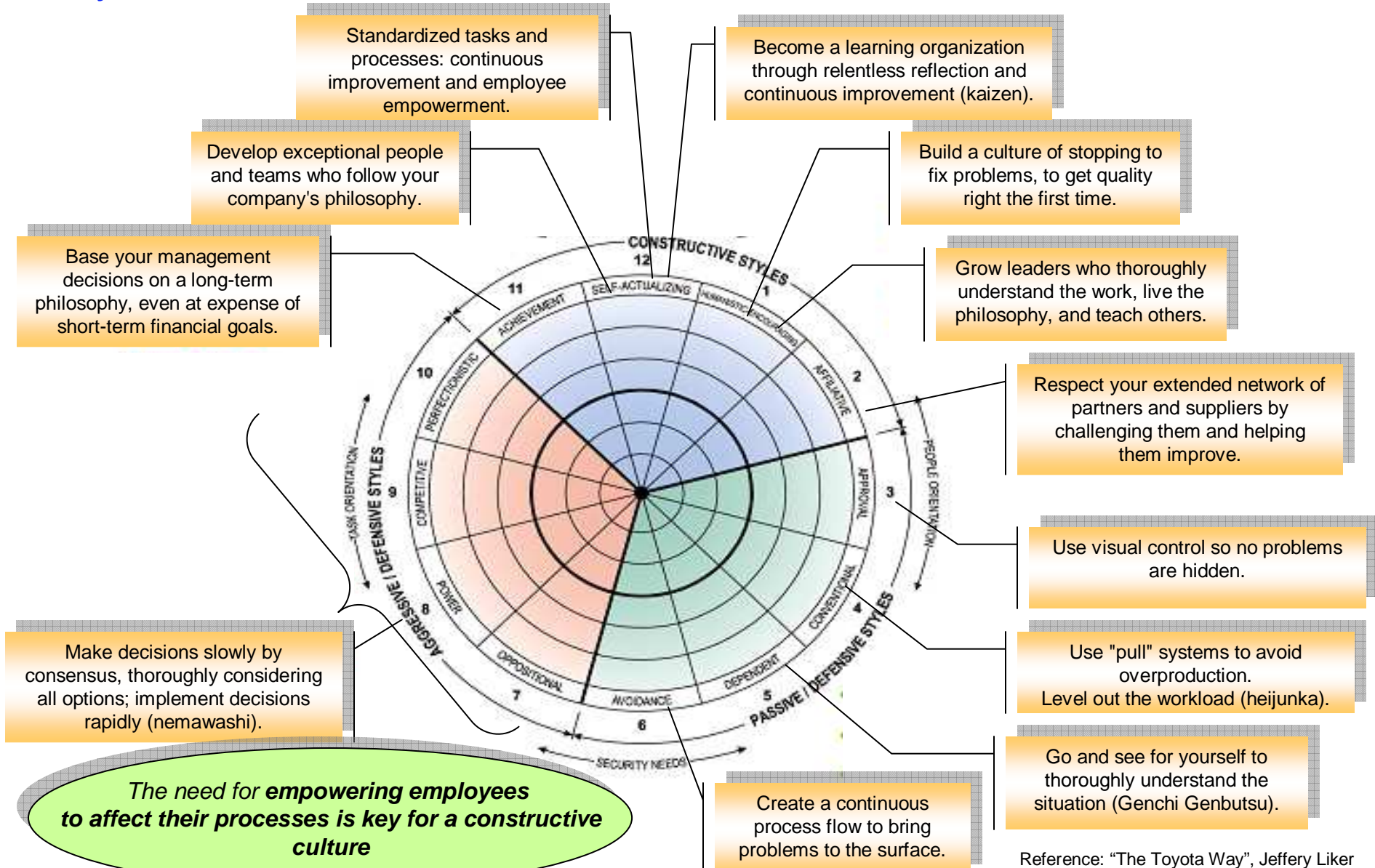*"Teach your associates to teach themselves and in that way you will strengthen the entire organization"*

Financial

Customer Value

People: Learning & Growth

Internal Business Processes

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Organizational Culture Inventory®, OCI
Circumplex with a Brief Description of the 12 Styles

Self-Actualizing
Members are expected to gain enjoyment from their work and produce high-quality products/services
12

Achievement
Members are expected to set challenging but realistic goals and solve problems effectively
11

Humanistic-encouraging
Members are expected to be supportive, constructive, and open to influence in dealing with others
1

Affiliative
Members are expected to be friendly, open, and sensitive to the satisfaction of the work group
2

Perfectionistic Members are expected to avoid making mistakes, work long hours, and keep "on top" of everything
10

Competitive Members are expected to operate in a "win-lose" framework and work against their peers to be noticed
9

Approval
Members are expected to agree with, gain the approval of, and be liked by others
3

Power Members are expected to take charge and "control" others, and make decisions autocratically
8

Conventional
Members are expected to conform, follow the rules, and make a good impression
4

Oppositional
Members are expected to gain status and influence by being critical and constantly challenging one another
7

Dependent
Members are expected to do what they are told and clear all decisions with supervisors
5

Avoidance
Members are expected to shift responsibilities to others and avoid being blamed for mistakes
6

Styles of Behaviors Required to "Fit-in"

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Why Focus on Process? *14 Lean Principles* and the OCI Circumplex*

Standardized tasks and processes: continuous improvement and employee empowerment.

Become a learning organization through relentless reflection and continuous improvement (kaizen).

Develop exceptional people and teams who follow your company's philosophy.

Build a culture of stopping to fix problems, to get quality right the first time.

Base your management decisions on a long-term philosophy, even at expense of short-term financial goals.

Grow leaders who thoroughly understand the work, live the philosophy, and teach others.

Respect your extended network of partners and suppliers by challenging them and helping them improve.

Use visual control so no problems are hidden.

Make decisions slowly by consensus, thoroughly considering all options; implement decisions rapidly (nemawashi).

Use "pull" systems to avoid overproduction. Level out the workload (heijunka).

Go and see for yourself to thoroughly understand the situation (Genchi Genbutsu).

*The need for **empowering employees to affect their processes is key for a constructive culture***

Create a continuous process flow to bring problems to the surface.

