Quality Presentation at PACE

By Larry Cooke, MBA, PMP
April 20, 2009

Scope of the Talk

- Define *Quality* in a Business Context
- Introduce PMI and ASQ Quality (Q) Goals
- Provide Case Studies
- Discuss (Q) Tools in Software Context
- Summary;   Questions ?

Quality: Goal – Business Improvement

- ***Definition***: "The totality of characteristics of an entity that bears on its ability to satisfy the stated or implied need."
- **Webster**: From "*qualite'*, from latin *qui,"* essential character …"
- **Benefits:** **(Kerzner; PM Network, Feb 2006)**
  - **Continuous compression of schedules**
  - **Improved Estimating**
  - **Customer Satisfaction**
  - **Partnership; Customer—Supplier**
  - **Maturity of tools and processes**

QUALITY SHIFT (Over 20 Years)

"Old" Quality

PLANNING (Define) 20 %	ASSURANCE (Test and Rework) 50 %	CONTROL (Rework) 30 %

"New" Quality

PLANNING (Includes Prototyping) 60 %	ASSURANCE (Test and Rework) 30 %	CONTROL (Oversight) 10 %

PMI View on Quality

- Project Management is a Practice
- Key areas are Scope, Cost, Schedule
  - Scope is sometimes called Quality but they are not comparable; e.g., more scope doesn't mean more quality
  - Quality is VoC – "Voice of the Customer",
  - "Fitness for Use",
  - "Cost of Non-conformance", etc.

ASQ View on Quality

- Focus on Quality primarily, not on Project Management,
- Broader scope, longer history, (from ’20s)
- Main focus on Manufacturing, but lately interest in *Services*,
- More “scientific” orientation,
  - However, complementary, now interested in affiliation with PMI in some degree.

Dimensions of Quality

- **David A. Garvin, "Competing on Eight Dimensions of Quality",** ***HBR*****, Nov 1987**
- (Quality Control: From Defect Repair to Prevention)
- 8 Dimensions:
  - Performance
  - Features
  - Reliability
  - Conformance
  - Durability
  - Serviceability
  - Aesthetics
  - Perceived Quality

DATA QUALITY (*International* – and even *Domestic* Issues)

- **Languages** (200 +) Unicode 5.1
- **Currencies** – Decimal or Comma for thousands, fractions?
  - When in effect, what exchange rates, end-of-month?
- **Dates** - 6/24/2008 or 24/6/2008? (Years not always Western)
- **Names** – Salutations, placement, how to address?
- **Addresses** – Regions, Streets, Counties, Zip code, Country
- **Time Zones** – over 100 worldwide
- **Privacy** – France- No data kept on Religion, Sex, Party,
  - Ethnicity, Unions, Marital Status – (many exceptions)
- **3rd Party** input – what leverage, who cleans up the data?

- *To maintain data integrity, need **virtual machines** of obsolete equipment to prove actual status of da*ta
- Finally, Data Quality is a **Senior Management** Issue, not **IT**!

