



## **Advanced Manufacturing Centre**

**The following presentation  
“Lean -- the 4 key factors for success”  
is provided by the kind permission from  
Mr. Brian Heymans, Director of KAIZEN Institute AG**

**March 2005**

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# **Advanced Manufacturing Centre**

## **Lean -- the 4 key factors for success**

**Brian Heymans**  
Director  
KAIZEN Institute AG  
March 2005

# Origins of Lean

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- **Ford production system -- the 20's and 30's**
  - **Mass assembly on an assembly line with fast repetitive cycle times**
  - **Connecting flows**
  - **Lead time from raw material to finished product, 7 days**
  - **Process fast but inflexible**
  - **Little latitude for product variation**
  - **Skills levels raised in one sense, diminished in another**



# Origins of Lean -- WWII

- **WWII Phenomena that predicated lean**
  - Mass training of women using the TWI, JRT methods
  - Operational standards required for military equipment
- **Quality requirements forced new production standards using four Training principles**
  - Standards must be set
  - Good instruction must be established
  - Continued training must be maintained
  - Training must not end too soon
- **Charles Allen the author of TWI**



# **TWI – The Foundation of Lean**

- **TWI has a four step method**
  - Preparation
  - Presentation
  - Application
  - Testing
- **Job Relations Training (JRT) for Supervisors key to long term success of TWI**
- **TWI and JRT the core method of establishing work standards using Job methods approach**
- **TWI became the forerunner of kaizen and PDCA process created by Feigenbaum**
- **TWI spread through Multiplier Principle of certifying and standardizing training of trainers through JIT (Job Instruction Training)**



# **WW II and Rise of Quality**

- **Military insistence on reliability led to focus on quality**
- **Statistical methods from Feigenbaum with students Deming and Juran led to new methods of ensuring standards taught in TWI were adhered to**
- **Unit cost reduction on aircraft assembly led to new approaches to understanding competitive cost models**
- **TWI training enforced use of job methods and analysis using statistical approaches**
- **Learning by doing became the most pervasive instructional strategy**
- **Use of Suggestion Systems grew to support improvement methods**



# From TWI to Lean

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- **TWI introduced into Japan after WWII in the Marshall plan**
- **TQC methods from Job Methods and SPC introduced by Deming and Juran**
- **Job Methods, TWI and Job Instruction training was the foundation of kaizen, or practice of engaging employees in improvement and maintaining standards**
- **TWI transferred to Japan in 1946 and institutionalized in Japanese companies**
- **Return of men to workplace, women to home, effect of TWI lost and it was never re-instituted for returning servicemen**



# **From TWI to TQM to JIT to TPM**

- **TWI foundation of TQC with Deming and Juran major protagonists**
- **Arranged visit to American plants by Japanese executives created learning about TWI, and flow methods at Ford**
- **Shingo and Ohno learned flow methods and developed basic systems of visual factory, flow improvement leading to JIT, SMED and factory production flexibility**
- **Fukuda and others created methods of setting improvement goals**
- **Nakajima and others created role of equipment reliability in JIT**



# **From TWI to TQM to JIT to TPM**

- **No single strategy for “Lean” as we know it today**
- **Japanese focus on quality and reliability, plus reduced design and production lead time became visible in late 1970’s**
- **Oil crisis and competitive pressure started USA use of separate strategies**
- **Crosby’s Quality is free popularized TQM as an initiative**
- **Deming’s return to USA started companies implementing TQM methods**
- **Kaizen, kaikaku the new method of employee involvement using quality circles**



# Strategy Effectiveness

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- **Ability to respond to external environment**
  - customers, suppliers, competitors, economy
- **Ability of internal systems to respond to externals**
  - Systems
  - Culture
  - Technology
  - Leadership
- **Alignment, Flexibility and Reliability of resources and processes to achieve results for competitive advantage.**



# World Class - What Is It

- **Best in Class - Total Quality**
  - Zero defects
  - Waste eliminated, reduced inventory
- **Speed to market - Just in Time**
  - Reliable resources - **Total Productive Maintenance**
  - Flexible resources - **Agile, Lean, Ability to respond**
- **Customer recognition of QCD leadership**
- **Competitor emulation of Strategies and Practices.**



# **What it Takes to Be World Class**

- **Strong management/leadership commitment**
- **Low tolerance of waste**
- **Whole Systems Thinking**
- **Balanced view between Process and Results**
- **Non-Judgmental/Non-Blaming Culture**
- **Increasing involvement of everyone**
- **Persistence and attention to detail.**
- **A focus on the drivers of cost and waste**



# Key learnings from Lean implementations

- **Leadership behaviour**
- **Paying attention to detail**
- **Integrate initiatives/whole system approach**
- **Employee engagement – the heart of change**



