Introduction to Master Black Belt

Learning objectives:

1. Understand the fundamentals of Lean and Six Sigma.
2. Identify the roles and responsibilities of the different actors in the implementation and monitoring of the philosophy.
3. Understand the elements of the Shingo Prize Model.

Content

I. Background
II. Lean Six Sigma Evolution
III. Implementation Strategy
IV. Lean Six Sigma Principles
V. Why do some organizations fail at implementation?
VI. Lean Six Sigma Roles and Functions
VII. How to track progress?
VIII. Shingo Prize Model
IX. Lean Company Assessment

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I. Background

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In most cases, companies that implement quality improvement systems often do so:

- Without strategy alignment and having full management understanding and support
- Only for the key processes
- Managed by people directly responsible for the areas where these are implemented
- Without professional support to ensure the correct implementation of the philosophy, methodology, and tools
- Without standardizing processes
- Without follow-up after project completion

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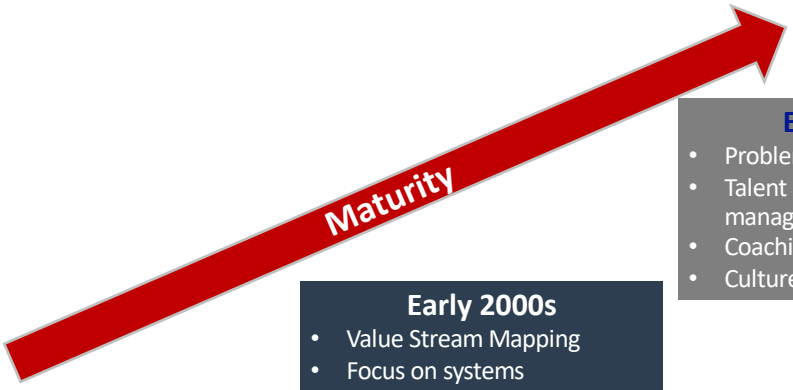
II. Lean Six Sigma Evolution



Early 1990s
- 5S Housekeeping in all areas
- Popcorn Kaizen
- The 'war' on waste
- Lean Six Sigma evangelists
- Tools only

Early 2000s
- Value Stream Mapping
- Focus on systems
- Combination of tools and teamwork

Early 2010s
- Problem-solving
- Talent development and management
- Coaching
- Culture & Techniques

3

Training & Certification

Capacity Development

Philosophy
1 – **Leadership**
- Strategy & KPIs
- Value Stream teams
- Training

Kaizen
2 – **Stability**
- Visual Management
- 5S Housekeeping
- Standardization

Lean
3 – **Effectiveness**
- Value Stream Mapping
- Continuous Flow
- Eliminate waste

Six Sigma
4 – **Optimization**
- Control key variables
- Statistical tools
- Reduce variability

DFSS
5 – **Robust Design**
- Agile design
- Lean company
- Products & services

6 – **Work Systems**
- Innovation
- Supply chain
- Sustainability

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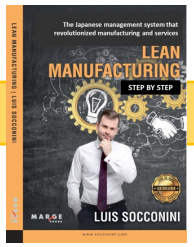
Lean Six Sigma



- White Belt
- Yellow Belt
- Green Belt
- Black Belt
- Master BB

Lean Six Company

- Mkt & Sales
- Manufacturing
- Accounting
- Design
- Logistics
- Quality
- Maintenance
- Energy
- IT

Lean SS Industry

- Healthcare
- Hospitality
- Restaurant
- Government
- Agriculture
- Education
- Mining
- Banking
- Insurance
- Non-profit

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III. Implementation Strategy

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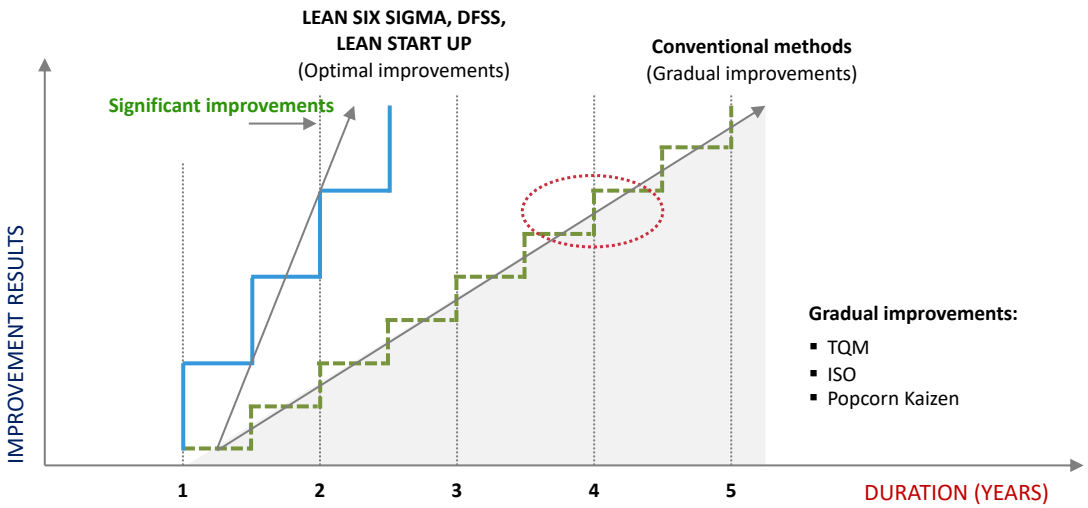