Grade

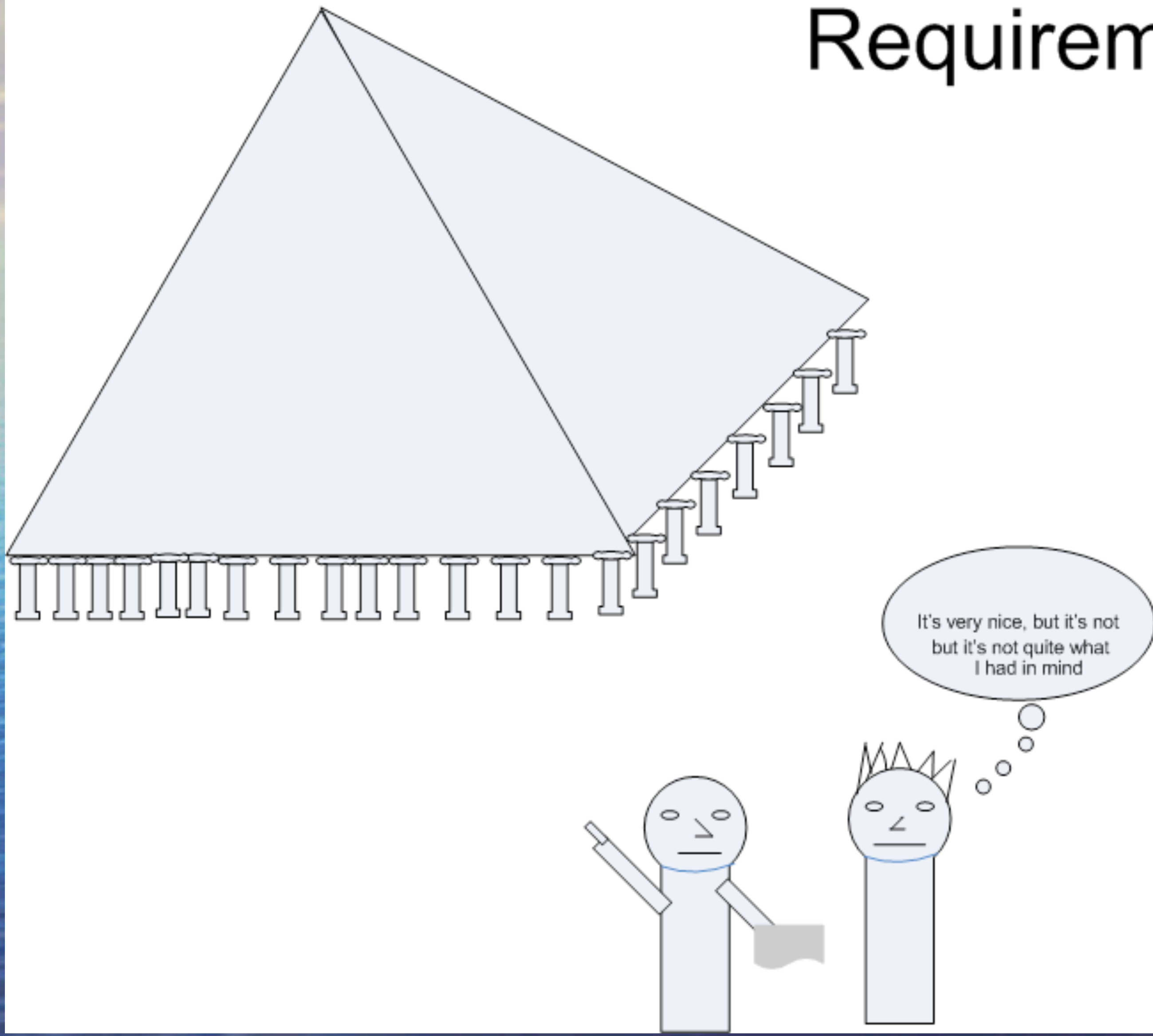
Watches:	Swatch	v.	Rolex
Autos:	Fiat	v.	Jaguar
Luggage:	Samsonite	v.	LVHM
Fashion:	J C Penney	v.	Hermes

- Quality is “Fitness for Use”

Requirements

- Requirements are always "gathered,"
- What you will be told will not be the "real" requirements,
- You will be *wrong* on everything you have *forgotten*,
- You will never know the *real* requirements.

Requirements



Break

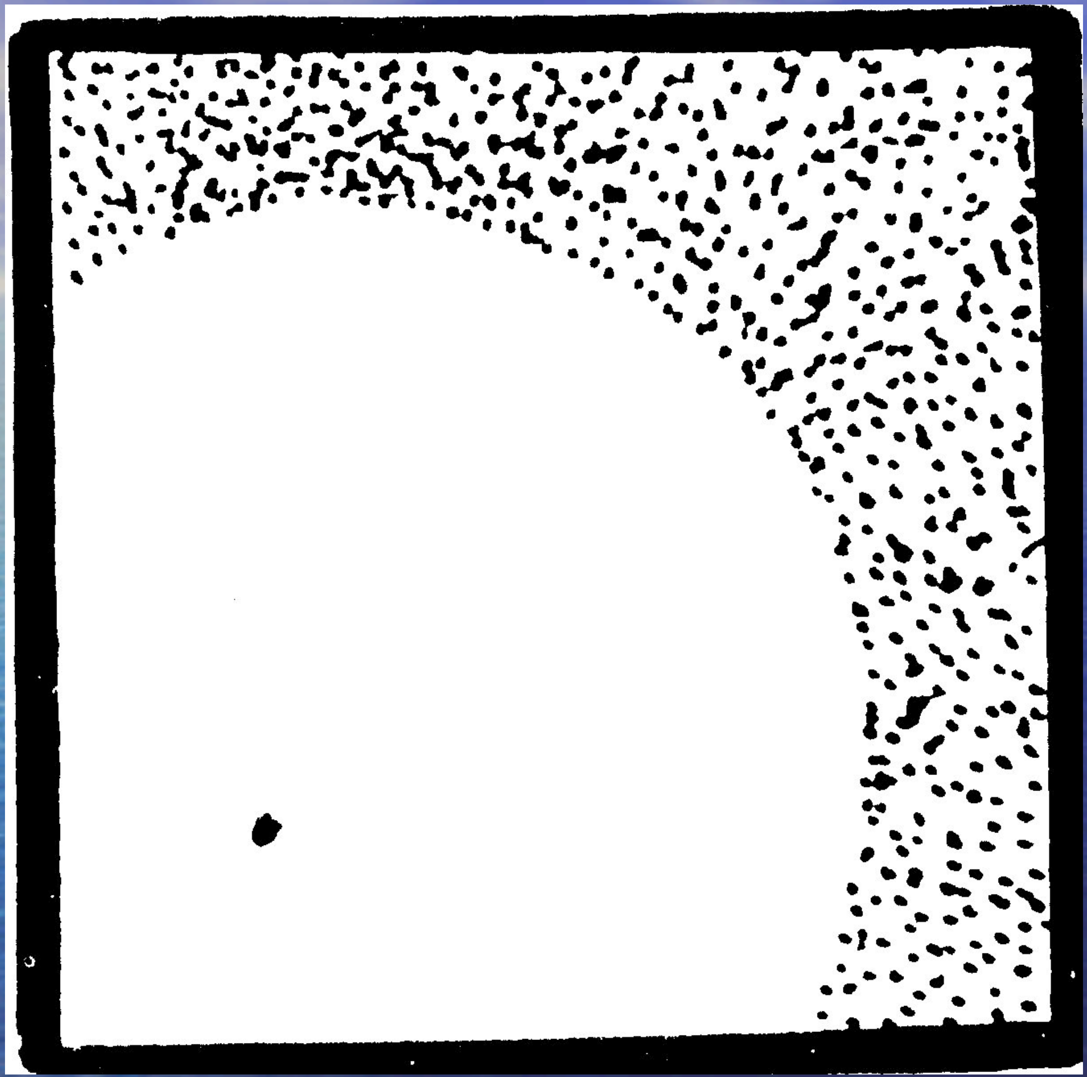
- Myths of Quality:

Eight ***Classic*** (PMI – PMBOK) QC Tools

- Cause & Effect (Fishbone, Ishikawa)
- Control Chart
- Flowchart
- Histogram
- Pareto Chart
- Run Chart
- Scatter Diagram
- Statistical Sampling

(We're Way Beyond That Now!)

Scatter Diagram Example



From *Droodles the Classic Collection* by Roger Price, Copyright 2000 by Tallfellow Press.

(Germs Avoiding a Friend Who Has Caught Penicillin)

Quality Tools in a Continuous Improvement Context

- Continuous Improvement (CI)
  - Perfected By Toyota after World War II, <u>But</u> …
  - Developed Scientific Management – 1880's
    - Fredrick Taylor – Improvement by measurement
    - Shewhart, Deming – PDCA (20's thru 50's)
  - Also known as "Learning by Doing"
    - WWII Bomber factory, after 1943
    - No more capital development, no new management input
    - Made bombers faster, cheaper thru worker improvements
  - Studies by Maslow, Agyris, others on Behavior
    - Workers act to improve productivity on their own

Continuous Improvement (more)

- Still, the Japanese made the most progress after WWII (After a visit from Deming)
  - Applied first to Manufacturing at Toyota
  - Line workers - Quality Circles
  - **Kanban**, move work close to production line
    - **Constantly examine and experiment**
    - **Avoid deviations from a standard**
    - **Continuously improve the standard**
    - **(TQM) Total Quality Management**

