Sheridan College Institute of Technology and Advanced Learning
Faculty of Applied Computing and Engineering Sciences

Quality Management

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Module 1 Total Quality Management (TQM)

Session 1 (3 hours) ….Introduction to the TQM and CI concepts
Introductions/expectations /rules
Industry perspective on the 3 big operating performance parameters (Quality Cost and Delivery)
Defining quality …Incentives for good quality
Implications of quality; Deming 14 points;
Introduction to C… …/ISO and the Evolution plan.

Session 3 (3 hours) ….Operational Excellence Measurement systems.
Measuring business process Improvements...
Operations excellence survey and benchmarking competitiveness (Class workshop)
The Lynch and Cross model of performance.
Customer satisfaction as a measurement…
Linking operational improvement projects and overall business operations competitiveness.
Quality process management tools (cause-effect diagrams, Pareto, fish bone).
Juran's Trilogy: Planning, Control and Improvement;
Case study class work…
Assignments 3 (5%)

Session 4 (3 hours)… ISO Quality Management Systems
Typical ISO Quality Management Systems used by industry (Performance/cost trade-offs)
Review of appropriate strategies and measures to improve quality assurance systems.
Basics and Principles of quality standards and auditing procedures (ISO 9000 ISO 14000)
Strategies for the successful implementation of an appropriate quality control system
The street tips and tricks and do's & don'ts about quality systems
Issues faced in implementing quality management initiatives in compliance with ISO standards.
Measures to improve quality assurance systems using data from internal quality audits.
Assignment 4 (5%)

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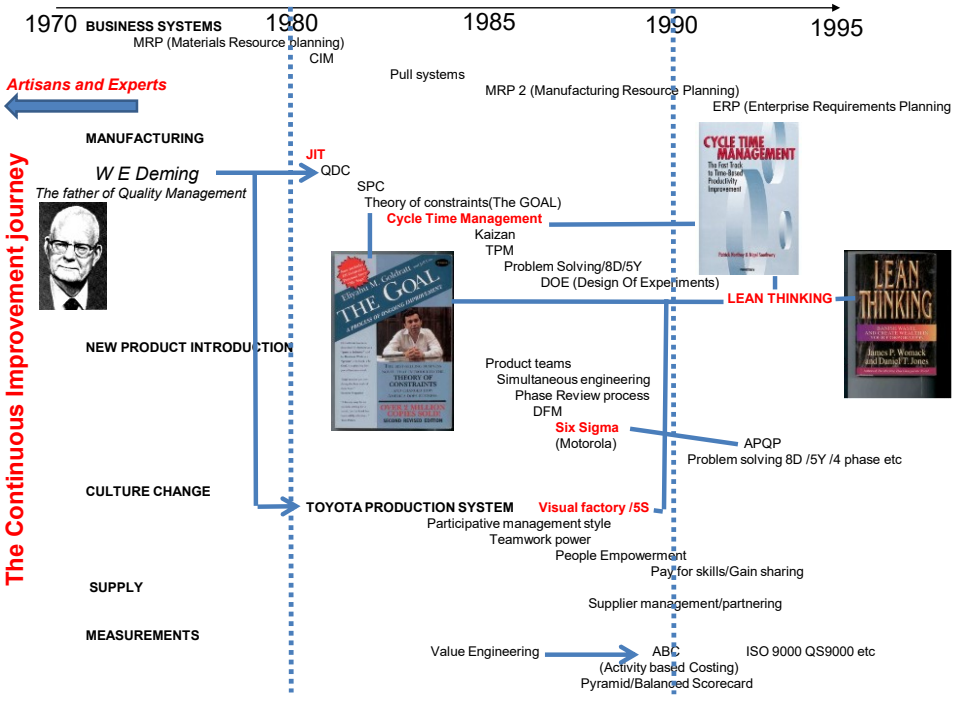
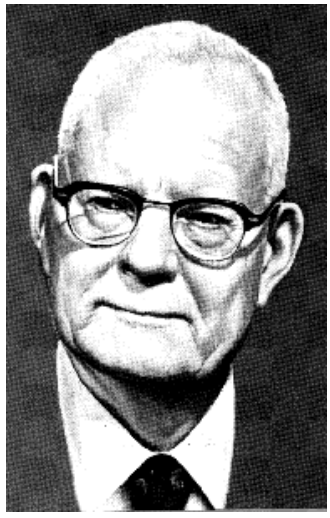
The Journey continues...



William Edwards Deming

(October 14, 1900–December 20, 1993) was an American engineer, statistician, professor, author, lecturer, and management consultant. Educated initially as an electrical engineer and later specializing in mathematical physics, he helped develop the sampling techniques still used by the U.S. Department of the Census and the Bureau of Labor Statistics. In his book *The New Economics for Industry, Government, and Education*,[1] Deming championed the work of Dr. Walter Shewhart, including Statistical Process Control, Operational Definitions, and what Deming called The Shewhart Cycle[2] which had evolved into PDSA (Plan-Do-Study-Act). This was in response to the growing popularity of PDSA, which Deming viewed as tampering with the meaning of Shewhart's original work.[3] Deming is best known for his work in Japan after WWII, particularly his work with the leaders of Japanese industry. That work began in August 1950 at the Hakone Convention Center in Tokyo when Deming delivered a seminal speech on what he called Statistical Product Quality Administration. Many in Japan credit Deming as the inspiration for what has become known as the Japanese post-war economic miracle of 1950 to 1960, when Japan rose from the ashes of war to become the second most powerful economy in the world in less than a decade, founded on the ideas Deming taught:



The father of Quality Management

1.The problems facing manufacturers can be solved through cooperation, despite differences.

2.Marketing is not sales. It is the science of knowing what repeat customers think of a product, as well as whether, and why, they will buy it again.

3.Initial stages of design must include market research, applying statistical techniques for planning and inspecting samples.

4.The manufacturing process must be perfected.[4]

7

DEMING…Key principles

Deming offered fourteen key principles to managers for transforming business effectiveness. The points were first presented in his book *Out of the Crisis.* (p. 23–24)[28]

Although Deming does not use the term in his book, it is credited with launching the Total Quality Management movement.[29]

1.Create constancy of purpose toward improvement of product and service, with the aim to become competitive, to stay in business and to provide jobs.

2.Adopt the new philosophy. We are in a new economic age. Western management must awaken to the challenge, must learn their responsibilities, and take on leadership for change.

3.Cease dependence on inspection to achieve quality. Eliminate the need for massive inspection by building quality into the product in the first place.

4.End the practice of awarding business on the basis of a price tag. Instead, minimize total cost. Move towards a single supplier for any one item, on a long-term relationship of loyalty and trust.

5.Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly decrease costs.

6.Institute training on the job.

7.Institute leadership (see Point 12 and Ch. 8 of "Out of the Crisis"). The aim of supervision should be to help people and machines and gadgets do a better job. Supervision of management is in need of overhaul, as well as supervision of production workers.

8.Drive out fear, so that everyone may work effectively for the company. (See Ch. 3 of "Out of the Crisis")

9.Break down barriers between departments. People in research, design, sales, and production must work as a team, in order to foresee problems of production and usage that may be encountered with the product or service.

10.Eliminate slogans, exhortations, and targets for the work force asking for zero defects and new levels of productivity. Such exhortations only create adversarial relationships, as the bulk of the causes of low quality and low productivity belong to the system and thus lie beyond the power of the work force.

1. Eliminate work standards (quotas) on the factory floor. Substitute with leadership.
2. Eliminate management by objective. Eliminate management by numbers and numerical goals. Instead substitute with leadership.

11.Remove barriers that rob the hourly worker of his right to pride of workmanship. The responsibility of supervisors must be changed from sheer numbers to quality.

12.Remove barriers that rob people in management and in engineering of their right to pride of workmanship. This means, *inter alia*, abolishment of the annual or merit rating and of management by objectives (See Ch. 3 of "Out of the Crisis").

13.Institute a vigorous program of education and self-improvement.

14.Put everybody in the company to work to accomplish the transformation. The transformation is everybody's job.

"Massive training is required to instill the courage to break with tradition. Every activity and every job is a part of the process."[30]

8

Deming philosophy synopsis

The philosophy of W. Edwards Deming has been summarized as follows:

Dr. W. Edwards Deming taught that by adopting appropriate principles of management, organizations can increase quality and simultaneously reduce costs by reducing waste, rework, staff attrition and litigation while increasing customer loyalty.

The key is to practice continual improvement and think of manufacturing as a system, not as bits and pieces."

In the 1970s, Deming's philosophy was summarized by some of his Japanese proponents with the following 'a'-versus-'b' comparison:

(a) When people and organizations focus primarily on quality, defined by the following ratio, quality tends to increase and costs fall over time.

(b) However, when people and organizations focus primarily on *costs*, costs tend to rise and quality declines over time.

$$\text{Quality} = \frac{\text{Results of work efforts}}{\text{Total costs}}$$

9

Industry perspective on the 3 big operating performance parameters

(Quality Cost and Delivery)

Which one is more Important? **& Why?**

10

Who is responsible for quality?

Every-one…

Who drives the need for quality?

Customers/Competitors

11

Industry perspective on the 3 big operating performance parameters

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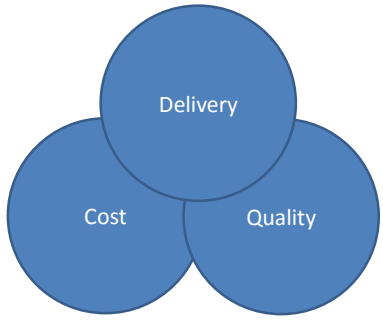

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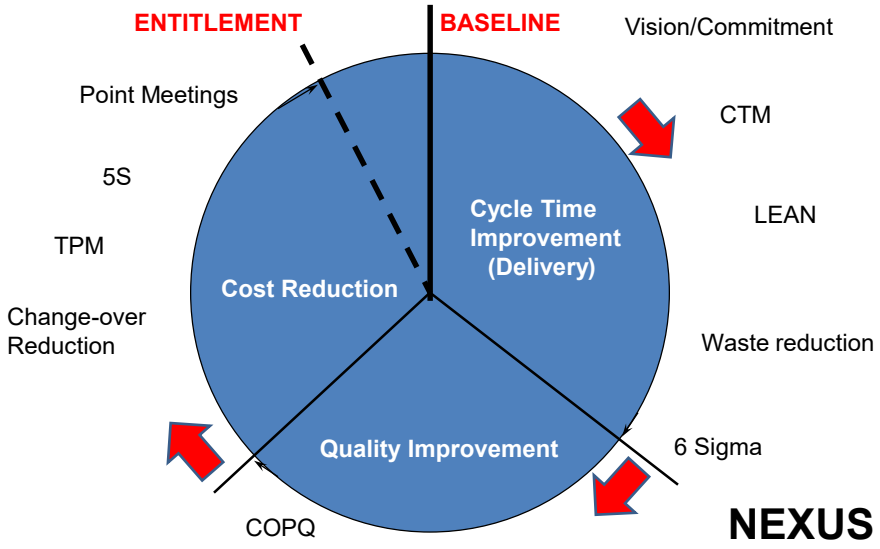
Continuous Improvement Environment



Reading list (Optional)

- The JIT threat… "Made in Japan" Early 80s… TPS etc
- The GOAL… 1984 Goldratt
- TOTAL CYCLE TIME 1985 Phil Thomas
- World
- Time..
- Measu
- Cycle T
- Lean tl
- LEAN fo

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Home-work (Module 1 Session 1)

- Provide me a written response to my request using the "who is here?.. Template" and include your picture
- Research the teachings of Deming.. Start with http://en.wikipedia.org/wiki/W._Edwards_Deming
- Review the Deming **RED BEAD** experiment…. Use these and other web links..

http://www.bing.com/videos/search?q=the+red+bead+experiment&qpvt=the+red+bead+experiment&FORM=VDRE#view=detail&mid=91DFDF835A246839297C91DFDF835A246839297C

http://www.bing.com/videos/search?q=Demming+Variatioin+YouTube+Video&Form=VQFRVP#view=detail&mid=56981F72EF8E0353750156981F72EF8E03537501

- Explain in your own words what you think the **RED BEAD** experiment results explain about quality control?
- In your own words prioritize Deming's 14 points in terms of which are most important to you and explain why?.
- In Your Own words describe why you think all 3 operating parameters Cost Quality and Delivery are important and how they interrelate to each other.
- Give an example of how consumers have driven the quality of products.
- Read all papers at www.nigelsouthway.com/positionalpapers
  (I will post any reading material I want you to read to this page.)
- Strongly recommend you read the book… THE GOAL by Goldratt (OPTIONAL)

15

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The Past and the Future …. Any Business

The Challenge ???……..

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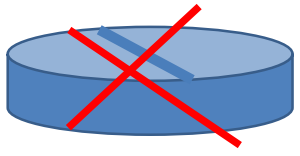
The Future …. Any Business

The Problem

- Margin Pressure
- Shorter lead-times
- Need for agility
- More global competition

The Solution



A Magic Pill ?

The Future …. Any Business

The Problem	The Solution
• Margin Pressure	Continuous Improvement
• Shorter lead-times	Continuous Improvement
• Need for agility	Continuous Improvement
• More global competition	Continuous Improvement

The leaders and survivors will have a strong integrated CI Culture

Continuous

THE GOAL

Improvement

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Continuous Improvement……
……. a Strategic Imperative

The experts predict that "disruptive technologies" such as IoT and Advanced Automation and Artificial Intelligence (AI) Technologies will drive business competitiveness.

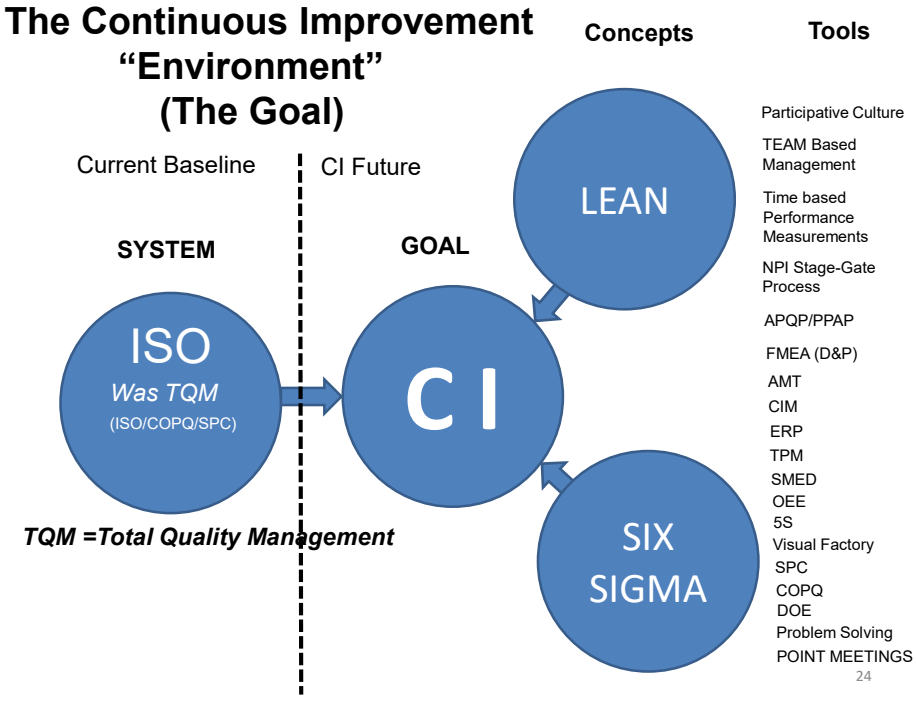
90% of North American business leaders are revisiting CI as a strategic differentiator

90% of them believe advanced automation and AI will be the direction for productivity

80% are unhappy with the effectiveness of past automation solutions

85% are looking at a much more integrated information environment

All agree to compete on a global basis will require operational excellence



The Future …. Any Business

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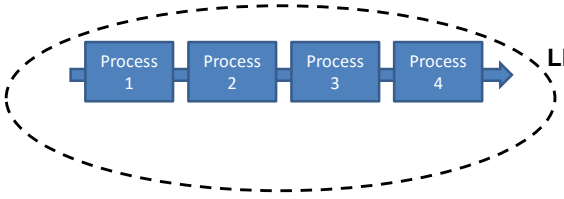
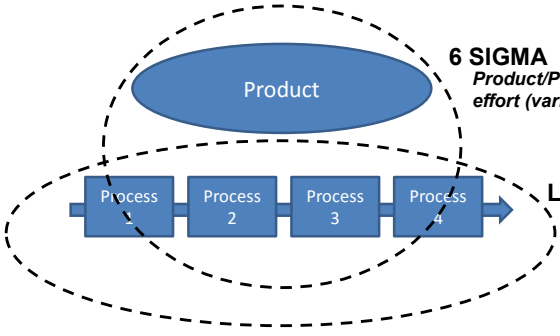
Continuous Improvement Environment

Continuous Improvement Environment



LEAN
How to Improve processes to do things faster with no wasted effort motion or time.

Continuous Improvement Environment



6 SIGMA
Product/Process combined improvement effort (variation, error and defect reduction)

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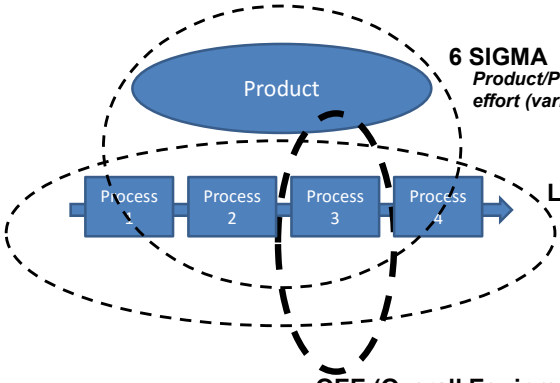

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Product/Process combined improvement effort (variation, error and defect reduction)

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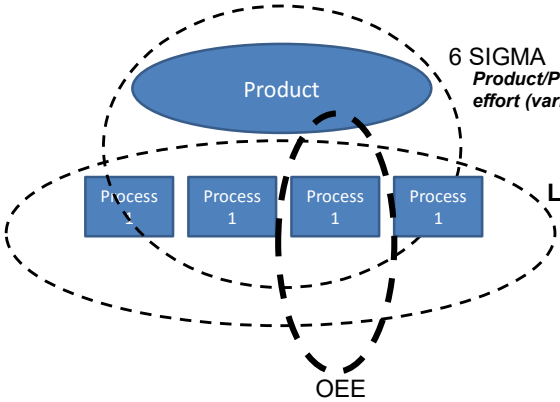
How to Improve processes to do things faster with no wasted effort motion or time.

OEE (Overall Equipment Effectiveness)
An environment for everyone within the organization to understand the health of the manufacturing process and what action to take to improve it..