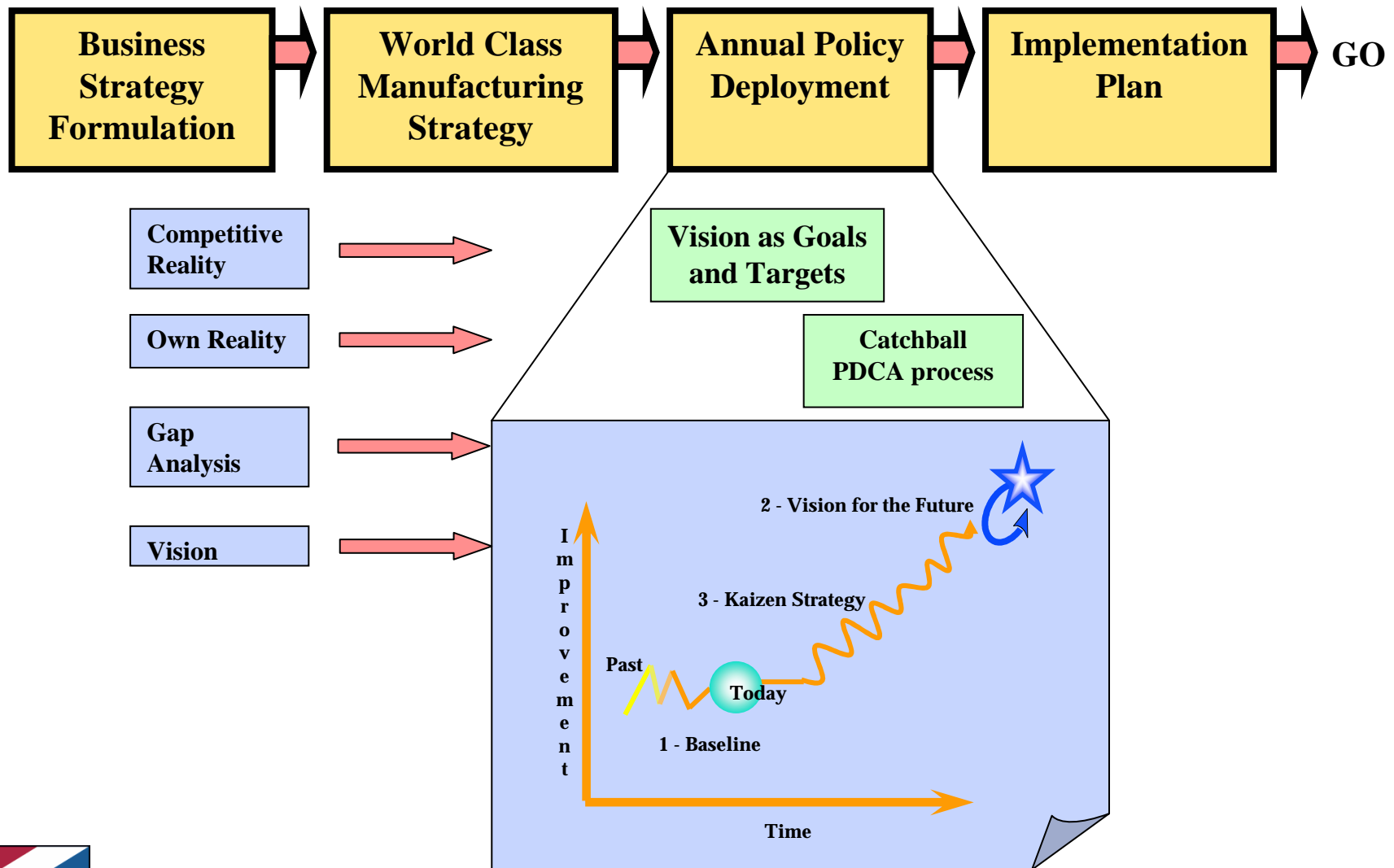
# Desired Leadership Behaviors

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- **Link strategy to “Lean” Action**
  - They see the total picture and understand strategy
- **Listen to the Process**
  - Perceptual intelligence
- **Set Goals/Targets for Improvement**
  - Challenge and foster an employee involvement culture
- **Real action to implement lean**
  - Understand your role