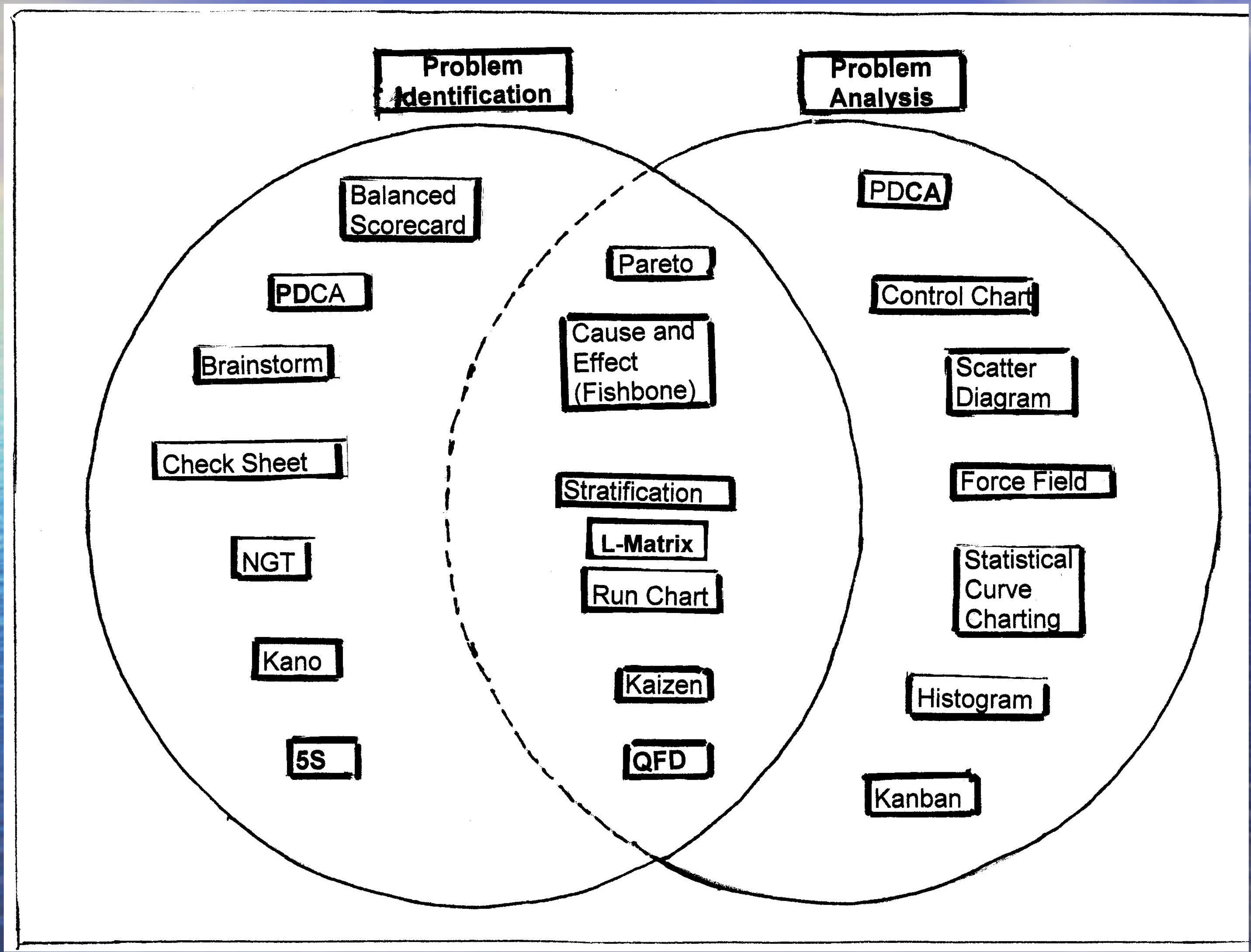
Continuous Improvement (still more)

- Any "downsides? "
  - Sure... Big "*I*" and Little "*I*"
  - Big I = Major Innovations
  - Little i = Small changes
- Exclusive focus on "i" can miss great opportunities
- Exclusive focus on Manufacturing until recently

Continuous Improvement - Kaizen

- Kaizen – Japanese for "Good Change"
- Another tool perfected at Toyota
  - 1.Measure a base level
  - 2.Look for improvements (worker driven)
  - 3.Innovate to improve productivity
  - 4.Standardize on the improved methods
  - 5. Repeat the process (1-5) etc.
- Training - Job Instruction - Process Improvement

Quality Tools – When to Use Them



Planning & Problem Identification Tools

- Balance Scorecard
- **PD**CA – Plan and Define (Do)
- Brainstorming
  - **VOC** - Voice of the Customer
- Check Sheet
- NGT – Nominal Group Technique
  - Affinity, Multi-voting
- Kano analysis
- "5S"

Balanced Scorecard

- R. Kaplan and D. Norton, 1993
- Framework – 4 Criteria for Vision and Strategy
  - ***Financial*** –
    - **Traditional P&L, Risk, Cost/Benefit**
  - ***Customer*** – ***VOC (Voice of the Customer)***
  - ***Internal Business Processes*** –
    - **Communication, Requirements, Metrics**
  - ***Learning and Innovation*** –
    - **Employee Training, Corporate Culture**

(Circular Process, with Feedback and Learning)

PDCA – Plan Do (Define) Check Act

- Plan tools:
  - Brainstorming
    - **Nominal Group Technique**
    - **Affinity Diagram**
  - Multi-Voting
  - Benchmarking
  - Survey
  - Checklist, Check Sheet

Break for Extreme Brainstorming

- *Exercise*

- Two Teams
- Shift moderators

Plan - Brainstorming

- Why are We Doing This?

  Who Decides?

  Who is the Customer?

- How do we know when we are done?

VOC – Voice of the Customer
What Do We Know About the Customer?

- Determine the Target Audience
  - Decide to find out the Voice of the Customer
- Are our Current Customers the only ones?
  - How to Reach the (*real*, potential) Customers?
- Customers are *Fickle*
  - What they want today may not be wanted tomorrow!
    - **EG – Big Cars, Houses in the Country …**
- What Tools?

