

TPM through LEAN Methodology

TPM (Total Productive Maintenance)
Lean Manufacturing
TPS (Toyota Production System)

How different are they?


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JMAC America, Inc.

Out Line

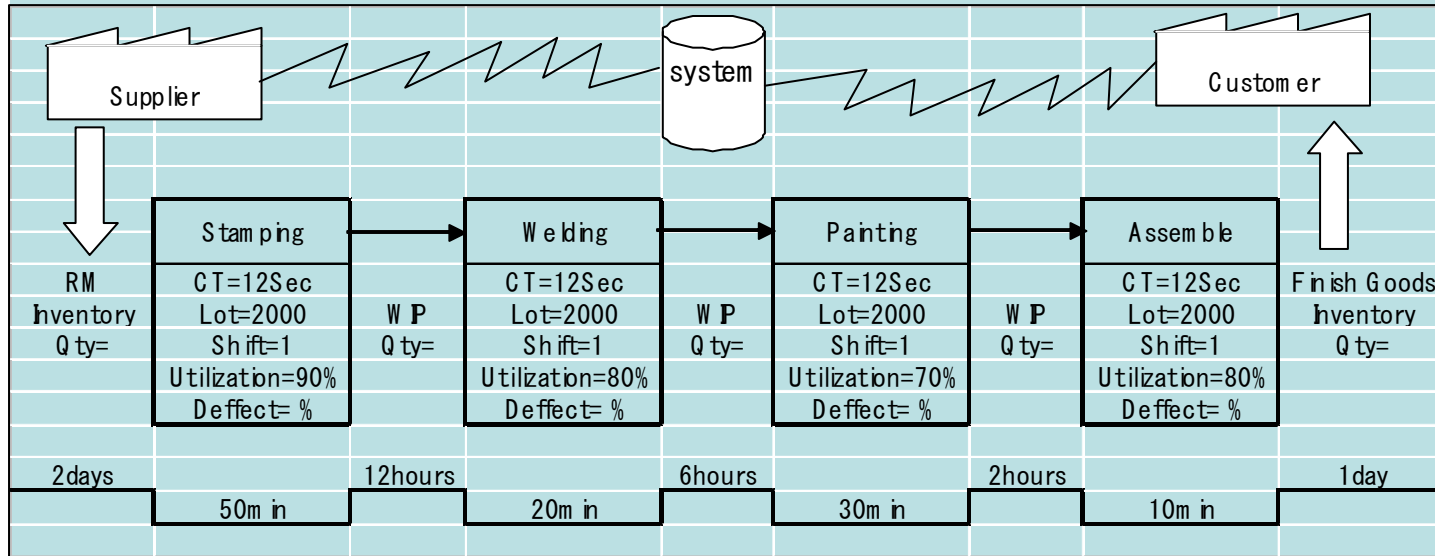
- **History**
- **Philosophy and Approach**
- **Characteristics**
- **Road Map**
- **Evolution**
- **Conclusion**

History of TPM and LEAN

	1920-1960	1970	1980	1990	2000 
Toyota Group Development	26' Toyoda Automatic Loom Works 37' TOYOTA MOTORS 41' Toyoda Machine Works 43' AISIN 49' DENSO				
TPS Development	24' Jidoka 38' JIT	★ 73' Toyota Production system (Internal Manual) ★ 78' Toyota Production system (Ohno)	★ 83' Toyota Production system (Ohno, Monden)	★★★★★ 5 Copies (Monden)	
LEAN Development				←→ 85'-'90' Japan Study ★ 90' The Machine that Changes the world (Womack)	
TPM Development		★ 65' PM Manual (Takahashi) ★ 71' DENSO TPM Prize	★ 82' AISIN TPM Prize ★ 82' TPM Development Program (Nakajima)		★ 92' TPM Development Program (Rev.)

LEAN vs. TPS

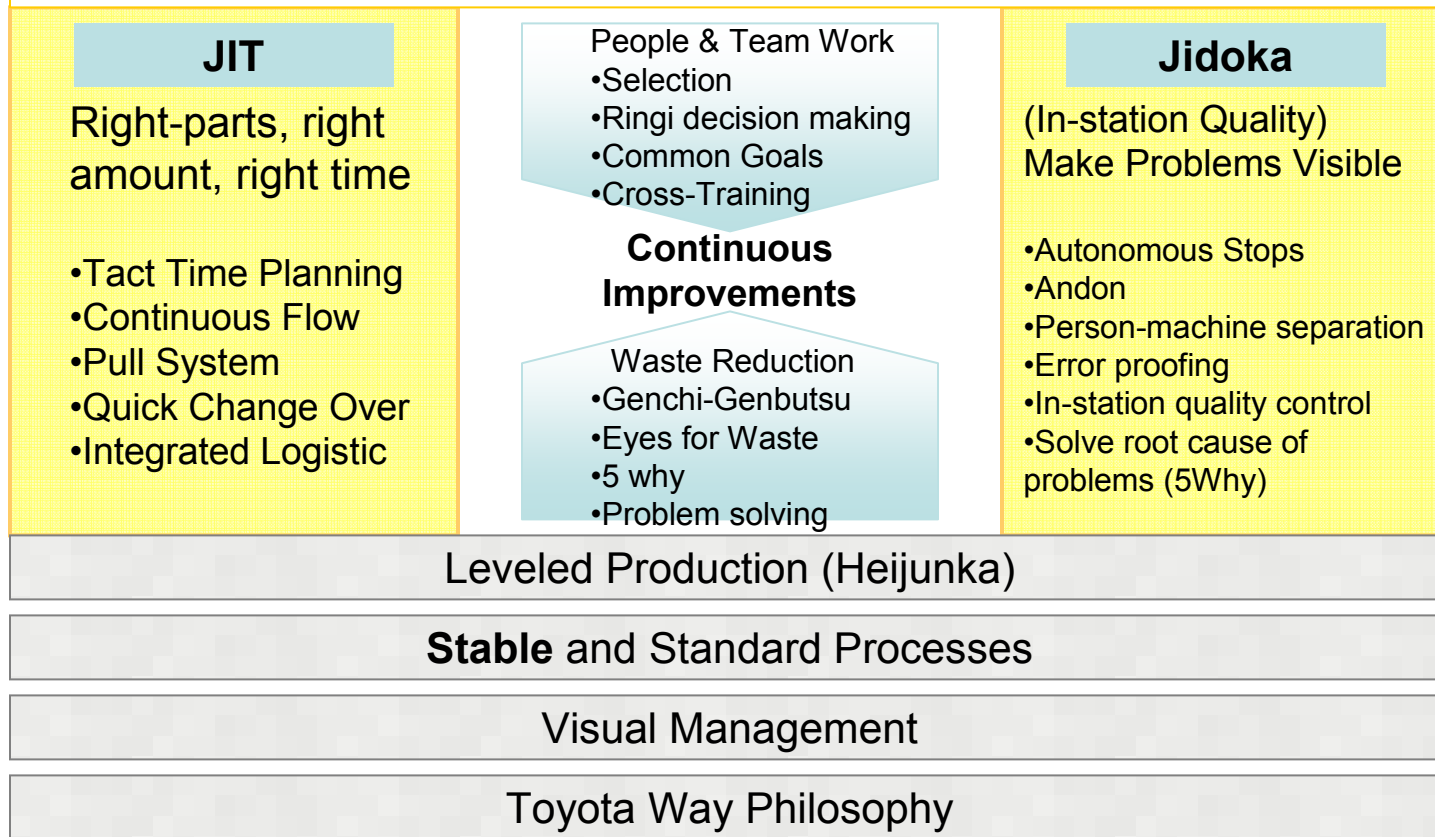
- **Lean = TPS**
+ VSM
+ Emphasis of Cultural Change
- **TPS was developed based on bottom up**
- **Lean System is design to Top Down Approach**