Reference: "The Toyota Way", Jeffery Liker

CONSTRUCTIVE STYLES
SELF-ACTUALIZING
HUMANISTIC-ENCOURAGING
AFFILIATIVE
ACHIEVEMENT
APPROVAL
PEOPLE ORIENTATION
CONVENTIONAL
TASK ORIENTATION
PERFECTIONISTIC
COMPETITIVE
POWER
DEPENDENT
OPPOSITIONAL
AVOIDANCE
PASSIVE / DEFENSIVE STYLES
AGGRESSIVE / DEFENSIVE STYLES
SECURITY NEEDS
11 10 9 8 7 6 5 4 3 2 1 12

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Our Deployment Model:
Engaging People to Transform Processes Critical to Business Transformation

Problem Solving (CI & learning)
- Seek **perfection**
- Continual organizational **learning** through Kaizen
- **Learn to see** by walking the process
- Make decisions by **consensus**, Implement swiftly

> Focus on Continuous Improvement and Learning

People & Partners (Respect, challenge and grow them)
- **Grow leaders** that live the philosophy & teach it to others
- Respect, develop and challenge your **people** and **teams**
- Use the **expertise** of the workforce
- Respect, challenge and help your **suppliers**

> Engaged Employees & Suppliers, Generate Business Value

Process (eliminate waste)
- Deliver value through understanding **customer requirements**
- Remove **waste** to create **flow**
- **Pull** work through the process
- **Level** the workload (Heijunka)
- **Stop** when there is a quality problem (Jidoka)
- **Standardize** all tasks for continuous improvement
- Use **visual control** so no problems are hidden

> Fundamental Lean Thinking – "Seeing & Eliminating Wastes"

Philosophy (long term thinking)
- Base management decisions on a **long-term philosophy**, even at the expense of short-term financial goals

> Starts with Transformational Leadership

> Engaging employees directly contribute to improving constructive styles, reducing passive/aggressive styles → Transforming culture and generating business value

SMART Lean Assessment – Defining the Transformation Plan

SMART Lean Assessment (SLA) was conducted in conjunction with the OCI to understand the organization's process and technology maturity

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Deployment Strategy

STAGE 1: Readiness for Change

The "Burning Platform"

Balanced Scorecard, Lean Assessment, & Global Competition

Organization Vision of Success

Leadership Commitment

Define Success, Success Measures, Barriers and Top Actions for Success

OCI®, Sub-cultures

STAGE 2: Skills Development

Lean Transformation Plan

Transformational Leadership Development Roadmap

Lean Transformation Skills Development and Deployment

Preferred OCI

All Respondents N=78

STAGE 3: Continuous Learning

Bottoms-up Kaizens

Gemba & Kaizens are the engine for continuous improvement

Continuous Employee Skills Development

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IBM Path Forward Business Transformation – Results
ISC HE Server Manufacturing Operations, Poughkeepsie

Shoot for the Stars
2005

Assembly Plant of the Year
2008

Progressive Manufacturing 100
2011

2004   *2007*   *2010*
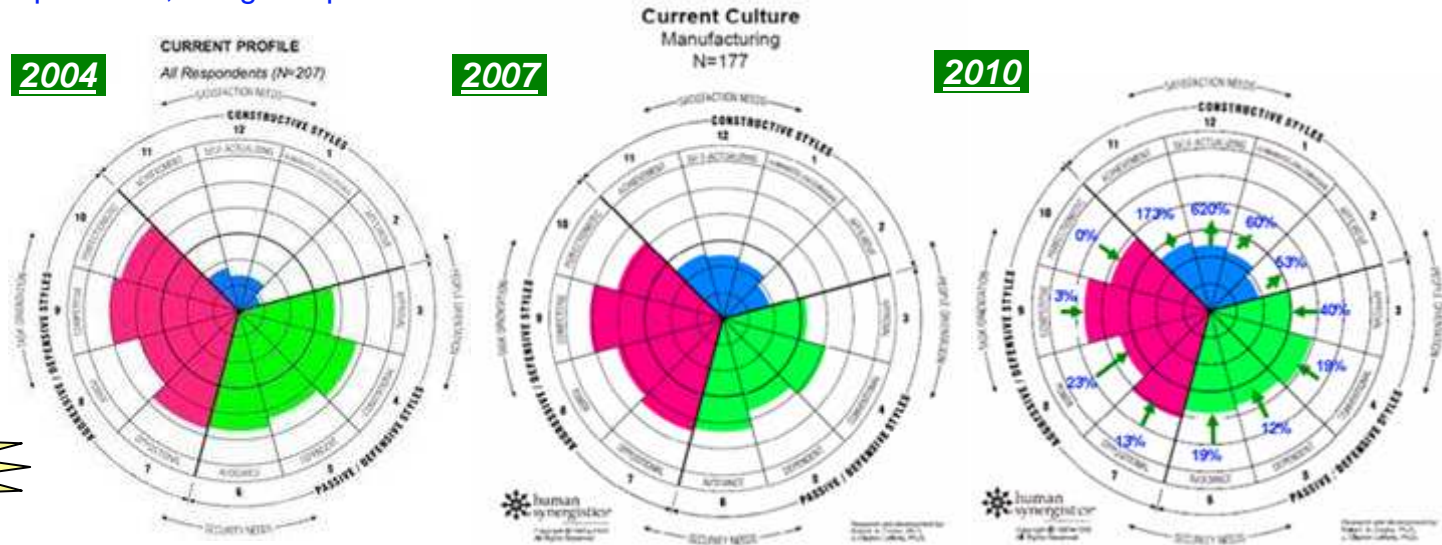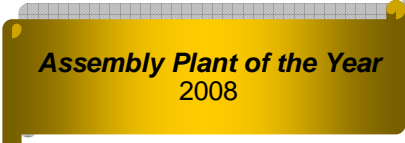
	2004	2007	2010
Cultural Performance Index - CPI	181	313	369
Financial Performance	Under Plan	Under Plan	Exceeded Plan
Inventory Management	Under Plan	Under Plan	Exceeded Plan
Quality Performance	Under Plan	Improving	Exceeded Plan
Lean Process Maturity	Score: 2/5	Score: 3.1/5	Score 3.9/5
Leadership CPI	245	358	728
Employee Satisfaction	3.62/5.00	3.68/5.00	3.71/5.00
Kaizens/# Ideas	0/20	0/80	46/300
# Employees Trained	10 (<3%)	30 (<10%)	220 (55%)

An adaptive culture + process excellence consistently produce superior business results

Patents and Publications

- 22 Publications at IIE Annual Conferences (2007-10)
  - One publication won the best of the simulation track

- 10 Publications at the American Society of Engineering Management Conference (2008-10)

- 1 Publication at the IEEE Winter Simulation Conference

- 5 Patents (filed, pending)

Recent Recognition

- Assembly Magazine – Assembly Plant of the Year 2008

- Progressive Manufacturing 100 – 2011

Backup

Poughkeepsie LEAN Journey
Story of "Driving Continuous Improvement"

2010

Flags legend:
- *Lean Projects Delivered*
- *Productivity Gains*
- *Cultural Transformation*
- *Strategic Innovation*

VISION EMPOWERMENT Principle Driven SDWT

2004 Part-Time Team
- Scheduing Opptys
- Oppty Analysis
- OCI Measurement

2005 Part-Time Team
- Oppty Analysis
- Local Innovate Winner

2006 Dedicated Lean Team
- $3 Million Cost Savings- Oppty Analysis
- Client Focus Tour Strategy
- 5S Plan "The Goal"
- Factory Relayout Modeling/Simulation
- Strategic PLAN for NPI
- Data Analysis Team (Business Intelligence)

