

# **The Vision of Six Sigma**

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## **A Roadmap for Breakthrough**

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**1994**

**Sigma Publishing Company**

Phoenix, Arizona, USA

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## **“The Vision of Six Sigma: A Roadmap for Breakthrough”**

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Fax: (602) 460-1001

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Sigma Publishing Company

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Phoenix, Arizona USA 85048

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Title of Publication, ISBN#

Your Name, Phone, Fax, Company, Address

THE VISION OF SIX SIGMA: A ROADMAP FOR BREAKTHROUGH

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### **Library of Congress Cataloging in Publication Data**

Harry, Mikel J.

The Vision of Six Sigma.

Includes Bibliography and References

1. Quality control - Statistical methods. 2. Six Sigma

I. Title

ISBN 0-9643555-2-3

Current Printing (last digit)

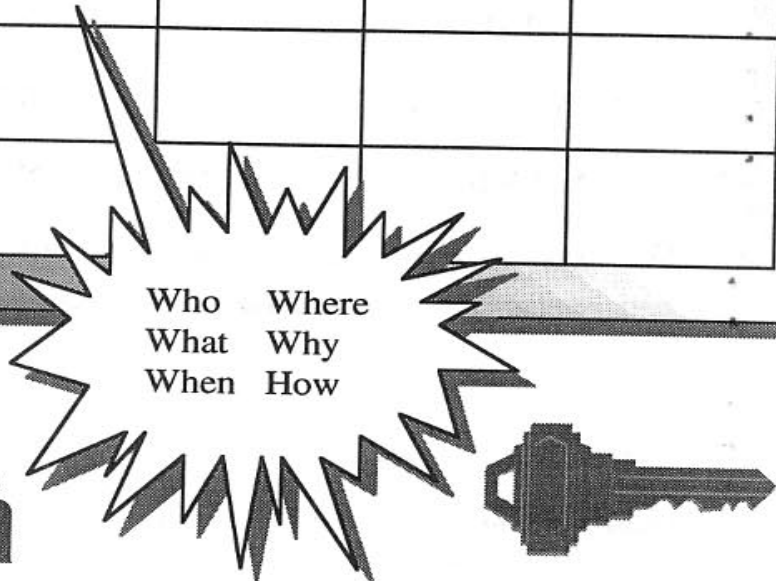
6 5 4 3 2 1

PRINTED IN THE UNITED STATES OF AMERICA

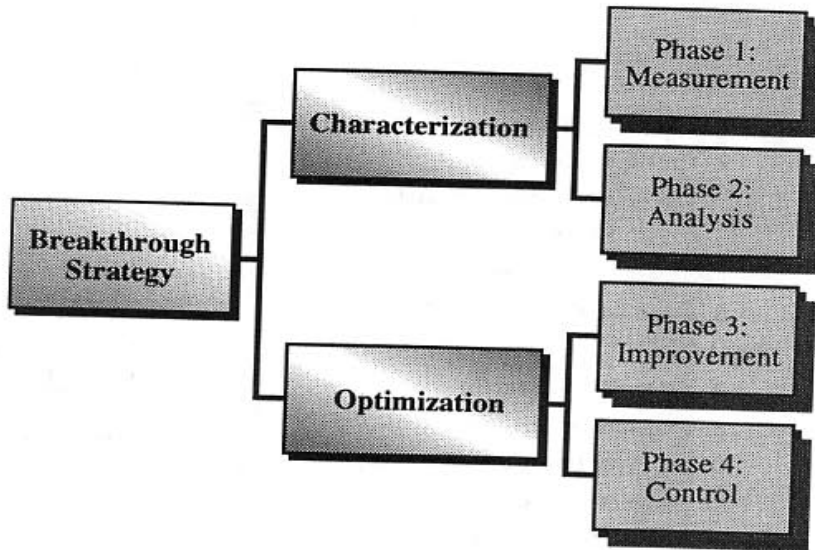
**To the Memory of Bill Smith**

# The Application Tactics

<b>Factory XYZ</b>		Measure	Analyze	Improve	Control
	Plan				
	Tools				
	Procedures				
	Training				
	Application				
	Review				



# The Breakthrough Phases



**Phase 1 (Measurement)** This phase is concerned with selecting one or more product characteristics; i.e., dependent variables, mapping the respective process, making the necessary measurements, recording the results on process "control cards," and estimating the short- and long-term process capability.

**Phase 2 (Analysis)** This phase entails benchmarking the key product performance metrics. Following this, a gap analysis is often undertaken to identify the common factors of successful performance; i.e., what factors explains best-in-class performance. In some cases, it is necessary to redesign the product and/or process.