VSM: Value Stream Mapping

2 Pillars of LEAN (House of Toyota)

Best Quality - Lowest Cost - Shortest Lead Time - Best Safety - High Morale
Through shortening the production flow by eliminating waste

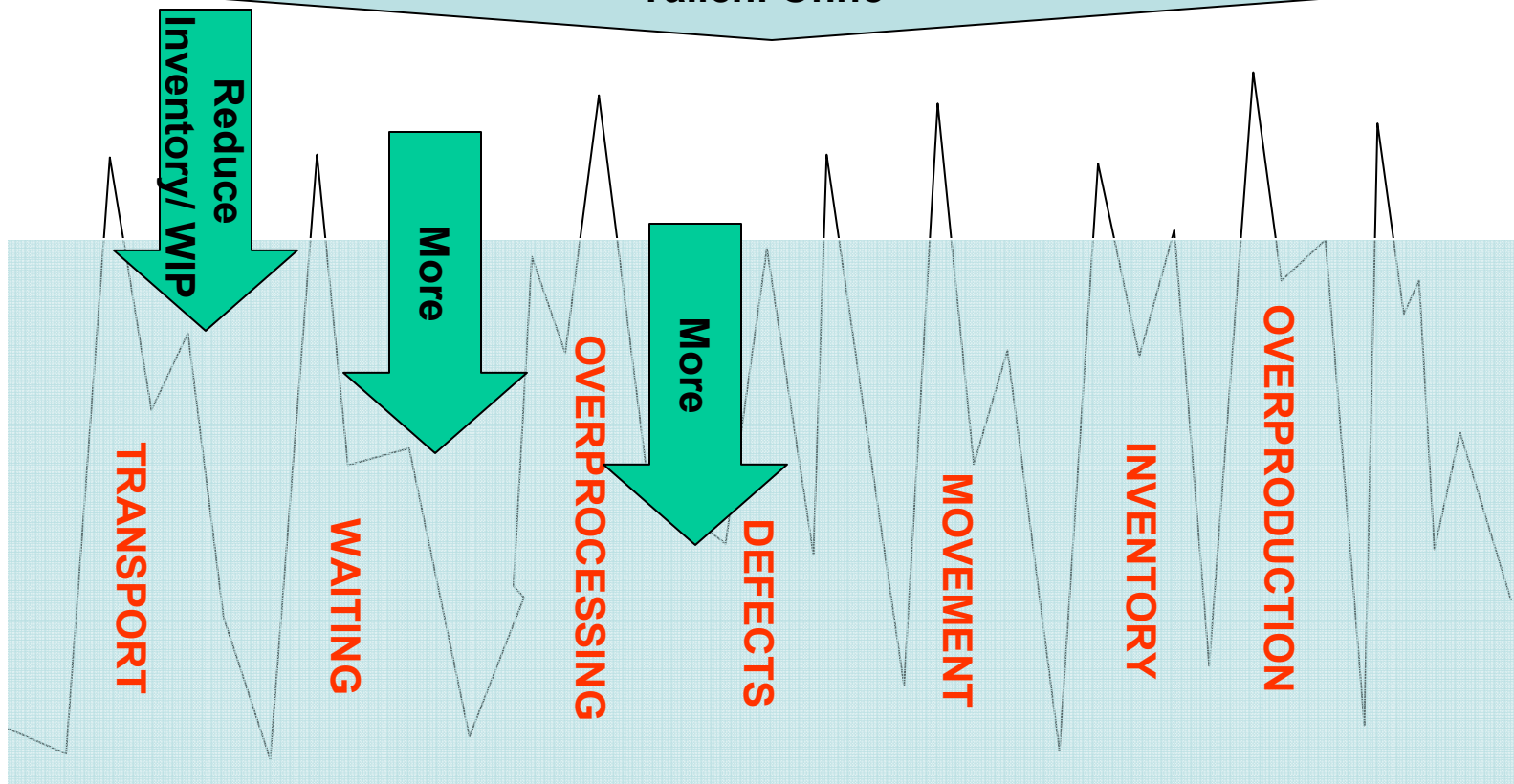


5S is Foundation

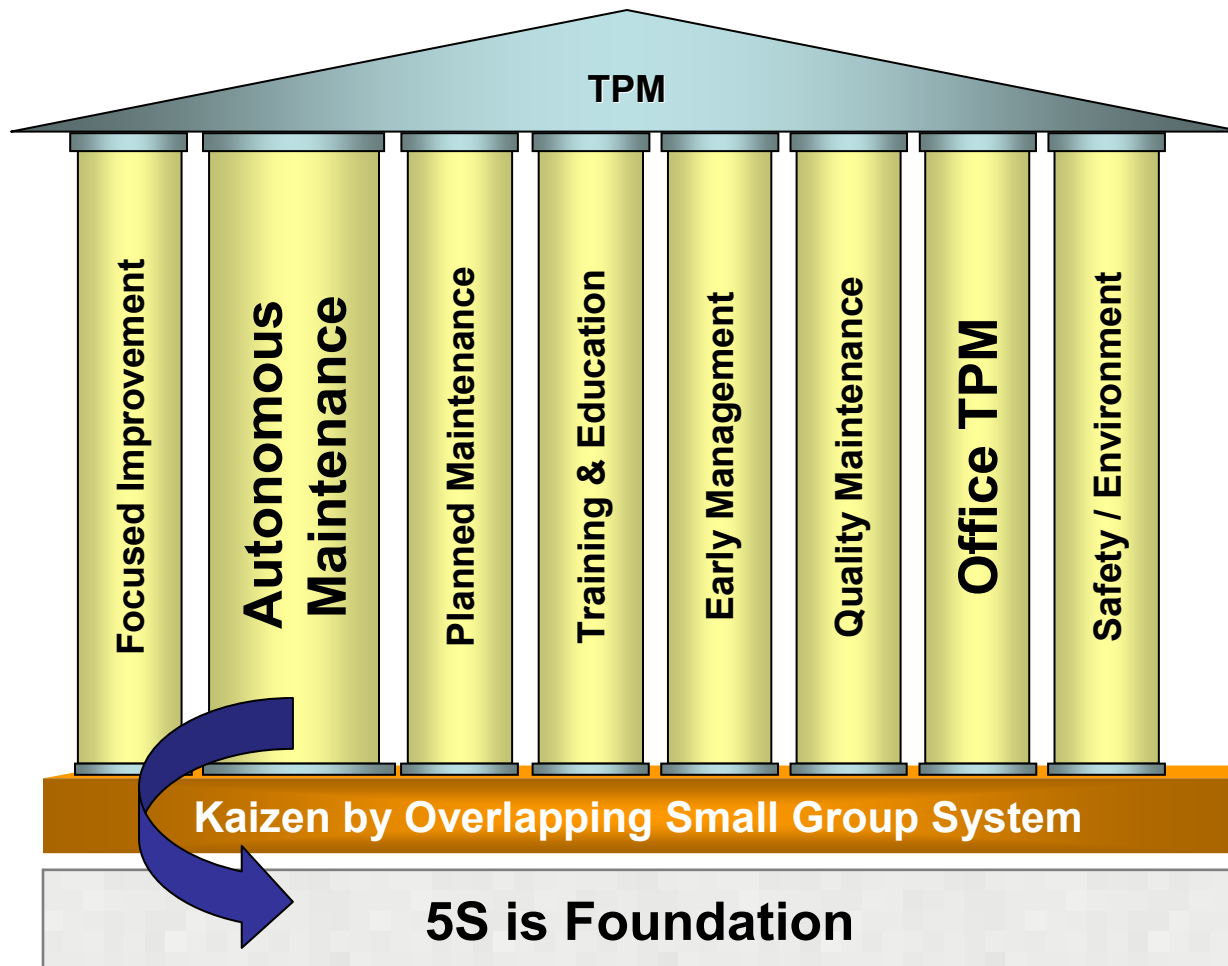
(TPS House Fujio Cho Jeffrey K Linker The Toyota Way 2004 p33,)