The OEE measurement defines absolute process effectiveness

Continuous Improvement Environment



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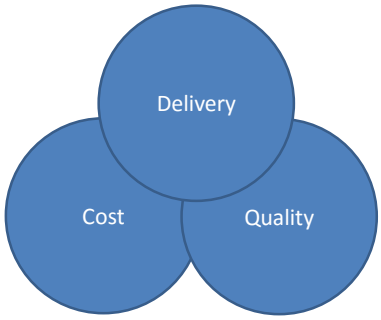

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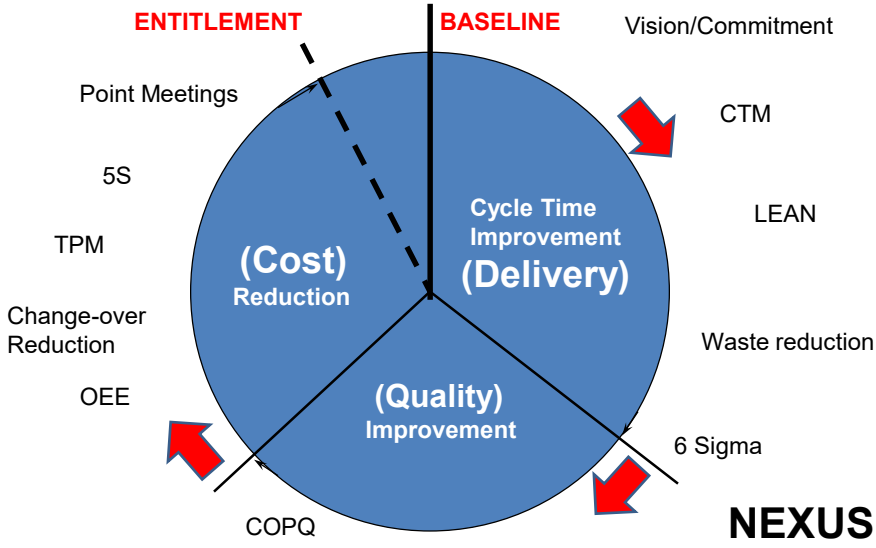
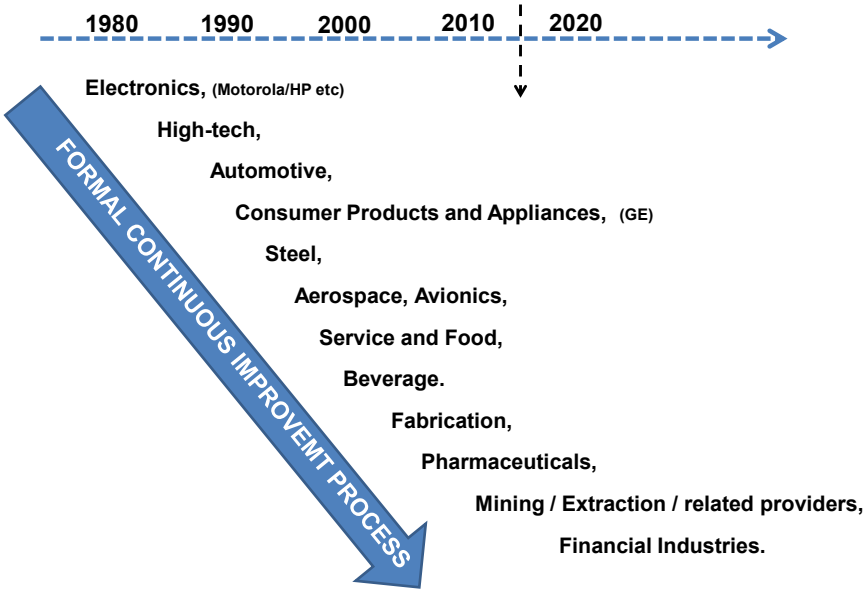
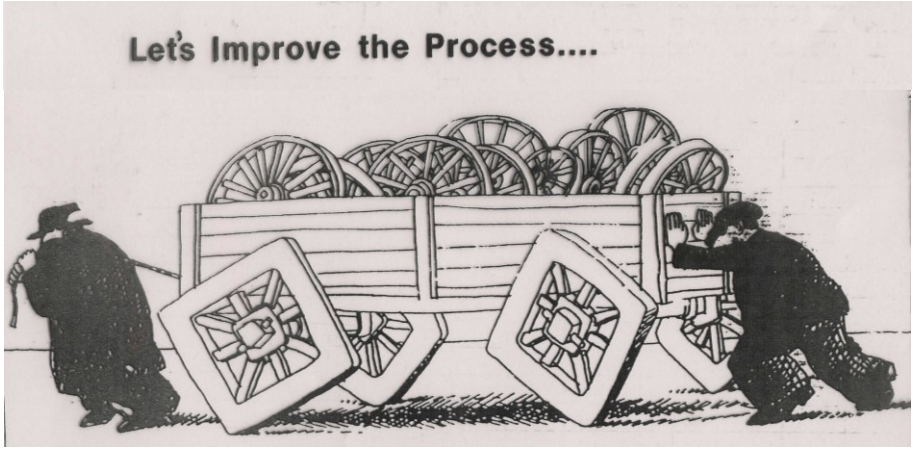
Continuous Improvement Environment



The Threat/Change Pressure Curve





Clear visioning and self awareness at all times!!

Make improvements happen from within the organization!

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Joint AME/SME/ASQ Forum findings…

The Continuous Search for Profitability

- *To remain highly competitive, companies must continuously identify opportunities for key improvements, facilitating increased profitability and creating an environment of innovation and organic continuous improvement in……*

- Processes
- Systems
- Organization

- They must have an ongoing plan to:
  - Identify opportunities for key improvem
  - Facilitate increased value and profitabil
  - Install a formal system for continuous im
  - Breed a culture of Continuous Evolution planning
  - Create an environment of innovation

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35

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Still the best choice

LEAN

" It's become a bit denatured"

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Still the best choice

LEAN

Implementation pitfalls

One criticism of lean perennially heard among rank-and-file workers is that lean practitioners may easily focus too much on the tools and methodologies of lean, and fail to focus on the philosophy and culture of lean. The implication of this for lean implementers is that adequate command of the subject is needed in order to avoid failed implementations.

Too much.. Fancy language, Complex mathematical terms, and Japanese words

愚かな

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Still the best choice

LEAN

Implementation pitfalls

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It's Stupid!

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Reading list

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• The GOAL…	1984 Goldratt
• TOTAL CYCLE TIME	1985 Phil Thomas
• World Class Manufacturing	1986 Schonberger
• Time.. A Competitive Advantage	1990 George Stalk BCG
• Measure-Up (Performance Measurement Score-carding)	1990 Lynch and Cross
• Cycle Time Management	1993 Northey/Southway
• Lean thinking	1996 Womak/Jones
✡ LEAN for Dummies	Sayer/Williams

Now!!!

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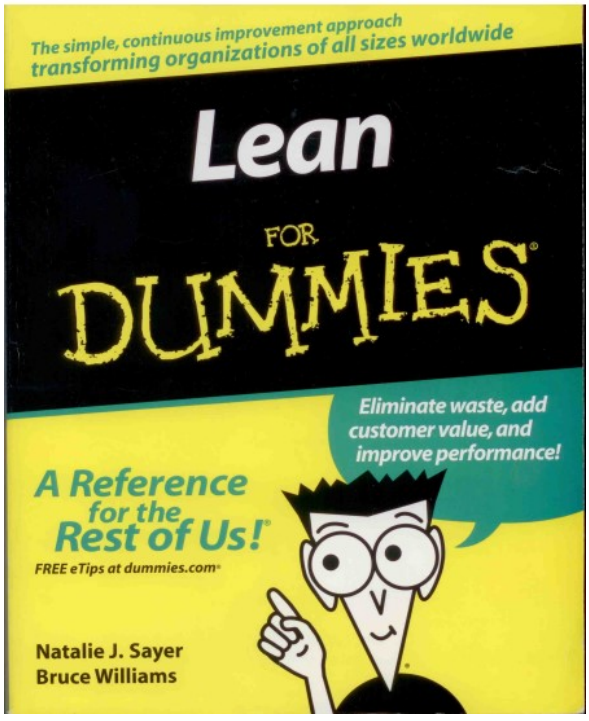
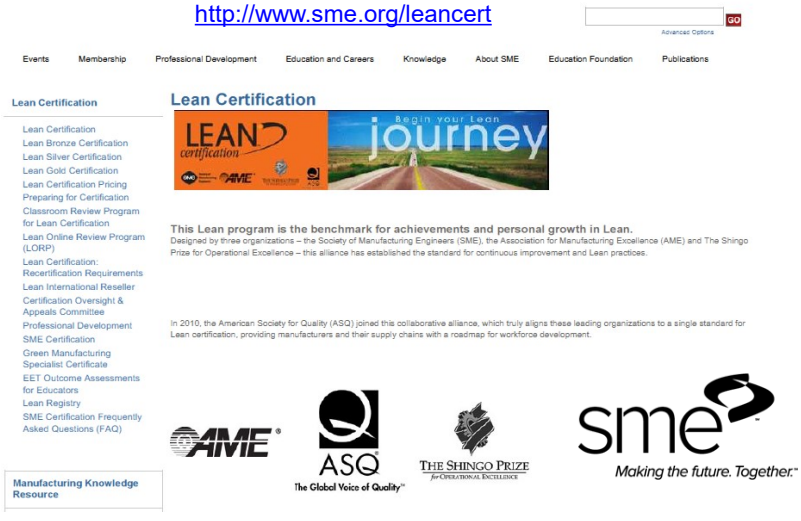


LEAN Certification

http://www.sme.org/leancert



Lean thinking applies to ALL business sectors

- Every type of business or organization has "Operations"
- From first customer contact to payment for the product or service
- Manufacturing, distribution, service, finance, health care, insurance, government, public support, etc.
- They all have processes, value streams and supply chains!
- All can be performance reviewed!
- All need to IMPROVE!

"If it can be flow-charted ..it can be improved

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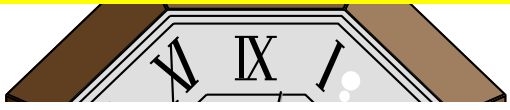
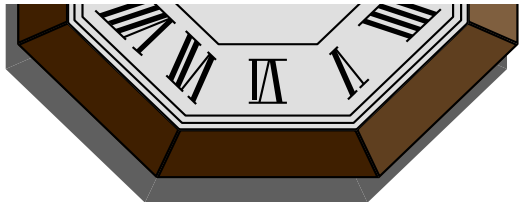
Finding that lever for Continuous improvement!

Start thinking in the 4th Dimension!!



Cycle-Time



A LEAN MEASUREMENT

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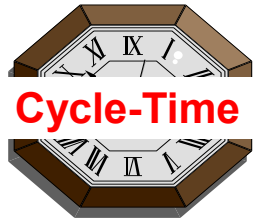
What is Total Business Cycle Time?



"Total Cycle Time" is the actual time elapsed from when a customer expresses a need for that product or service until the time the customer's need is satisfied and payment is received.

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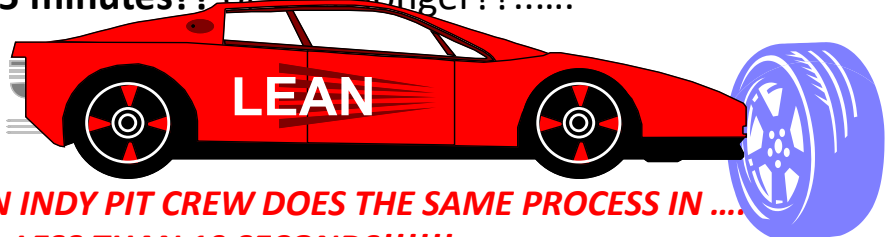
A CYCLE-TIME REDUCTION EXAMPLE!!!

- How long does it take you to change a wheel????
- ***Stop car…..loose nuts…raise car…..remove nuts….replace new wheel…Fit nuts…. lower car…tighten nuts……Go…***
- **15 minutes??** or even longer??……



•AN INDY PIT CREW DOES THE SAME PROCESS IN ….
…….LESS THAN 10 SECONDS!!!!!!

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Cycle Time Is The Time It Takes To Get Something Done!!!

- Improve quality
- Deliver a service
- Develop a product
- Enter an order
- Design a product
- Manufacture a product
- Develop a financial plan
- Close the books
- Reduce inventory
- Procure materials
- Develop a spec
- Type a letter
- Develop a proposal
- Change culture ….

(i.e.. change the way to do business)

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The things in daily life that are LEAN….

Eyeglasses…. 1 hour!!!...
Paint colors…. Mixed in store
Pizza delivery…. 1 hour and sometimes free
Video conferencing…. NOT business travel
Non coin tolls on highway
British Round- A-Bouts
Pay for gas at pump
Cell phones
Internet banking
Self serve/checkout stores
Internet movies
Car Rental (some)
Internet shopping?
www information

NOT Lean

Global Supply Chains
Legal system
Government policy making
Voting system
Heath care systems
Educational system
HEALTH System
Business commute time
Airport check in/baggage handling
Security at airports
Hotel check-in

ALL CAN TAKE TOO LONG!!

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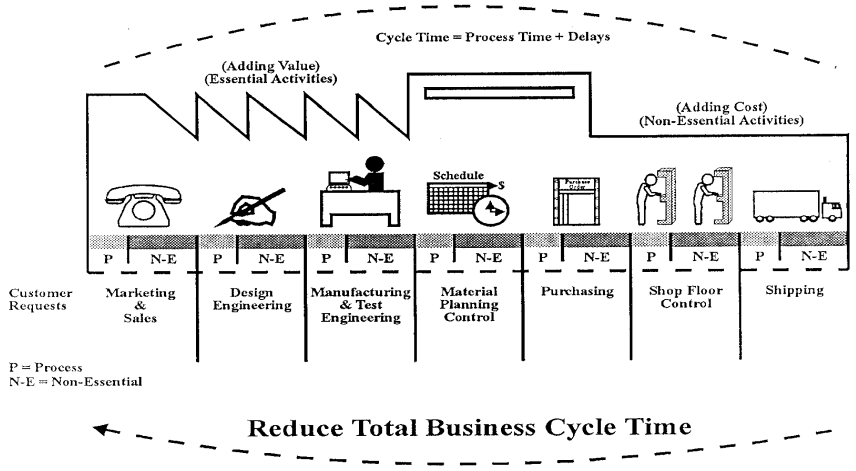
Traditional Business Flow



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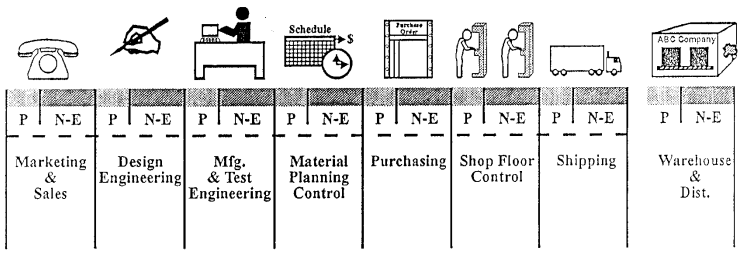
Reduce Total Business Cycle Time

Cycle Time Activities	=	Activities That Add Value And Are Essential	+	Activities That Add Cost And Are Non-Essential



Comparison Of Operating Models

Lead Time = Transport + Store + Changeover + Run + Wait

Cycle Time	= Delay	+ Delay	+ Delay	+ Run	+ Delay
	= NVA	+ NVA	+ NVA	+ VA	+ NVA
	= Waste	+ Waste	+ Waste	+ VA	+ Waste

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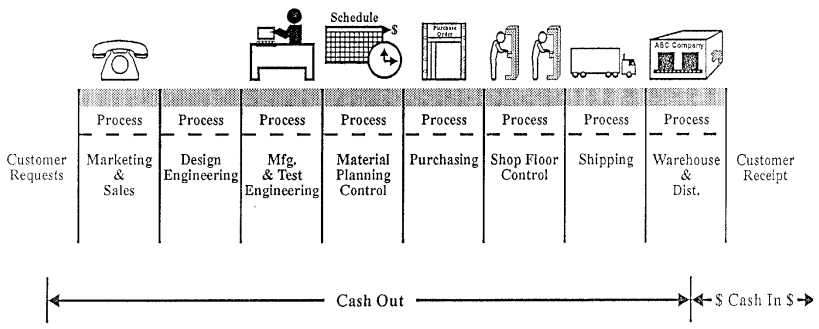
Goal Number One: Delay Elimination

Cycle Time = Process Time
(Adding Value 100%)
(Essential Activities Only)



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Definitions

- **Value Adding Operation**
  - **An operation that transforms or shapes a product/interacting/ service towards that which is sold to a customer**
- **Non-Value Adding Operation**
  - **Those operations that take time, resources or space, but do not add to the value of the product/interaction/service itself**

- **Delays/Bottlenecks/Excess**
  - ↓
- **Non-Value Adding**
  - ↓
- **Non-Essential**
  - ↓
- **Non-Conversion**
  - ↓
- **Cost Adding**
  - ↓
- **Waste**

8 Types of Waste

Waiting
Inventory
Excess Transportation
Over-production
Defects
Over-processing
Excess Motion
Under-utilized Talent

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WASTE! **NEXUS**

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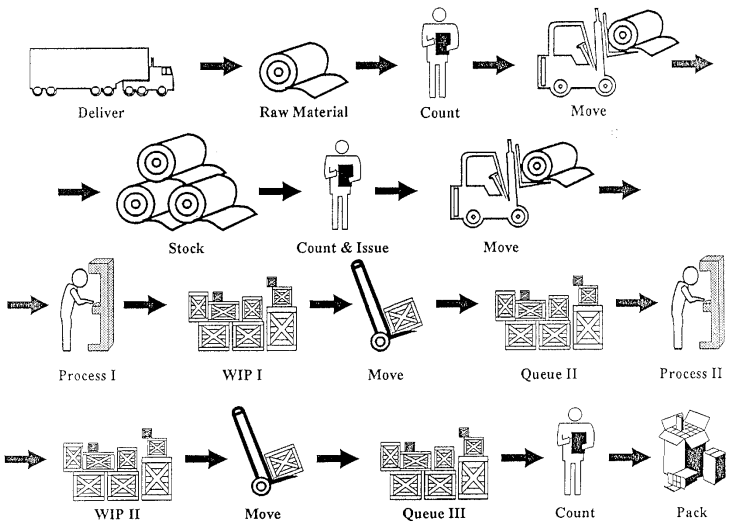
Excess Motion
Under-utilized Talent

"In any business big or small and whatever the type of Products or Services as much as 90% waste or non value adding cost can exist in some of the activities within the business"

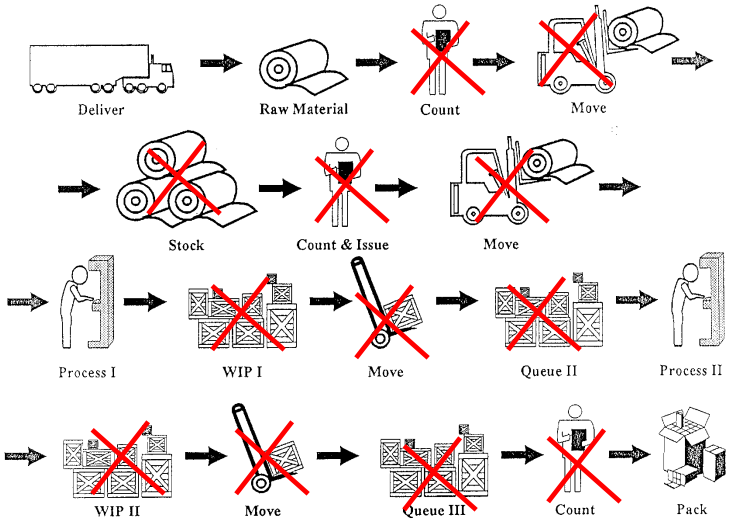
16 Activities From Raw Material To Packaging . . . (12 Are Waste!)

