Memorandum

CITY OF DALLAS

DATE January 2, 2015

TO Honorable Mayor and Members of the City Council

SUBJECT Lean Six Sigma Initiative

Attached is the briefing material on the "Lean Six Sigma Initiative" to be presented to Dallas City Council on Wednesday, January 7, 2015. This effort is a component of the new Dallas Center for Performance Excellence (CPE), along with several other continuous improvement tools that are either existing or forthcoming.

If you have any questions or need any additional information, I would be happy to respond.

Mark McDaniel
Assistant City Manager

c: A.C. Gonzalez, City Manager
Warren M.S. Ernst, City Attorney
Craig D. Kinton, City Auditor
Rosa A. Rios, City Secretary
Daniel F. Solis, Administrative Judge
Ryan S. Evans First Assistant City Manager
Eric D. Campbell, Assistant City Manager
Jill A. Jordan, P.E., Assistant City Manager
Joey Zapata, Assistant City Manager
Jeanne Chipperfield, Chief Financial Officer
Sana Syed, Public Information Officer
Elsa Cantu, Assistant to the City Manager – Mayor & Council

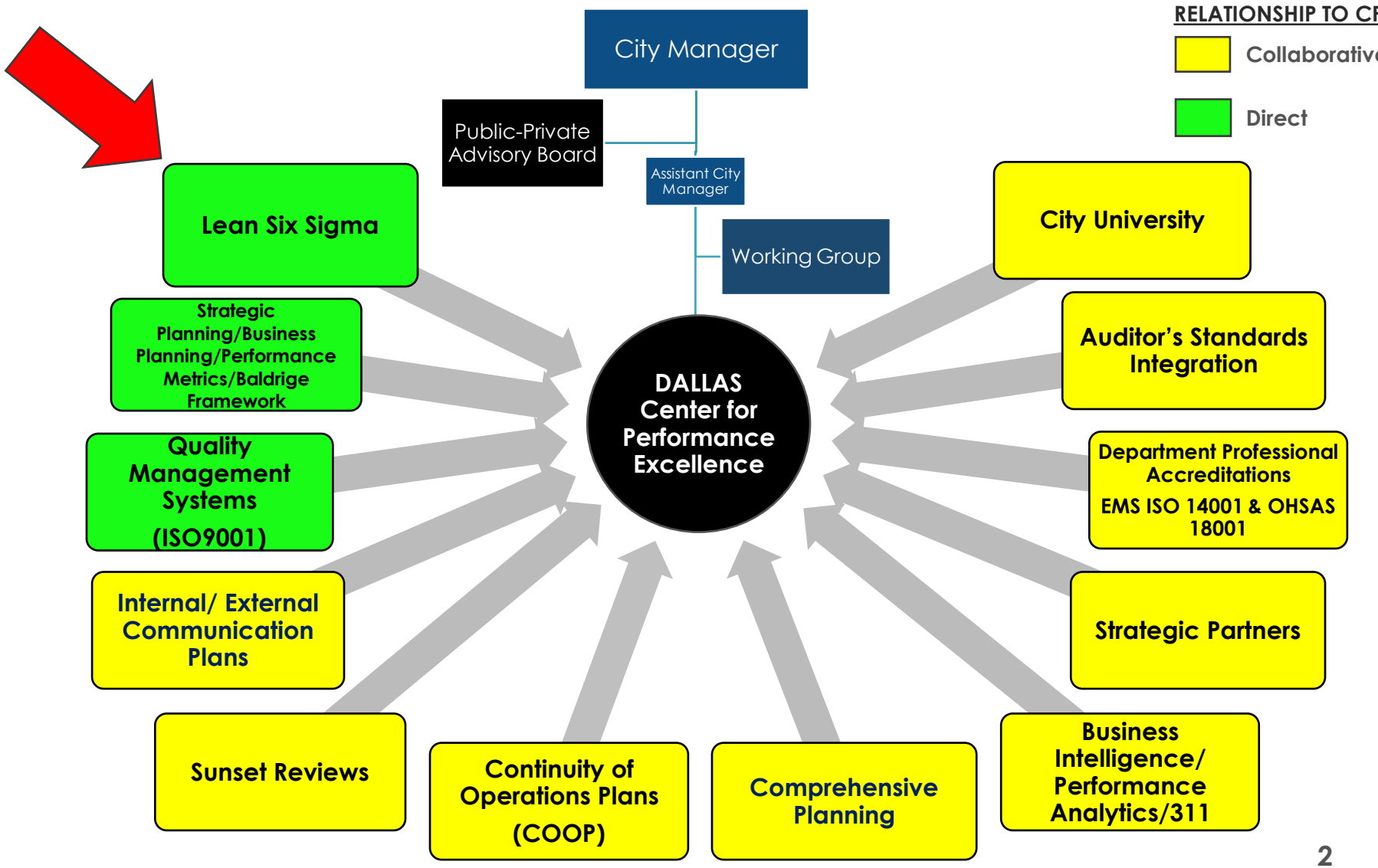
Lean Six Sigma Initiative

DALLAS Center for Performance Excellence (CPE)

Setting New Standards for Local Government

City Council Briefing
Wednesday, January 7, 2015

Lean Six Sigma: A Component of the CPE



Lean Six Sigma: What is it?

A combination of **two disciplined, data-driven** approaches and methodologies for improving performance:

- **Lean Enterprise**:
  Developed by Toyota Motor Company as the Toyota Production System in the 1950's

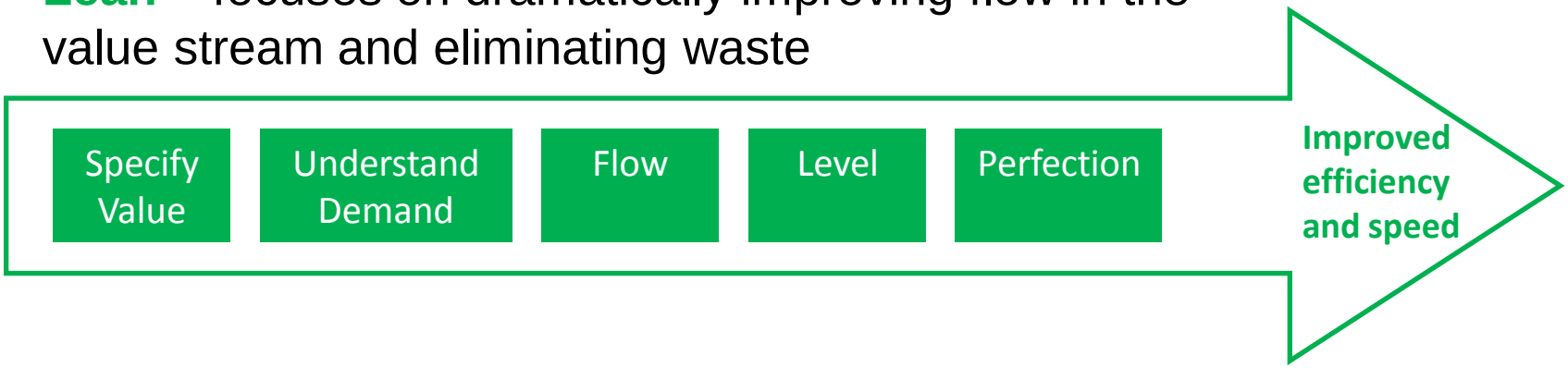
- **Six Sigma**:
  Developed by Motorola in the 1980's