# Integrating Strategy and Policy Deployment



# Typical Relationship Between Improvement Method and Strategic Benefit to Company

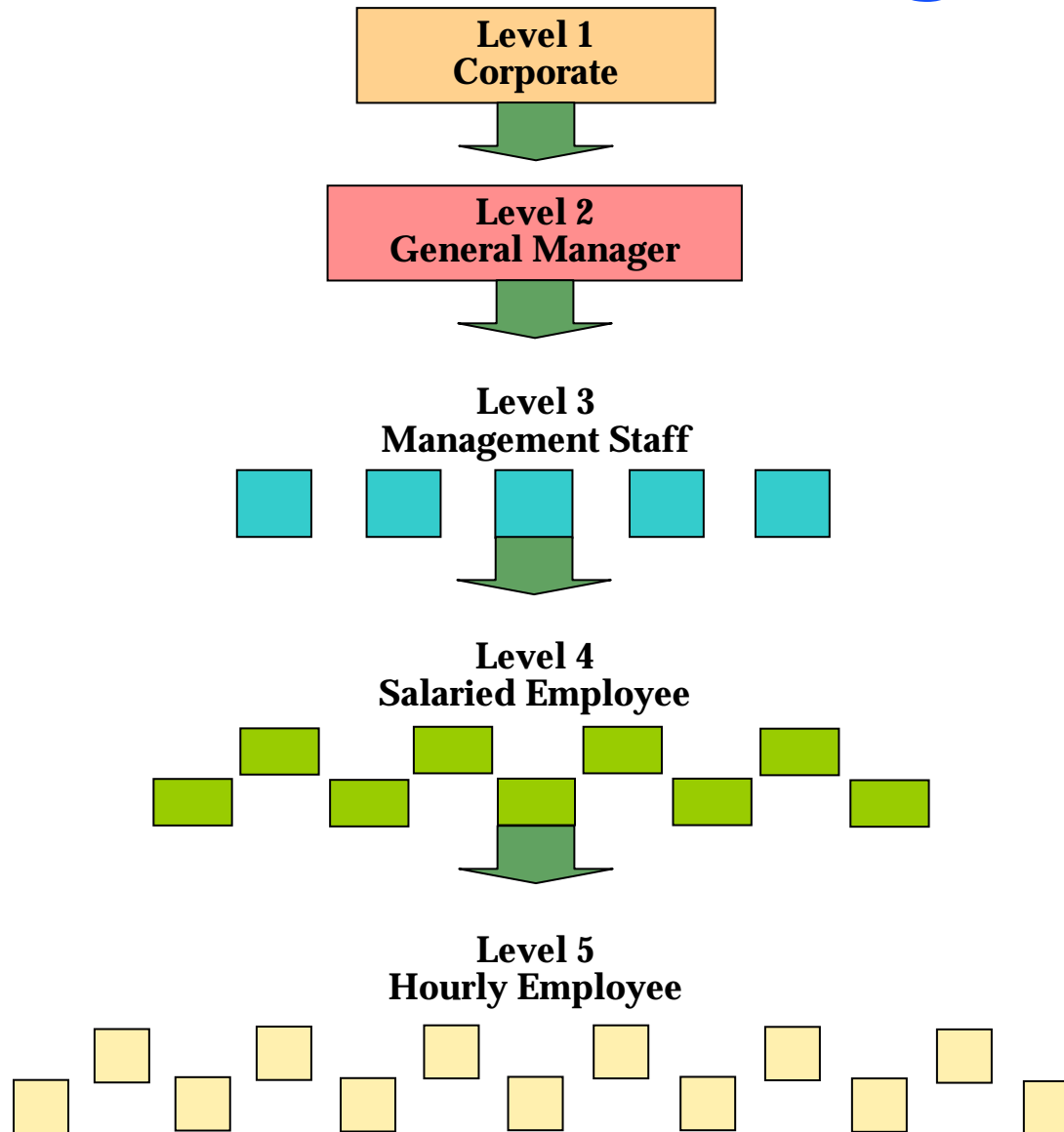
Lean Strategy Method/Approach	→ Immediate Result	→ Business Benefit	Impact on Income Statement	Impact on Balance Sheet
<b>Workcell/One Piece Flow</b>	Reduced lead or production cycle time	On-time delivery	Higher sales potential	Increased ROA & ROI
		Higher productivity per capital invested	Reduced unit cost per part	Increased ROA & ROI
	Production space reduced	Space for more productive use now available	Reduced unit cost from overhead allocation	Increased ROI from buildings
	Reduced WIP in process/line	Space savings	Reduced inventory carrying cost/interest on short-term borrowings	Inventory turns higher
			Reduced depreciation absorption per product	Increased operating capital
	Reduced number of employees on line	Reduced labor cost	Reduced unit cost/improved margin	
	<b>Internal JIT/Improved Flow between Operations</b>	Reduced material handling	Reduced opportunity for error	Reduced cost of double handling
		Reduced scrap	Reduced cost	
Reduced internal WIP		Space savings	Reduced inventory carrying cost/interest on short-term borrowings	Increased operating capital
			Reduced depreciation absorption per product	Increased ROI from buildings