BASELINE



NEXUS

16 Activities From Raw Material To Packaging . . . (12 Are Waste!)



NEXUS

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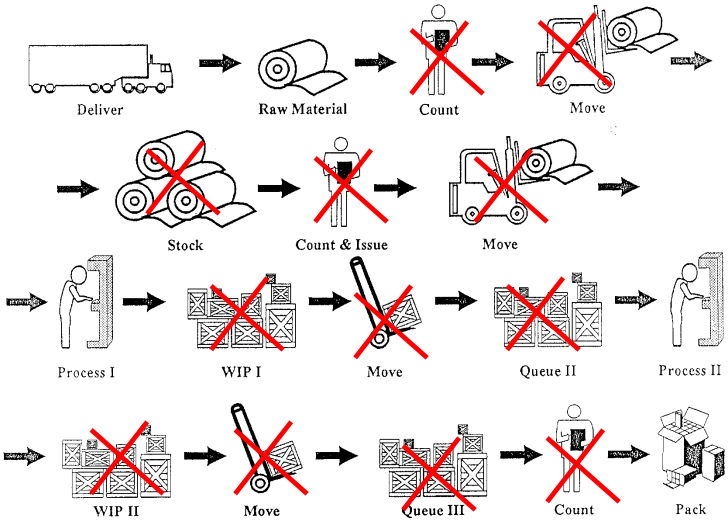
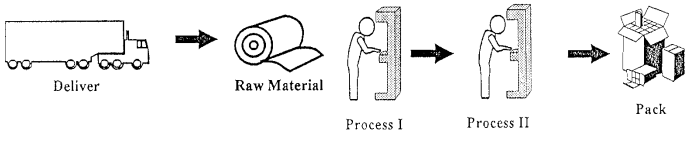


NEXUS

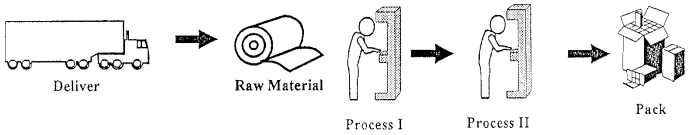
The LEAN Version (Entitlement)



With LEAN but low capital

NEXUS

The LEAN Version (Entitlement)

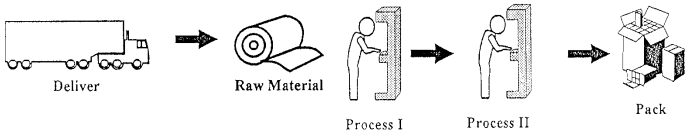


With LEAN but low capital

THEN….

NEXUS

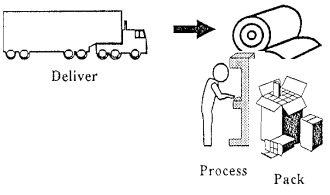
The LEAN Version (Entitlement)



With LEAN but low capital

THEN….

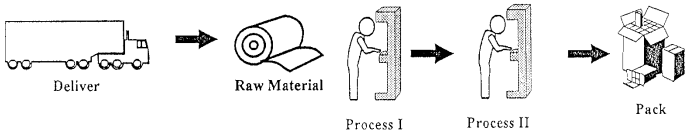
The LEAN Version (Benchmark)



Add Capital and Technology

NEXUS

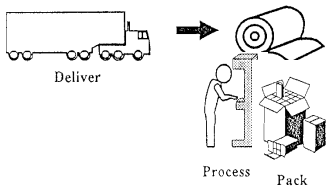
The LEAN Version (Entitlement)



With LEAN but low capital

THEN….

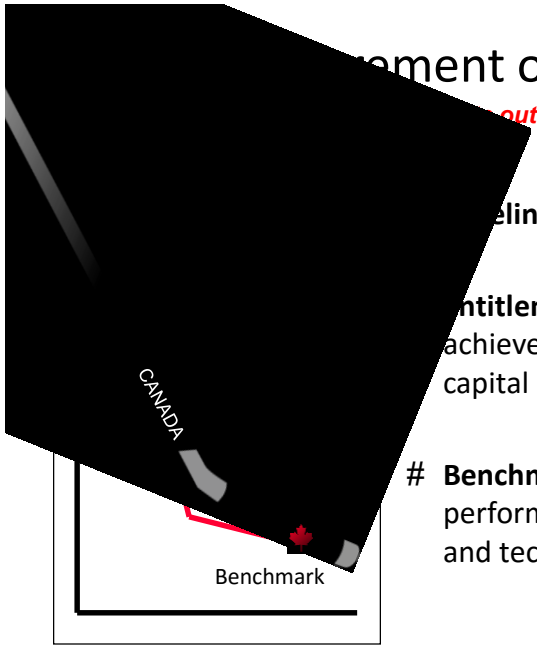
The LEAN Version (Benchmark)



Add Capital and Technology

Note:
Baseline..Where you are now!
Entitlement… with Lean but low capital
Benchmark… Capital and Technology

NEXUS



…ement of Performance

…out first.. Then Capex in!

…eline: Current performance

…ntitlement: Level of performance …achieved with present resources & capital

Benchmark: Best competitive performance with added resources and technology

NEXUS

Benchmarking

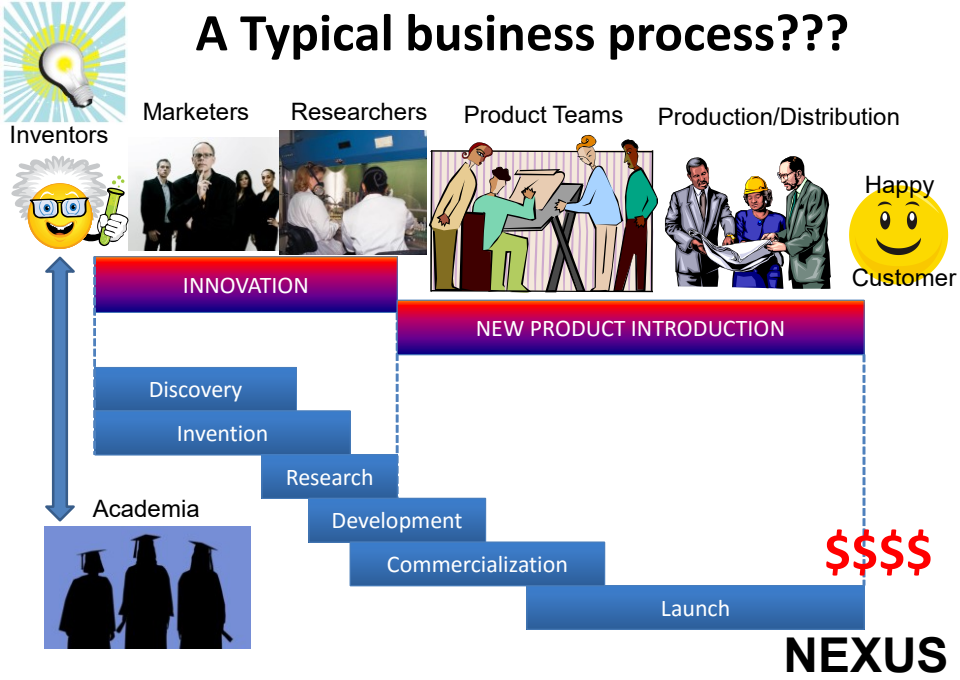
- Review with Measurements who is “best in class”
  - In your industry
  - In any industry with similar process or conditions.

- Study why they are better and try to apply to your own business.

Copy/Steal/Cheat/Beat the Competition!!

NEXUS

A Typical business process???

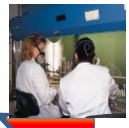


A Typical business process???

Inventors

Marketers

Researchers



Product Teams

Production/Distribution

Happy

Customer

Academia

INNOVATION

NEW PRODUCT INTRODUCTION

Discovery

Invention

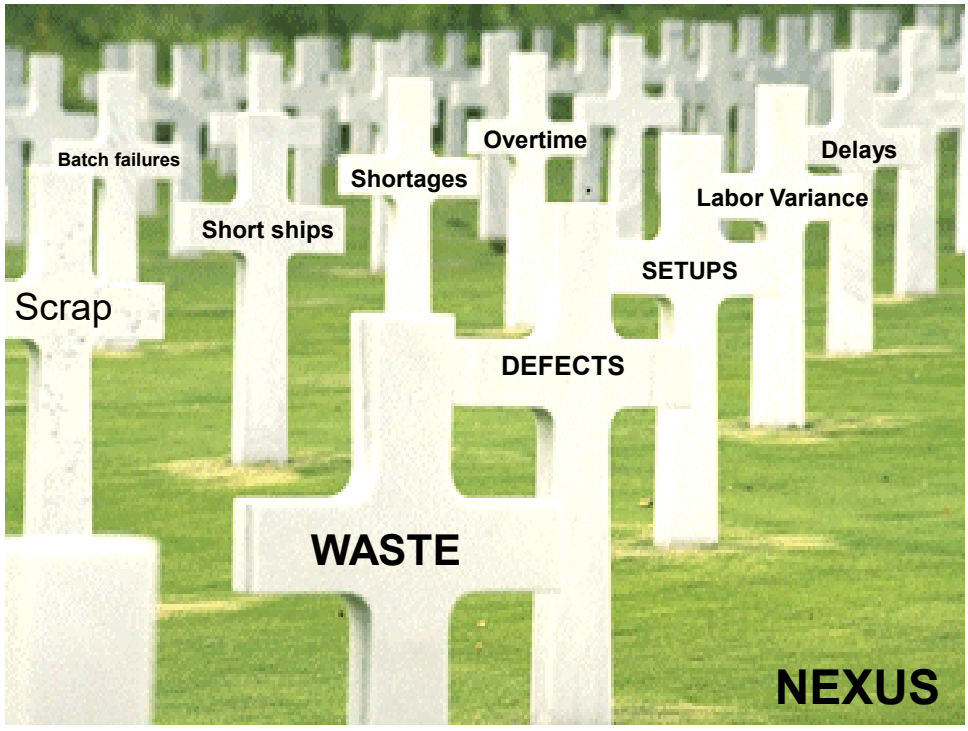
Research

Develo

C

White Spaces

The time delay between major functions, where less than effective communication linkage can occur, which affects the interaction required between these functions or departments to complete the essential tasks of the business.

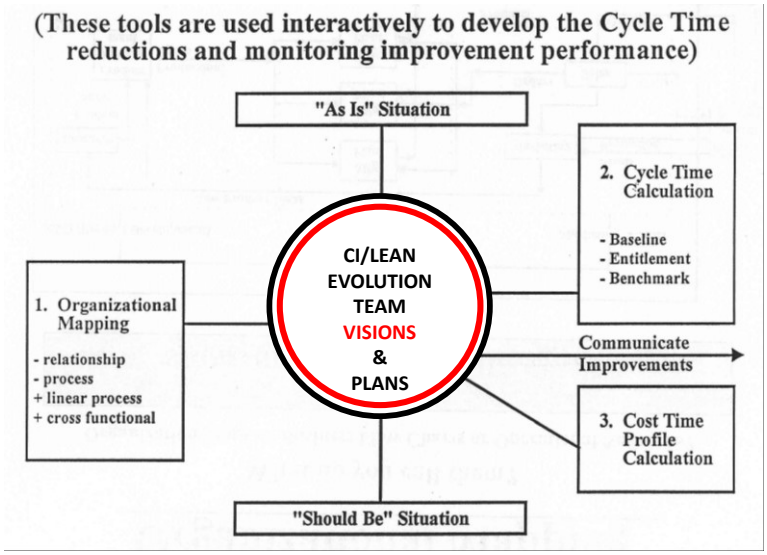


Typical Operational Improvement %... …… Traditional to Benchmark

Improvement Parameter	Strategic plans	New Product Introduction	Supply Chain	Internal Operations	Distribution and Payment
Response Cycle-time	From Periodic to Continuous	25% to 50%	15% to 25%	10% to 50%	10% to 50%
Productivity costs	5% to 20%	5% to 20%	5% to 20%	5% to 20%	5% to 20%
Inventory costs	NA	NA	5% to 25%	10% to 50%	10% to 50%
Cost Of Poor Quality	NA	NA	10% to 50%	10% to 50%	10% to 50%
Over-head costs	NA	10% to 25%	10% to 25%	10% to 25%	10% to 25%
Capital Utilization	NA	10% to 50%	5% to 10%	10% to 25%	10% to 25%
G&A costs	10% to 25%	10% to 25%	10% to 25%	10% to 25%	10% to 25%
People Engagement	25% to 50%	25% to 50%	25% to 50%	25% to 50%	25% to 50%
Innovation Focus	25% to 50%	25% to 50%	NA	NA	NA

67

LEAN/CYCLE TIME REDUCTION TOOLS



NEXUS

Linear Map… Value stream

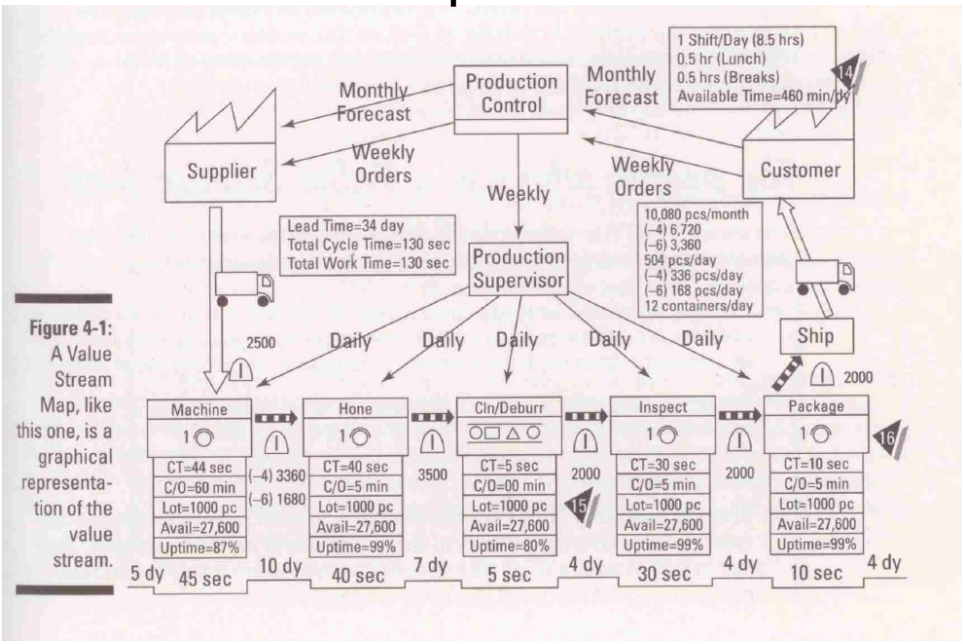
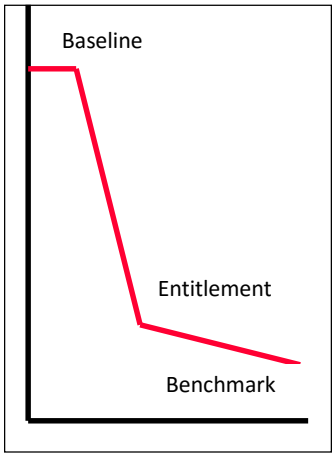


Figure 4-1: A Value Stream Map, like this one, is a graphical representation of the value stream.

Measurement of Performance



- **Baseline:** Current performance
- **Entitlement:** Level of performance achieved with present resources & capital
- **Benchmark:** Best competitive performance with added resources and technology

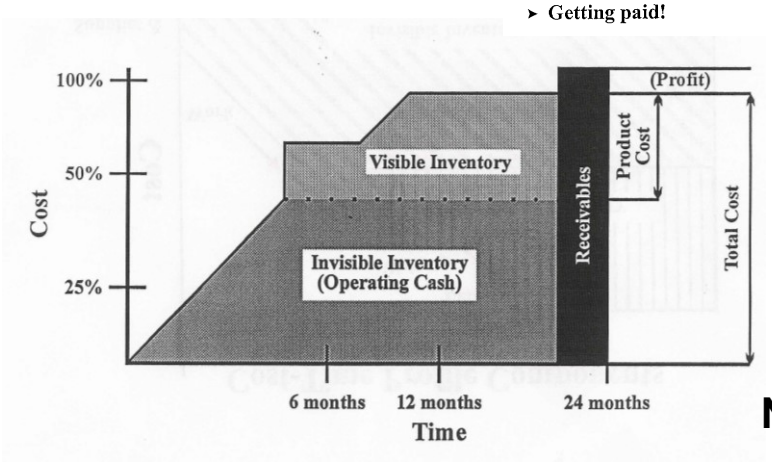
NEXUS

The Cost Time Profile

A *cost-time profile* is a graphic representation of the accumulation of cost for a product or service as it passes through its entire cycle in the business operation.

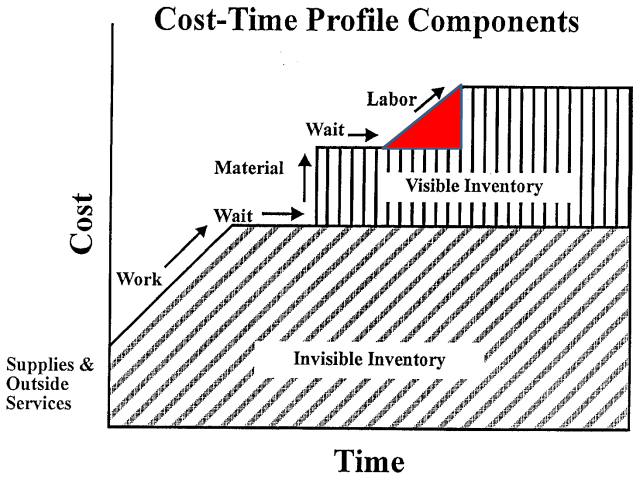
How much money is tied up in:

- Obtaining work!
- Making the product!
- Delivering it!
- Providing the service!
- Getting paid!