2007 Dedicated Lean Team
- $7 Million (Tot) Cost Savings- Oppty Analysis
- 5S Deployment
- Green Supply Chain Team
- Innovation Council Kickoff
- 1st Line MGR Training Leading Lean
- OCI Measurement

2008 Dedicated Lean Team
- $10 Million (Tot) Cost Savings- Oppty Analysis
- Organization Kaizen Plan and Kickoff
- Assembly Magazine Plant of the Year
- Planning and Layout of new bldg

2009 Dedicated Lean Team
- $11.5 Miilon (Tot) Cost Savings Oppty Analysis
- Lean Certification Programs (G/S/B)
- WW Smart Lean
- Poke Yoke Organization
- MGR LSI EXEC LIs
- Standard Work
- Innovation Hub
- GEMBA Deployment
- OCI Measurement
- New Bldg OPENING
- Supplier Relations

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Foundational Competencies: Lean Certification Levels
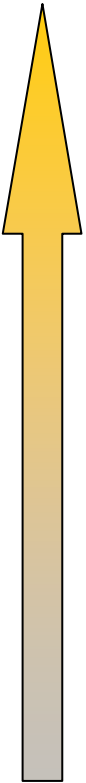
GOLD LEVEL

1. Pass the Gold Level Certification Examination
2. Lead or Actively Participate in 5 Lean TACTICAL* Projects
3. Coach and Mentor; Conduct Workshops or Kaizen Events using 8 Step
4. Lead or Actively Participate in 3 STRATEGIC# Projects

Gold practitioners help to lead the Lean deployment across an organization

SILVER LEVEL

1. Pass the Sliver Level Certification Examination
2. Lead or Actively Participate in 3 Lean TACTICAL* Projects
3. Coach and Mentor; Conduct Workshops or Kaizen Events using 8 Step

* - Deployment and application of lean principles, concepts and methods within a work cell, work group or value stream

Silver practitioners Lead Lean Improvement Project teams

BRONZE LEVEL

1. Complete Class and Pass the Bronze Level Certification Examination
2. Lead or Actively Participate in 1 Lean TACTICAL* Project
3. Knowledge of 8 Step Structured Problem Solving

Bronze practitioners lead lean quick win opportunities and Kaizens

* - Deployment and application of lean principles, concepts and methods within a work cell, work group or value stream
# - Projects that demonstrate the transformation of a business or organization

Adapted from SME Lean Certification BOK

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House of Lean- Concepts and Knowledge Elements

Lean Vision of Success

Continuous Learning Organization

Capabilities & Skills	House of Lean Building Blocks		
Strategic Planning	Deployment Leadership & VSM Management	Lean/Agile/LSS Applied Learning	Hoshin Planning
Information & Support Systems	Decision Support Systems	QFD / Visual Control Board	Simulation Modeling
Pull Value & Streamline E2E Flow	Pull Systems, Kanban	POUS / Single Unit Flow	Process vs. Functional Layout
Structured Problem Solving Plan-Do-Check-Act	8D Problem Solving & A3 Process Improvement	DMAIC & DFSS	FMEA
Basic Stability	5S, Visual Management	Standard Work Process Map, Value Add Analysis	Kaizen Events
Basic Knowledge (Getting Started)	Lean 101 Core Team Training	Science of Mfg. Web Lectures	Leadership Book Clubs & Workshops

Client Satisfaction · Financial Excellence · Process Excellence · Employee Empowerment

Results Feed the Organization's Balanced Score Card

High Performing and Adaptive Culture
Transformational Leadership

Value Stream Mapping

Foundational Competencies: Kaizen Training

Select Kaizen Area

Select Kaizen Team(s)

Baseline Metrics & Set Kaizen Scope
more

Lean 101 Training
more

Execute Kaizen Event
more

Complete all Actions via Management System
more

Close Kaizen Event & Report Out
more

Pre-define	Define/Measure	Analyze	Improve	Improve	Control
t-3 weeks	*t-2 weeks*	*t=0*	*t=1 week*	*t=3-4 weeks*	*t=4 weeks*
Management Team	PF Core Team	Kaizen Team	Kaizen Team	Kaizen Team	Mgmt., Kaizen Team

A3 Flow down: Aligning Kaizen Improvement Activities with Organizational Vision and Mission

Top Level Mission Flows Down to Lower Level Activities

- Senior Leadership Team

  Mission/Vision > Goals > Initiatives   A3

- Functional Management

  Mission/Vision > Goals > Initiatives   A3

- Line Management

  Mission/Vision > Goals > Initiatives   A3

- Self-directed work teams (Kaizen Teams)

  Mission/Vision > Goals > Initiatives   A3
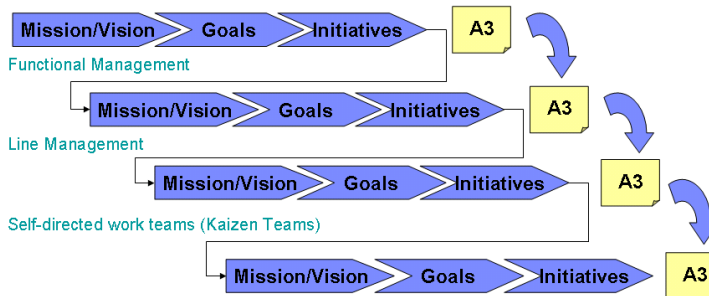
		No. of Ideas Generated	No. of Ideas Implemented	No. of Ideas Sustained	Impact (Impact/Range)	EIM
EIM	Kaizen Event 1	23	18	14	0.6	0.37 *
	Kaizen Event 2	40	33	32	0.8	0.64
	Kaizen Event 3	55	41	38	0.5	0.35 *
	Kaizen Event 4	26	25	22	0.6	0.51
	Kaizen Event 5	26	21	18	0.8	0.55
	Kaizen Event 6	46	42	37	0.7	0.56

* - Conduct lessons learned and address low sustainability; Another Kaizen event is scheduled upon re-defining the scope

		CPI Baseline	CPI After Kaizen	Improvement from Baseline(%)	CPI Sustain	Improvement from Baseline(%)
GSI®	Kaizen Event 1	298	453	52.00%	504	69.13%
	Kaizen Event 2	321	399	24.30%	420	30.84%
	Kaizen Event 3	245	382	55.92%	387	57.96%
	Kaizen Event 4	311	499	60.45%	510	63.99%
	Kaizen Event 5	329	396	20.36%	522	58.66%
	Kaizen Event 6	281	478	70.11%	543	93.24%

$$EIM = \frac{\#Solutions\_Sustained}{\#Ideas\_Generated} \cdot \%Im\,pact$$

Increased Team Based Decision Making

"Safe" Environment for Employees for Idea Generation

High % of Solutions Implemented

Employee Empowerment, Build on Ideas of Team

Decrease in aggressive styles of behavior

Increase in constructive styles of behavior

Decrease in defensive styles of behavior

Baseline – Day 0
CPI = 245

After Kaizen– Day 5
CPI = 382

Sustain – Day 60-90
CPI = 387

Published in 2010 IIE Annual Conference and Exposition, Cancun, MX
"The Role of Kaizen Events in Sustaining a Lean Transformation"

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Foundational Competencies: 5S

- Mission: To utilize Poughkeepsie team ingenuity along with Japanese 5s concepts to implement organization, orderliness, and cleanliness for establishing a highly functional, visual, state-of-the-art manufacturing facility.