Sampling of Organizations Utilizing Lean and/or Six Sigma to Improve Performance

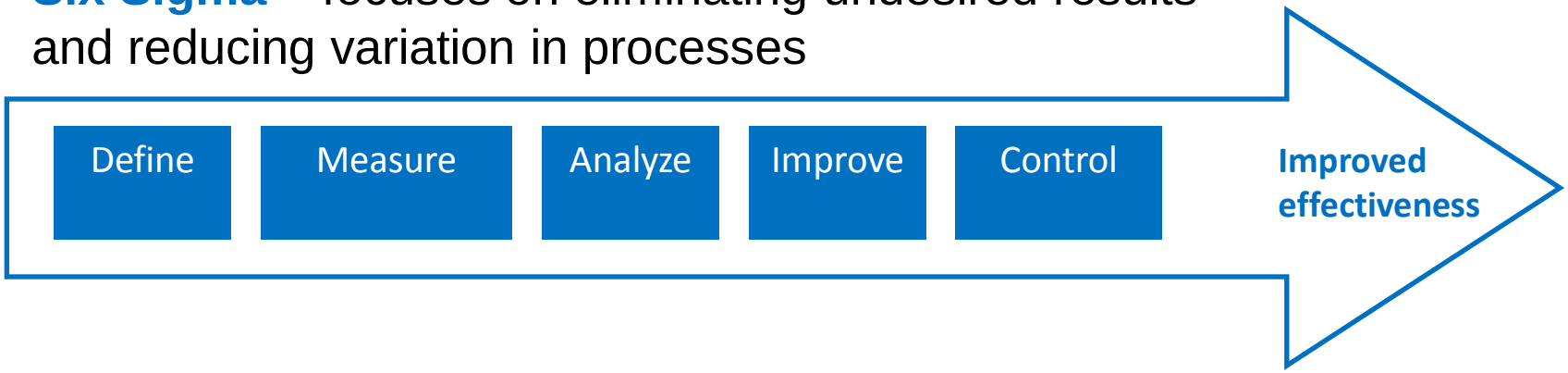
- 3M
- Accenture
- Alcoa Toyota
- Allied Signal
- Amazon
- Amerimax
- Apple
- Bank of America
- Bayer
- Bell Helicopter
- Boeing
- Capital One
- Caterpillar
- Citicorp
- Coca Cola
- Dell
- Dr. Pepper
- Home Depot
- Honda
- Ford Motor Company
- Fujitsu
- General Electric
- Motorola
- Northrop Grumman
- Raytheon
- Starwood Hotels & Resorts
- Sony
- Texas Instruments
- United States Marine Corps
- Xerox

Focus Comparison

Lean – focuses on dramatically improving flow in the value stream and eliminating waste



Six Sigma – focuses on eliminating undesired results and reducing variation in processes



Process Comparison

Steps:	Lean Process	Six Sigma Process
Step 1	Current State Assessment (Value Stream Map)	Define Opportunities--identify, quantify, and prioritize process improvement opportunities.
Step 2	Future State Map (Value Stream projections after Waste Reduction Kaizens)	Measure approved opportunities--current state measurements
Step 3	Identify, quantify, and prioritize process improvement opportunities	Analyze--scenarios, what-ifs, design of experiments leading to an outcome result
Step 4	Kaizen--implement the change and re-measure	Improve--implement the solution and re-measure
Step 5	Audits to sustain the gains	Control--develop control system to sustain the change.

Six Sigma: Statistically Visualized

The term "Six Sigma" is based on a statistical concept:
defective items can be minimized by maintaining 6 standard deviations (6 "sigmas")
between the process mean (average) and its upper and lower specification limits.

Six Sigma also accounts for the tendency of processes to degrade over the long term:
A Six Sigma process can tolerate a "shift" of 1.5 standard deviations (1.5σ shift) and still
maintain a "safety cushion" between the process mean and its specification limits.

GO LEANSIXSIGMA

Source: http://GoLeanSixSigma.com

Achieving Six Sigma

A statistical representation

Sigma Level	DPMO	% Defective	% Yield
1	691,462	69%	31%
2	308,538	31%	69%
3	66,807	6.7%	93.3%
4	6,210	.62%	99.38%
5	233	.023%	99.977%
6	3.4	.00034%	99.99966%

In other words, a measure of quality that strives for near zero defects.

**Defects per million opportunities*

Six Sigma: 8 Areas of Waste

Defects

Efforts caused by rework, scrap, and incorrect information.

Overproduction

Production that is more than needed or before it is needed.

Waiting

Wasted time waiting for the next step in a process.

Non-Utilized Talent

Underutilizing people's talents, skills, & knowledge.

Transportation

Unnecessary movements of products & materials.

Inventory

Excess products and materials not being processed.

Motion

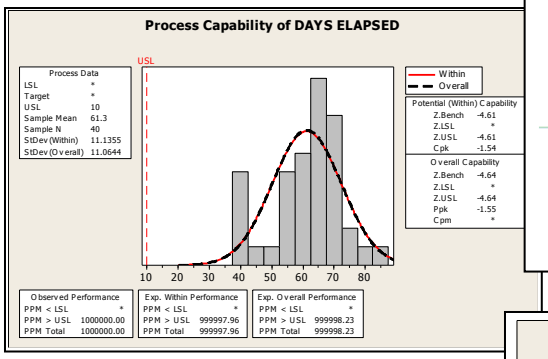
Unnecessary movements by people (e.g., walking).