Philosophy and Approach of LEAN(TPS)

Philosophy: Eliminate all sorts of WASTE
Approach: Practice in preference to theoretical analysis
Results in preference to process
- Taiichi Ohno -

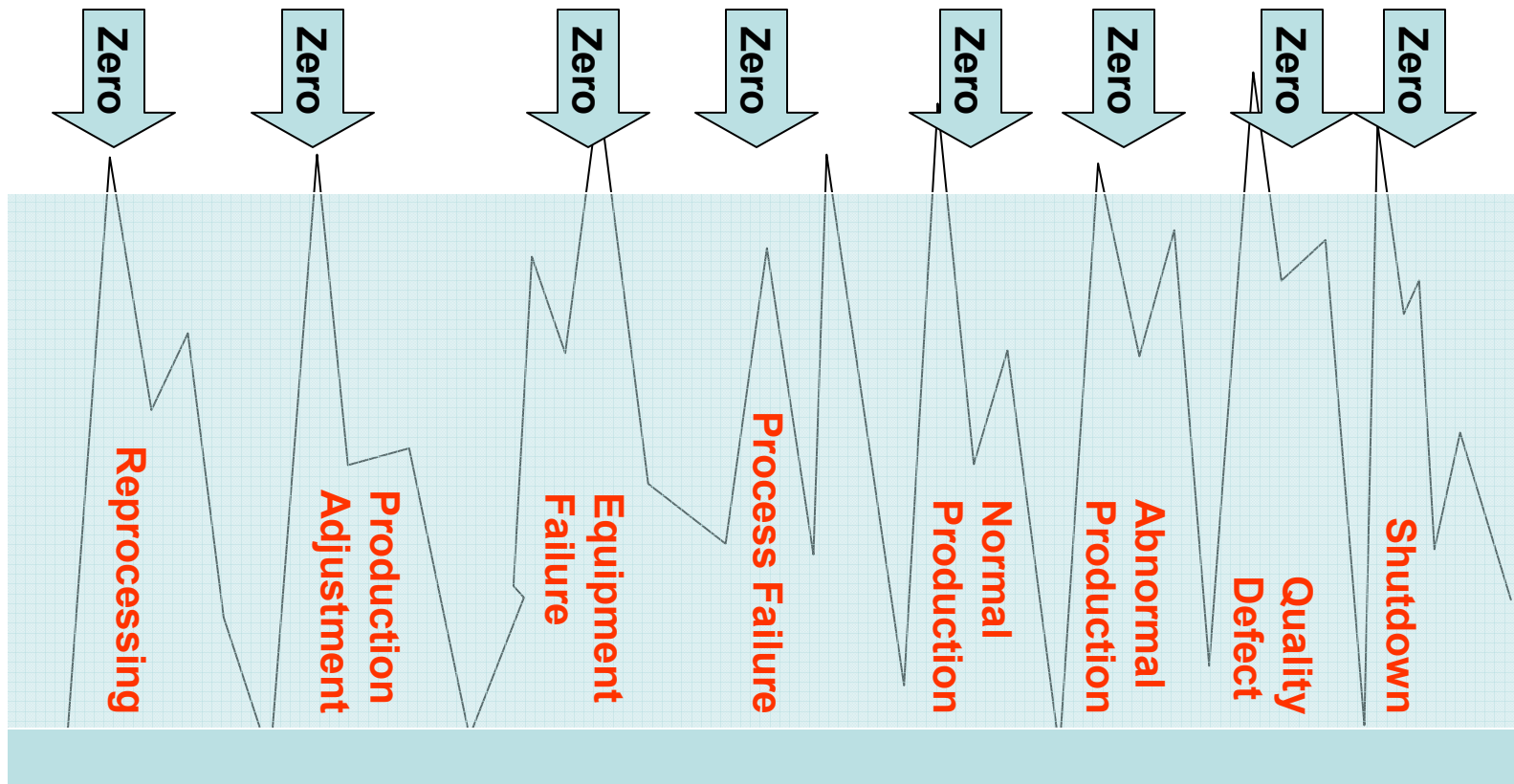


8 Pillars of TPM



Philosophy and Approach of TPM

Philosophy: Achieve ZERO LOSSES
Approach: Establish Program, Step deployment
- TPM Development Program (1982) -