NGT – Nominal Group Technique

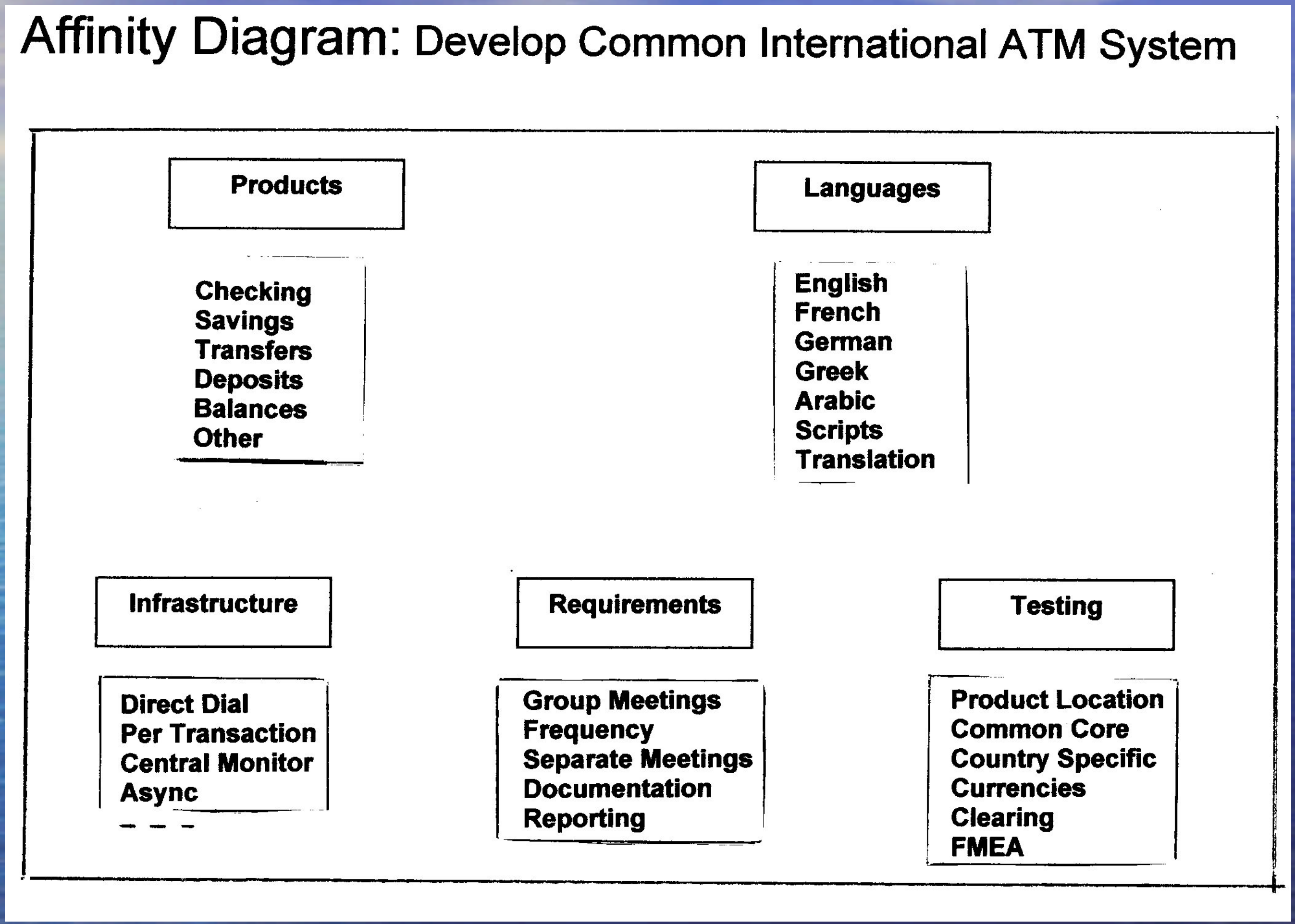
- After *Brainstorming,* Before *Affinity*
- Use when *Some* Group Members are *very* Vocal
- Perform Idea Generation in Silence (10 min.)
- Use when there are Controversial Subjects

(No Discussion Until Everyone Has Participated)

Affinity Diagram

- When to use it? – During Quality Planning
  - After Brainstorming – an Organizing technique
    - **For Complex Issues**
    - **Where Group Consensus is needed**
    - **As a tool to analyze Verbal Data**
  - Also called "Crawford Slip"
    - **Can be used in SubGroup or SuperGroup contexts**

Affinity Diagram Layout



Multi-Voting

- Try to Order the (*Tasks, Projects*) by Priority
  - Use when there are Big Lists of Items
  - Compare (A to B): If B greater, reverse order
  - Continue until List is Sorted by Priority
  - Pick "Top 6" for Action
- Reinforces Group Judgment