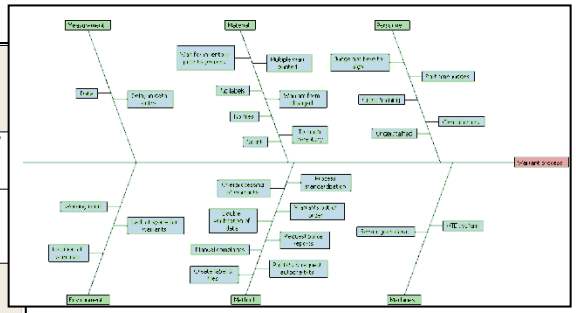
Extra-Processing

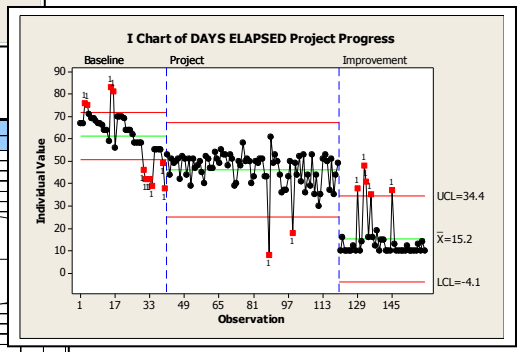
More work or higher quality than is required by the customer.

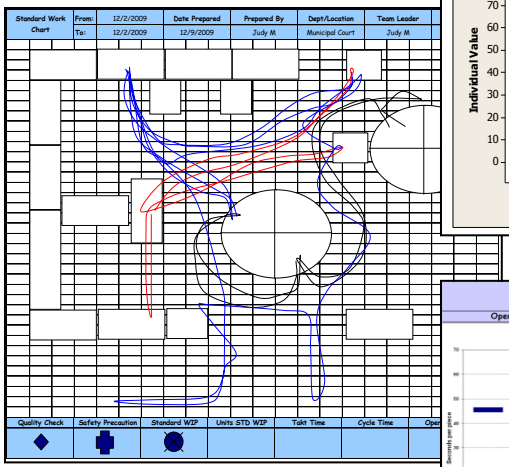
Sampling - Lean Six Sigma Analysis Methods

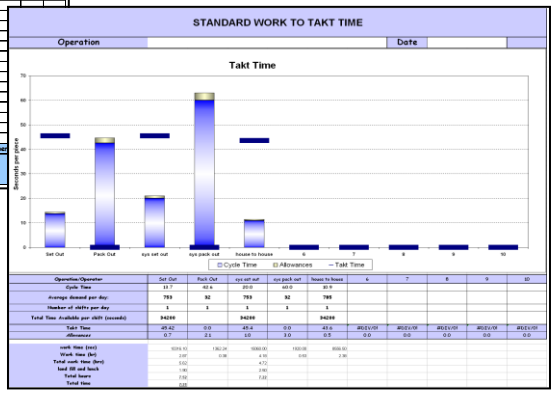
- Descriptive Statistics
- Pareto Charts
- Graphing
- Regression Analysis
- Capability Analysis
- Process Mapping
- Value Stream Mapping
- Fish Bone Diagram
- Spaghetti Diagram
- XY Summary
- TAKT Time and Cycle Time
- Visual Management