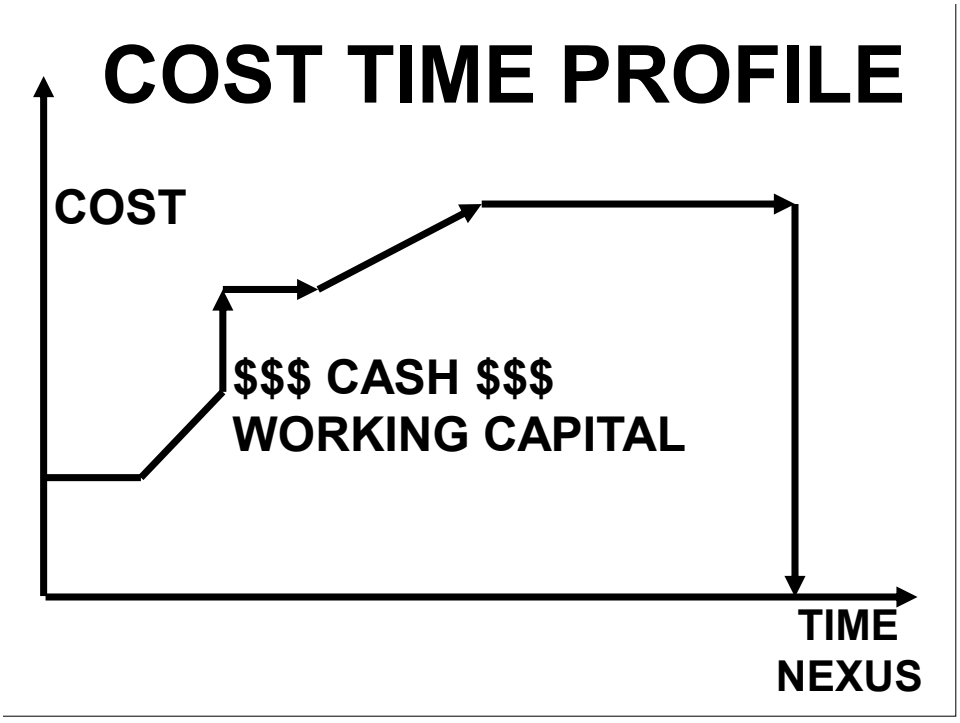


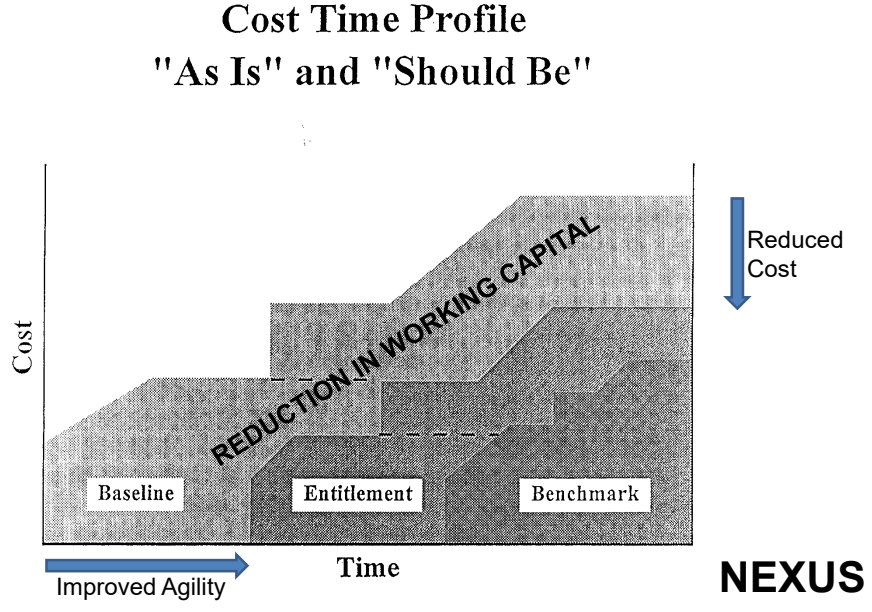
NEXUS

Generic Cost-Time Profile

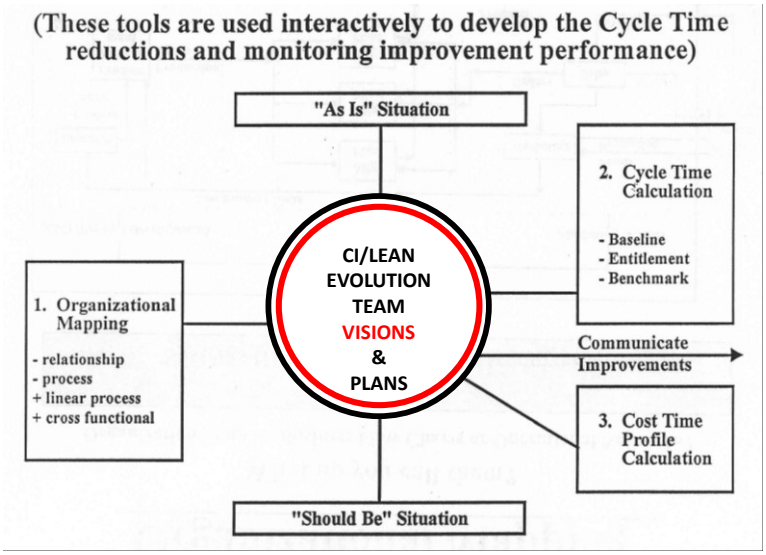


NEXUS


COST TIME PROFILE
COST
$$$ CASH $$$
WORKING CAPITAL
TIME
NEXUS


Cost Time Profile
"As Is" and "Should Be"
Cost
REDUCTION IN WORKING CAPITAL
Reduced
Cost
Baseline
Entitlement
Benchmark
Time
Improved Agility
NEXUS

LEAN/CYCLE TIME REDUCTION TOOLS



NEXUS

VISION

Baseline to Entitlement

The essential extra special skill set

Must Shift Paradigms

Create Emotional Tension

Manage and Measure!

Process to develop a semi-custom proposal to offer client services

30 page power-point Proposal

Baseline

Takes 50 steps

And at least 2 weeks to complete (estimated)

Only 11 steps out of 50 add real value

80% Waste in this Process !!

Process to develop a semi-custom proposal to offer client services

30 page power-point Proposal

Baseline

Used to take 50 steps
and more than **2 weeks**

ACTION
Started with mapping the process and defining NVA and defined ways to eliminate or do activities concurrently

Looked at better templates/new procedures

Entitlement

Now takes 11 steps
and reduced to **2 working days**

Benchmark

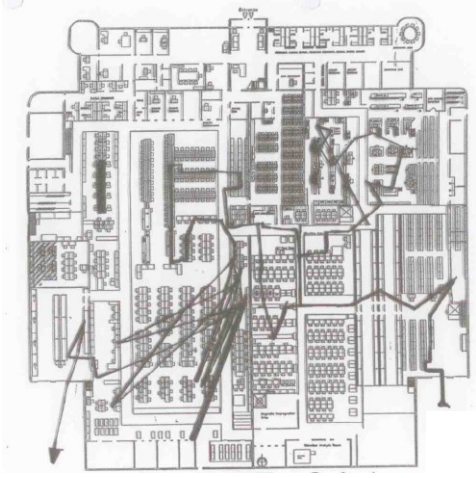
Then asked computer guys to systematize the steps that remained!... Now same day!!

Vision…. "Next day Proposals"

VISION

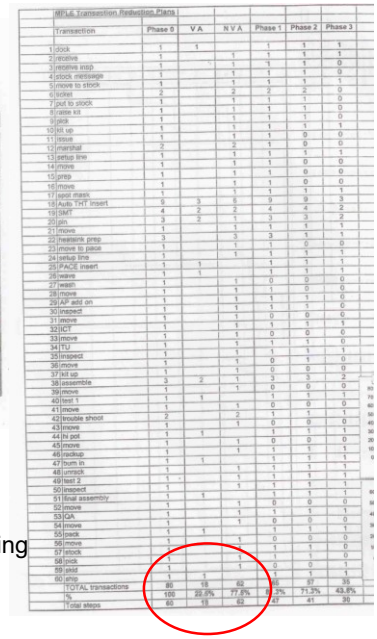
Baseline to Entitlement

BUSINESS/FACILITY LAYOUT & ORGANIZATION



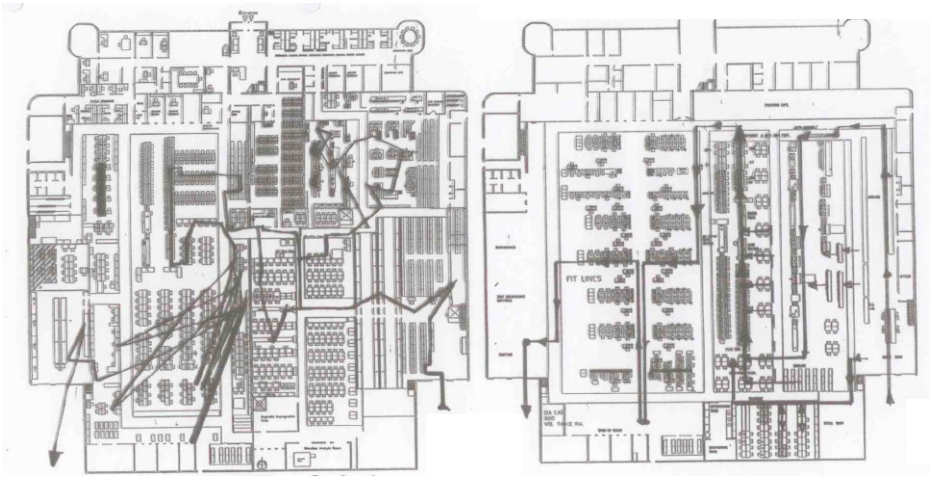
BEFORE

80 transactions…62 are Non Value adding



Transaction	Phase 0	V A	N V A	Phase 1	Phase 2	Phase 3
1 stock	1	1		1	1	1
2 receive	1		1	1	1	1
3 receive insp	1		1	1	1	0
4 stock message	1		1	1	1	0
5 move to stock	1		1	1	1	1
6 kickit	2		2	2	2	0
7 put to stock	1		1	1	1	0
8 rate kit	1		1	1	1	0
9 pick	1		1	1	1	0
10 kit up	1		1	1	0	0
11 move	1		1	1	0	0
12 marshal	2		2	1	0	0
13 setup line	1		1	1	0	0
14 move	1		1	1	0	0
15 prep	1		1	1	0	0
16 move	1		1	1	0	0
17 spot mask	1		1	1	1	1
18 Auto THT insert	9	3	6	9	9	3
19 SMT	4	2	2	4	4	2
20 pin	3	2	1	3	3	2
21 move	1		1	1	1	1
22 heatsink prep	1		1	1	0	0
23 move to pace	1		1	1	1	1
24 setup line	1		1	1	1	1
25 PACE insert	1	1		1	1	1
26 wave	1	1		1	1	1
27 wash	1		1	1	0	0
28 move	1		1	1	0	0
29 AP add on	1		1	1	1	0
30 inspect	1		1	1	0	0
31 move	1		1	1	0	0
32 ICT	1		1	1	1	1
33 move	1		1	1	0	0
34 ITU	1		1	1	1	1
35 inspect	1		1	1	0	0
36 move	1		1	1	1	1
37 kit up	1		1	1	0	0
38 assemble	3	2	1	3	3	2
39 move	1		1	1	0	0
40 test 1	1	1		1	1	1
41 move	1		1	1	0	0
42 trouble shoot	2		2	1	1	1
43 move	1		1	1	0	0
44 hi pot	1	1		1	1	1
45 move	1		1	1	0	0
46 rackup	1		1	1	1	1
47 burn in	1	1		1	1	1
48 unrack	1		1	1	1	1
49 test 2	1		1	1	1	1
50 inspect	1		1	1	1	1
51 final assembly	1	1		1	1	1
52 move	1		1	1	0	0
53 QA	1		1	1	1	1
54 move	1		1	1	0	0
55 pack	1	1		1	1	1
56 move	1		1	1	0	0
57 stock	1		1	1	1	0
58 pick	1		1	1	0	0
59 ship	1	1		1	1	1
60 ship	1	1		1	1	1
TOTAL transactions	80	18	62	80	57	33
%	100	22.5%	77.5%	71.3%	71.3%	43.8%
Total steps	60	18	42	47	41	30

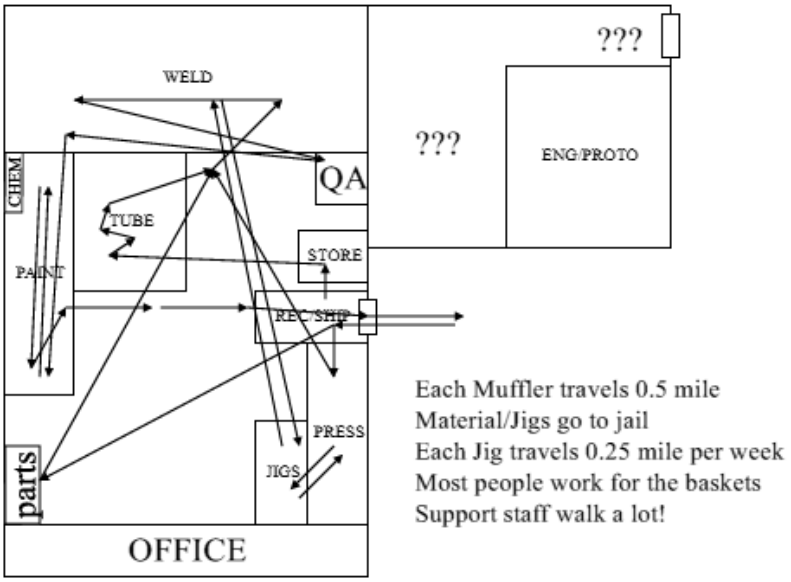
BUSINESS/FACILITY LAYOUT & ORGANIZATION



BEFORE **AFTER**

Product Travel Distance: 2500 feet to 1000 feet
 # Transactions: 80 to 35
Total Process Steps: 60 to 30

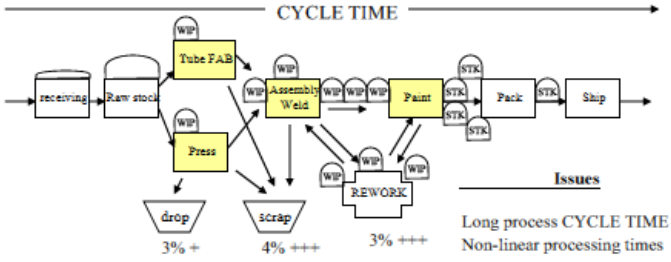
EXISTING ACS FACILITY LAYOUT & FLOW



Each Muffler travels 0.5 mile
Material/Jigs go to jail
Each Jig travels 0.25 mile per week
Most people work for the baskets
Support staff walk a lot!

NEXUS

ACS EXISTING (Baseline)



Process CT Baseline = 7days?plus (6 to 8 weeks of WIP)

Pt=0.5hrs (standard hours or value-added time)

Process CT Entitlement =3*Pt+dwell+pack
= 3*0.5 + 1.0 +0.5 =3 Hrs

VA to NVA ratio is 6*40*2/2 = 240 times !!!!!

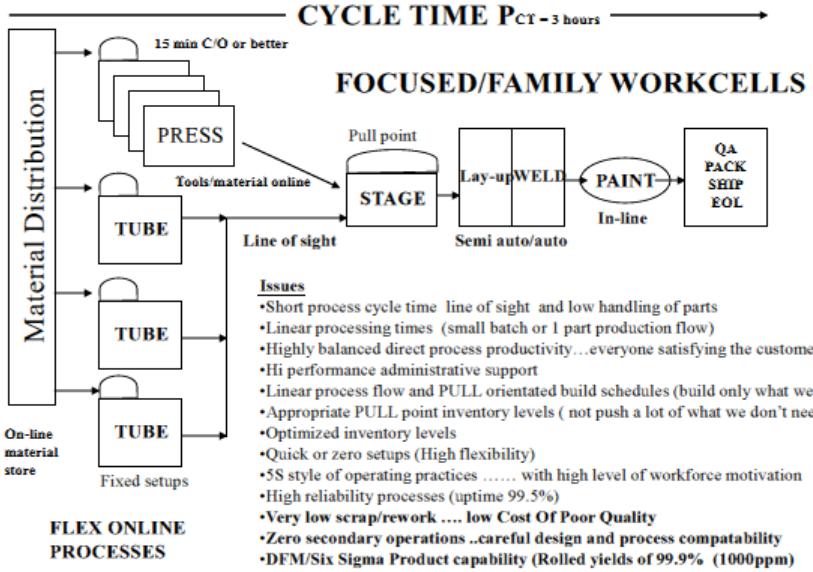
(VA = value added
NVA = non-value added)

Issues

Long process CYCLE TIME
Non-linear processing times
Low direct process productivity
Very Disrupted process flow
High inventory levels ($700,000 or 2 months of stock)
High levels of stock in "waste" baskets
High scrap/rework
High number of secondary operations
Large setups (low **Flexiblity**)
Some process downtime (low **Relability**) No PM
Low level of workforce motivation
Low process/product **Capability**
Opportunity to reduce waste in chasing problems

NEXUS

PROCESS ENTITLEMENT (where we want to be)

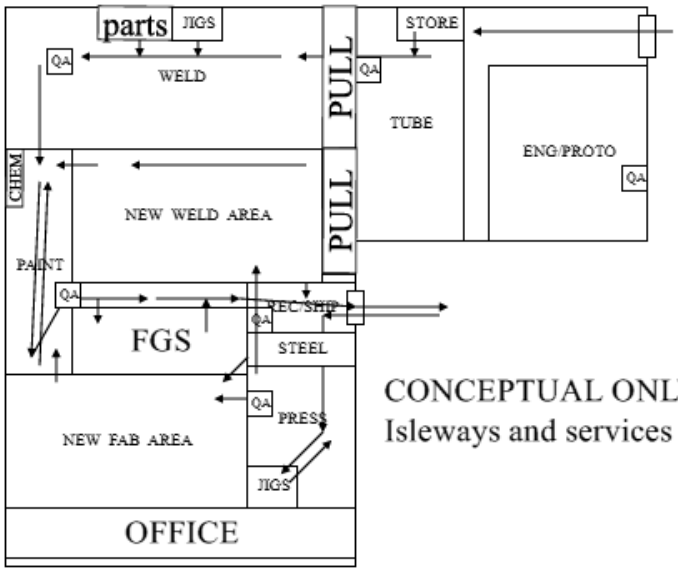


Issues

•Short process cycle time line of sight and low handling of parts
•Linear processing times (small batch or 1 part production flow)
•Highly balanced direct process productivity…everyone satisfying the customer
•Hi performance administrative support
•Linear process flow and PULL orientated build schedules (build only what we need)
•Appropriate PULL point inventory levels (not push a lot of what we don't need)
•Optimized inventory levels
•Quick or zero setups (High flexibility)
•5S style of operating practices …… with high level of workforce motivation
•High reliability processes (uptime 99.5%)
•Very low scrap/rework …. low Cost Of Poor Quality
•Zero secondary operations ..careful design and process compatability
•DFM/Six Sigma Product capability (Rolled yields of 99.9% (1000ppm)