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Lean Six Sigma

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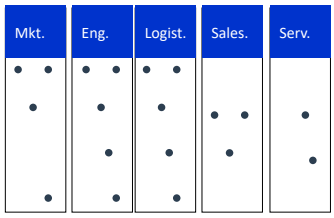
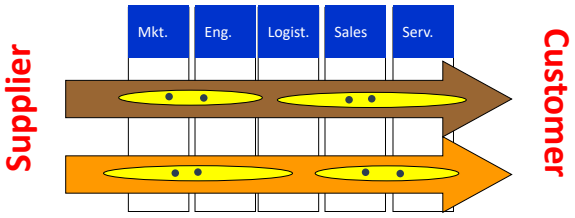
Traditional



Lean Six Sigma



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Lean Six Sigma is a **philosophy** that improves productivity and profitability of organizations by eliminating all non-value-adding factors and activities

Lean Company

Design Logistics Accounting Human Development Products & Services	Manufacturing Maintenance Safety Quality IT

Improve **Prevent** **Solve**

Define: QFD, A3, Kano, Canvas, etc.
Measure: VSM, Sampling, Gauge R&R, etc.
Analyze: Statistics, Balance Chart, FMEA, etc.
Improve: Kanban, Continuous Flow, SMED, TPM, etc.
Control: SPC, Control Plan, Poka Yoke, Std. Work

5S Housekeeping
Visual Administrator
Standardized Work
Basic Tools

Strategic Planning: Canvas, Box Score
LSW, Gemba, Kata, Scrum
Value Stream Structures
Talent Development
Management Tools

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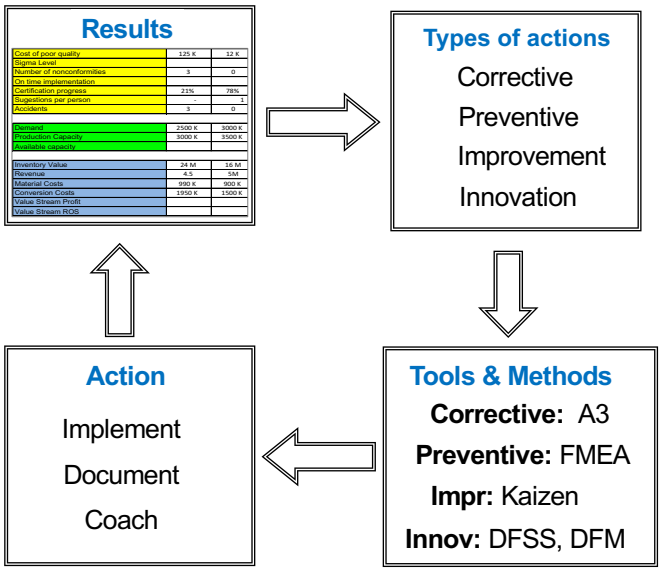
Tools & Methodologies



LEAN	SIX SIGMA
Define	
Hoshin Kanri	Quality Function Deployment
A3	Needs Tree
	Kano Model
Measure & Map	
Time Studies	SIPOC Diagram
Value Stream Map	Measurement System
Spaghetti Diagram	Sampling
Analyze	
Waste Analysis	Basic Statistics
Balance Chart	Histogram
Bottleneck Analysis	Process Capability
Capacity Analysis	Sigma Level
5 Why's	Cause & Effect
Correlation	FMEA
Improve	
Kaizen	Experimental Design
Continuous Flow	Regression Analysis
Kanban	Total Productive Maintenance
Quick Setup	
Control	
Standardized Work	Plan Control
Poka Yoke	Statistical Process Control