# A Measurement Model



# T-Chart Levels for Targets



# Policy Deployment

Plan and Schedule for \_\_\_\_\_

GOAL	ACTION AND SCHEDULE			RESULTS / MEASUREMENT
	ACTION	RESPONSIBLE PERSON	SCHEDULE 11 12 1 2 3 4	
		○		○

# Policy Deployment

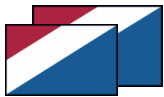
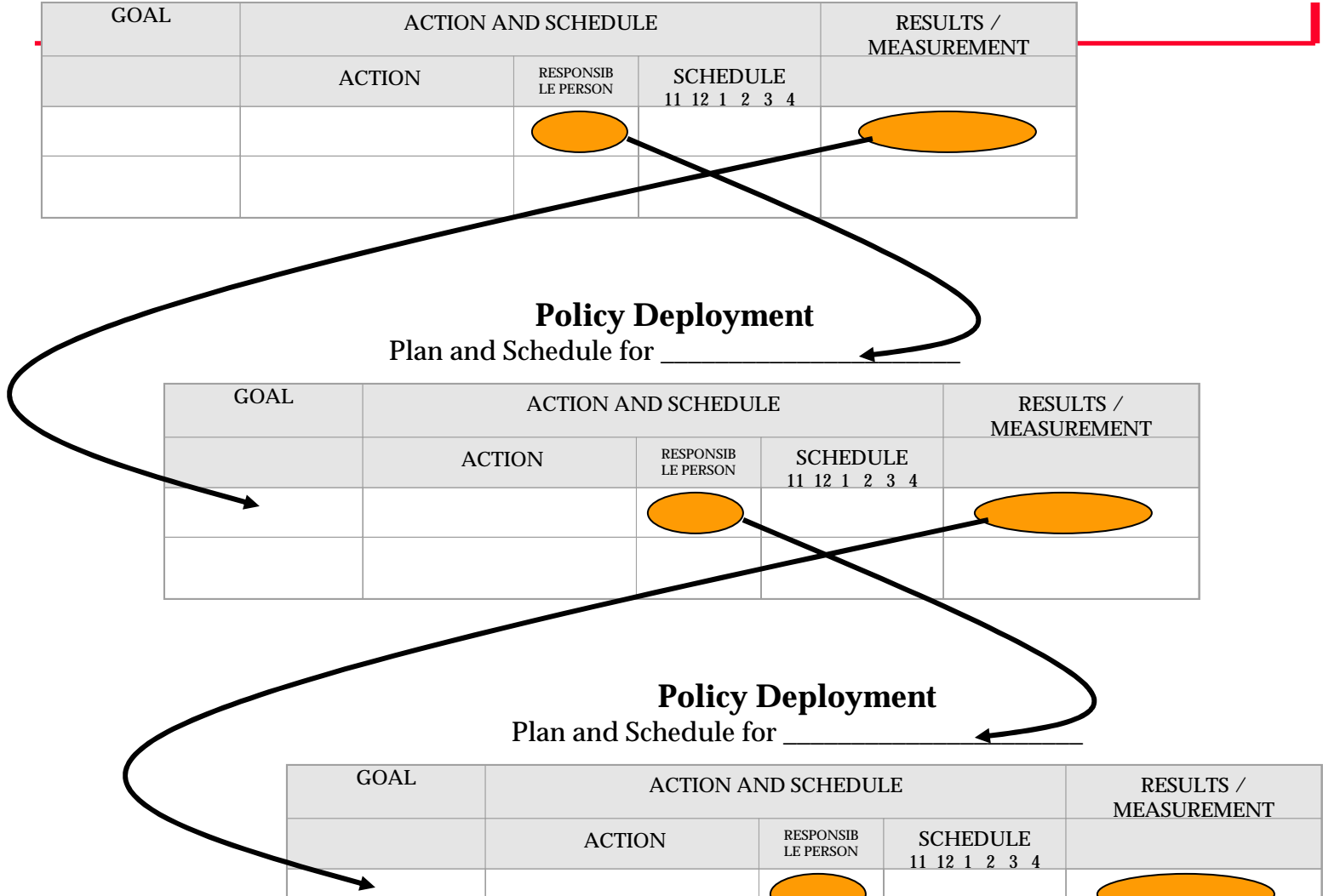
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# Plant Level Goals

<u>Product:</u> XYZ	<u>Phase I</u> (6-9 mos.)	<u>Phase II</u> (9-18 mos.)	<u>Phase III</u> (18-24 mos)
<u>Changeover Time</u>	From 4 hrs to 1 hr	From 1 hrs - 0.3 hrs	From 0.3hrs to 0.1hrs
<u>OEE</u>	From 55% to 70%	From 70% to 80%	From 80% to 85%
<u>Mfg Lead Time</u>	From 4 weeks to 2 weeks	2 Weeks	From 2 weeks to 1 Week
<u>Buffer DOS</u>	From \$1.2MM to \$0.6MM	\$.6MM	From \$.6MM to \$0.3MM
<u>Yield</u>	From 82% to 85%	From 85% to 87%	From 87% to 89%
<u>Conversion Cost</u>	\$.08	From \$.08 / Lb to \$.07 / Lb	From \$.07/ Lb to \$.06 / Lb
<u>"Operating Profit"</u>	\$1.2MM	\$1.3MM	\$1.4MM



**KAIZEN Institute**  
**Continuous Improvement Goals/Plan**

	Date				Aug-02		Sep-02		Oct-02		Nov-02
	Improvement Element	Current State	Competitors	Vision	Activity Date /Goal	Result	Activity Date /Goal	Result	Activity Date /Goal	Result	Activity Date /Goal
<b>Project Area.</b>											
	Quality at source	15.00%	<3%	<1%	14	12	12	12	10	11	9
	On-time delivery	80.00%	96.00%	100.00%	82	80	84	82	86	74	88
	Unit Cost	\$35	\$31	\$27	35	36	35	36	35	35	32
	Equip Downtime	45.00%	35.00%	<15%	43	46	38	42	38	40	35
	Inventory Turns	7	12	30	7	6	9	8	10	10	11



# Key learnings from Lean 6 Sigma implementations

- **Leadership behaviour**
- **Paying attention to detail**
- **Integrate initiatives/whole system approach**
- **Employee engagement – the heart of change**



# Structure of Visual Management

- 1. Real Time Process Management**
  - Gauges
  - Automation devices (andon)
- 2. Process Data Management and Control**
  - Production control charts
  - Process control charts
  - Customer trends (QCD)
- 3. Condition of Resources**
  - Status of resources
  - Equipment maintenance standard
- 4. Organization of workplace**
  - Materials location - flow
  - Equipment locations
- 5. Safety Management**