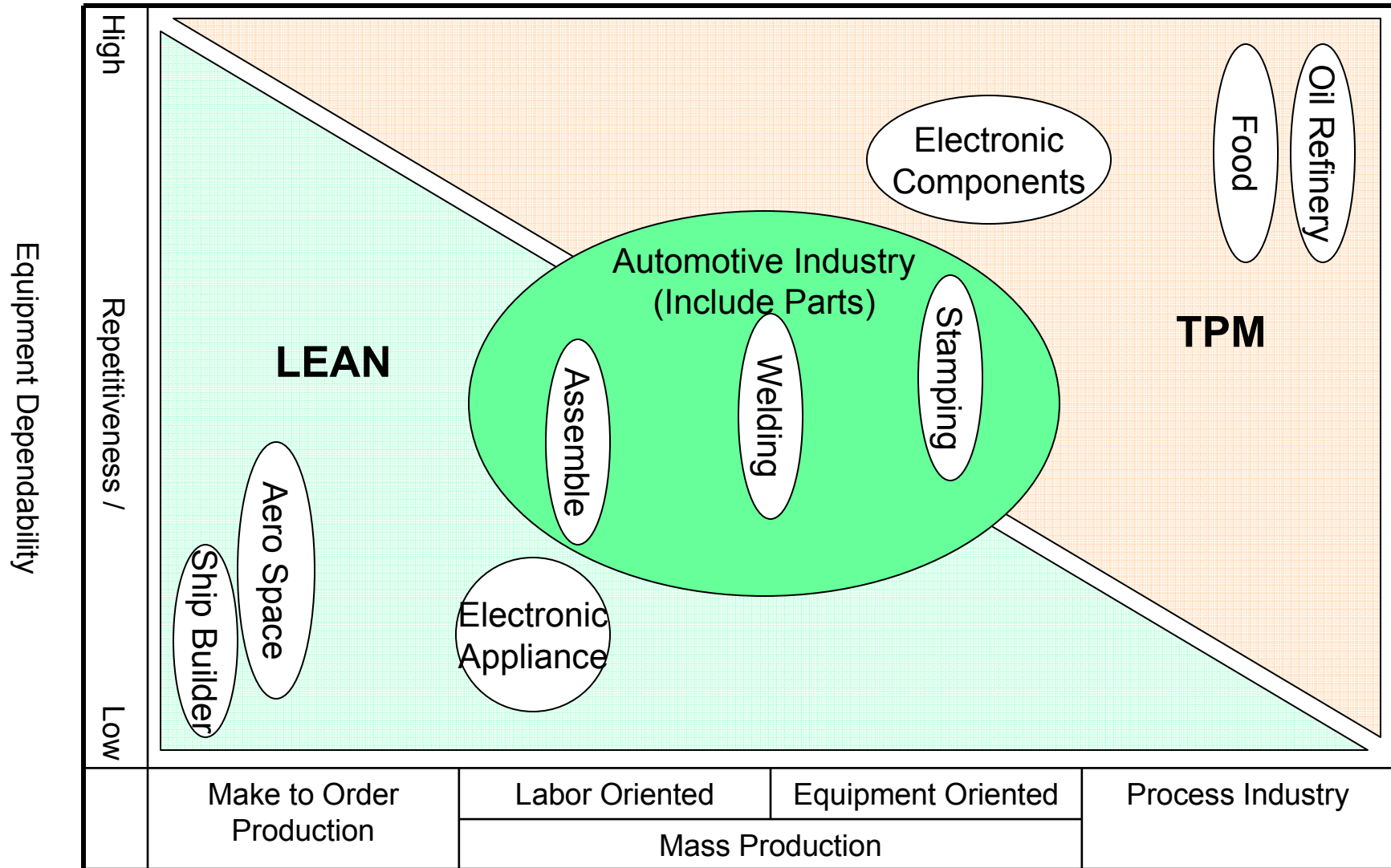
Waste (LEAN) vs. Loss (TPM)

LEAN 7 Waste	Operation	Equipment	Material (Flow, Inventory, WIP)
Over Production			○
Waiting	○	○	
Transport			○
Over Processing	○	○	
Inventory			○
Motion	○		
Defects	○	○	

TPM Process Industry	Operation	Equipment	Material (Flow, Inventory, WIP)
8 Major Losses			
Shutdown		○	
Production Adjustment	○	○	○
Equipment Failure		○	
Process Failure		○	
Normal Production		○	
Abnormal Production		○	
Quality Defect	○	○	
Reprocessing	○	○	

TPM Assemble Industry	Operation	Equipment	Material (Flow, Inventory, WIP)
16 Major Losses			
Equipment	Equipment failure		○
	Change over	○	○
	Tool Change		○
	Start-up		○
	Minor stoppage		○
	Speed	○	○
SD	Defect/ Rework	○	○
	SD		○
Operation	Control	○	
	Motion	○	
	Line balance	○	
	Automation	○	
	Measurement	○	○
Material	Yield		○
	Energy		○
	Die/ Tools		○