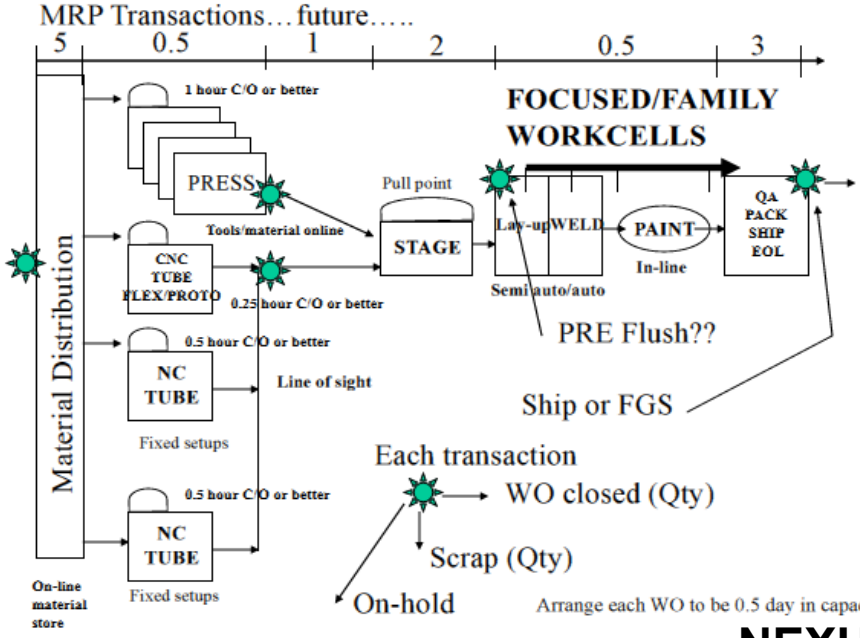
NEXUS

PROPOSED ACS FACILITY LAYOUT & FLOW

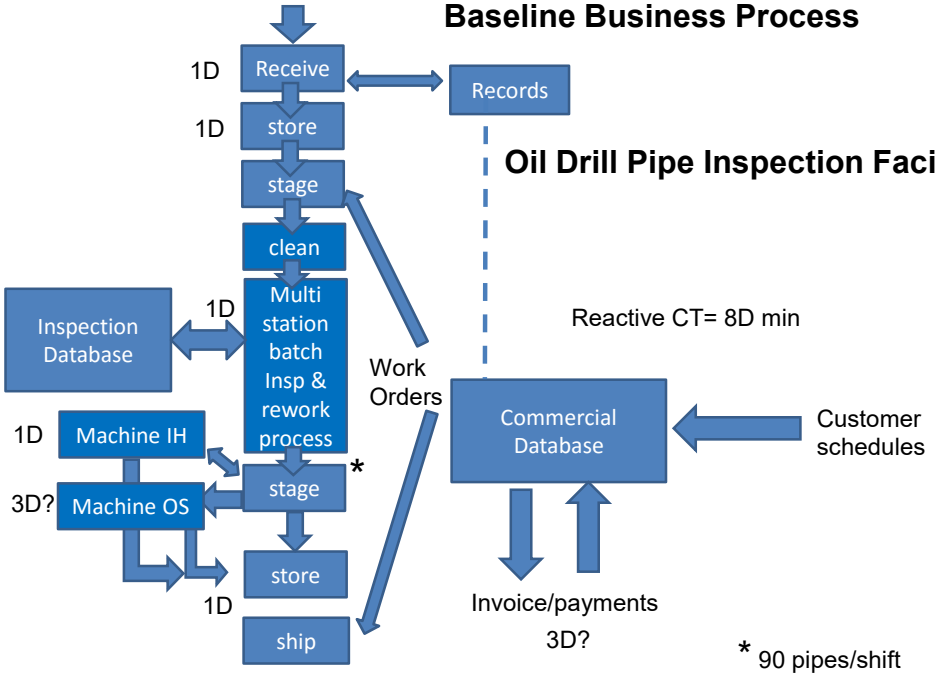


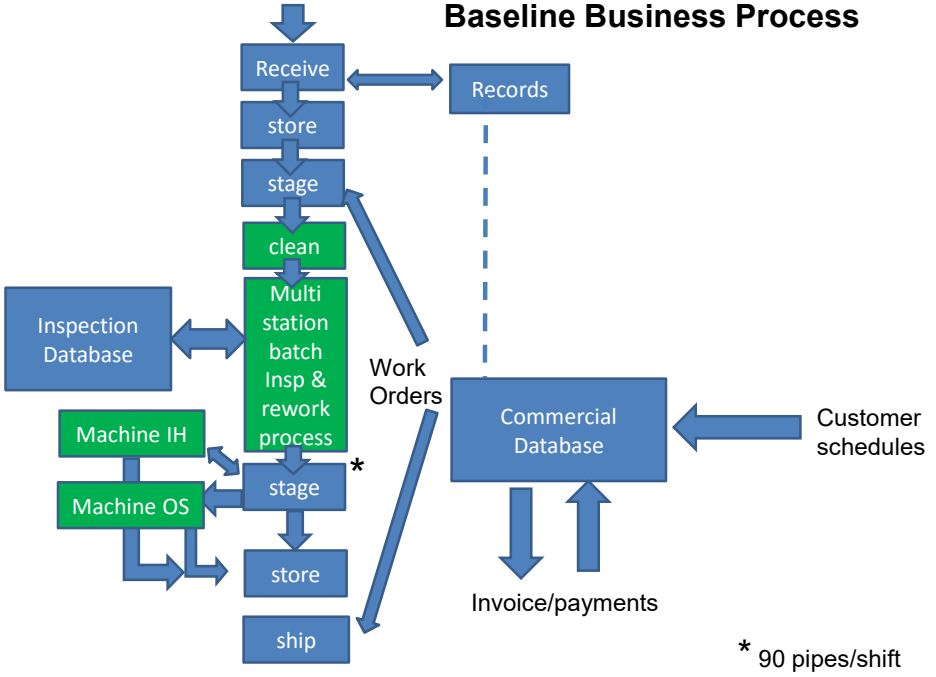
CONCEPTUAL ONLY
Isleways and services excluded

NEXUS



NEXUS


Baseline Business Process
Oil Drill Pipe Inspection Faci
1D
Receive
Records
1D
store
stage
clean
Inspection Database
1D
Multi station batch Insp & rework process
Work Orders
Reactive CT= 8D min
Commercial Database
Customer schedules
1D
Machine IH
3D?
Machine OS
*
stage
store
1D
ship
Invoice/payments
3D?
* 90 pipes/shift


Baseline Business Process
Receive
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Customer schedules
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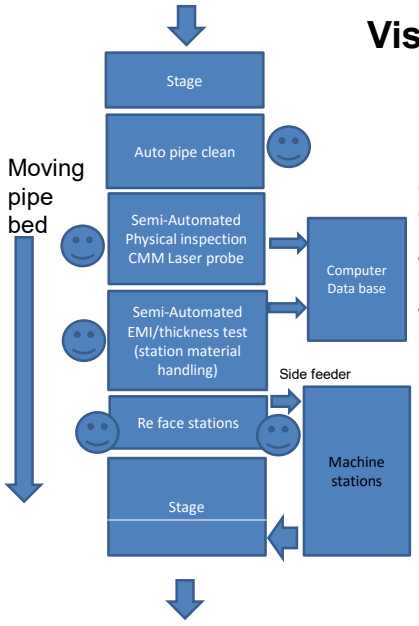
*
stage
store
ship
Invoice/payments
* 90 pipes/shift



Vision (Entitlement)

1 piece flow/Same Day delivery
Semi automated processes
Improved material handling
Reduced manning needed
Controlled bottleneck
Output rate is about 3 min optimized.

With a 3 min BN O/P = 7.5*60/3=150 pipe/shift

With 5 man team std time =5*7.5*60/150=15min

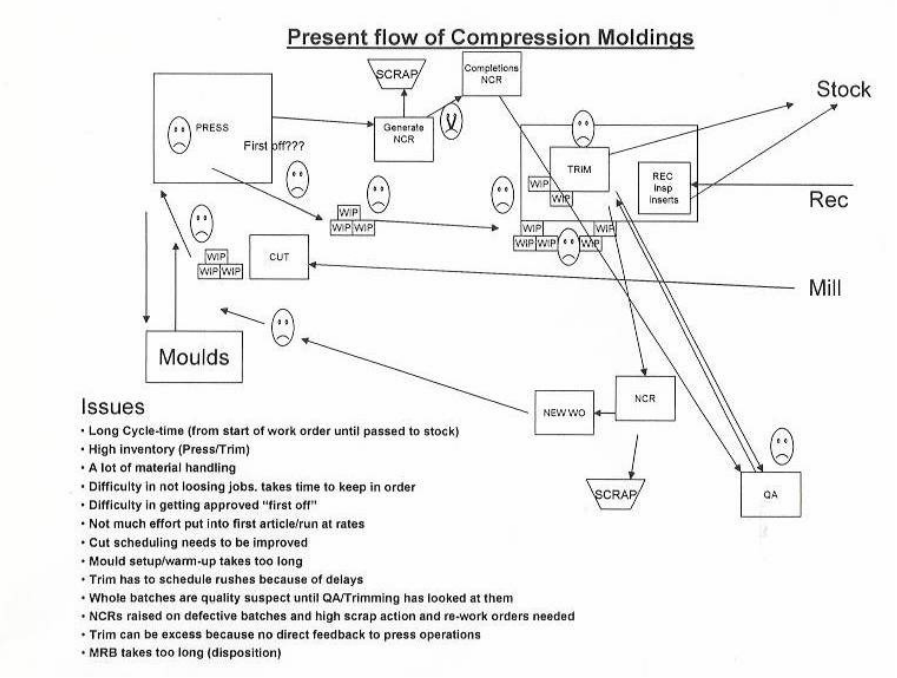
(Will need selective Capex and technology)

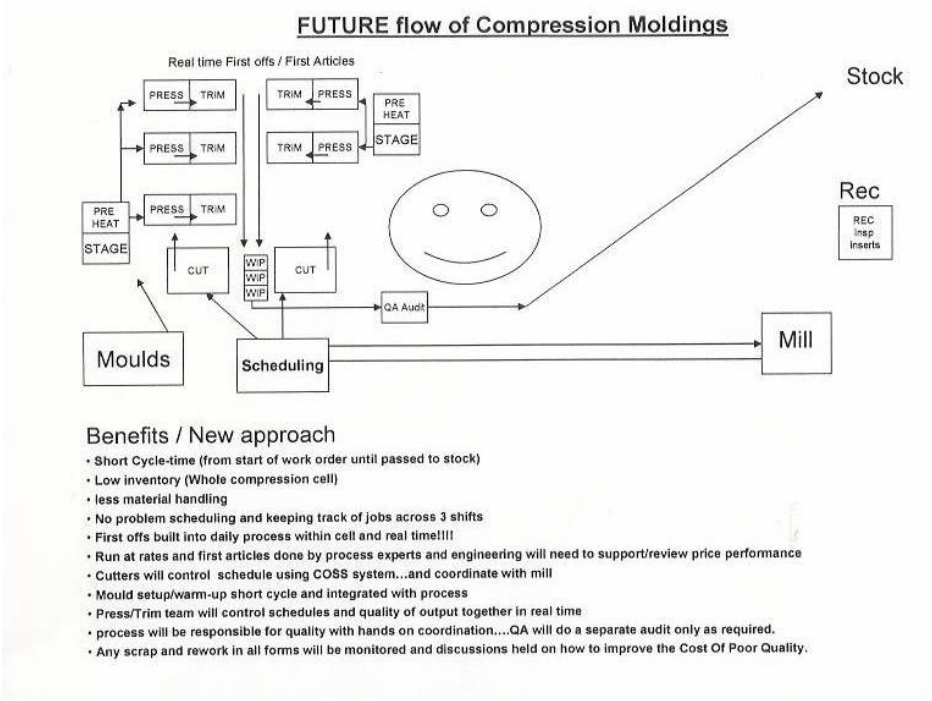
Conservative Improvement…

From 90pipe/shift to 150 pipe/shift 66% increase in Output

From std 40 min/pipe to 15 min /pipe 2.66 times improvement

EBITDA improved by about 2.5 times





Imagine the Vision

The Perfect Business Process

- **Cycle time inside customer expectations**
- **Faster time to market capability**
- **Minimal Inventory and carry costs and waste in all forms**
- **Perfect or Improved quality (Product /Process/Services)**
- **Total Cost performance excellence**
- **Greater productivity and increased gross margins**
- **Reduced working capital**
- **Increased cash-flow cycle & reduced need for credit**
- **Employee Participative and Empowerment culture**
- **Close to Customer culture**
- **A distinct competitive edge.**

NEXUS

Comments that can make you go insane!!!!

1. We tried that before.
2. Our place is different.
3. It costs too much.
4. That's beyond our responsibility.
5. That's not my job.
6. We're all too busy to do that.
7. It's too radical a change.
8. We don't have the time.
9. Not enough help.
10. That will make other equipment obsolete.
11. Let's make a market research test of it.
12. Our division is too small for it.
13. Not practical for operating people.
14. The men will never buy it.
15. The union will scream.
16. We've never done it before.
17. It's against company policy.
18. Runs up our overhead.
19. We don't have the authority.
20. We tried that back in '62.
21. Let's get back to reality.
22. That's not our problem.
23. Why change it, it's still working o.k.
24. I don't like the idea.
25. You're right, but...
26. You're two years ahead of your time.
27. We're not ready for that.
28. We don't have the money, equipment, personnel, room, etc..
29. It isn't in the budget.
30. Can't teach an old dog new tricks.
31. Good thought, but impractical.
32. Let's hold it in abeyance.
33. Let's give it more thought.
34. Top management would never go for it.
35. Let's put it in writing.
36. We'll be the laughing stock.
37. Not that again.
38. We'd lose money in the long run.
39. Where'd you dig that one up?
40. We did alright without it.
41. We don't have the staff.
42. It's never been tried before.
43. Let's shelve it for the time being.
44. Let's form a committee.
45. Has anyone else tried it?
46. Customers won't like it.
47. I don't see the connection.
48. It won't work in our plant.
49. What you are really saying is...
50. Maybe that will work in your department, but not mine.
51. The management committee will never go for it.
52. Don't you think we should look into it further before we act?
53. What do they do in our competitor's plant?
54. Let's all sleep on it.
55. It can't be done.
56. It's too much trouble to change.
57. It won't pay for itself.
58. I know a fellow who tried it.
59. It's impossible.
60. **We have always done it this way!**

NEXUS

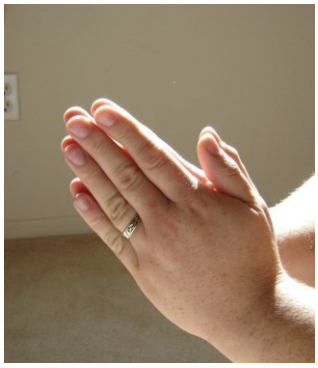
Definition: INSANITY

"Doing the same things…. and expecting better results!"

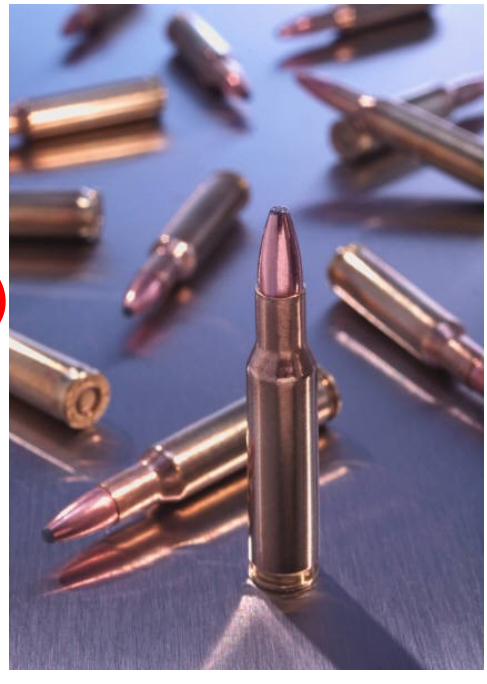
NEXUS

60. We have always done it this way!

Break your own paradigm's



Get the LEAN Religion

?  ?

RUN!!!!!!!

?.....

!

WASTE REDUCTION

Staying ahead of the competition!

Continuous Improvement through…

Lean-thinking …….

1.Use Vision …
2.Remove/Reduce Waste…
3.Change Operating Practices…

WIN!!!

Staying ahead of the competition!

LEAN THINKING IS A FORM OF INNOVATION TO STAY AHEAD OF THE COMPETITION

Contin… …ient through…

…g …….
1.Use Vision …
2.Remove/Reduce Waste…
3.Change Operating Practices…

WIN!!!

NEXUS
CONSULTING SERVICE

Still the best choice

LEAN

Implementation pitfalls

One criticism of lean perennially heard among rank-and-file workers is that lean practitioners may easily focus too much on the tools and methodologies of lean, and fail to focus on the philosophy and culture of lean. The implication of this for lean implementers is that adequate command of the subject is needed in order to avoid failed implementations.

NEXUS

A LEAN THINKING Knowledge Test

Questions..

What is the main thing we should attack in LEAN?

And how many types are there?

What do we mean by Value adding and Non value adding process steps?

What are “white spaces” ?

What is the vision of a perfectly LEAN Enterprise?

INDUSTRY WEEK

CORPORATE STRATEGY

THE CYCLE-TIME ADVANTAGE

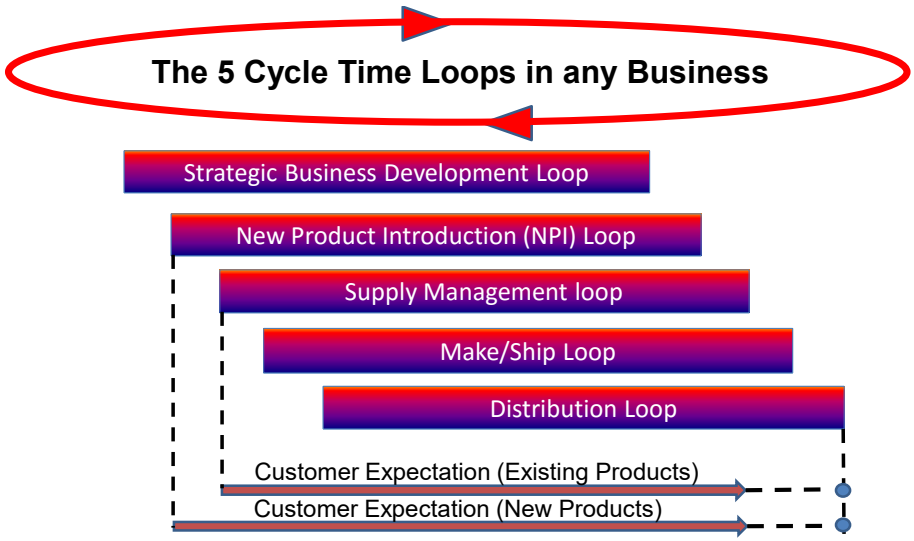
An integrated approach delivers the greatest competitive impact, contend the authors of a new book on managing the total business cycle.