Structure & Results

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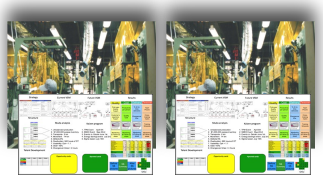
	Base Line	Goal
NPS	55%	70%
Revenue	4.5 M	5 M
Days to launch new products	123	45
Market Share	12%	15%
Facility sigma level	3.3	4.2
Ontime deliveries	78%	99%
OEE	53%	78%
Delivery time (days)	12	8
Inventory Value	24 M	16 M
Inventory turns	4	12
Conversion Costs	2.1 M	1.25 M
Cost of poor quality	125 K	12 K
Sigma Level		
Number of nonconformities	3	0
On time implementation		
Certification progress	21%	78%
Sugestions per person	-	1
Accidents	3	0
Demand	2500 K	3000 K
Production Capacity	3000 K	3500 K
Available capacity		
Inventory Value	24 M	16 M
Revenue	4.5	5M
Material Costs	990 K	900 K
Conversion Costs	1950 K	1500 K
Value Stream Profit		
Value Stream ROS		

BALANCED SCORECARD

Guidelines	Objectives	Goal	(YTD)	January	February	March	April	May
Financial	Economic Value Added	4%						
	ROI	12%						
	RONA	18%						
	$ Backlog	$100,000						
	Throughput	$4,010,000						
	Cash Flow	$800,000						
Commercial	Profit / Loss	$2,060,000						
	Revenue	$5,000,000						
	Net Promoter Score	78%						
	Market Share	22%						
Processes	Conversion Costs	$1,250,000						
	Direct Cost	$990,000						
	Inventory Value	$650,000						
	Total Investment	$27,364,000						
People	Internal NPS	90%						
	Employee engagement	90%						
	Turnover	1%						
	Talent Development	85%						

Day by-the-hour boards



Value Stream boards

IV. Lean Six Sigma Principles

RESULTS	Create value for the customer
STRATEGY & LEADERSHIP	Constancy of purpose and thinking systematically
CONTINUOUS IMPROVEMENT	Waste reduction, continuous flow, quality at the source, seeking perfection
CULTURE	Attitudes, standards, values, beliefs, and respect for all individuals

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V. Why do some organizations fail during implementation?

Leadership

Focus

Resources

Opportunities

- Executive sponsors not fully understanding projects or initiatives
- Treating projects as isolated efforts
- Poor or no alignment with strategy and vision
- Poor teamwork
- Lack of executive involvement & engagement
- Expecting immediate results from a small amount of work

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Why do some organizations fail when implementing LSS?

Leadership

Focus

Resources

Opportunities

- Implementation is limited to specific areas or processes (e.g., just manufacturing)
- Little understanding of financial impact
- Change in processes but not in mindset
- Working on projects but not on developing long-term knowledge
- Implementing tools but not systems

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Why do some organizations fail when implementing LSS?

Leadership

Focus

Resources

Opportunities

- Only specific people are assigned to projects
- There are always many reasons for opposing proposed projects
- Time and money are invested in training but not in practicing and implementing knowledge
- Poor resource allocation prevents achievement of changes and results

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Why do some organizations fail when implementing LSS?

Leadership

Focus

Resources

Opportunities

- Work system development
- Best practices
- Self-directed work teams
- Strategic processes
- Learning & new knowledge creation
- Customer and supplier development
- High-value product development

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Why do some organizations fail when implementing LSS?

Lack of clear strategic direction

Lack of alignment and communication

Traditional structure

Poor teamwork and obsolete work structures

Wrong tool implementation

And under-usage: only 4-5 % of tools are implemented

Incorrect project management and monitoring

Not assigning task ownership nor deadlines

Inaccurate results tracking and measuring

Measurements by areas and on a monthly basis

Lack of resources and commitment

Absent managers and low participation

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DEVELOPING ORGANIZATIONS

Common waste when implementing Lean Six Sigma

Having certified personnel	Not using their knowledge optimally
Developing certification projects	Not launching additional projects since there are no incentives or motivation
Implementing either Lean **or** Six Sigma	Not capitalizing on the full potential of Six Sigma and/or DFSS
Prioritizing production projects	Not optimizing LSS implementation to define a strategy
Developing courses and internal certifications	Not acquiring new learning or knowledge
Many tools are taught	No more than 4% are used (and only in fewer than 10% of the processes)

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VI. Lean Six Sigma Roles & Functions

Description of roles and skills

MANAGEMENT TEAM

CHAMPION

Responsible for budget and resources

Lean Six Sigma Project Sponsor

YELLOW BELT

Lean Practitioner

Ensures philosophy is sustained on a daily basis

GREEN BELT

Small Project Leader

Provides specific support.

Ensures sustainability in his/her area of responsibility.