- What are the goals and expectations?
  - We will succeed in building a world class visual factory and "set the bar" for the future.
  - We will all buy-in to sustaining PACC and take personal responsibility for our work areas.
  - We will revitalize our factory in for our new product base.

5S Kaizen

Red Tag Area – "Graveyard"

Kanban for Shipping

Assembly Area

Thermal Chambers

Parts Transport Carts

| Take Ownership | Eliminate Waste | Create Order | Visual Factory | Sustain & Measure |

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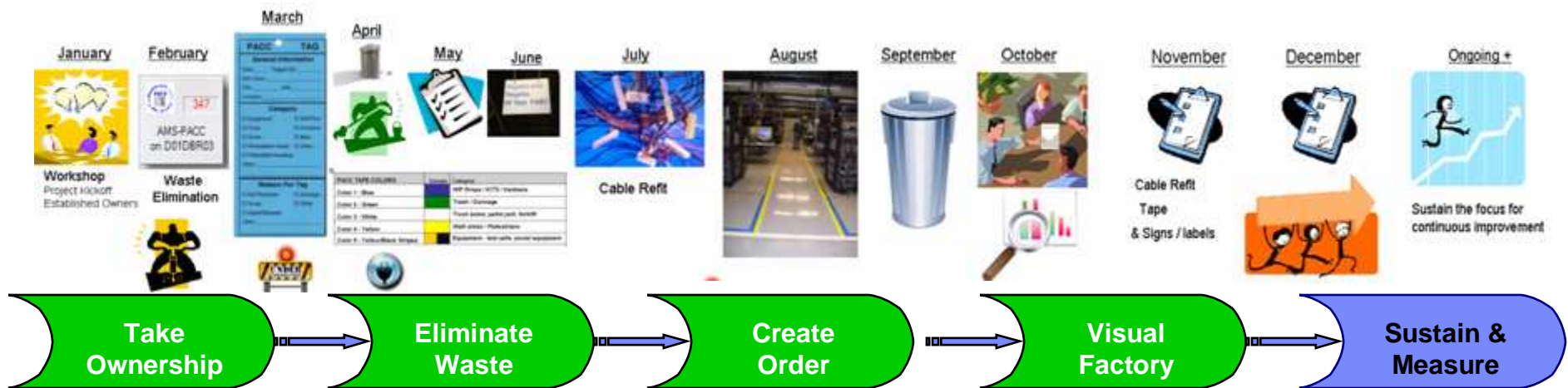
Pull and Streamline E2E Flow: Factory Layout

- Flow Matrix: A "one-stop-shop" matrix to re-layout a floor, using key factors, such as distances, frequency, transportation costs, resource utilization

Resource Utilization Factors (RUF)

Shared Resource Symbol (SRS)

Opportunity Analysis Table (OAT)

Process Interrelationship Matrix (PIM)

Contains Area-to-Area Proximity Indices

Proximity Index (PI)

PI

By-Area Cost Evaluator (BACE)

Transportation Mode indicator (TMI)

FLOW MATRIX

○ Shared Resource
▢ Shared Tool/Workstation
◎ Both

Ease of movement

Easy--> Green
Moderate--> Yellow
Hard--> Red

OPPORTUNITIES

Close shouldn't be 1A/B, 2C

Far shouldn't be >= 3C

	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6								Total
Station 1	■	5A	0C	4D	0C	0C				1				1
Station 2	5A	■	4C	3B	4C	1A		1						1
Station 3	0C	4C	■	5D	0A	4A					1	1		1
Station 4	4D	3B	5D	■	8B	0B								
Station 5	0C	4C	0A	8B	■	5A								
Station 6	0C	1A	4A	0B	5A	■								
Cost							0	1	0	1	0	1		3

USPatent: 7725857 (2010)

To

From

(Operations 1 through 24 matrix — partial values)

AS-IS
Opportunities in the Server Assembly Area, **67** Relationships Identified
TO-BE
Identified and Implemented **16** Proximity Improvements
Space Savings: **18.3K sqft,** Transportation Cost Savings**: $120K/yr**
IT Simplification/Reduction, Cycle Time Savings, WIP Reductions

Published in 2008 IIE Annual Conference and Exposition, Vancouver, BC
"A Novel Method to Re-Layout Facilities Using Industrial Engineering Concepts"

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Strategic Planning: 3P and Simulation Modeling

- Integrated Design of Experiments (DoE) – Simulation modeling approach for making strategic decisions
  - DoE identifies the key factors that impact decisions
  - Simulation modeling can represent the randomness and uncertainty
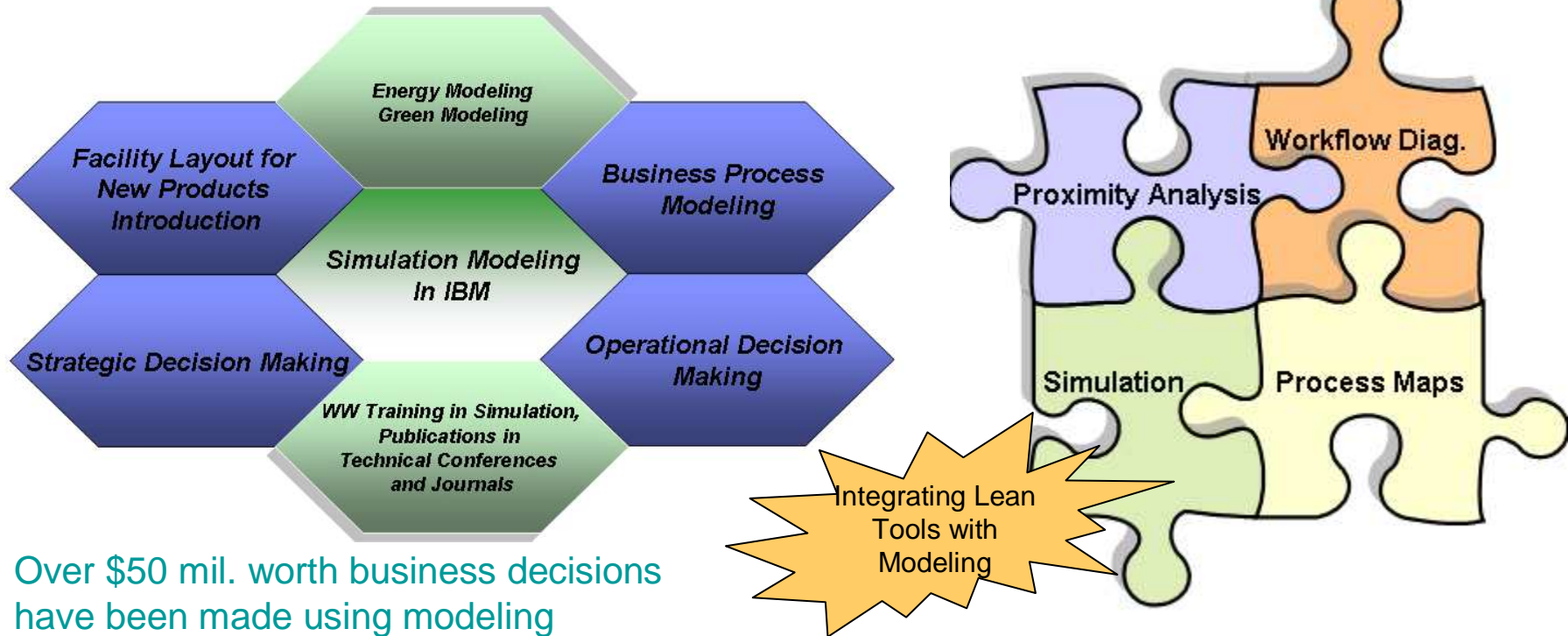
Over $50 mil. worth business decisions have been made using modeling