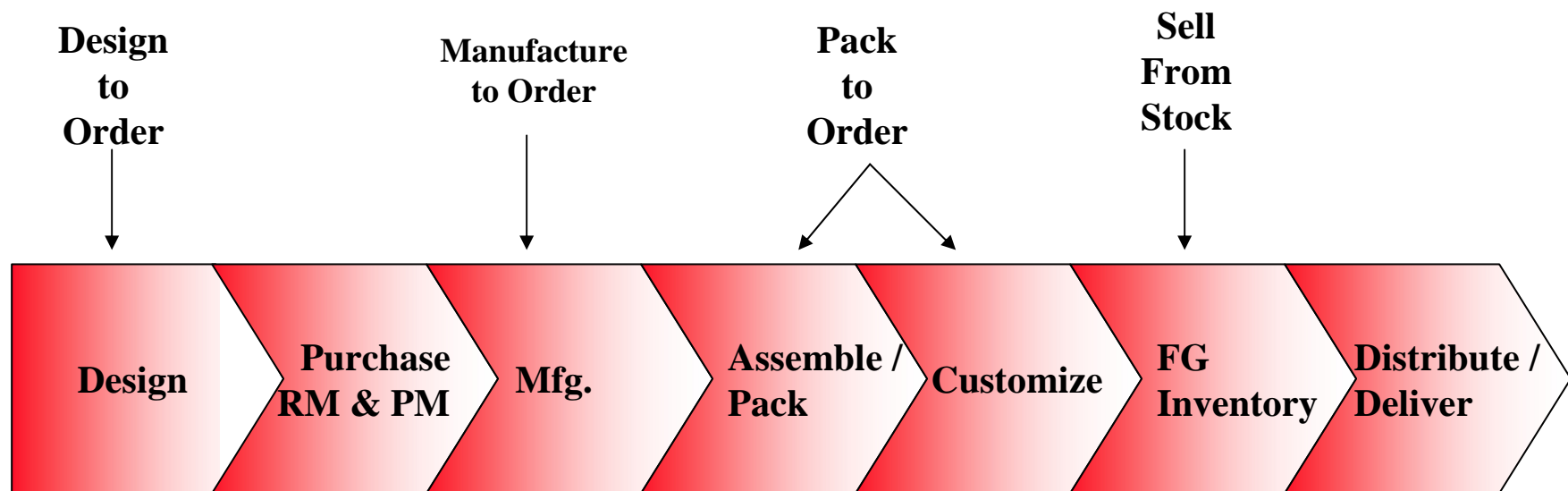
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# Forecast / Inventory Level relationship

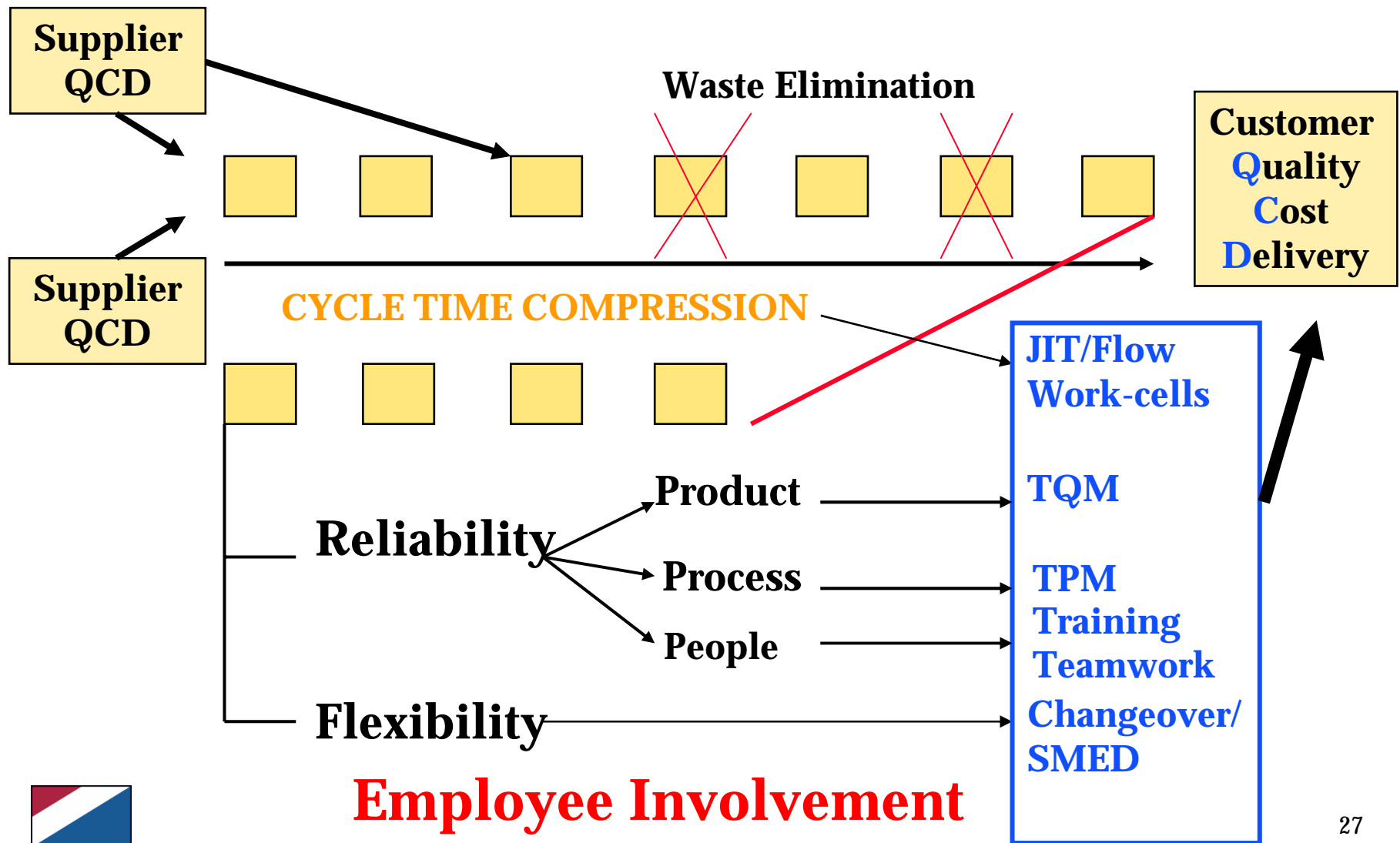
Goal - Shorten lead time and drive order point upstream