BLACK BELT

Project Leader & Coach

Ensures correct implementation for the value streams or service families.

MASTER BLACK BELT

Experienced implementation expert and BB coach

Expert in practicing Lean Six Sigma throughout the company and supply chain

TEAMS

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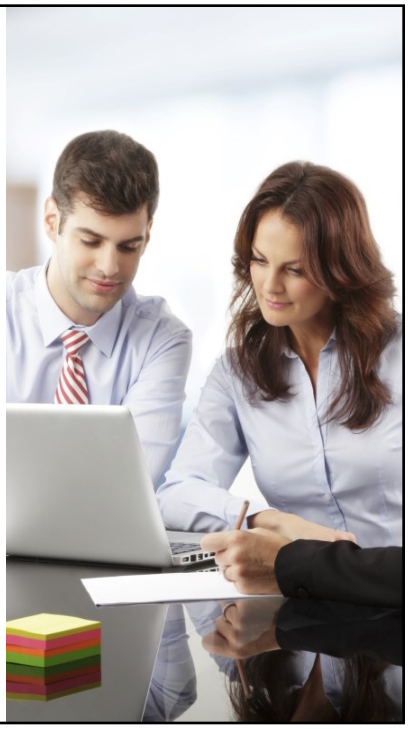
MANAGEMENT TEAM

- Establishes the organization's vision, mission, and cultural elements
- Make important strategic decisions
- Defines strategic key performance indicators
- Tracks the organization's overall results
- Achieves results through proper management
- Manages change to develop work systems and mindset
- Accountable to customers and shareholders



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CHAMPION

- Typically, is a member of the management team
- Identifies implementation needs for strategic [Lean Six Sigma] projects
- Supports and oversees the implementation
- Supervises teams and projects' objectives to ensure scope is maintained
- Removes impediments and alleviates pressure from Black Belts and Green Belts
- Identifies potential improvements and refers them to teams
- Responsible for budget and resource management

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TEAM MEMBERS

- Contribute their professional experience to developing projects
- Participate throughout the entire lifecycle of the projects assigned to them
- Encourage and facilitate teamwork
- Inform and report to project leaders/project managers (Black Belts / Green Belts)
- Generally, dedicate most of their time to one specific function and work either part-time or full-time on projects as they are initiated and assigned

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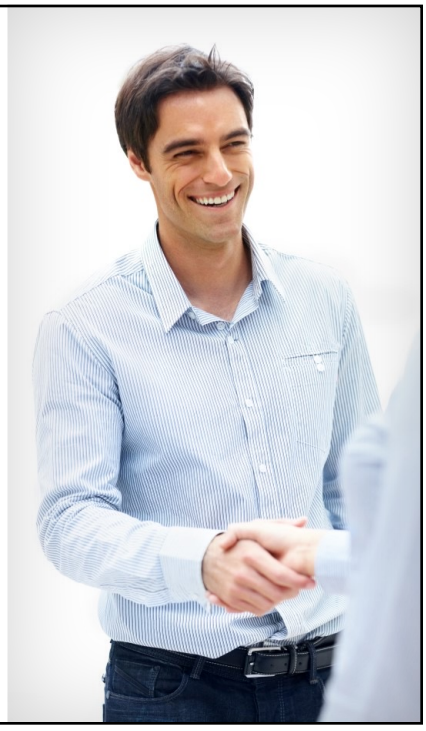
YELLOW BELT

- Active practitioner of LSS philosophy
- Leads small LSS projects and Kaizen events
- Delivers results and constantly improves them
- Has knowledge of Lean tools and methodology
- Generally works on operational and supporting activities
- Helps Green Belts and Black Belts implement complex projects
- Is an active advocate of the philosophy and constantly proposes improvement ideas as well as solutions to problems



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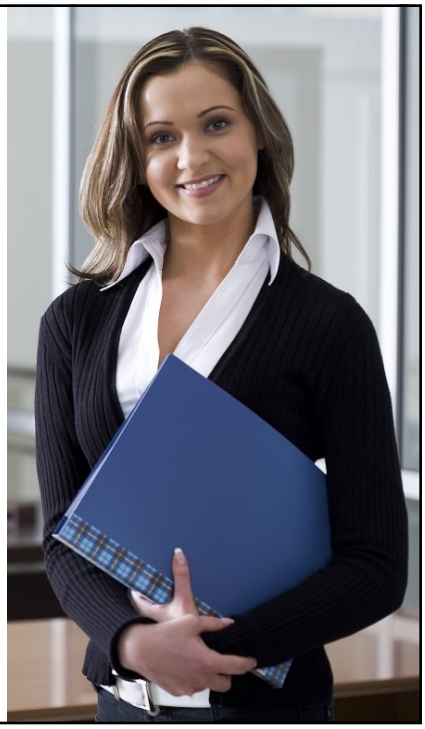
GREEN BELT