Integrating Lean Tools with Modeling

Publications:

2008 IIE Annual Conference: *Using Simulation Modeling to Establish Kanban Levels in a Server Manufacturing Environment (Won Best Paper in Lean Systems Track)*

2008 IIE Annual Conference: *Using Design of Experiments and Simulation Modeling to Study the Facility Layout for a Server Assembly Process*

2008 Winter Simulation Conference: *Using Design for Six Sigma and Simulation in a Server Manufacturing Process*

2010 International Conference on ISO 9000 and TQM – ICIT

Note: In the 2011 IIE Annual Conference, a member of the team will be hosting the "Modeling to Support Lean Transformation" Session

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Strategic Planning: Information Systems and Decision Support Systems
Using Lean and Agile Techniques to Eliminate *Muda*

Demand/Constraint Supply Reports

•Forecasts any demand and supply constraints to prevent production stoppage

WW Order Status System
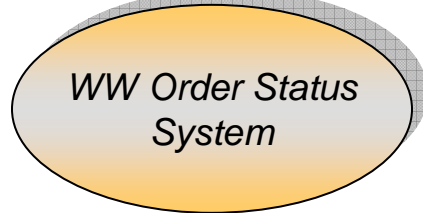
• Real-time update of orders and decision support to address (e-Gemba) any fluctuations in order deliveries

Training Within Industry *(On-demand Training System)*

• A one-stop-shop for employee skill development (online training/certification system)

Innovation Hub

• System for employees to submit ideas and collaborate on improvements

Value Stream Mapping	Standardization/Learning Tools
Data Gathering	Enable IT Improvements
Eliminate Waste, Process Redesign	Adapt Technology to Resources
Enable Cross-functional Teams, Voice of the Customer	Flexibility and Adaptability to Changes
'LEAN' CONCEPTS	**'AGILE' CONCEPTS**

Workflow and Information Flow Re-design

Standard Work Decision Support
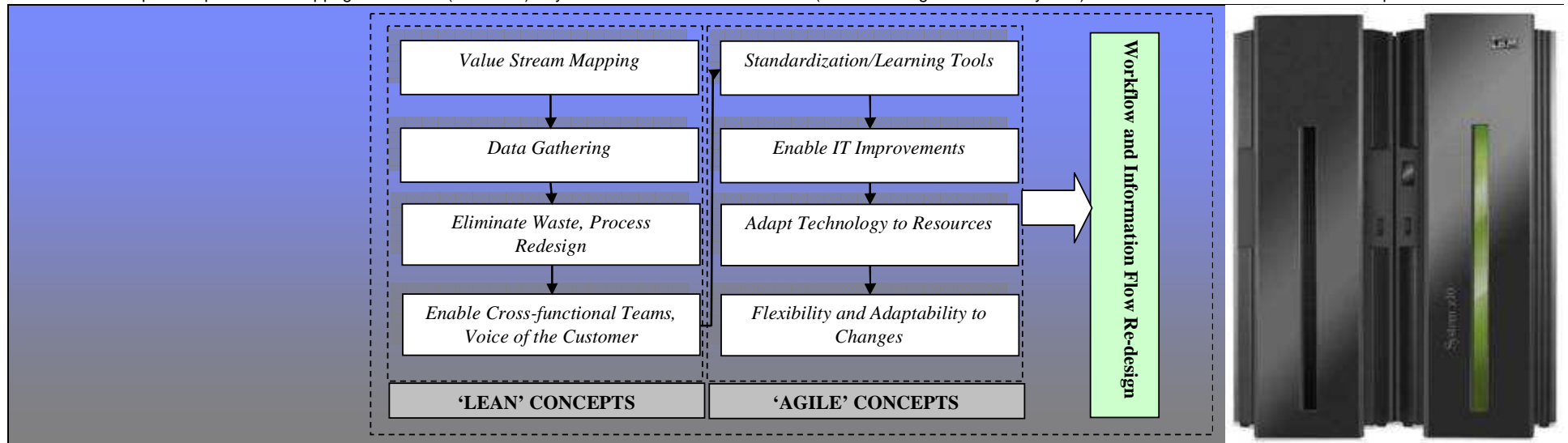
• Defines a methodology to identify areas/processes for improvement using standard work and lean methods

Used Parts Inventory System *(Reverse Logistics)*
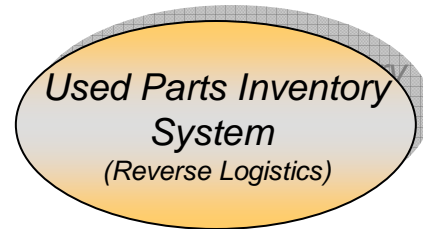
• Identifies the optimal part allocation policy for maximizing part life cycle (Greener products through reverse logistics)

Resource Deployment Matrix *(Flexible Workforce)*
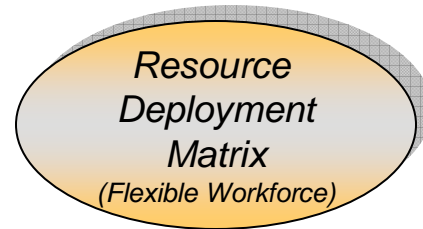
• Identifies most appropriate resource for a task based on skill, quality and complexity

SMART Warehouse Management System
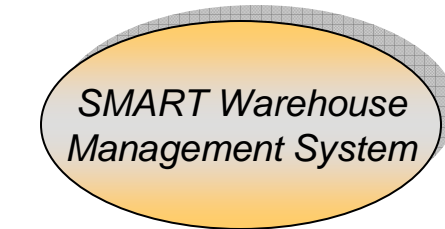
• Defines a new real-time slotting principle for warehouses (IIE 2008, Patent Pending)