**Phase 3 (Improvement)** This phase is usually initiated by selecting those product performance characteristics which must be improved to achieve the goal. Once this is done, the characteristics are diagnosed to reveal the major sources of variation. Next, the key process variables are identified by way of statistically designed experiments. For each process variable which proves to be leverage in nature, performance specifications are established.

**Phase 4 (Control)** This phase is related to ensuring that the new process conditions are documented and monitored via statistical process control methods. After a "settling in" period, the process capability would be reassessed. Depending upon the outcomes of such a follow-on analysis, it may be necessary to revisit one or more of the preceding phases.

# The Breakthrough Roadmap

*Six Sigma Breakthrough Strategy*



**Measurement**

- 1 Select Key Product
- 2 Create Product Tree
- 3 Define Performance Variables
- 4 Create Process Map
- 5 Measure Performance Variables
- 6 Establish Performance Capability

**Analysis**

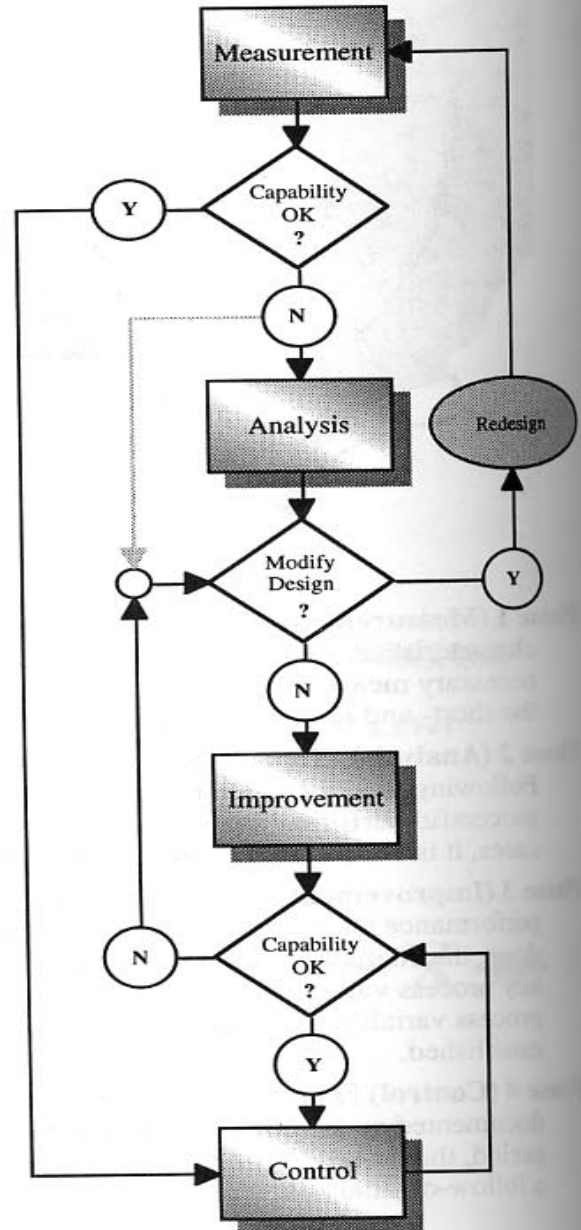
- 7 Select Performance Variable
- 8 Benchmark Performance Metric
- 9 Discover Best-in-Class Performance
- 10 Conduct Gap Analysis
- 11 Identify Success Factors
- 12 Define Performance Goal

**Improvement**

- 13 Select Performance Variable
- 14 Diagnose Variable Performance
- 15 Propose Causal Variables
- 16 Confirm Causal Variables
- 17 Establish Operating Limits
- 18 Verify Performance Improvement