Inventory levels rise the more we depend on forecasts.



# Total Systems -- Lean Manufacturing



# KAIZEN -- Where to start

- Envision a new house
- Create a vision-- Create an architect drawing  
Idea/Strategy
- Create a builders working drawing -- Blueprint/Plan
- Develop Building Specifications and bill of materials -- Process Development
- Build it to your dream -- Action/Resource acquisition
- Live in it and make improvements. KAIZEN

Creation

Product/Process

Development



Improve

KAIZEN for  
improvement



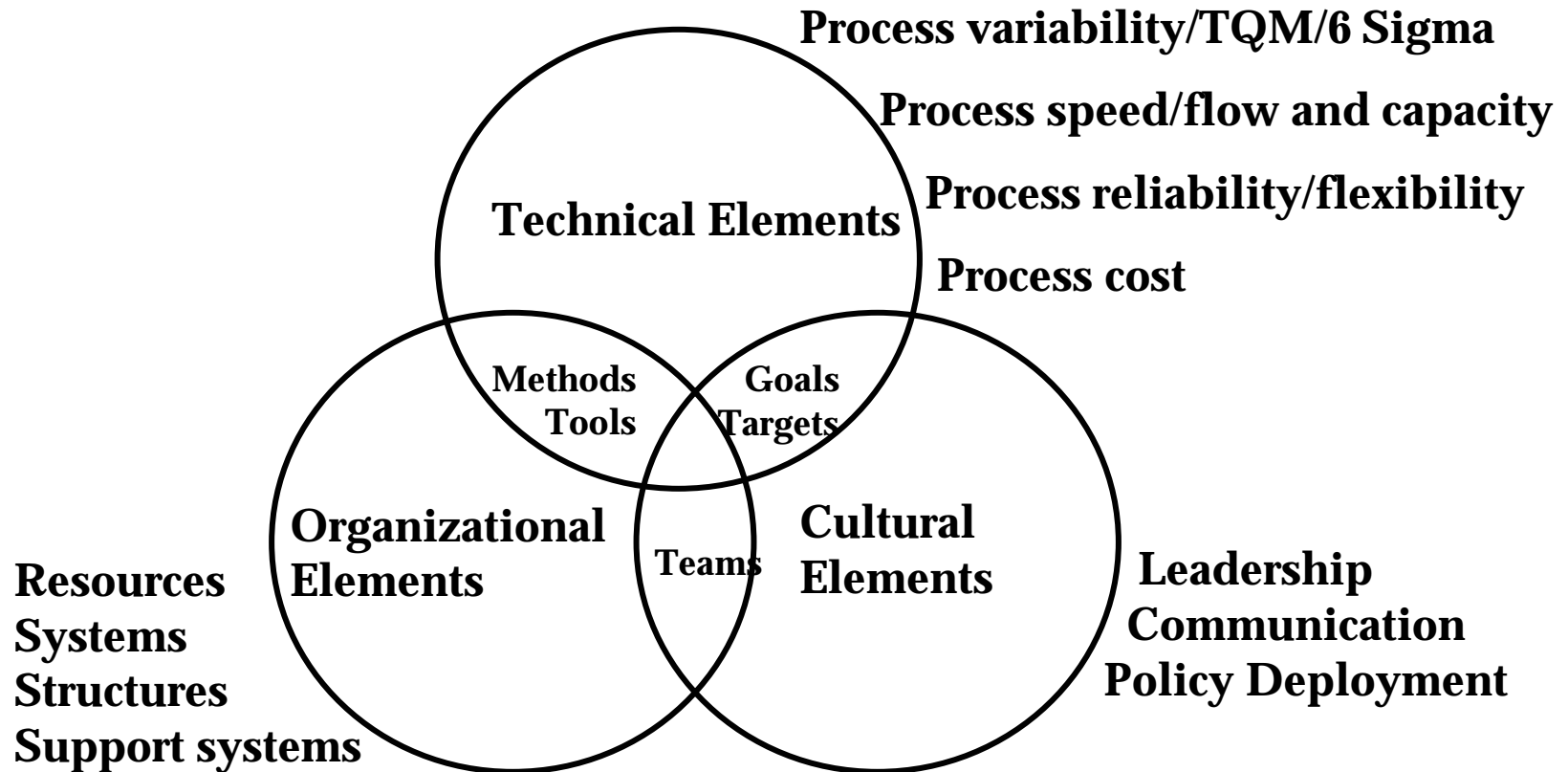
# **Integration of Strategies**

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- **TQM and TPM became prerequisite for JIT**
- **Toyota focus on growing market share created initial links between Strategy and shop floor improvements**