BY PATRICK NORTHEY AND NIGEL SOUTHWAY

Authors Nigel Southway (left) and Patrick Northey

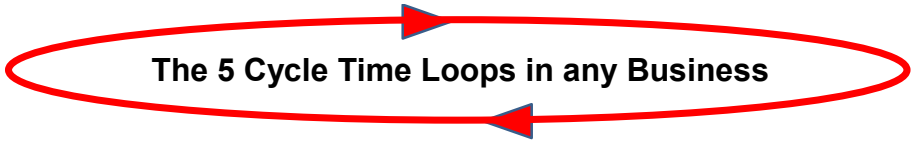
Patrick Northey and Nigel Southway: “The corporations that can eliminate red tape and minimize the time required to make and execute decisions will be able to survive in the 1990s.”

www.nigelsouthway.com/positionalpapers

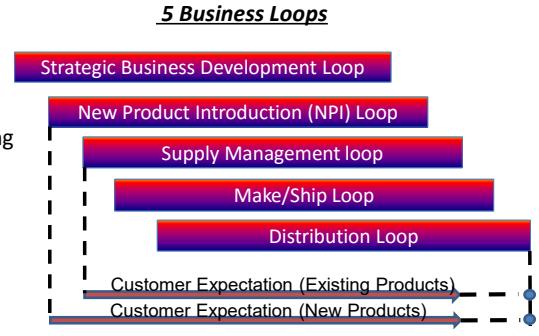


"Total Cycle Time" …The actual time elapsed from when a customer expresses a need for that product or service, until the time the customer's need is satisfied, and payment is received.

NEXUS



- Who is the customer?
- Must think holistically !
- From Vertical to Horizontal thinking
- The 5 Loops in the business
- Use the 5 Loops to provide focus



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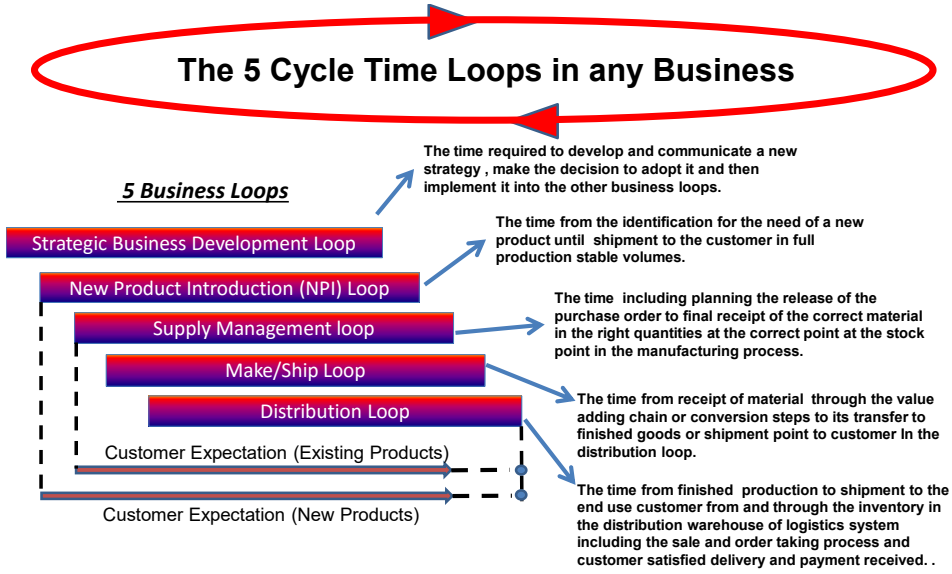
The 5 Cycle Time Loops in any Business
5 Business Loops
Strategic Business Development Loop
New Product Introduction (NPI) Loop
Supply Management loop
Make/Ship Loop
Distribution Loop
Customer Expectation (Existing Products)
Customer Expectation (New Products)
The time required to develop and communicate a new strategy , make the decision to adopt it and then implement it into the other business loops.
The time from the identification for the need of a new product until shipment to the customer in full production stable volumes.
The time including planning the release of the purchase order to final receipt of the correct material in the right quantities at the correct point at the stock point in the manufacturing process.
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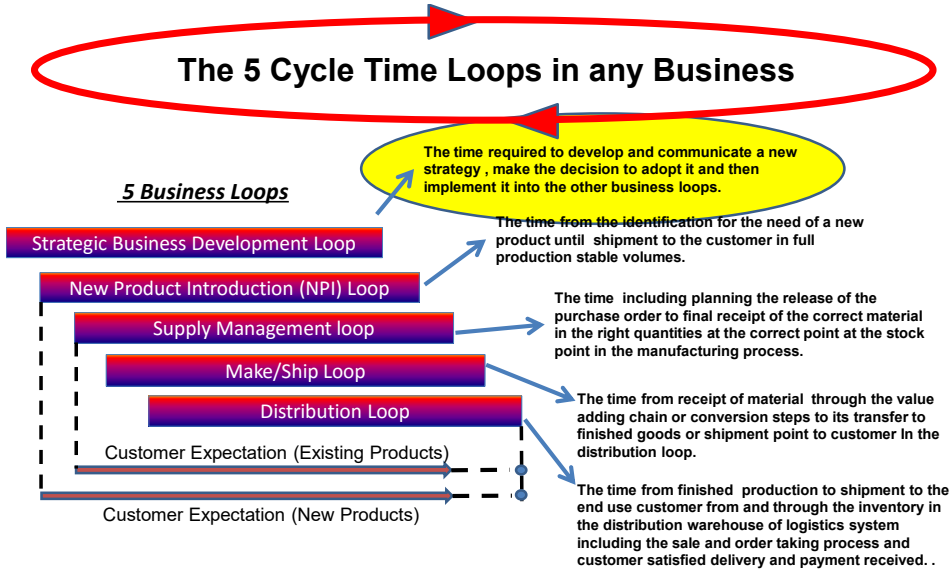
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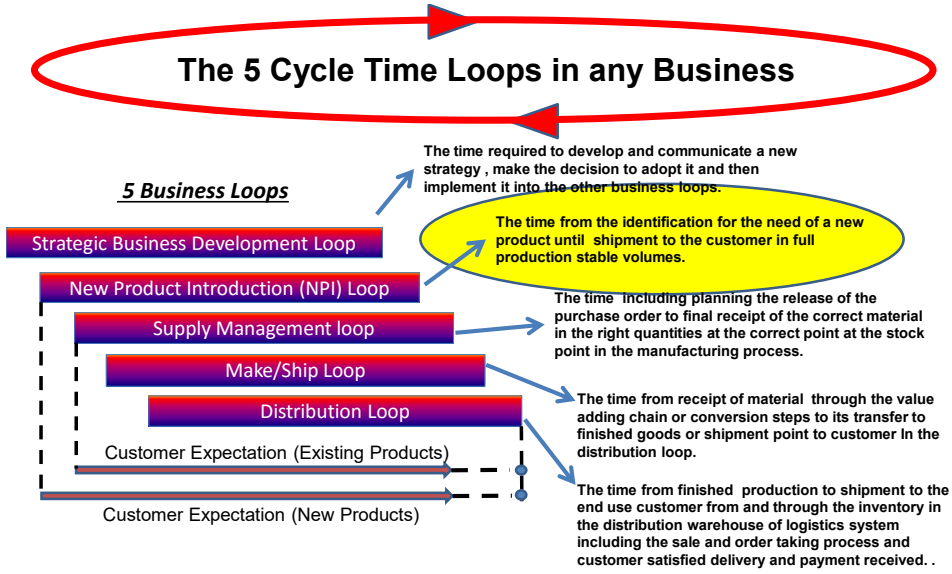
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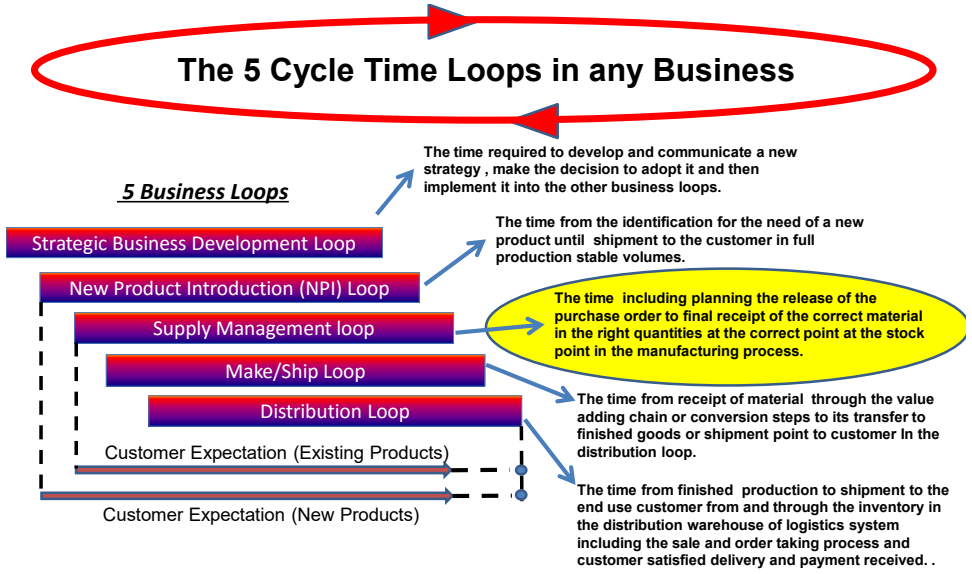
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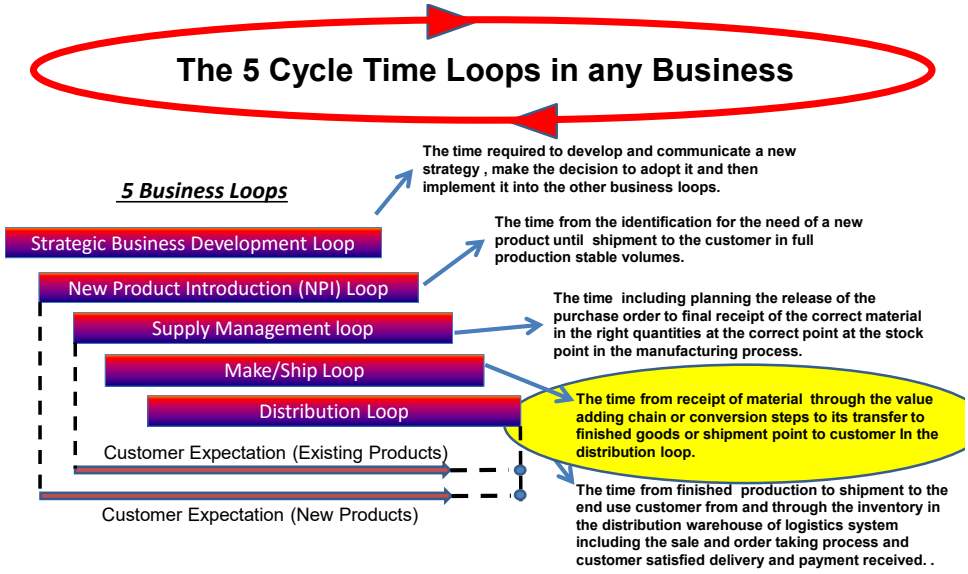
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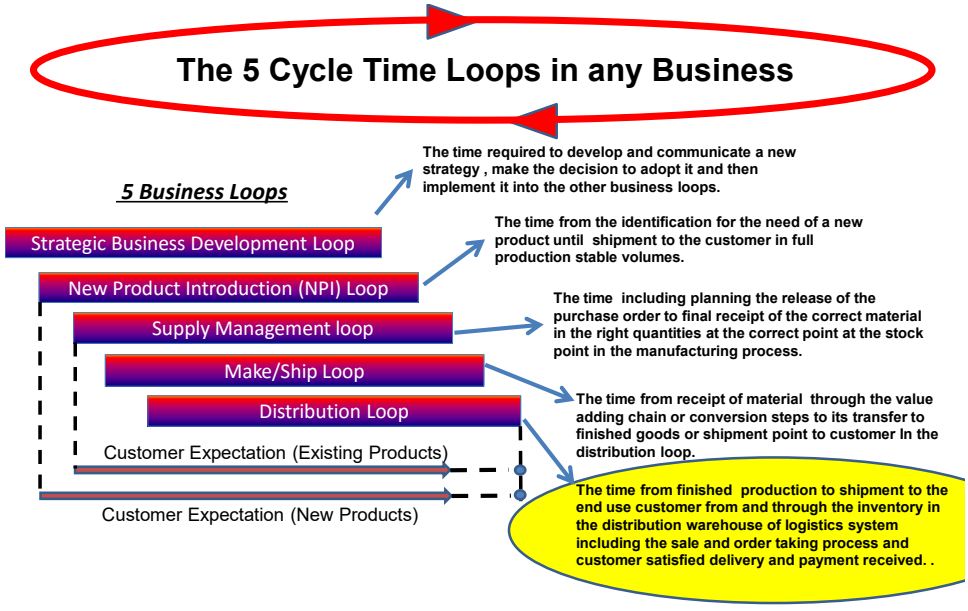
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NEXUS

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5 Business Loops

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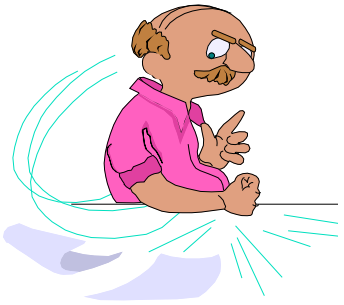
Supplier/Customer Relationship



We are *all* suppliers and customers.

(The internal customer concept)

The relationship *must* be based on mutual trust and respect.

BUT……..
THIS IS A MUCH MORE EXACTING & STRESSFUL CONCEPT THAN JUST MEETING OUR OWN GOALS

NEXUS

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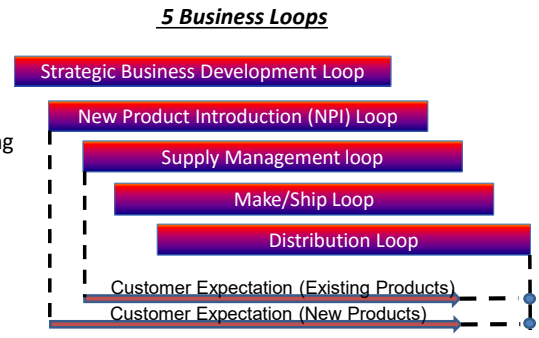

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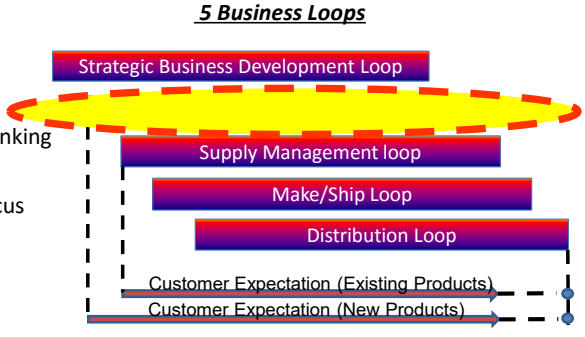

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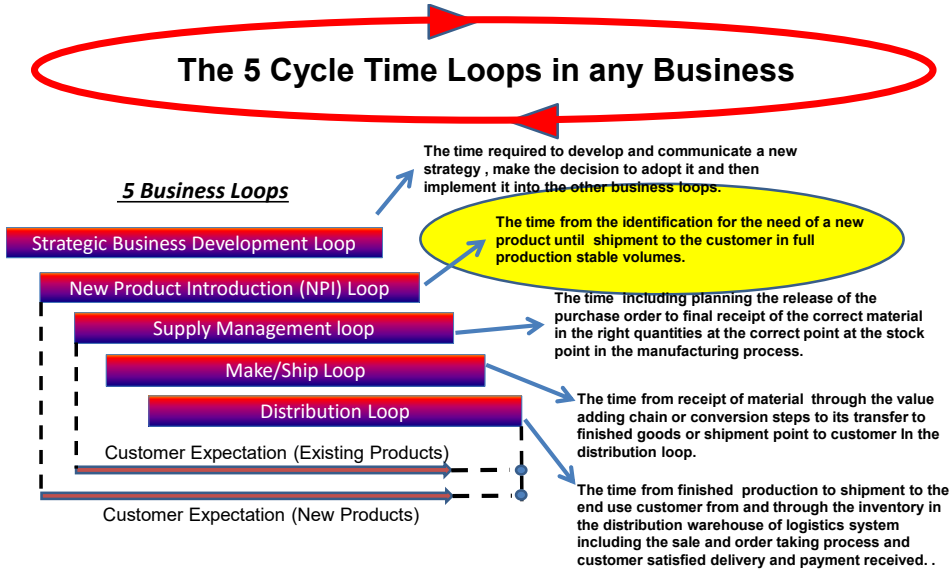

NEXUS

NPI

NEXUS

Ideas to Launch process…

N…P….I

New

Product

Introduction

NPI

Any Change in:

Fit
Form
Function
Process
Procedure

HISTORY OF NPI….

- Railroads…Shipbuilding… 1900's
- Aerospace..NASA…..60's and 70's
- Electronics Industry…Automotive 80's and 90's
- Consumer goods……plus the rest of us!!!

- Ongoing Issues…..
  - Time to launch
  - Early customer acceptance
  - First delivery quality

NEXUS

General Electric!... 1990's

~~General Electric!...~~ 1990's

1985

Motorola

The 5 Cycle Time Loops in any Business

6σ SIX SIGMA

Focused Only on New Products/Processes

5 Business Loops

- Who is the customer?
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NEXUS

Ideas to Launch process…

Ideas to launch?.. What's It Really All About?

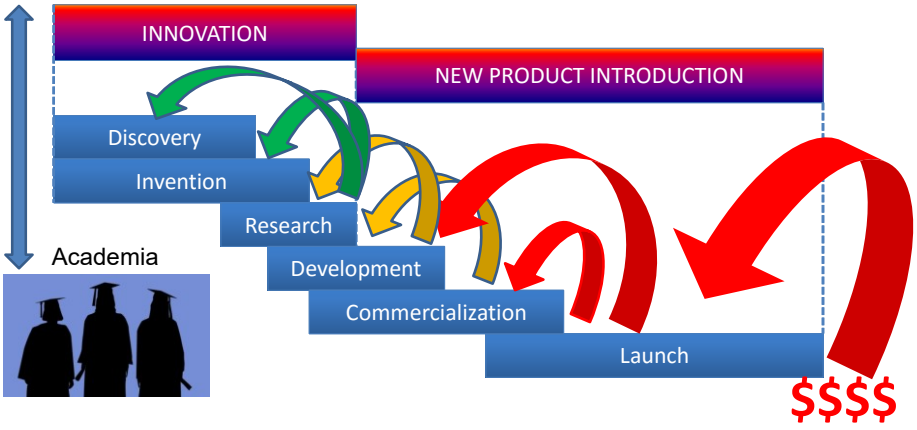
Strategic Business Development

INNOVATION

NPI

NEW PRODUCT INTRODUCTION

A Typical business process???



New Product Introduction

3 LAWS FOR HIGH PERFORMANCE NPI….

LAW # 1. INTEGRATE THE NPI FLOW ACROSS ALL DEPARTMENTS

LAW # 2. FOCUS INTO AN APPROPRIATE & ACCOUNTABLE TEAM

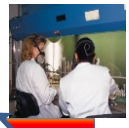
LAW # 3. STREAMLINE WITH EFFICIENT PROCEDURES AND MEASUREMENTS

A Typical business process???

Inventors

Marketers

Researchers



Product Teams

Production/Distribution

Happy

Customer

INNOVATION

NEW PRODUCT INTRODUCTION

Discovery

Invention

Research

Develo

Academia

White Spaces

The time delay between major functions, where less than effective communication linkage can occur, which affects the interaction required between these functions or departments to complete the essential tasks of the business effectively and efficiently.