- Leads Lean Six Sigma projects of medium complexity
- Has knowledge of statistics and the required methodology to guide teams through project development
- Reports to the leader of the organization: the Six Sigma Champion
- Coached by Black Belts regarding methodologies
- Some GBs dedicate 100% of their time to project development and coaching operational personnel on basic tools implementation
- Oversees own projects in his or her functional area



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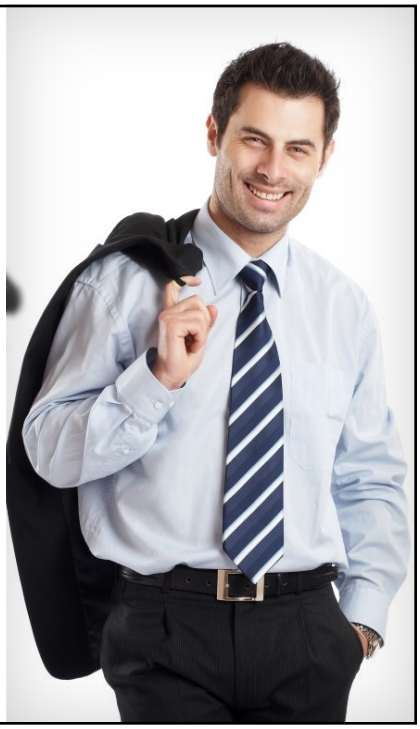
BLACK BELT

- Experienced Lean Six Sigma project leader across all value streams (Products, Services, R&D, etc.), support processes (Logistics, Finance, Maintenance, IT, Quality Assurance, etc.), suppliers, and customers
- Ensures the right implementation of tools and methodologies
- Reports to the management team
- Guided by MBBs in his/her training, mentoring, and methodologies
- Generally spends 100% of his or her time on project development, as opposed to daily operational activities
- Coaches Green Belts
- Accountable for project delivery and documentation
- The projects he or she works on are generally related to value streams or support processes



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MASTER BLACK BELT

- Committed to ensuring that the correct implementation of Lean Six Sigma philosophy, methodologies, and tools are followed
- Experienced leader of strategic projects
- Coaches Black Belts and provides support for their projects and certifications
- Coordinates the correct execution (methodology) of the organization's projects and proposals
- Develops and promotes LSS implementation across supply chains and support processes (suppliers and customers)
- Evaluates the maturity and development of the LSS philosophy across the entire organization
- Designs the master implementation and development plan for the company's Lean Six Sigma initiatives

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MASTER BLACK BELT

- Leader high-complexity strategic projects
- Oversees the process of knowledge generation as well as its use across the organization
- Provides support for and coordinates the implementation of improvement tools and methodologies for all internal processes
- Coordinates strategy development and updating in a systematic way
- Facilitates the interaction between product and process experts and decision-makers
- Promotes continuous improvement for product and process innovation
- Implements improvement tools in management accounting processes. (Budgeting, value stream accounting, and strategy monitoring)

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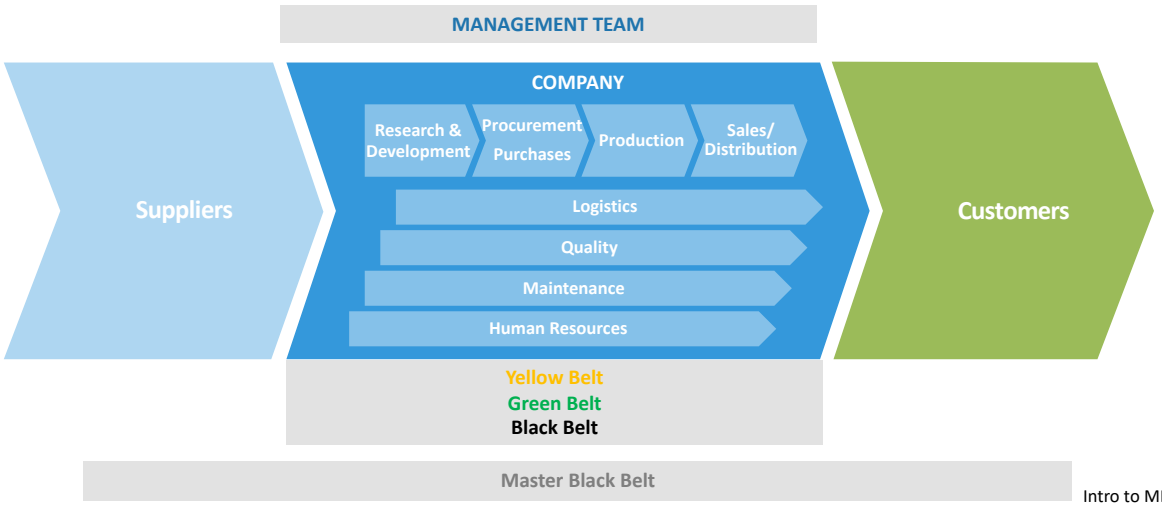
Value Stream Scope

Master Black Belts support continuous improvement efforts throughout the entire supply chain.