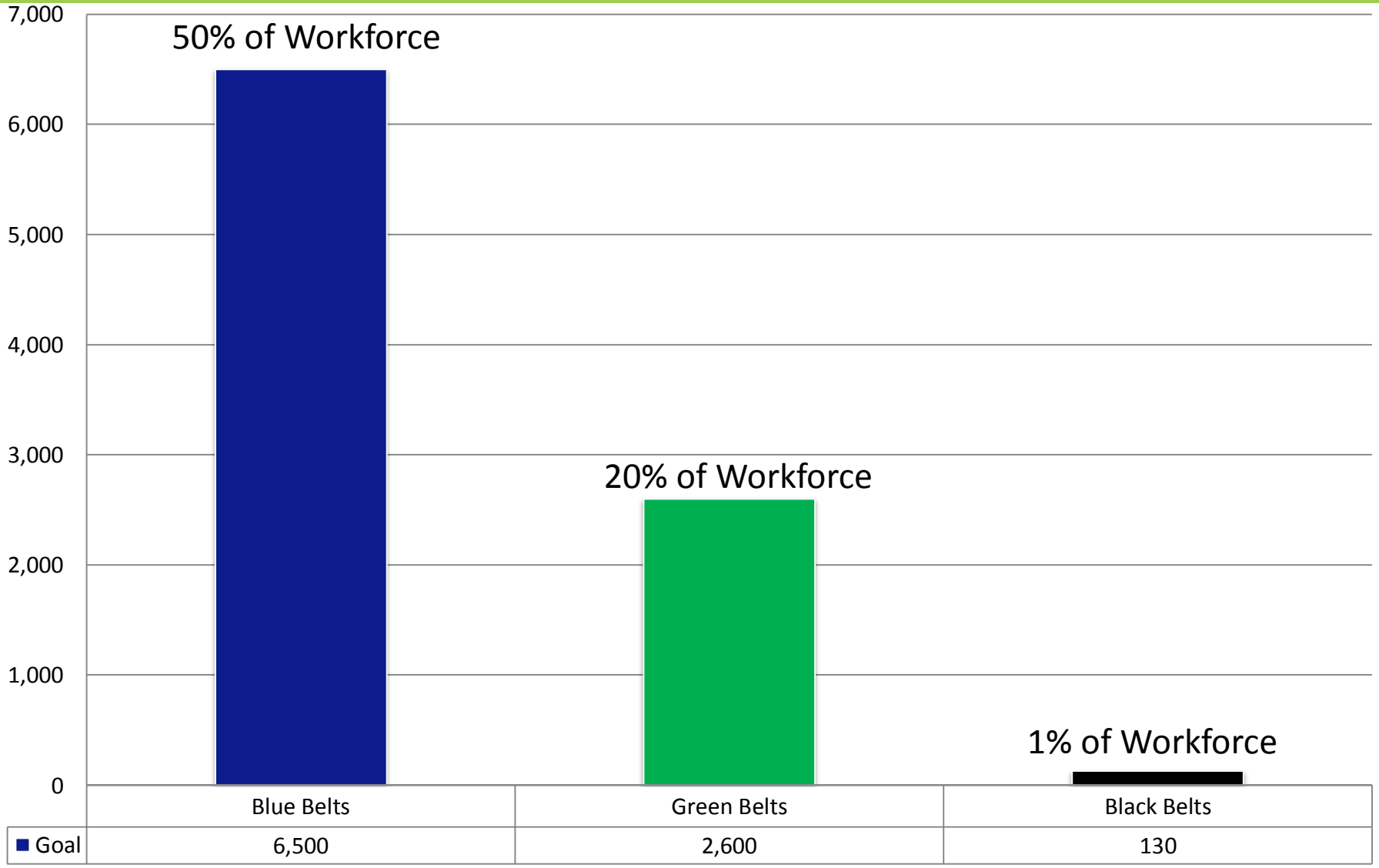








Long-term Employee Training & Certification Goals



Prospective Project Identification

Projects identified through a variety of means, including but not limited to:

- Annual budget process
- Sunset reviews
- Monthly expenditure forecast reviews
- Twice annual departmental business plan reviews
- Council suggestions
- Customer feedback
- Internal audits
- 311 data analysis
- Business intelligence/performance analytics
- Continuity of Operations (CoOP) assessment