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Continuous Improvement: GEMBA

- Objective: To Improve business efficiency by transforming the factory from current management process to **_lean visual management process_**
  - Using communication gemba boards and implementing shift to shift crossover and management gemba walk discipline

Highlights:

Implemented in 2010 after 6S is in Sustain

Reduced number of status meetings (impact of ~$0.5M a year in lost productivity

Reduced time from problem identification to problem resolution

Employee empowerment: Eliminates time where employees are waiting for direction

Integrated with 5S and TAKT Management System

Continuous Improvement: 8 Step Structured Problem Solving

PLAN

DO

CHECK

ACT
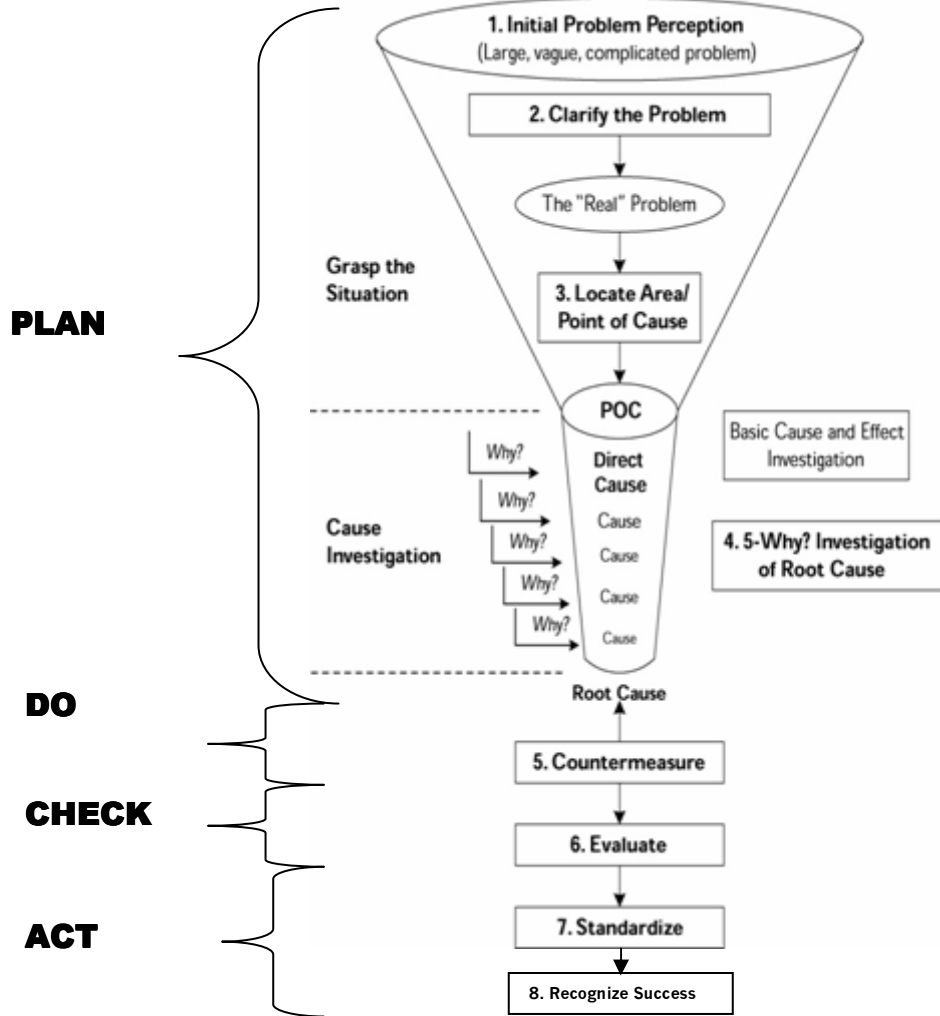
- 8 Step Structured Problem Solving Methodology
  - Uses <u>qualitative process analysis</u> tools, along with the seven quality tools

- Focus on Quick Wins to address problems and opportunities
  - 1-2 month projects

- Empowers employees to identify problems and implement containment actions and countermeasures

- Increased collaboration between teams as a result of team based problem solving

- Improves constructive styles of behavior and reduces passive/aggressive styles

- Available learning resources: Path Forward
  - 2 day workshop (face-to-face) or virtual delivery
  - Web lectures available for reference

- Used organization wide for quick major wins
  - Key enabler to GEMBA process

Balanced Scorecard of Poughkeepsie ISC Server Organization (2007-10)

Process Excellence
- Dedicated Process Improvement Team
- Self Directed Work Teams (2010 strategy)
- Kaizen Events, PACC and Strategic Initiatives
- SMART Lean – WW Collaboration
- Standard Work on all Processes
- Modeling and Simulation Competency
- Data Analysis and Reporting Competency
- Over **$11.5 mil** cost savings through Process Improvements (over $10 mil savings in 2004-05)

Client Satisfaction
- Flagship Site – Launching three new products
- Successful 'Zero Pends' Initiatives
- Frequent Customer tours
- Green initiatives
- Assembly Plant of the Year Award (2008) and other recognitions (IP and Publications)

People Growth
- People-centric initiatives – GEMBA, 5S/PACC
  - Lowering "Center of Gravity" for Decision Making
- Lean Certifications for Manufacturing
  - **10** Silver Trained (generated ~ $500k in savings)
  - **50+** Bronze Trained (projects under progress)
- Lean for Services – for support functions
- Innovation through Think-Place Ideas
- Kaizen Events empowering teams to implement new ideas (>100 employees, >300 ideas)
- Leading Lean for Managers (LSI's and LI's)

Financial Excellence
- Over **$ 11.5 mil** cost savings through Process Improvements
  - 2005 "Shoot for the Stars Award" ($1m cost savings)
- Successful building bring up (cost and competitive advantages): The new product family bring-up and product performance has been the faster than the predecessor
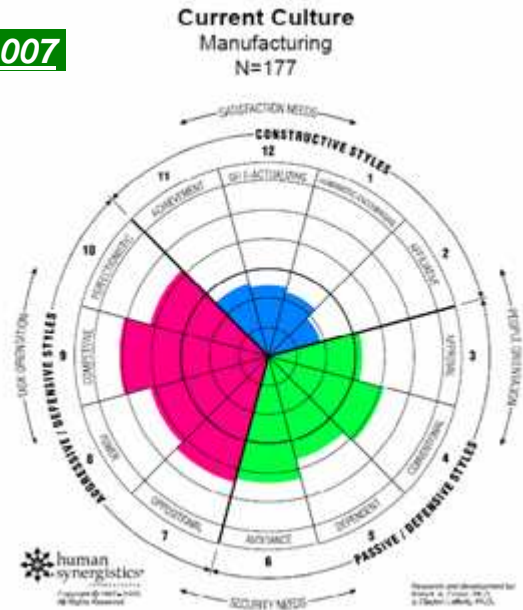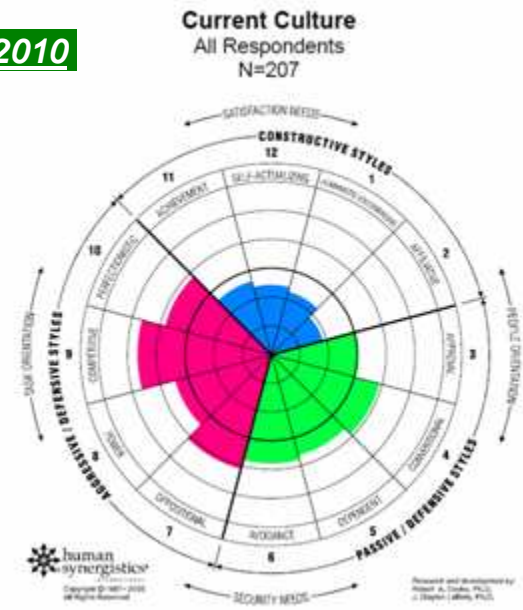
IBM