Scope

	R & D	HR	Marketing	Sales	Accounting & Finance	Supply Chain	Manufacturing	Services	Quality	Maintenance	IT	
Management systems												
Strategic planning & Box score	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	Lean Management
Value stream structure	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	
Talent development	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	
Essential systems												
5S Housekeeping	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	White Belt
Visual management	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	
Standardized work	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	
Situational systems												
Problem solving	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	Yellow Belt Green Belt Black Belt
Defect prevention	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	
Continuous improvement	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	
Control	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	
Innovation	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	

Master BB

VII. How to track progress?

Comparing results

We need to objectively evaluate the progress and development of the lean Six Sigma culture

- Who – and what – should we evaluate?
- How do we evaluate objectively?
- How should we track progress?
- How do we compare results among building plants, offices, etc.?
- How do we certify processes, and not just people?
- How do we know if any effort has paid off?

VIII. Shingo Prize Model

The Shingo Model strives for things to happen with minimal supervision.

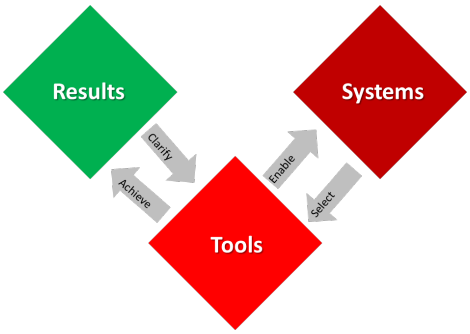
Focus should be on behaviors – as compared to results.

Once principle-based behaviors are established, results are eventually [and naturally] achieved.

Source:
The Shingo Prize Model for Operational Excellence
Jon M. Huntsman School of Business – Utah State University

Shingo Prize Model

- **System**: A set of elements that interrelate with each other to generate results. Tools and tasks are highly integrated to achieve an objective: *production plan, budget, income statement, hiring, etc.*
- **Tool**: Device or article that perform specific actions: VSM, 5S Housekeeping, etc.
- **Results**: Organizations design systems in order to achieve results and choose tools that support such systems.



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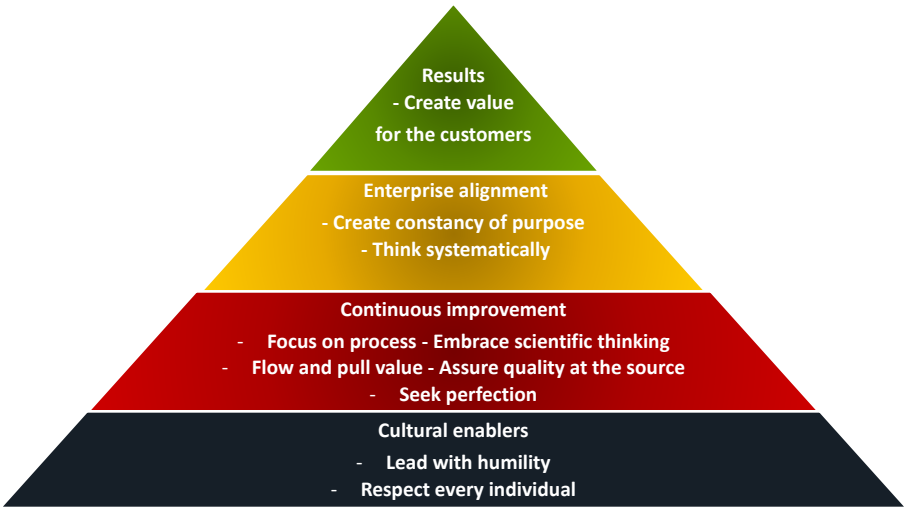
Guiding Principles

Shingo Prize model



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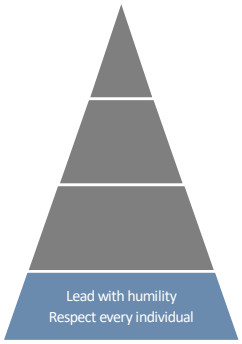
Cultural enablers



Lead with humility

Willingness and ability to listen carefully and create an environment of trust where teamwork and constant communication are encouraged.