PRODUCT TEAMS

6σ SIX SIGMA

INNOVATION

NEW PRODUCT INTRODUCTION

Discovery

Invention

Research

Development

Commercialization

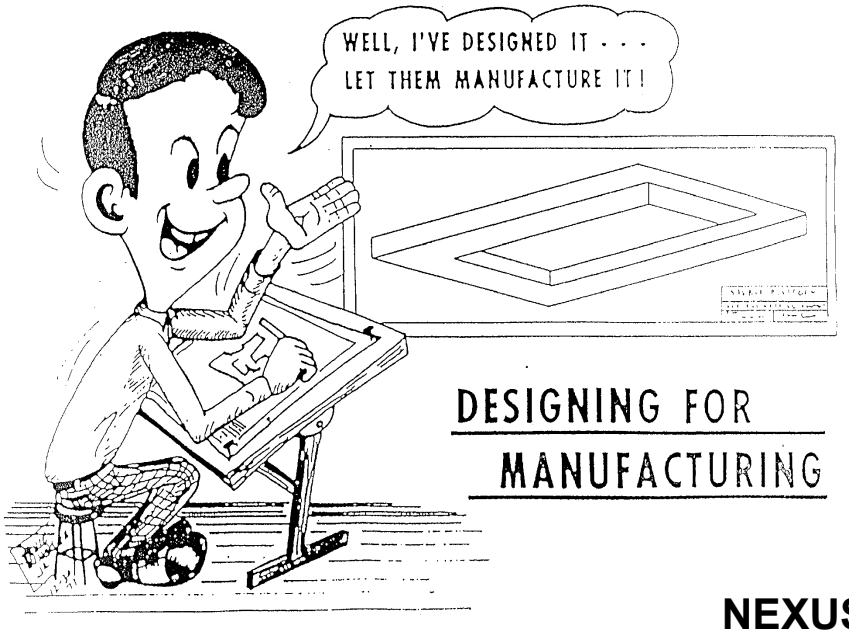
Launch

Academia

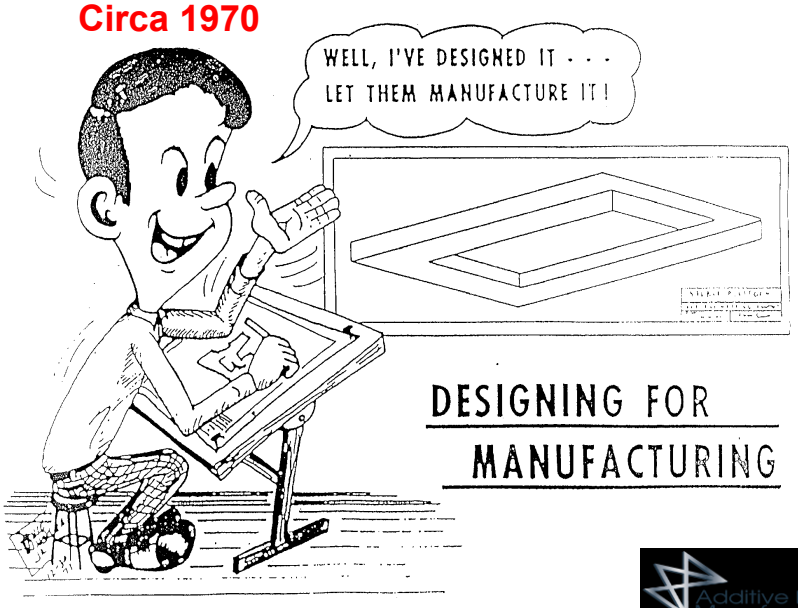
$$$$

DFM

DESIGN FOR MANUFACTURABILITY



Circa 1970



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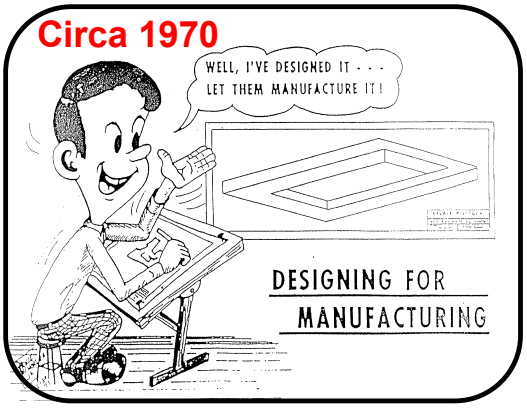

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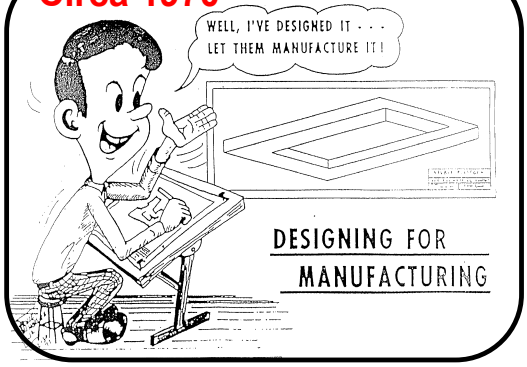
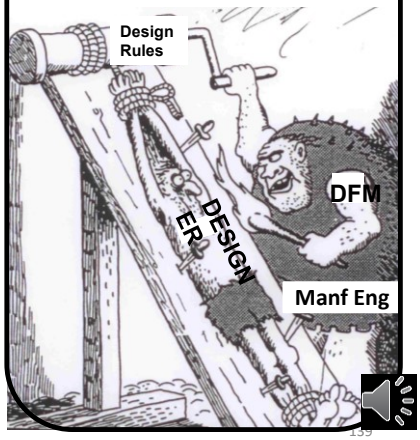


Circa 1985 Onward

6σ SIX SIGMA

Design Rules and Checkl



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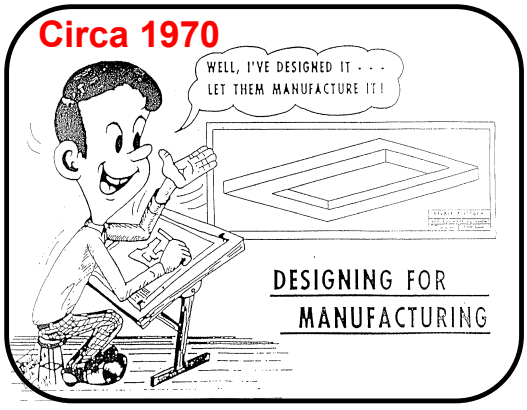

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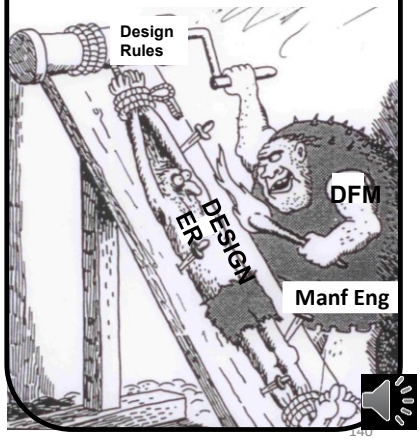


Manufacturability Definition

- Manufacturability implies the reproduction of units with minimum variation among all units.
- Both customer and business requirements must be satisfied.
- Design for Manufacturability is cross-functional.
- Manufacturability is critical to survival.

NEXUS

How much can be lost by *not* designing for manufacturability?

- A conservative estimate:
  - Non-"manufacturable" product and process designs cost mo corporations last year at least 10% of gross sales revenue.
- Confirmed by:
  - General Motors
  - Hewlett Packard
  - Motorola
  - Westinghouse
  - Black & Decker
  - Canada Packers
  - Inland Steel
  - Singer
  - Cannon
  - Etc.

NEXUS

D. F. M.
Design For Manufacturability

- Design for Assembly
- Design for Fabrication
- Design for Supply
- Design for Testability
- Design for Quality
- Design for Inspectability
- Design for Dis-assembly
- Design for User Friendliness
- Design for Field Service
- Design for Reliability
- Design for Procurement
- Design for Processability
- Design for Distribution/Shipping

NEXUS

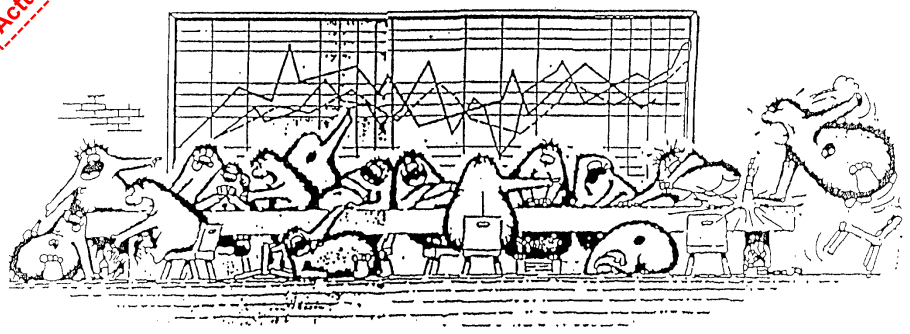
D. F. M.
Design For Manufacturability

- Design for Functionality
- Design for Group Technology
- Design for Cost Effectiveness
- Design for Price negotiation
- Design for Regulatory Acceptance
- Design for Environmental and Conservation
- Design for Obsolescence
- Design for Backward Compatibility
- Design for Forward
- Design for Aesthetics
- Design for Zero Changeovers
- Design for Zero Fixturing

NEXUS

Actual Motorola slides from the $u

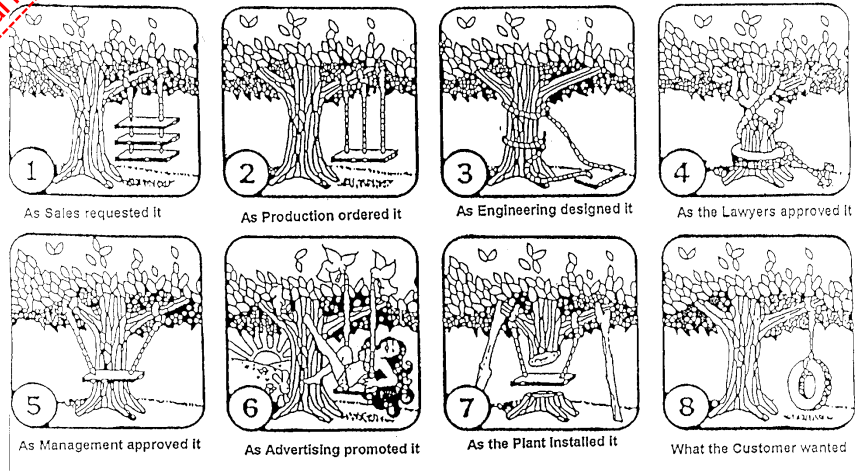
The War Room



NEXUS

Actual Motorola slides from the $u

Chart Of Standard N.P.I. Procedures

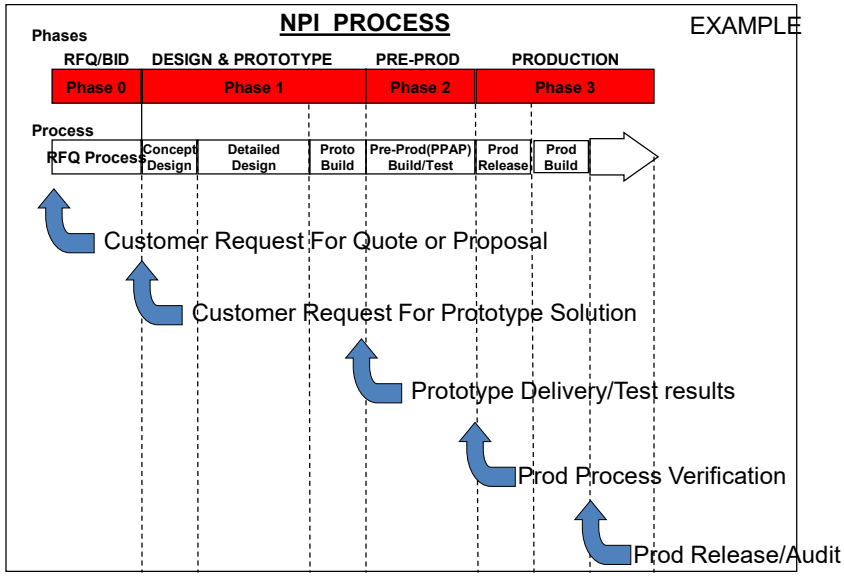


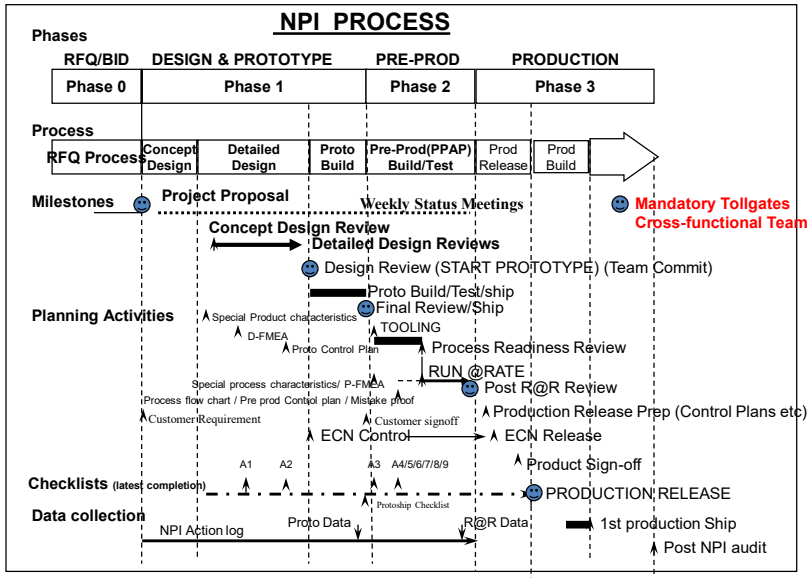
NPI …PROCEDURES..

What they call them…..

- **Electronics Industry..”NPI Phase review process**
  Also has adopted 6 SIGMA as a team excellence process)
  First Motorola..then GE and then others
- **Automotive…. APQP (Advanced Product Quality Plan)….QS9000)**
  (This includes terms such as PPAP and R@R etc)
- **STAGE GATE PROCESS……ETC ETC ETC**

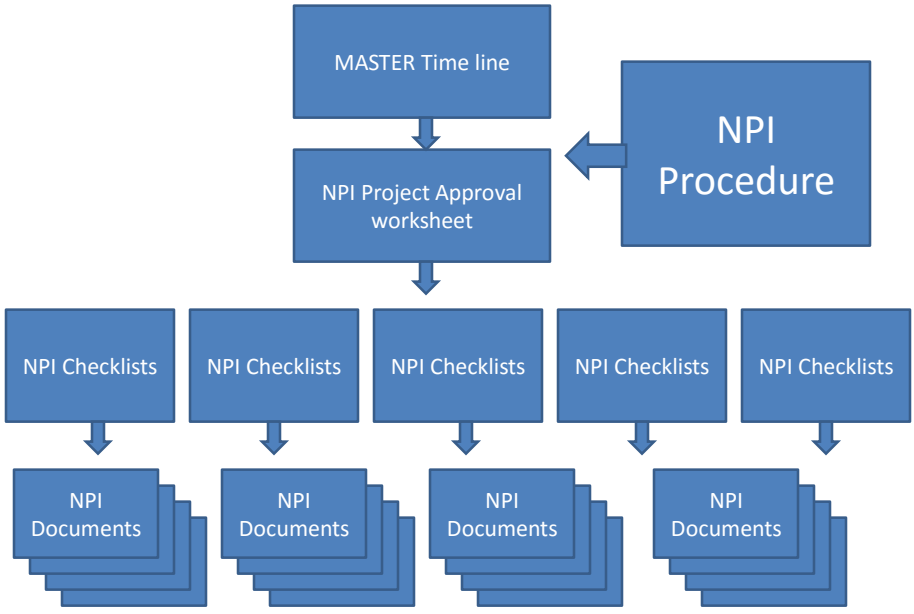
NEXUS





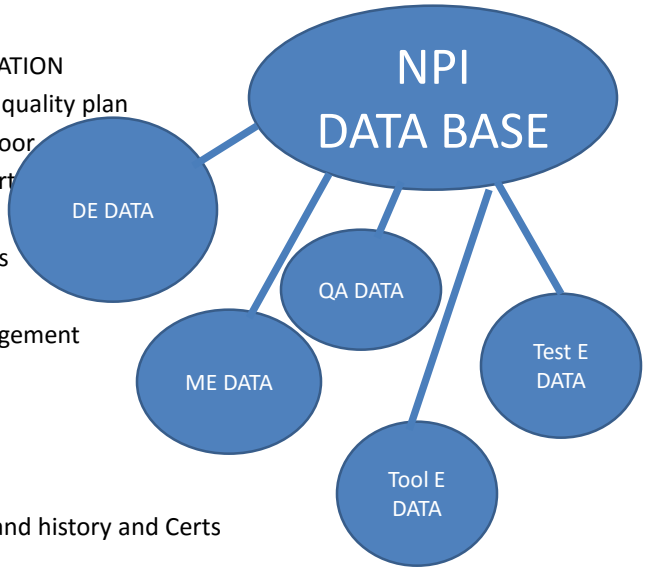
The Stage /Gate process

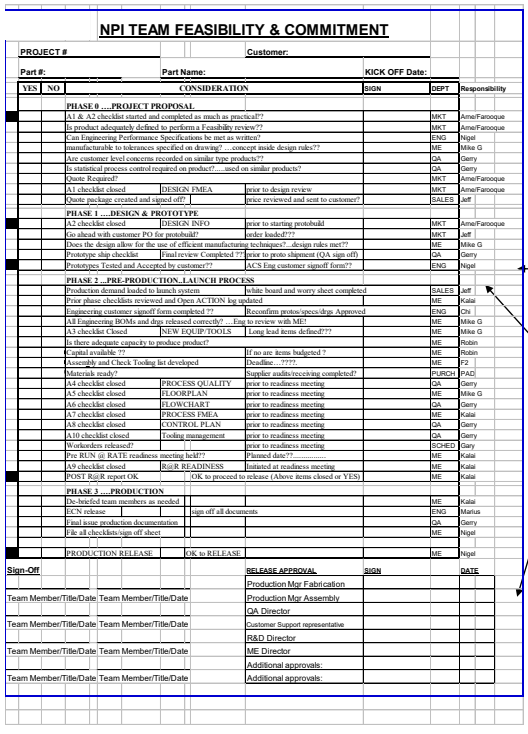
NPI System Architecture



CHECKLISTS/FILES?