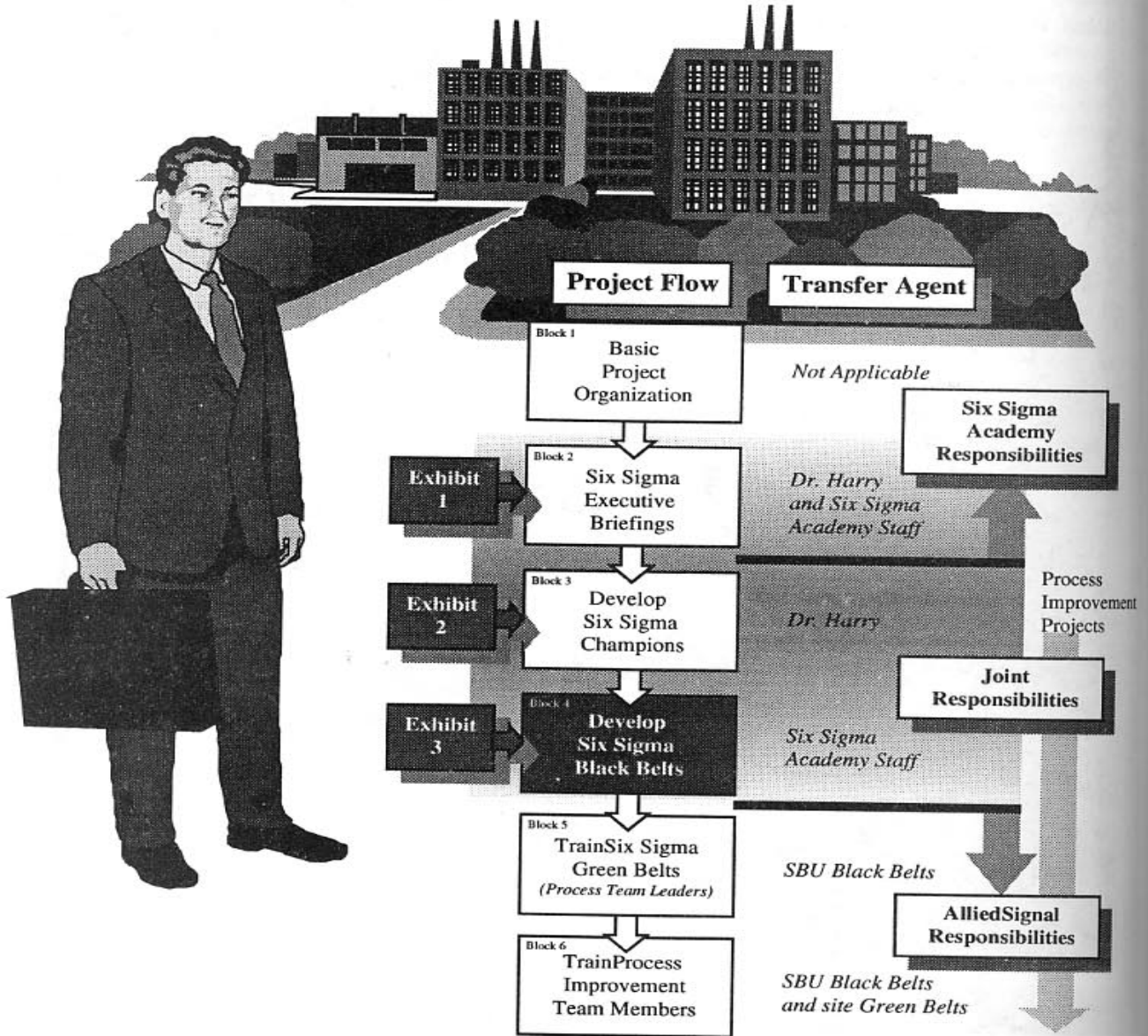
**Control**

- 19 Select Causal Variable
- 20 Define Control System
- 21 Validate Control System
- 22 Implement Control System
- 23 Audit Control System
- 24 Monitor Performance Metrics



# The AlliedSignal Deployment Plan

## Six Sigma Black Belts



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# Exhibit 3.1 - Black Belt Certificate

*Six Sigma Black Belt Certification Program*





## Exhibit 3.2 - Certification Process

### Six Sigma Black Belt Certification Program

**Description:** Prior to initiating the certification process, the SBU Six Sigma Champion identifies 25-30 Black Belt Candidates from within the SBU. The intent is to create a relatively homogeneous group of candidates in terms of the organizational structure and geographic site locations. Following this, the Champion meets with the Master Black Belt so as to coordinate the program delivery. The program delivery is divided into 4 instructional sessions, where each session correlates to one of the four phases contained within the Six Sigma Breakthrough Strategy.