Current Culture – 2004 to 2010

2004

CURRENT PROFILE
All Respondents (N=207)
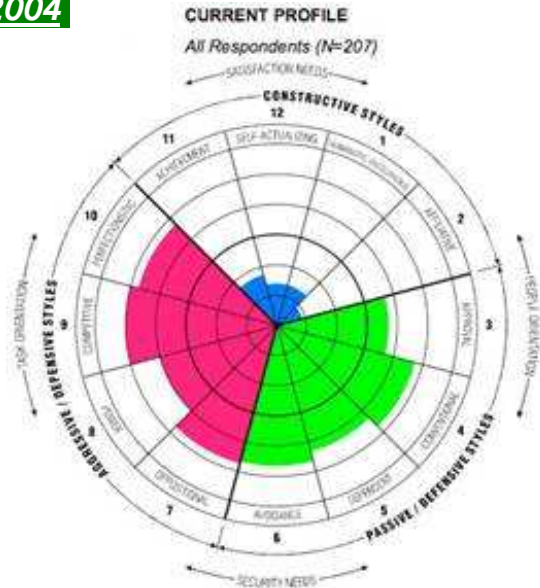
Culture Performance Index: 181

2007

Current Culture
Manufacturing
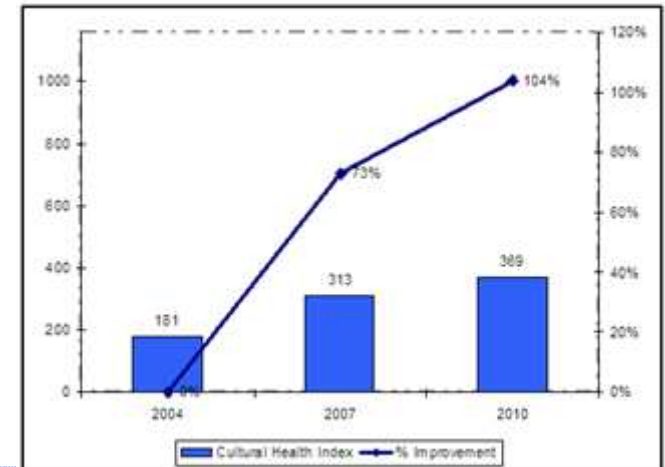N=177

Culture Performance Index: 313

2010

Current Culture
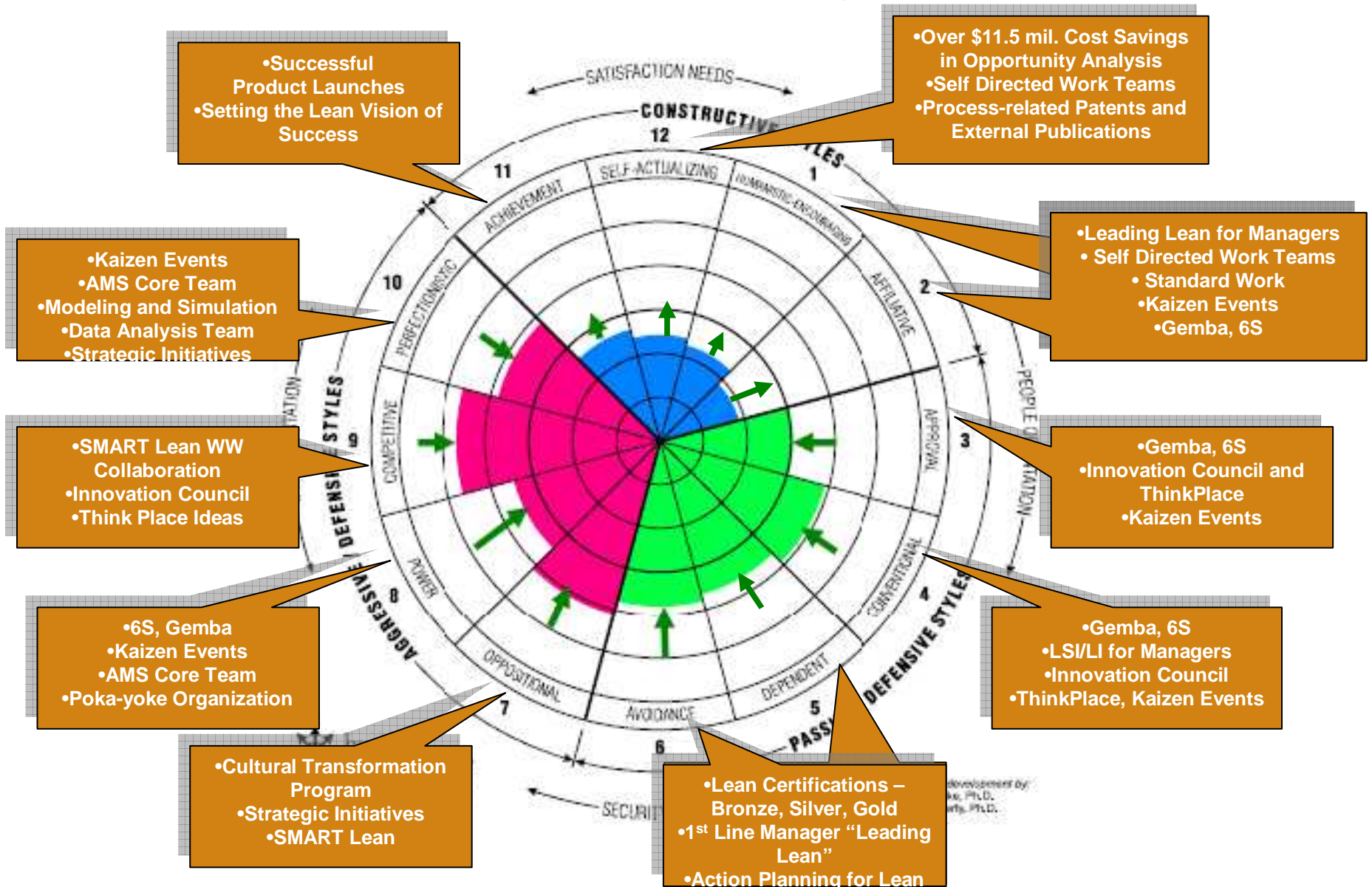All Respondents
N=207

Culture Performance Index: 369

- **Key Improvement Areas (from 2004 – 2010):**
  - **Significant Improvement in Constructive Styles of Behavior**
  - **Substantial Reduction in Aggressive Styles of Behavior**
  - **Significant Reduction in Passive Styles of Behavior**
  - **More than Doubled the Culture Performance Index from 2004 and 18% increase from 2007**