Example:

Being open to all ideas and being present at the place where value is created – observing and asking questions.

Respect every individual:

When people feel respected, they give far more than their hands; they give their minds and hearts.

Example:

Create development plans for employees and involve them in the improvement of your own job; place safety first and continuously provide training and coaching.

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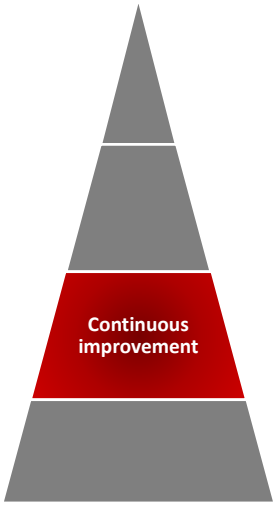
Continuous Improvement



Focus on process

All outputs are created by processes acting upon inputs. It is impossible to obtain good results with deficient processes.

Example:

When an error occurs, focus on improving the process – ensuring all proper inputs and needed resources are provided.

Seek perfection

The search of perfection, even knowing it is fundamentally impossible to achieve, brings out the best in people and creates a culture and mindset of continuous improvement.

Example:

Create long-term solutions instead of temporary fixes.

Continuously simplify processes.

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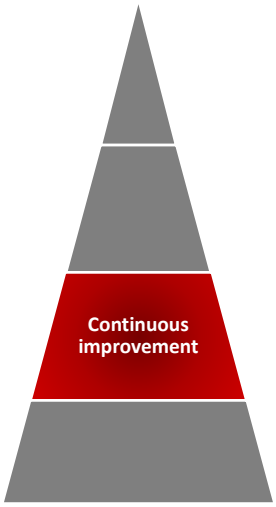
Continuous Improvement



Flow and Pull value

Value for customers is maximized when it is created based on real demand and in an uninterrupted manner (i.e., removing waste from the process).

Example:

Avoid producing more than customers need, and ensure inputs and resources are available when needed.

Assure quality at the source

Quality can only be assured by stopping and fixing processes rather than planning to fix them later. In other words, by not passing defects forward.

Example:

Organize workplaces so errors are visible and easily identified; stop and fix these problems.

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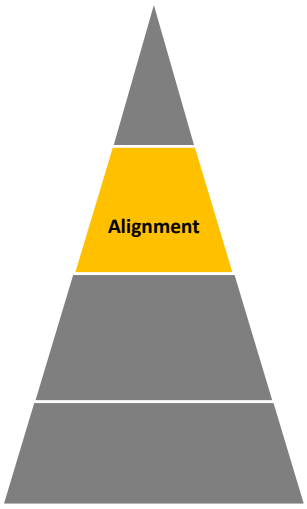
Enterprise alignment



Create constancy of purpose

Find agreement on philosophical and strategic direction (i.e., "Why does the organization exist?") to define a vision and align it with execution while adapting to change and taking risks.

Example:

Design a strategy, communicate direction and purpose of the organization, and establish clear, achievable goals (and continuously track their progress).

Think systematically

Understand how elements in a system are interdependent and work together.

Example:

Remove barriers of communication, ideas, decision-making.

Communicate daily goals (organized by value stream) for all teams, processes, and resources involved.

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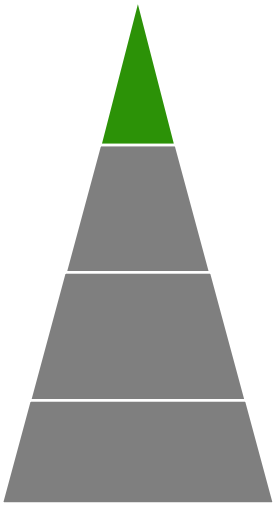
Results



Great results are the outcome of following the principles that govern the results.

Create value for the customer

Value must be defined based on the perception of what the customer wants and is willing to pay.

Example:

Understand customer needs and expectations.

Deliver improved products and services that exceeds them.

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Shigeo Shingo

" 'Know-how' alone is not enough!
You must 'Know-why.'

"All too often, people visit other plants
Only to copy their tools and methods.