TPM vs. LEAN



Summary of Characteristics

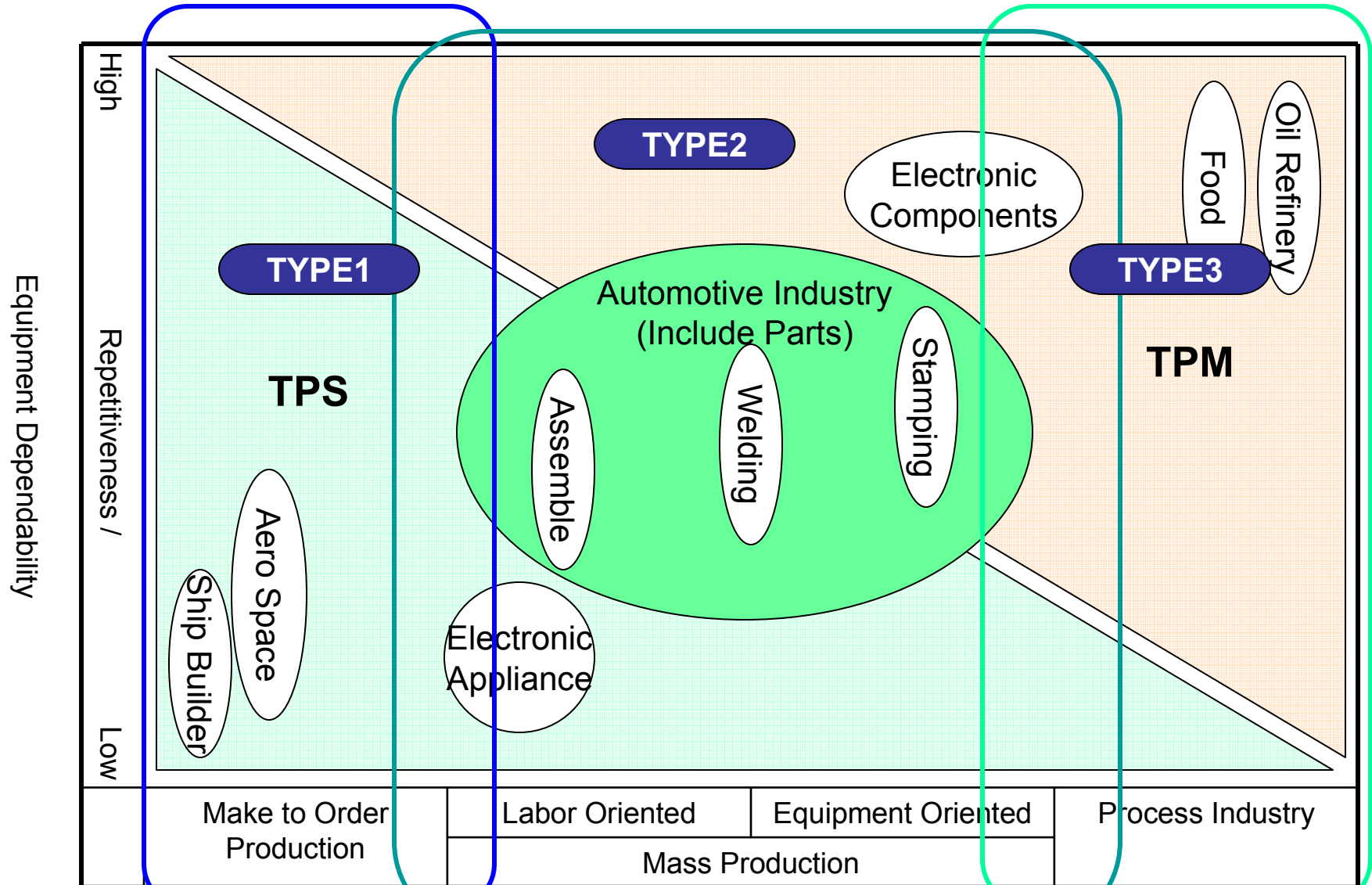
- LEAN

- Result of Toyota's years of try and error.
- Integration of many areas activities.
- Material Flow (Through Put) Approach
- Well Balanced (Operation, Equipment, Materials)
- Less Standardized Steps.

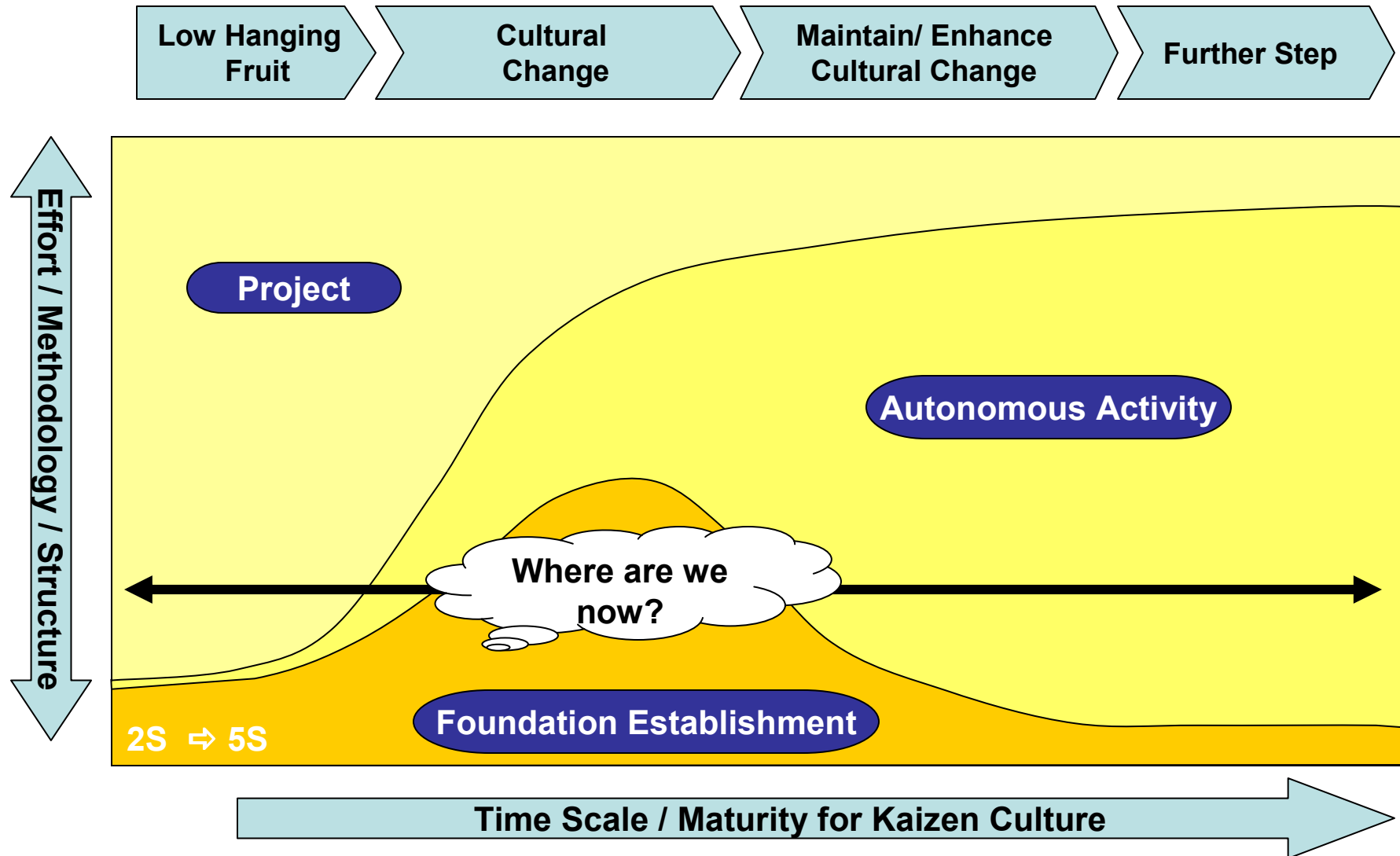
- TPM

- Design to implement many industries.
- More explicit definition on various area.
- Zero Loss Approach (Measurement).
- Relatively Equipment Focus (include operator).
- Established Standard Steps.