- **Kaizen the predominant implementation method using employee suggestions and team based manufacturing organization structures**
- **Growth of management methods such as Policy deployment**
- **Growth of application to non-manufacturing facets of business such as product development**



# Elements of any change process



# Strategic Change Elements

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- **Technical Elements**
  - Systems
  - Lean practices and methods, JIT, TPM, TPM
- **Organizational Elements**
  - Decision protocols
  - Organizational infrastructure
- **Cultural Elements**
  - relationships and communication
  - cross functional collaboration
  - employee involvement



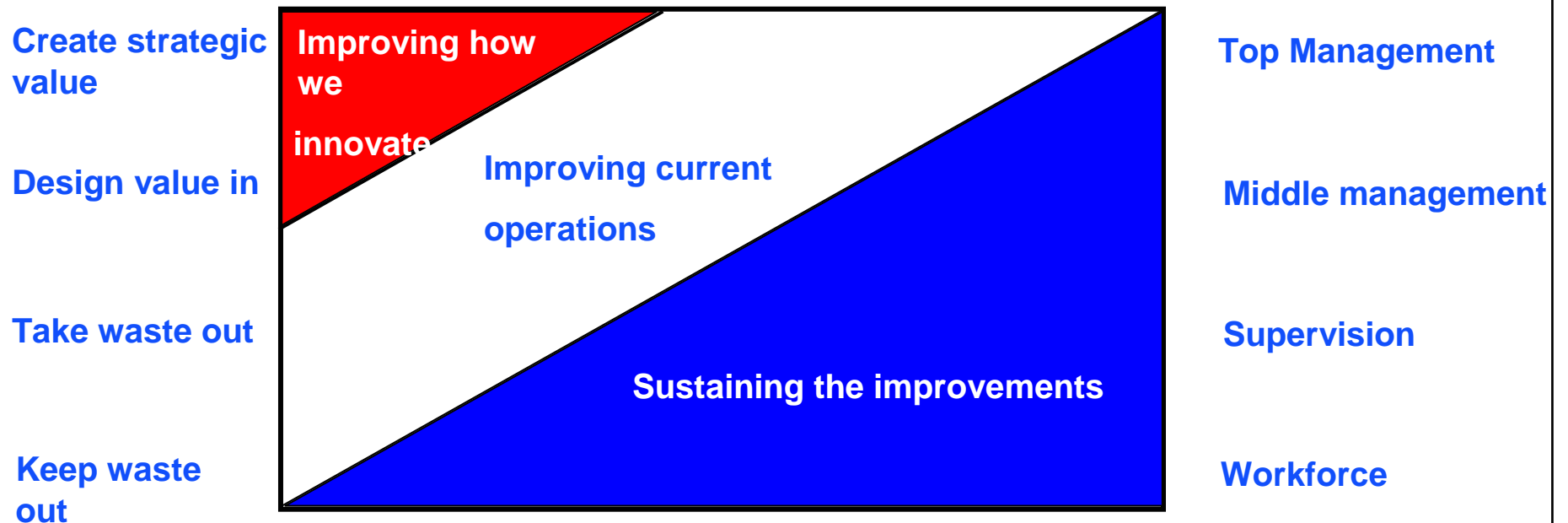
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# To be world class, a company must continuously improve