- A1 DESIGN FMEA
- A2 DESIGN INFORMATION
- A4 Product/process quality plan
- A5 process layout/floor
- A6 process flow chart
- A7 process FMEA
- A8 control plan/tests
- A9 Run at rates/stds
- A10 tool plan/management
- BOMs
- CAD FILES
- DRG FILES
- Process docs
- QA files inspection and history and Certs





NPI TEAM FEASIBILITY & COMMITMENT

PROJECT # Customer:

Part #: Part Name: KICK OFF Date:

YES	NO	CONSIDERATION			SIGN	DEPT	Responsibility
		PHASE 0 ….PROJECT PROPOSAL					
		A1 & A2 checklist started and completed as much as practical??				MKT	Ame/Farooque
		Is product adequately defined to perform a Feasibility review??				MKT	Ame/Farooque
		Can Engineering Performance Specifications be met as written?				ENG	Nigel
		manufacturable to tolerances specified on drawing? …concept inside design rules??				ME	Mike G
		Are customer level concerns recorded on similar type products??				QA	Gerry
		Is statistical process control required on product?….used on similar products?				QA	Gerry
		Quote Required?				MKT	Ame/Farooque
		A1 checklist closed	DESIGN FMEA	prior to design review		MKT	Ame/Farooque
		Quote package created and signed off?		price reviewed and sent to customer?		SALES	Jeff
		PHASE 1 ….DESIGN & PROTOTYPE					
		A2 checklist closed	DESIGN INFO	prior to starting protobuild		MKT	Ame/Farooque
		Go ahead with customer PO for protobuild?		order loaded???		MKT	Jeff
		Does the design allow for the use of efficient manufacturing techniques?…design rules met??				ME	Mike G
		Prototype ship checklist	Final review Completed ??	prior to proto shipment (QA sign off)		QA	Gerry
		Prototypes Tested and Accepted by customer??		ACS Eng customer signoff form??		ENG	Nigel
		PHASE 2 ….PRE-PRODUCTION..LAUNCH PROCESS					
		Production demand loaded to launch system		White board and worry sheet completed		SALES	Jeff
		Prior phase checklists reviewed and Open ACTION log updated				ME	Kalai
		Engineering customer signoff form completed ??		Reconfirm protos/specs/drgs Approved		ENG	Chi
		All Engineering BOMs and drgs released correctly? ….Eng to review with ME!				ME	Mike G
		A3 checklist Closed	NEW EQUIP/TOOLS	Long lead items defined???		ME	Mike G
		Is there adequate capacity to produce product?				ME	Robin
		Capital available ??		If no are items budgeted ?		ME	Robin
		Assembly and Check Tooling list developed		Deadline…?????		ME	P2
		Materials ready?		Supplier audits/receiving completed?		PURCH	PAD
		A4 checklist closed	PROCESS QUALITY	prior to readiness meeting		QA	Gerry
		A5 checklist closed	FLOORPLAN	prior to readiness meeting		ME	Mike G
		A6 checklist closed	FLOWCHART	prior to readiness meeting		QA	Gerry
		A7 checklist closed	PROCESS FMEA	prior to readiness meeting		ME	Kalai
		A8 checklist closed	CONTROL PLAN	prior to readiness meeting		QA	Gerry
		A10 checklist closed	Tooling management	prior to readiness meeting		QA	Gerry
		Workorders released?		prior to readiness meeting		SCHED	Gary
		Pre RUN @ RATE readiness meeting held??		Planned date?? ……		ME	Kalai
		A9 checklist closed	R@R READINESS	Initiated at readiness meeting		ME	Kalai
		POST R@R report OK		OK to proceed to release (Above items closed or YES)		ME	Kalai
		PHASE 3 ….PRODUCTION					
		De-briefed team members as needed				ME	Kalai
		ECN release		sign off all documents		ENG	Marius
		Final issue production documentation				QA	Gerry
		File all checklists/sign off sheet				ME	Nigel
		PRODUCTION RELEASE		OK to RELEASE		ME	Nigel

Sign-Off		RELEASE APPROVAL	SIGN	DATE
		Production Mgr Fabrication		
Team Member/Title/Date	Team Member/Title/Date	Production Mgr Assembly		
		QA Director		
Team Member/Title/Date	Team Member/Title/Date	Customer Support representative		
		R&D Director		
Team Member/Title/Date	Team Member/Title/Date	ME Director		
		Additional approvals:		
Team Member/Title/Date	Team Member/Title/Date	Additional approvals:		

← Start to use at first concept review

Prototypes will NOT be shipped without this sign-off

Start when added to launch sheet

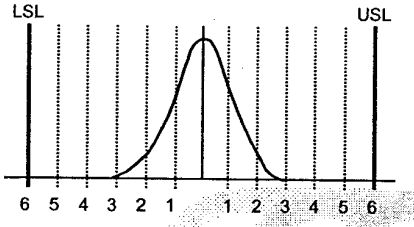
Close after R@R

WHAT IS SIX SIGMA??

- Journey to zero defects (or very close)
- Use of data and measurements
- Reduce variations
- Mainly Product/Process focused
- Forces cross-functional thinking

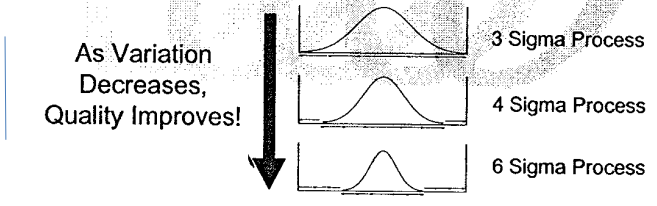
NEXUS

Process Sigma Level



Sigma Level	PPM/ DPMO	% Improvement
1	697700	
2	308538	56
3	66807	78
4	6210	91
5	233	96
6	3.4	99

Six Sigma process means 99.99966% of opportunities meet requirements.



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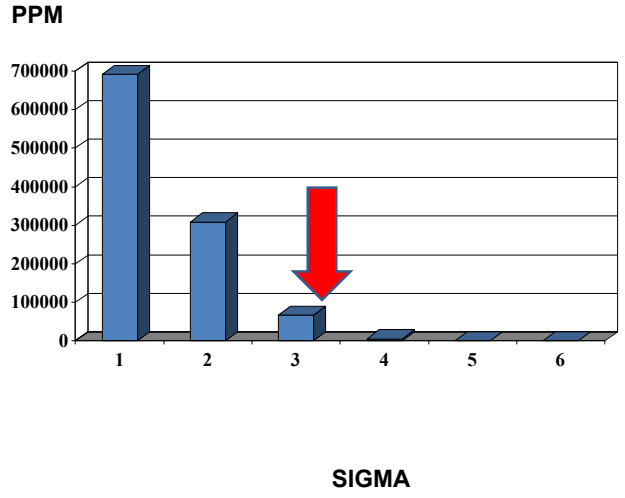
SIX SIGMA



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Real Life Sub-"Zero Defects"

3 Sigma means 2700 parts-per-million 0.27% defect (99.73% Yield)

59 newborn babies dropped in the maternity ward

23.65 hours of unsafe drinking water

20,000 incorrect drug prescriptions in Canada

200,000 documents lost by Revenue Canada

438 babies given to the wrong parents

517,200 cases of soft drinks flatter than a bad tire

Virtually no modern computer would function.

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Virtually no modern computer would function.

10,800,000 healthcare claims would be mishandled each year.

18,900 US Savings bonds would be lost every month.

54,000 checks would be lost each night by a single large bank.

4,050 invoices would be sent out incorrectly each month by a Telco .

270,000,000 (270 million) erroneous credit card transactions in USA

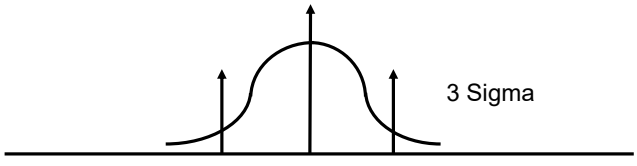
6σ SIX SIGMA

Motorola

FOCUS WAS NEW PRODUCTS/PROCESSES

A Cross Functional Melding for Product/Process Optimization

Pre
SIX Sigma



Motorola

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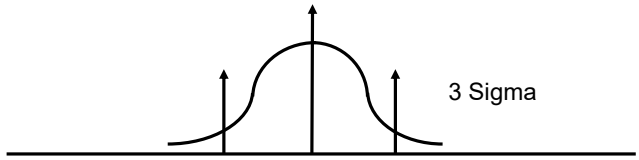
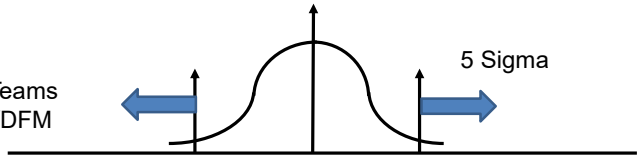


SIX Sigma
Product Development Teams
DESIGN PROCESS/DFM



Motorola

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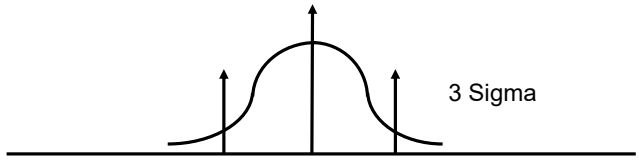
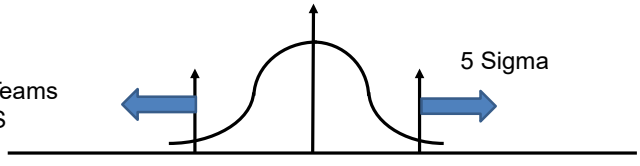
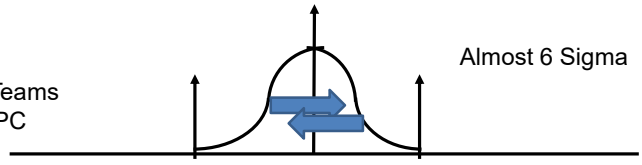


SIX Sigma
Product Development Teams
DESIGN PROCESS
DFM CHECKLISTS

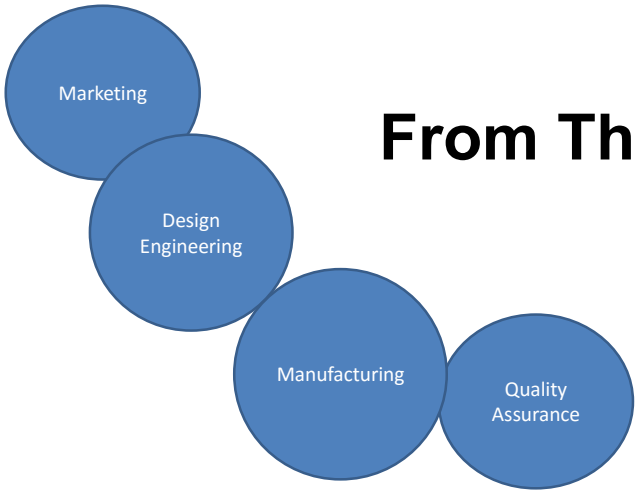


+

SIX Sigma
New Product Launch Teams
MFG PROCESS/SPC

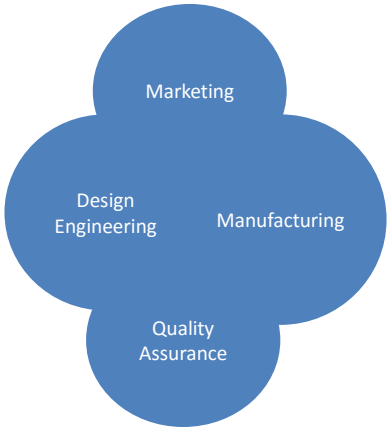


Six Sigma…Product team Integration



From This…..

Six Sigma…Product team Integration



To This…..

Co-Location and size was managed!

Same Café and Bath-rooms!

No Division bigger than 300 people!

PREFERRED SIX SIGMA FOCUS

- NPI (New Product/Process Introduction)

OR

- Existing Products/Process that CAN be redesigned as necessary

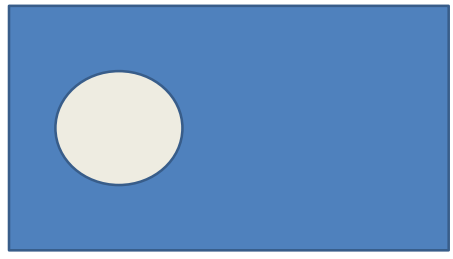
"Six Sigma is about a team effort to launch the next products and processes to they work together far better, to meet the performance to the customer".

Bob Galvin
Motorola

NEXUS

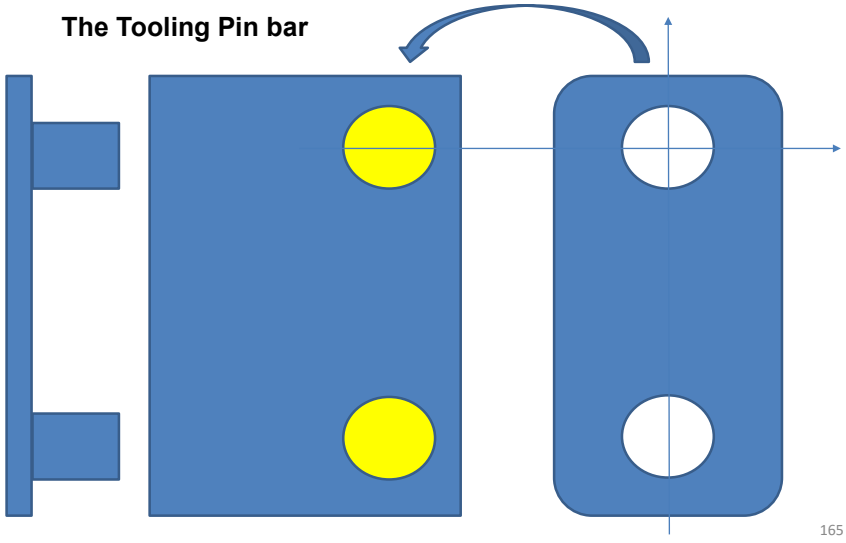
Examples of Six Sigma Designs

The piston and bore?



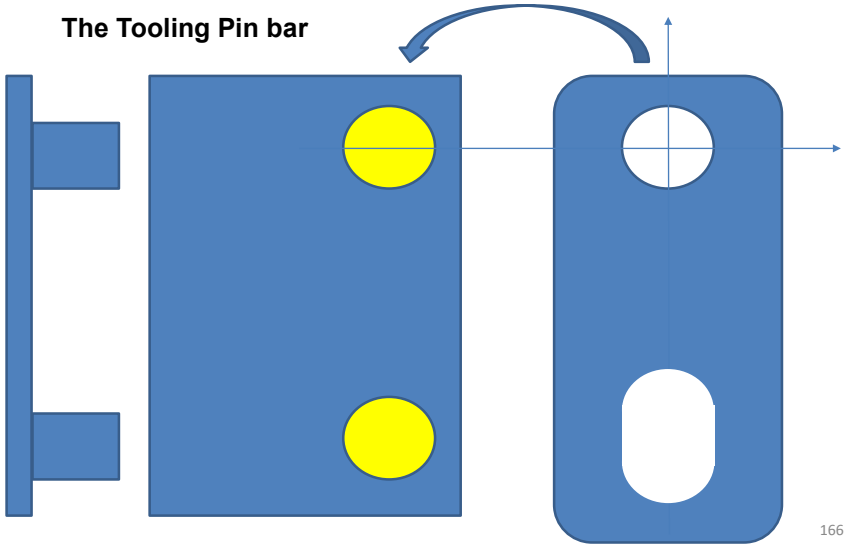
164

Examples of Six Sigma Designs



165

Examples of Six Sigma Designs



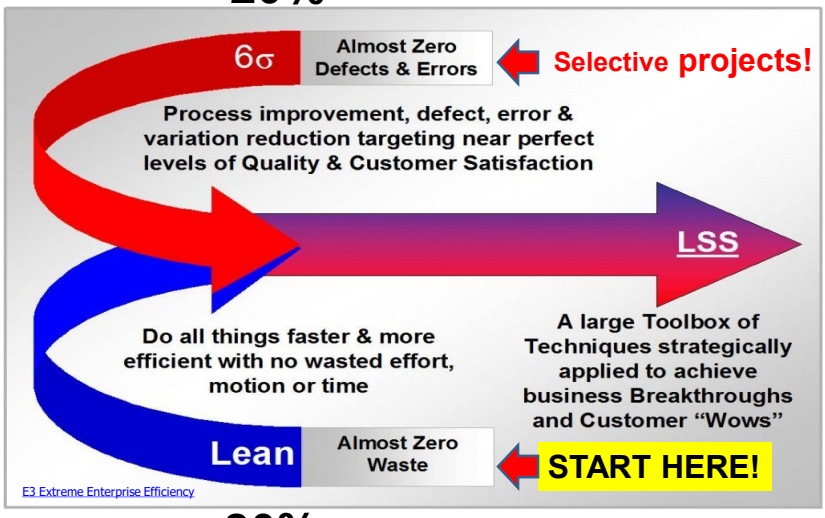
166

YOU NEED BOTH!

But also need a CI Implementation Process!

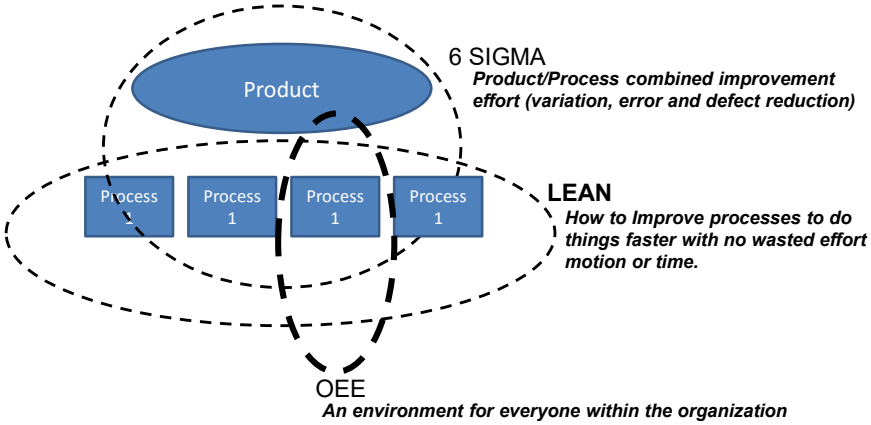
Plus a strong Vision!

20%



80%

Continuous Improvement Environment



6 SIGMA

Product/Process combined improvement effort (variation, error and defect reduction)

LEAN

How to Improve processes to do things faster with no wasted effort motion or time.

OEE

An environment for everyone within the organization to understand the health of the manufacturing process and what action to take to improve it..

Module 1 Session 2. Home-work

- **Watch the U tube video on stockless production by HP.. Be ready to explain what you see when we meet again.**
  - **Stockless production part 1**
  - **https://www.youtube.com/watch?feature=player_embedded&v=yZDRB_z51MQ**
  - **Stockless production part 2**
  - **https://www.youtube.com/watch?v=SOJZMC6uBro&feature=player_embedded**
  - **https://www.youtube.com/watch?v=fQUg01vyNJ8**
  - **Part 3 is optional**
  - www.youtube.com/watch?v=fQUg01vyNJ8
- **In Your Own words describe what is "LEAN thinking" as it relates to business improvement.**
- **In Your Own words describe what are the 5 Business loops?.**
- **Pick a business process you are aware of and map it and define its baseline and entitlement…. Explain your vision and logic.**
- **What should be implemented first LEAN or Six Sigma?… And what does each improvement concept help a business improve?**
- **Give an example of a six sigma design… we used the "hole and slot" and the "engine piston ring"… many other exist.. Research some others and explain them.**

169

END