"Think in terms of **principles"**

PRINCIPLES "Know-why" → **SYSTEMS** Knowing what, who, when, where → **TOOLS** "Know-how"

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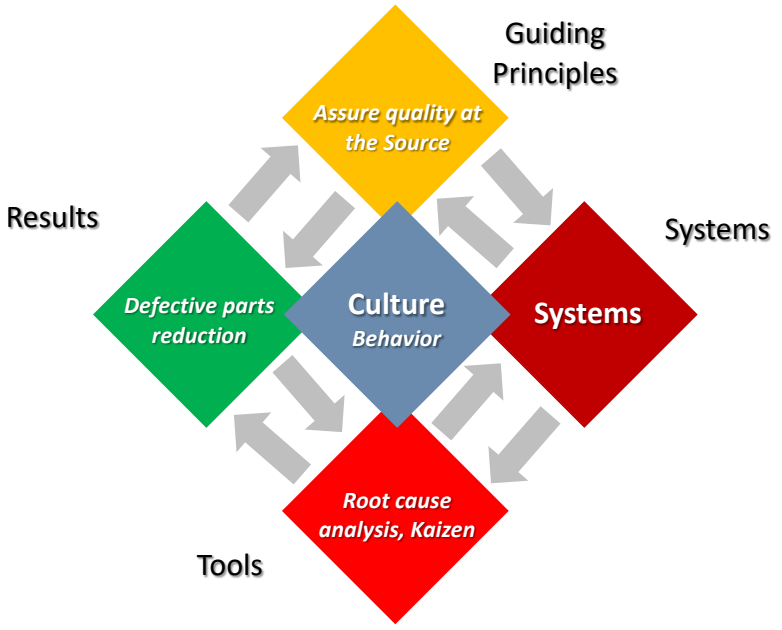

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How do you describe behavior?

Observed:

Behavior can be seen in plain sight

Defined:

Standards of behavior can be defined

Registered:

Each instance of behavior happens at a specific point in time, which can be measured and documented

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How do you describe behavior?

Associates implementing 5S Housekeeping in their respective area(s).

(Observed)

Associates keeping their workplace clean and all material having an assigned place.

(Observed and Described)

Associates keeping their workplace clean *on a daily basis*, and all things having an assigned place and *shown* with *visual aids.*

(Observed, Defined, and Registered)

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Examples of behaviors

Leaders	• Use coaching and daily Gemba walks to ensure all people understand the importance of implementing tools and are using protective equipment.
Managers	• Deliver the necessary tools to their teams for their daily operations and oversee their correct implementation.
Associates	• Use and take care of tools, equipment, and materials during their work period. • Arrive to their training workshops on time and are active participants during these sessions.

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Practical example

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Example of behavior after a product or service is rejected

In Company X, assembly operators have a habit where every time a product is rejected, they hide it due to fear of being blamed or having to provide an explanation.

If we want to achieve excellence, what should be the ideal behavior in this situation?

- ***Operator**: Whenever there is a high level of product rejects in the assembly line, the operator notifies the supervisor so that actions are taken to reduce and remedy the situation.*

- ***Supervisor**: Compliments the operator for identifying and reporting the issue – and pauses production in order to avoid generating further defective products.*

LEAN SIX SIGMA SYSTEM ELEMENTS

System dimensions

CULTURE

The way people in an organization think and act. An organization's personality.

TOOLS AND METHODS

The systems used to bring about significant change in processes and their results

LEADERSHIP

The skills to positively influence people to achieve results and follow a common vision

IX. Lean Company Assessment

		Executive Team	Product Development	Commercial Systems	Value Streams	Human Resources	Accounting & Finance	Logistics	Maintenance	Quality systems	IT	Suppliers
Results (250 points)	Quality											
	Cost/Productivity											
	Delivery											
	Customer satisfaction											
	Employee morale											

		Executive Team	Product Development	Commercial Systems	Value Streams	Human Resources	Accounting & Finance	Logistics	Maintenance	Quality systems	IT	Suppliers
Strategy & Leadership (200 points)	Vision											
	Strategy											
	Structure											
	Project management											
	Results management											
	Change management											
	Commitment											
	Decision-making											
	Daily management											
	Results											

		Executive Team	Product Development	Commercial Systems	Value Streams	Human Resources	Accounting & Finance	Logistics	Maintenance	Quality systems	IT	Suppliers
Improvement and Innovation systems (400 points)	Standardization											
	5S Housekeeping											
	Problem solving											
	Defect prevention											
	Kata											
	Kaizen											
	Lean											
	Six Sigma											
	Innovation											
	Gemba walks											

		Executive Team	Product Development	Commercial Systems	Value Streams	Human Resources	Accounting & Finance	Logistics	Maintenance	Quality systems	IT	Suppliers
Culture (150 points)	Talent development											
	Safety											
	Teamwork											
	Knowledge management											
	Employee acknowledgement											
	Workplace environment											
	Sustainability											
	Environment											
	Social Responsibility											