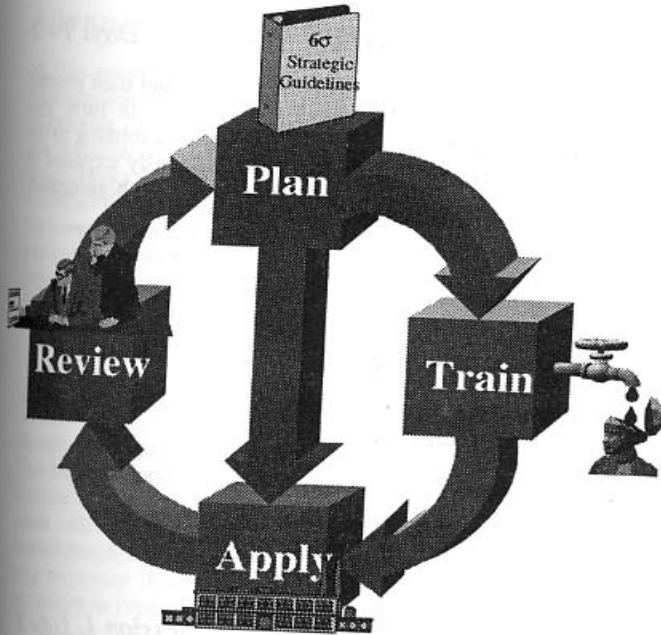
In terms of delivery, each instructional session contains 3 days of classroom activity followed by a 21 day on-the-job (OJT) application experience. During the OJT exercise, the Black Belt Candidates are supported and mentored by a visiting Master Black Belt. Each candidate's OJT results are reviewed and critiqued by the instructor (Master Black Belt), local Six Sigma Champion, and the Candidate's classmates. This is called the "Standard Six Sigma Review." From this perspective, we see that each of the 4 instructional sessions follows the Plan-Train-ApPLY-Review (PTAR) delivery model.

As should be apparent, the Six Sigma Black Belt Certification Process is founded upon the merits and benefits most commonly associated with a closed-loop feedback system. The terms and definitions related to this process are located in Exhibit 3.3.

	Event	Cycle	Activity Description	Duration
1st Month	1	•	Initial Meeting and Planning Session	2 days
	2	1	Champion Coordination Meeting	1 day
	3	1	Session 1: Black-Belt Training	3 days
	4	1	On-The-Job Application Exercise	21 days
2nd Month	5	2	Champion Coordination Meeting	1 day
	6	2	Standard Six Sigma Review	1 day
	7	2	Session 2: Black-Belt Training	3 days
3rd Month	8	2	On-The-Job Application Exercise	21 days
	9	3	Champion Coordination Meeting	1 day
	10	3	Standard Six Sigma Review	1 day
4th Month	11	3	Session 3: Black-Belt Training	3 days
	12	3	On-The-Job Application Exercise	21 days
	13	4	Champion Coordination Meeting	1 day
	14	4	Standard Six Sigma Review	1 day
	15	4	Session 4: Black-Belt Training	3 days
	17	•	Contingency	6 days

# Exhibit 3.7 - Training Strategy

*Six Sigma Black Belt Certification Program*

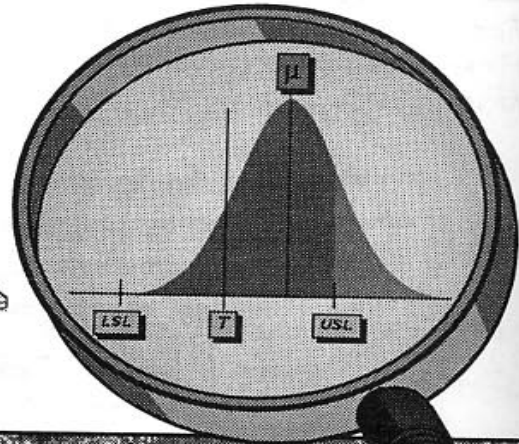
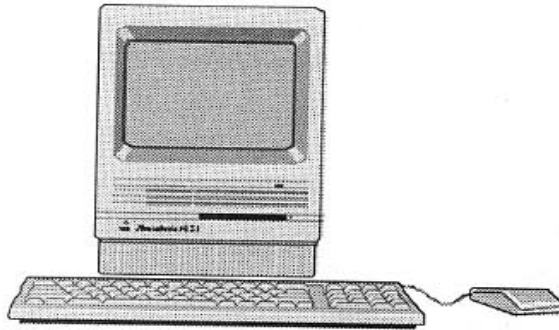


The program delivery follows the Six Sigma Plan-Train-Apply-Review (PTAR) model. As should be apparent, such a model is founded upon the merits and benefits most commonly associated with a closed-loop feedback system.