# Impact of Process Excellence on Improving Culture

•Successful Product Launches
•Setting the Lean Vision of Success

•Over $11.5 mil. Cost Savings in Opportunity Analysis
•Self Directed Work Teams
•Process-related Patents and External Publications

•Kaizen Events
•AMS Core Team
•Modeling and Simulation
•Data Analysis Team
•Strategic Initiatives

•Leading Lean for Managers
• Self Directed Work Teams
• Standard Work
•Kaizen Events
•Gemba, 6S

•SMART Lean WW Collaboration
•Innovation Council
•Think Place Ideas

•Gemba, 6S
•Innovation Council and ThinkPlace
•Kaizen Events

•6S, Gemba
•Kaizen Events
•AMS Core Team
•Poka-yoke Organization

•Gemba, 6S
•LSI/LI for Managers
•Innovation Council
•ThinkPlace, Kaizen Events

•Cultural Transformation Program
•Strategic Initiatives
•SMART Lean

•Lean Certifications – Bronze, Silver, Gold
•1st Line Manager "Leading Lean"
•Action Planning for Lean

Sustaining the Gains from Lean Deployment

How Do We Sustain Our Success?
Employee Engagement and Innovation Framework

IBM

Employee Develops New Skills and Competencies
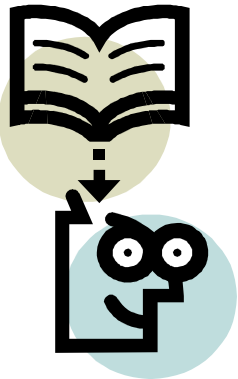
Organization Provides a Vehicle that allows employee(s) to overcome business challenges

Kaizen Events
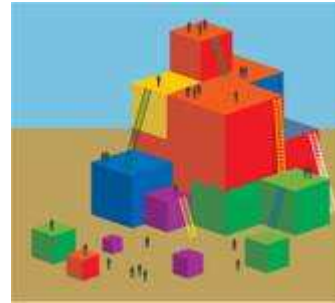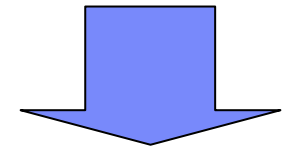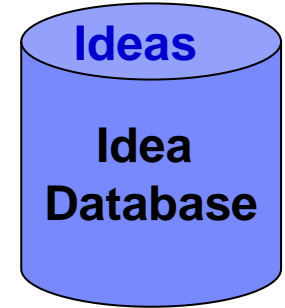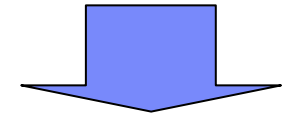
5S Teams

Scrum Meetings

Innovation Council

Green Teams

Self-directed Improvement Teams

Strategic Initiatives

300+ Ideas in DB
Over $1M Savings

Ideas

Idea Database

Innovation

Recognition

Publications

- **"The Role of Leadership in Sustaining a Lean Transformation",** *2010 Industrial Engineering Research Conference, IIE*

- **"The Role of Kaizen Events in Sustaining a Lean Transformation" ,** *2010 Industrial Engineering Research Conference, IIE*

- **"A Simulation Approach to Determine Inventory Release Times for a Pull System",** *2010 Industrial Engineering Research Conference, IIE*

- **"Using Lean and Optimization Techniques to Determine Line-Side Stock Kanban Limits",** *2010 Industrial Engineering Research Conference, IIE*

- **"A Fuzzy Optimization Approach for Product Configuration in Reverse Logistics",** *2010 Industrial Engineering Research Conference, IIE*

- **"A Used Parts Inventory Monitoring System for Server Reverse Logistics",** *2010 Industrial Engineering Research Conference, IIE*

- **"Critical Factor for Sustainable Kaizen Events – People, Process and Technology",** *2009 American Society for Engineering Management (ASEM) Conference*

- **"A Simulation-based Framework to Study the Impact of Lean Techniques on Green Supply Chain",** *2009 American Society for Engineering Management (ASEM) Conference*

- **"A Fuzzy Optimization Model for Employee Deployment in Complex Manufacturing Environment",** *2009 American Society for Engineering Management (ASEM) Conference*

- **"Integrating People, Process and Technology into Lean Business Transformation",** *2009 American Society for Engineering Management (ASEM) Conference*

- **"Integrating a Structured Problem-Solving Process in a Lean Project – Challenges and Opportunities",** *2009 American Society for Engineering Management (ASEM) Conference*

- **"A Hybrid Approach of Data Mining and Simulation Modeling for Production Planning in a Server Manufacturing Environment"**, *The 14th Annual International Conference on Industrial Engineering Theory, Applications & Practice,*

- **"A Novel Methodology to Allocate Commodities and Re-Layout a Warehouse",** *2009 Industrial Engineering Research Conference, IIE*

- **"Designing and Optimizing the Test Operations During New Product Introduction of High-end Server",** *2009 Industrial Engineering Research Conference, IIE*

- **"Using Simulation and Design for Six Sigma to Study the Server Assembly Process"**, *2008 IEEE Winter Simulation Conference*

- **"Maintaining an Efficient Workforce Through Innovative Resource Deployment Methodologies"**

- **"An 'e-Order Reconciliation Management System' in a Server Manufacturing Environment"**, *2008 American Society for Engineering Management Conference*

- **"An Integrated Real-time Visual Shop Floor Monitoring System in a Server Manufacturing Facility"**, *The 13th Annual International Conference on Industrial Engineering Theory, Applications & Practice*

- **"A Novel Approach to Relayout a Facility Using Industrial Engineering Principles"**, *2007 Industrial Engineering Research Conference, IIE*

- **"Using Design of Experiments and Simulation Modeling to Study the Facility Layout for a Server Assembly Process"**, *2007 Industrial Engineering Research Conference, IIE*

- **"A Lean Training and Certification Information System for a High-end Server Manufacturing Environment"**, *2007 Industrial Engineering Research Conference, IIE*

- **"A Systems Approach for Evaluating Discrete Event Simulation Softwares"**, *2007 Industrial Engineering Research Conference, IIE*

- **"An Alternate Configuration Tool for Fabrication Testing in a Server Assembly Environment"**, *2007 Industrial Engineering Research Conference, IIE*

Questions?

ISC Poughkeepsie, Manufacturing Operations