  (Orders the List into Highest Priority First)

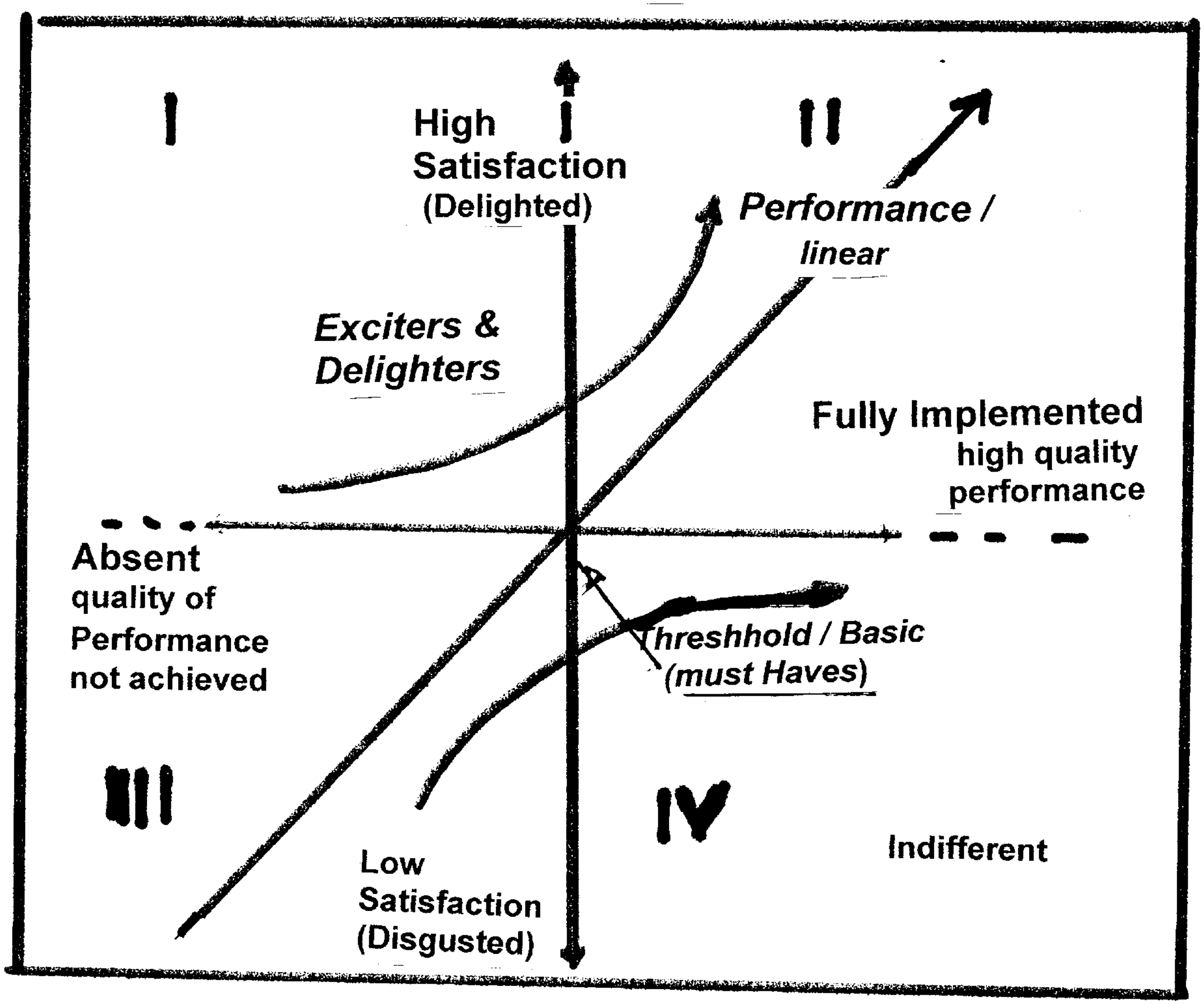
Check Sheet Example

Check Sheet Example: Returns Department Actions

Date	# Served	Refunded	Exchanged	Bought Another Item
mm/dd/yy to mm/dd/yy	𝍸 𝍸 𝍸 𝍸 𝍸 𝍷𝍷	𝍸 𝍸 𝍷𝍷𝍷	𝍸 𝍷𝍷𝍷	𝍸 𝍷
Etc.				

Note: Can be used to evaluate policies over time, or pinpoint problems.