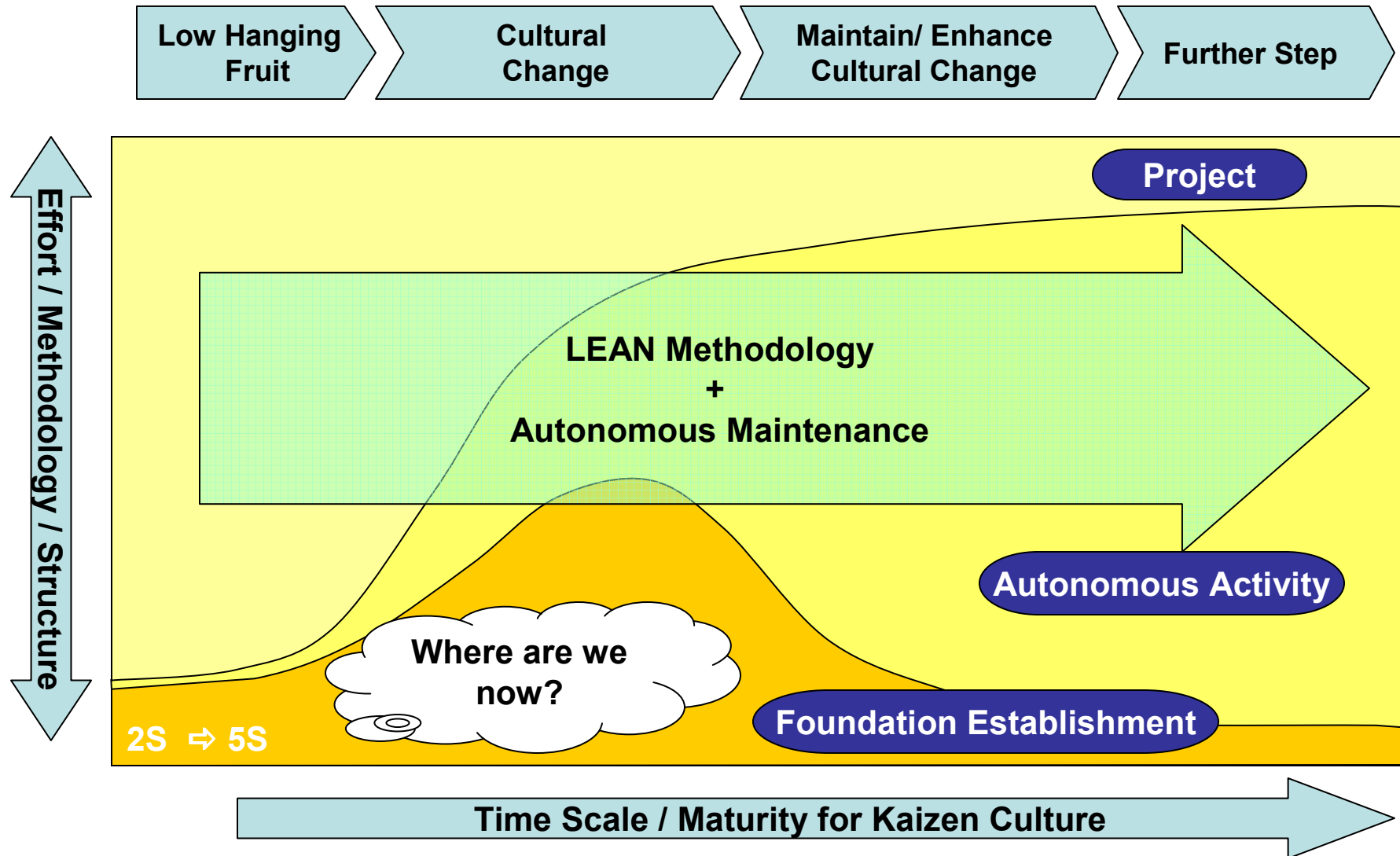
TPS vs. TPM



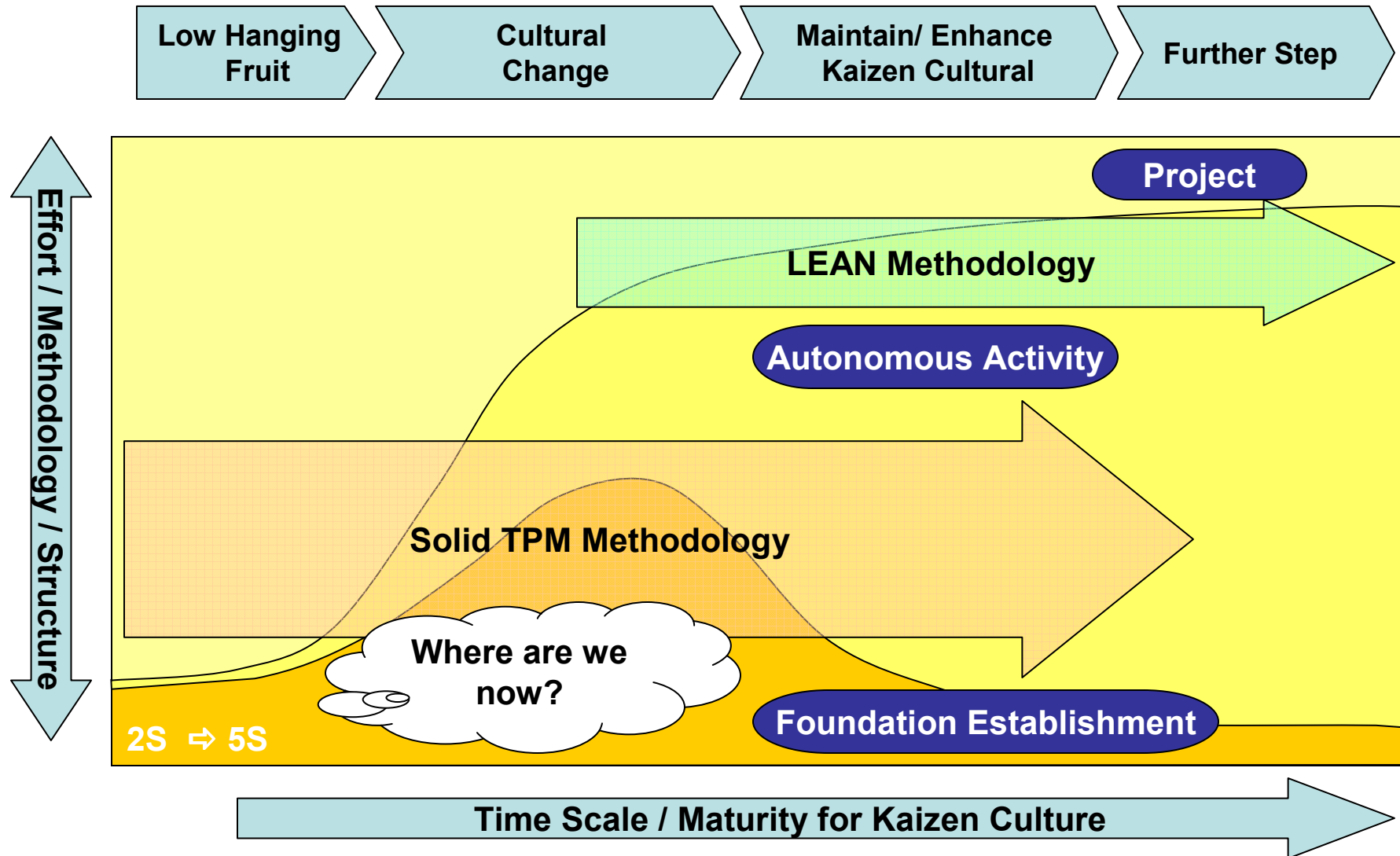
Kaizen Maturity Road Map



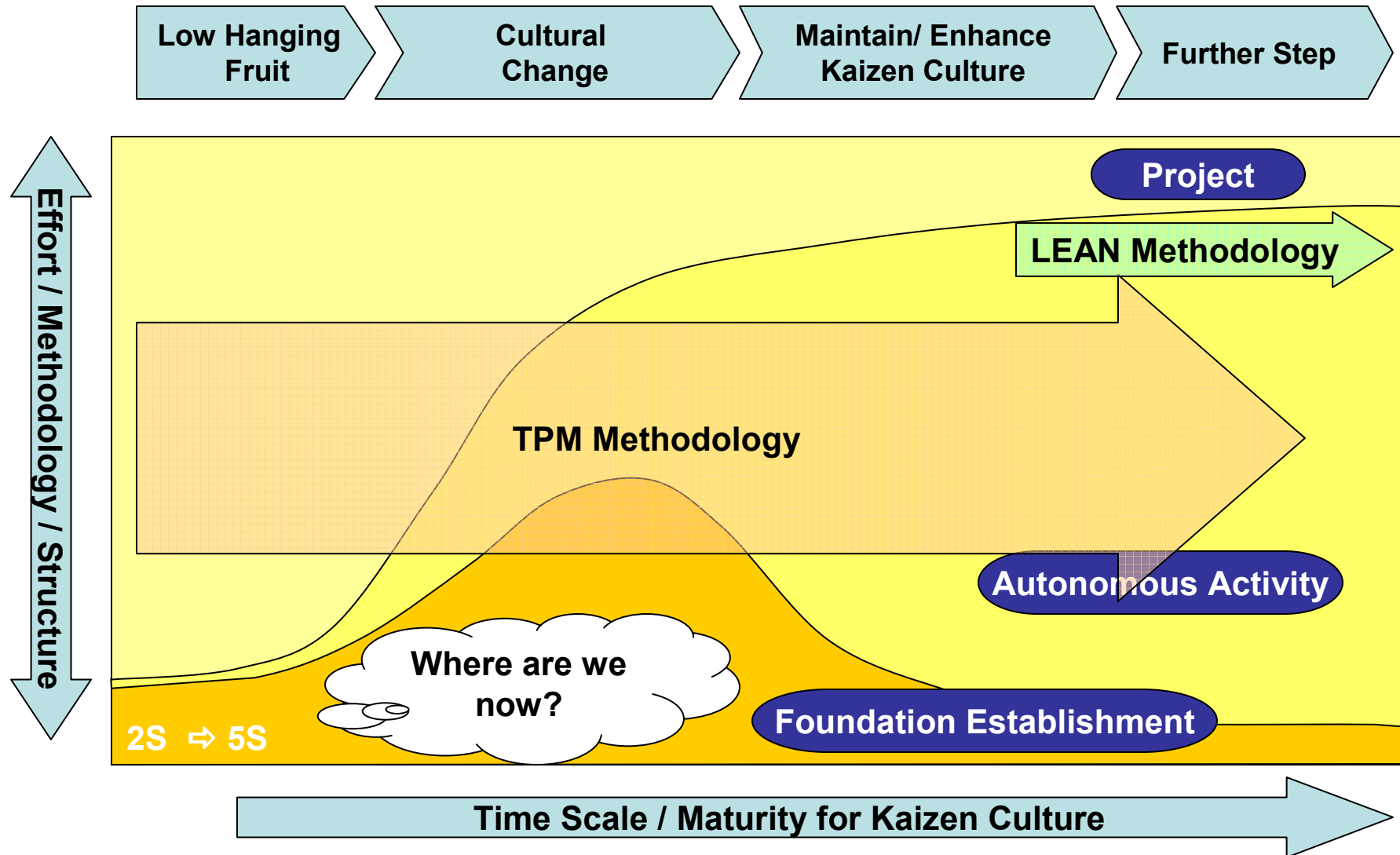
Road Map for TYPE 1 Industry



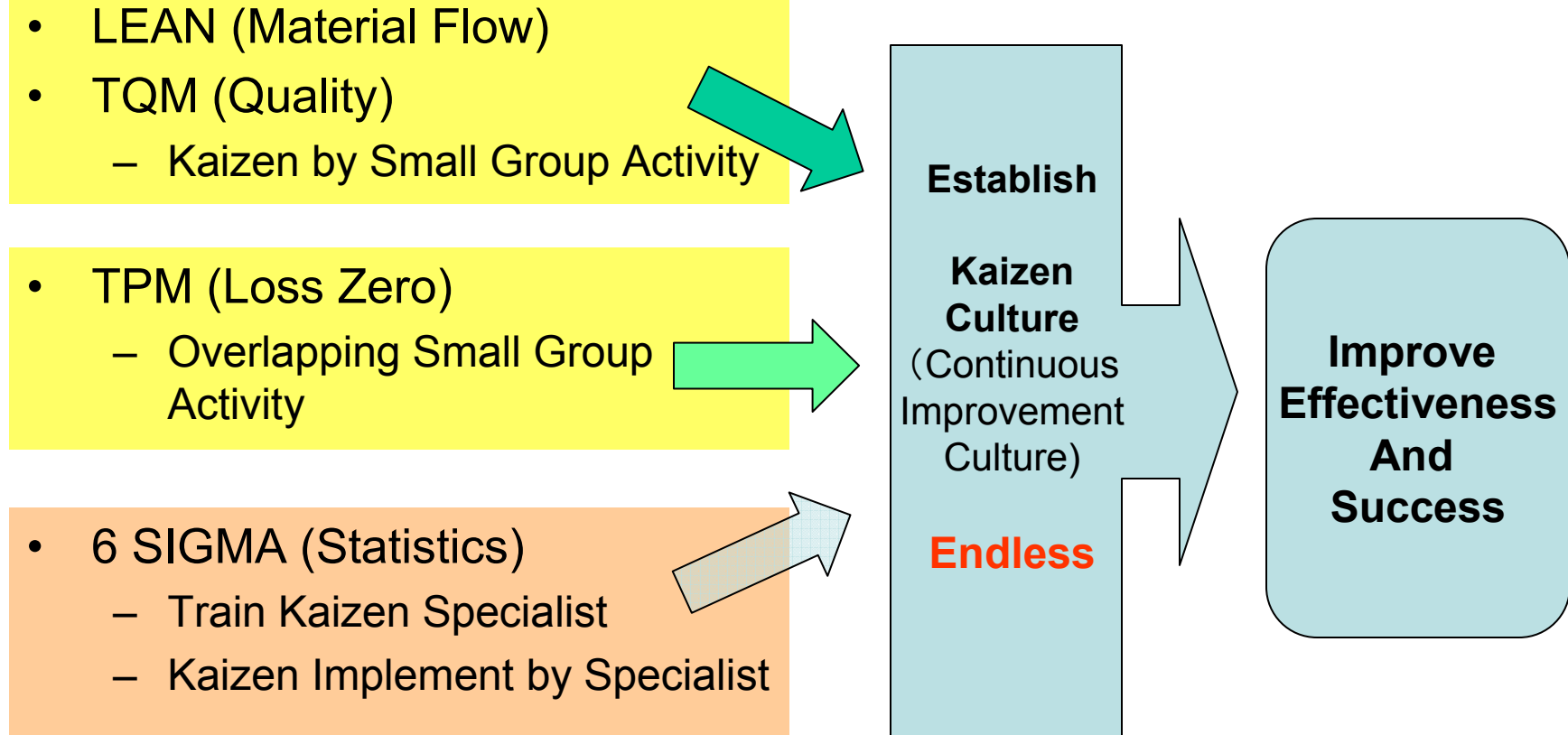