Everyone has their part to play in making constant change for the better



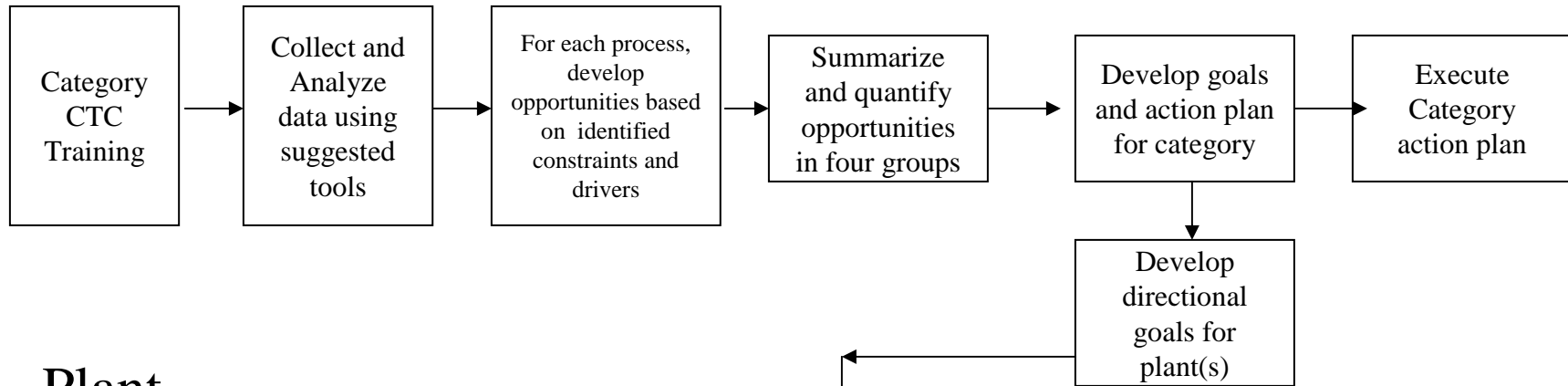
# **Develop Model Leaders**

- **Intent is to make leaders of all levels competent to lead improvement every day**
- **Four Levels of Development**
  - **Initial step to improve skills of maintaining operating standards**
  - **Develop team leadership skills to make small improvements every day**
  - **Develop team coaching skills**
  - **Develop skills to collaborate with other functions and support systems**
- **Create Standard expectations for leadership behavior**
- **Develop Facilitative skills for leading improvement workshops**

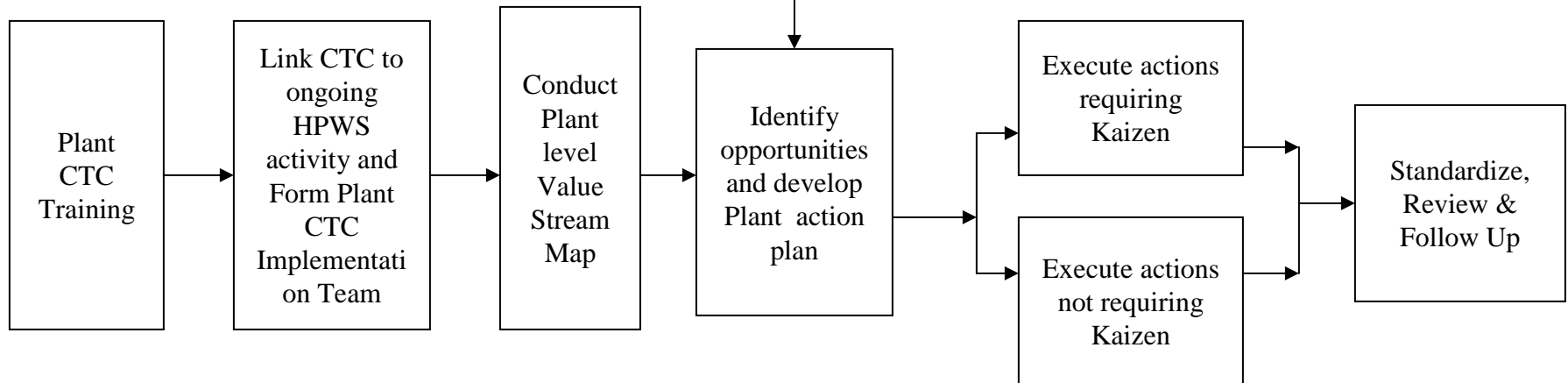


# From Training to Execution

## Category



## Plant



# **KAIZEN Institute**

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- **Founded in 1987 by Masaaki Imai -- author of book KAIZEN**
- **KAIZEN Institute of America**
  - North and South America, South Africa
- **KAIZEN Institute of Europe**
  - UK, Germany, France, Switzerland, Portugal, Italy, Poland, Czech Republic, Romania etc
- **KAIZEN Institute of Africa, Asia, Pacific**
  - Australia, China, India, Malaysia, Indonesia, Japan, UAE, Jordan



# **KAIZEN Institute experience**

- **Consulting experience across a broad range of medium and large multinational and global companies**
- **Experience with multi plant, country and cultural diversity.**
- **Global work includes following large clients**
  - **Fidelity Investments, NASA, Rockwell Automation, Kraft, Valeo, Bosch, Delphi – GM, Daimler/Chrysler, Ford, Tetrapak, Porsche, various Government Agencies etc**
- **Experience includes assisting with the development of Supplier Development Strategies**



# **KAIZEN Institute Capabilities**

- **Intent**
  - To help companies become competitive and profitable through the implementation of the best Continuous Improvement strategies and practices.
  - To raise the level of internal competency in Lean Practices
- **Consulting approach**
  - Facilitative and developmental.
  - Aimed at creating internal Continuous Improvement culture.
  - Technical direction limited to broad scope of implementation process, and teaching technical improvement methods and tools.
  - Client implements improvement using methods learned.



# **KAIZEN Institute - Australia**

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- **Highly experienced consultants in the following types of expertise**
  - » **Socio-technical and Lean Diagnosis**
  - » **JIT, TQM, TPM, Supplier Development, Product Development and Lean Production Preparation**
  - » **Leadership Development at all levels.**
  - » **Organization Change and Culture Change Strategies**
- **Experience in multi-cultural environments**
- **Contact Alex Crossley Tel 02 9956 3833**
- **acrossley @kaizen.com**