Kano Model



I
II
III
IV
High
Satisfaction
(Delighted)
Performance /
linear
Exciters &
Delighters
Fully Implemented
high quality
performance
Absent
quality of
Performance
not achieved
Threshhold / Basic
(must Haves)
Low
Satisfaction
(Disgusted)
Indifferent

"5 S" Method

Sort (*Seiri*), **Straighten** (*Seiton*), **Shine** (*Seiso*), **Standardize** (*Seiketsu*), **Sustain** (*Shitsuke*).

- (*Standardize* should be *Organize*, but kept with the "S" to parallel the Japanese convention)
  - **The process simplifies procedures, cleans up environment, energizes workers, "shipshape"**
  - **Better placement of tools, frees space, movement of documents, fewer interruptions of workflow**
- In use in major US corporations, e.g. Kyocera
  - **Periodic inspections, rating thru compliance audit**

Training

- Not just QA *tools* training
  - (Recruiters most request expertise in this for "Q" jobs)

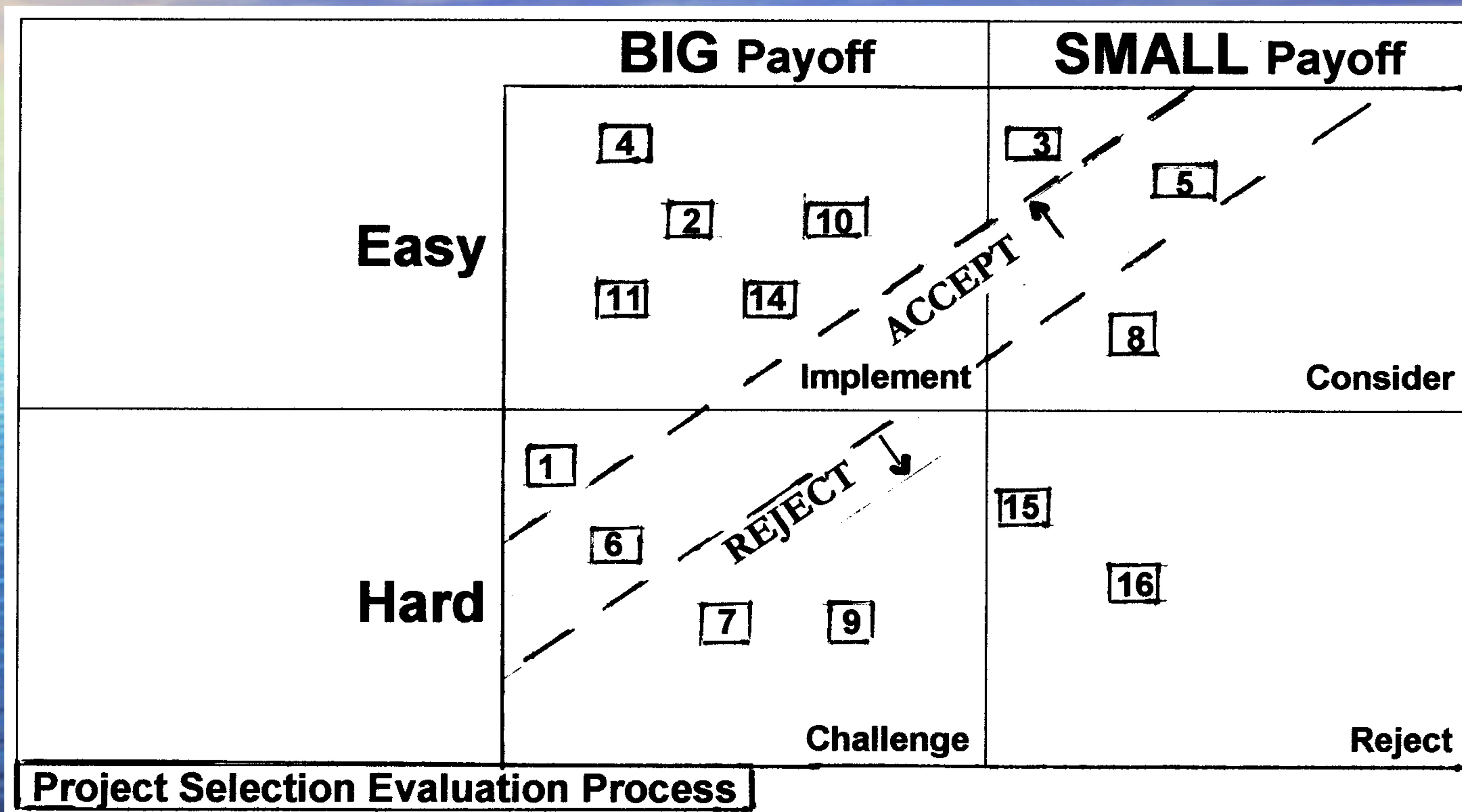
- How about *Employers* training *Employees* ?
  - Training in "People Skills"
  - Six Sigma "Green Belts"
  - Statistics training
  - Formal PMI and ASQ training courses?