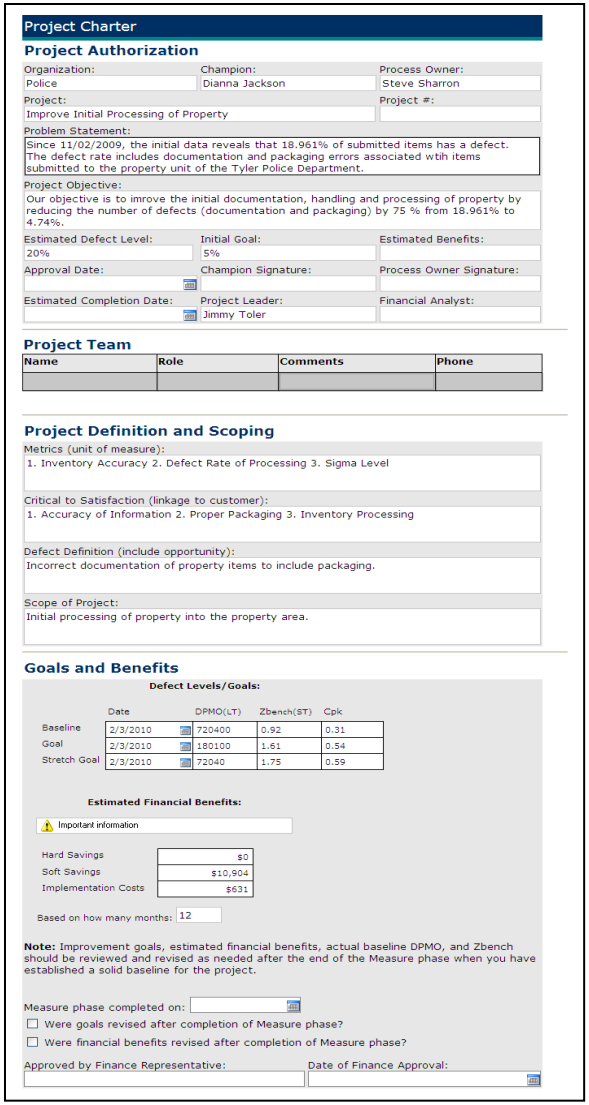
Project Selection Process

1. **Development:** *Proposed project charter developed by Green Belt as part of define phase*

2. **Review:** *Charter reviewed by Black Belt/Master Black Belt for appropriate scope and feasibility*

3. **Verification:** *Charter independently reviewed internally (by Finance, etc.) to verify projected benefits*

4. **Selection:** *Charter presented to CPE working group, then executive leadership team for consideration*



Project Charter

Project Authorization

Organization:	Champion:	Process Owner:
Police	Dianna Jackson	Steve Sharron

Project: Improve Initial Processing of Property — Project #:

Problem Statement:
Since 11/02/2009, the initial data reveals that 18.961% of submitted items has a defect. The defect rate includes documentation and packaging errors associated wtih items submitted to the property unit of the Tyler Police Department.

Project Objective:
Our objective is to imrove the initial documentation, handling and processing of property by reducing the number of defects (documentation and packaging) by 75 % from 18.961% to 4.74%.

Estimated Defect Level:	Initial Goal:	Estimated Benefits:
20%	5%	
Approval Date:	Champion Signature:	Process Owner Signature:
Estimated Completion Date:	Project Leader:	Financial Analyst:
	Jimmy Toler	

Project Team

Name	Role	Comments	Phone

Project Definition and Scoping

Metrics (unit of measure):
1. Inventory Accuracy 2. Defect Rate of Processing 3. Sigma Level

Critical to Satisfaction (linkage to customer):
1. Accuracy of Information 2. Proper Packaging 3. Inventory Processing

Defect Definition (include opportunity):
Incorrect documentation of property items to include packaging.

Scope of Project:
Initial processing of property into the property area.

Goals and Benefits

Defect Levels/Goals:

	Date	DPMO(LT)	Zbench(ST)	Cpk
Baseline	2/3/2010	720400	0.92	0.31
Goal	2/3/2010	180100	1.61	0.54
Stretch Goal	2/3/2010	72040	1.75	0.59

Estimated Financial Benefits:

Important information

Hard Savings	$0
Soft Savings	$10,904
Implementation Costs	$631

Based on how many months: 12

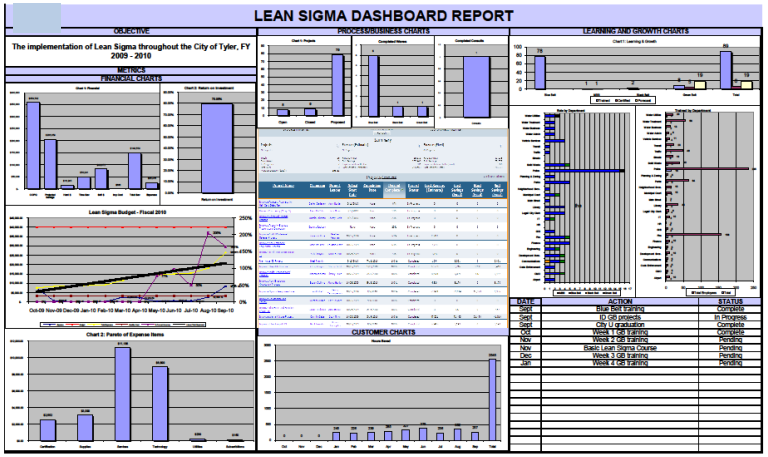
Note: Improvement goals, estimated financial benefits, actual baseline DPMO, and Zbench should be reviewed and revised as needed after the end of the Measure phase when you have established a solid baseline for the project.