Road Map for TYPE 2 Industry



Road Map for TYPE 3 Industry



Purpose of Improvement Activity

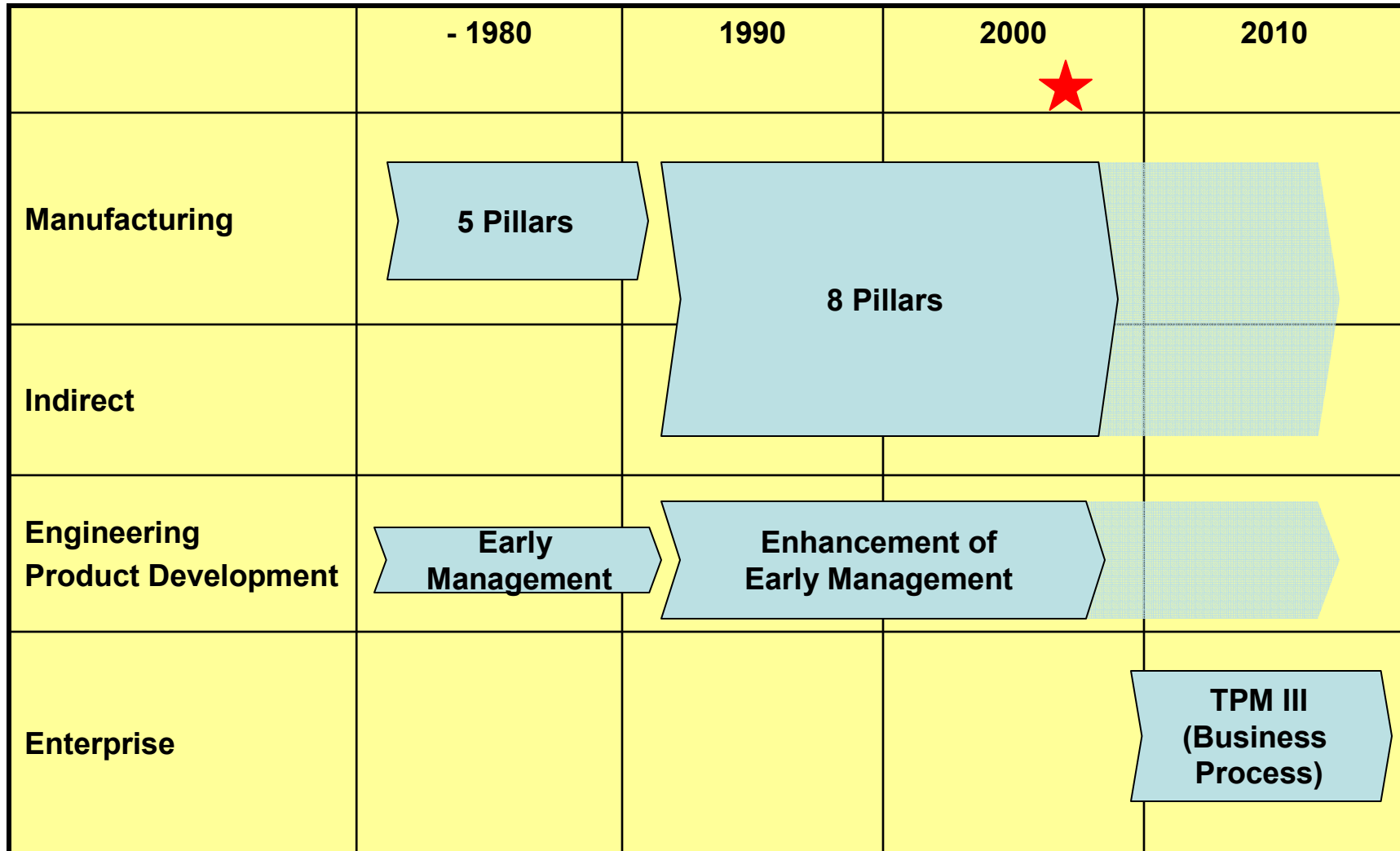


5S is Foundation

Evolution of LEAN

	- 1980	1990	2000	2010
Manufacturing				
Indirect				
Engineering Product Development				
Enterprise				

Evolution of TPM



Conclusion

- **Understand current status and needs**
- **Think about your Industry's characteristics**
- **It takes time to change culture**
 - **Be patient, but steady progress**
- **5S is Base**
- **Think by your self**