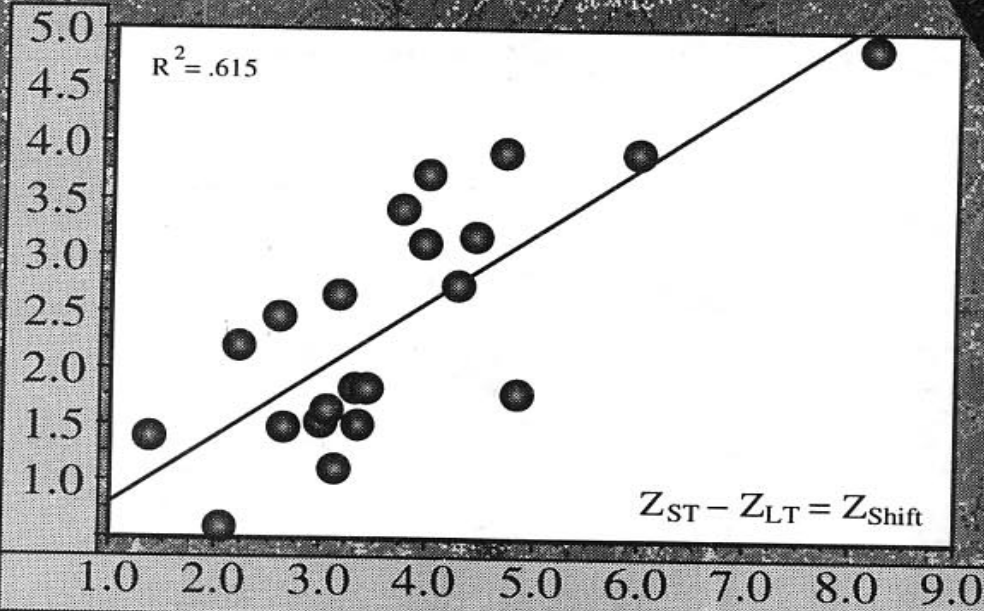
Event	Cycle	Activity Description
	1	• Initial Meeting and Planning Session
Phase 1: Measurement	2	1 Champion Coordination Meeting
	3	1 Session 1: Black-Belt Training
	4	1 On-The-Job Application Exercise
	5	2 Champion Coordination Meeting
Phase 2: Analysis	6	2 Standard Six Sigma Review
	7	2 Session 2: Black-Belt Training
	8	2 On-The-Job Application Exercise
	9	3 Champion Coordination Meeting
Phase 3: Improvement	10	3 Standard Six Sigma Review
	11	3 Session 3: Black-Belt Training
	12	3 On-The-Job Application Exercise
	13	4 Champion Coordination Meeting
Phase 4: Control	14	4 Standard Six Sigma Review
	15	4 Session 4: Black-Belt Training
	16	4 On-The-Job Application Exercise
	17	• Contingency



# Diagnosing Process Performance



Long-Term Capability  
(Z<sub>LT</sub>)

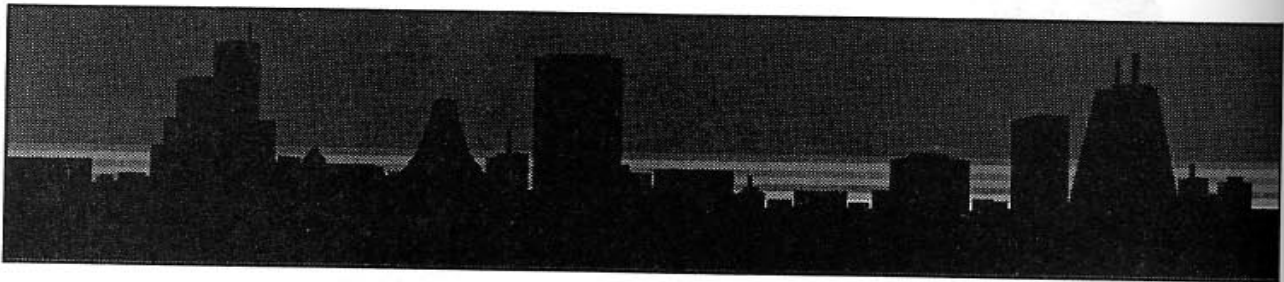


Short-Term Capability  
(Z<sub>ST</sub>)

Data Courtesy of Asea Brown Boveri

## Some Landmark Events

- 1979** • "Our Quality Stinks."
- 1980** • Corporate Quality Officer named
- 1981** • Motorola Training Center established  
5 year, 10x quality improvement goal set
- Benchmarking revealed 10 x not enough
- 1984** • Communications Sector staff meeting
- 1985** • Communications Sector begins total defect per  
unit measurement July - Manufactured Products  
November - Sales Orders
- 1986** • Chairman changes agenda of customer visits
- 1987** • Corporation adopts Six Sigma
- 4 year, 100x quality improvement, Six Sigma  
goal set
- 1992** • 2 year, 10x continuous improvement goal set



# Nature of the Problem

*RF Design Analysis & Optimization*

May 10, 1987

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