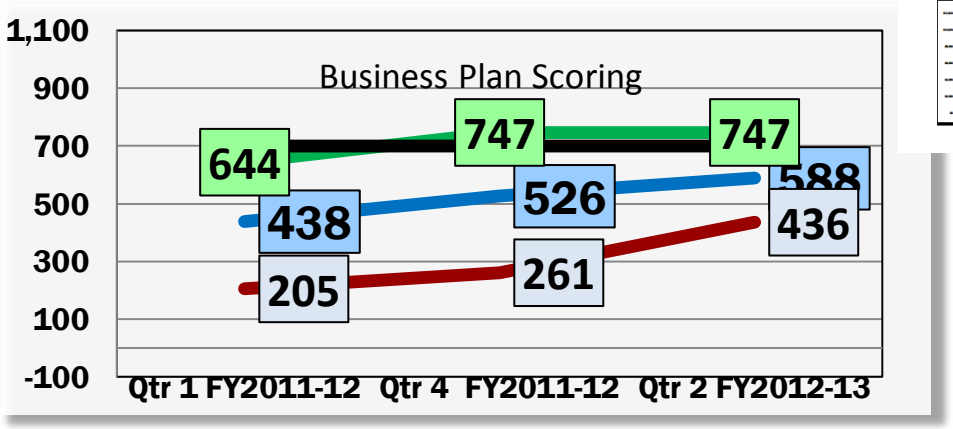
Measure phase completed on:
☐ Were goals revised after completion of Measure phase?
☐ Were financial benefits revised after completion of Measure phase?

Approved by Finance Representative: — Date of Finance Approval:

Monitoring Progress

- Lean Six Sigma/dashboard
- Quarterly/annual report outs
- Strategic planning – tracking organization-wide priority metrics
- Business planning reviews and scoring - using Quality Texas/Baldrige criteria
- Citizen and employee surveys





Project Examples from Other Cities

- Development Services – reduced time for residential plan review
- Fire – Implemented in-house total predictive maintenance program for protective gear
- HR – Improved employee requisition process
- Library – Reduced time to reshelf existing books, and time from purchase to shelf for new books
- Library – Optimized hours open
- Municipal Court – Condensed warrant process time
- Parks – Improved work order system
- Parks – Reduced time required to chalk ball fields
- Police – Increased time on street by reducing time to issue daily equipment from armory

Project Examples from Other Cities

- Police – Reduced dispatcher attrition rate
- Sanitation – Extended life of tires on heavy trucks
- Sanitation – Reduced missed collections
- Sanitation & Fleet – Reduced residential truck hydraulic maintenance costs
- Sanitation & Streets - Reduced costs associated with brush disposal
- Utility Billing - Improved billing process
- Warehouse – Reduced inventory costs
- Water – Optimized magnesium dosage, reducing cost for chemicals
- Water – Reduced inventory cost in water meter shop

Applying Lessons Learned from Others

- It is a **marathon**, not a sprint
- Participants need to **work in their own areas** so projects are considered part of their current job
- Senior **managers must actively steer**, while **participants push for progress** from organizational layers
- The **optimum ratio of Green Belts to Black Belts** is critical to mentoring and successful project completion
- The **indirect benefits are even greater** than the direct benefits

Indirect Benefits – Not Just About Saving $$$

- **Enhanced Responsiveness** for Citizens/Customers
- **Increased Capacity** of Existing Workforce (Saving Time)
- Improved Organizational Communications
- Employee Empowerment + Job Enrichment = **Motivated Workforce**
- Opportunity to **Differentiate Ourselves** in a Positive Way

Next Steps for Deployment

- Using existing resources, hire Master Black Belt – **January, 2015**
- Recruit and begin in-house training of up to 50 Green Belts from all levels of the organization in various departments – **February/March, 2015**
- Progress report to City Council – **May, 2015**