(If everyone is poaching from the same small pool, expertise dries up.)

Benchmarking

- Where Do We Look to Compare?
  - Is the Target Organization Better, and Why?
  - How Can We Determine their Best Practices?
  - What Will Be Our Action Plan?
- Caveats
  - How Does *Copying* Give Us an Edge?
  - Have We Analyzed Our Own Defects?

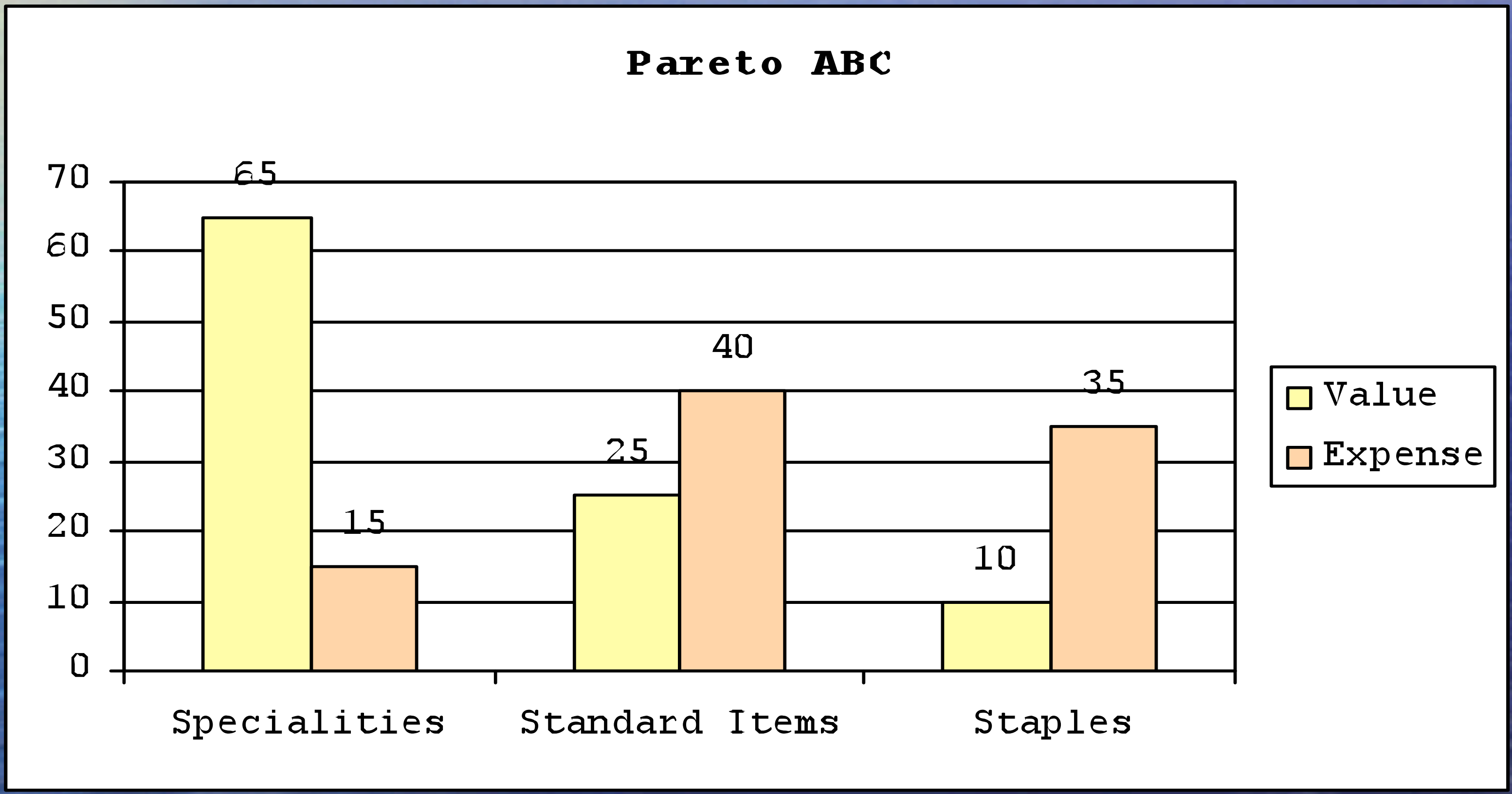
Business Process Management (BPM) Project Selection Matrix



Planning & Analysis Tools

- Pareto
- Cause & Effect
- Stratification
- L-Matrix
- Run Chart
- Kaizen
- QFD

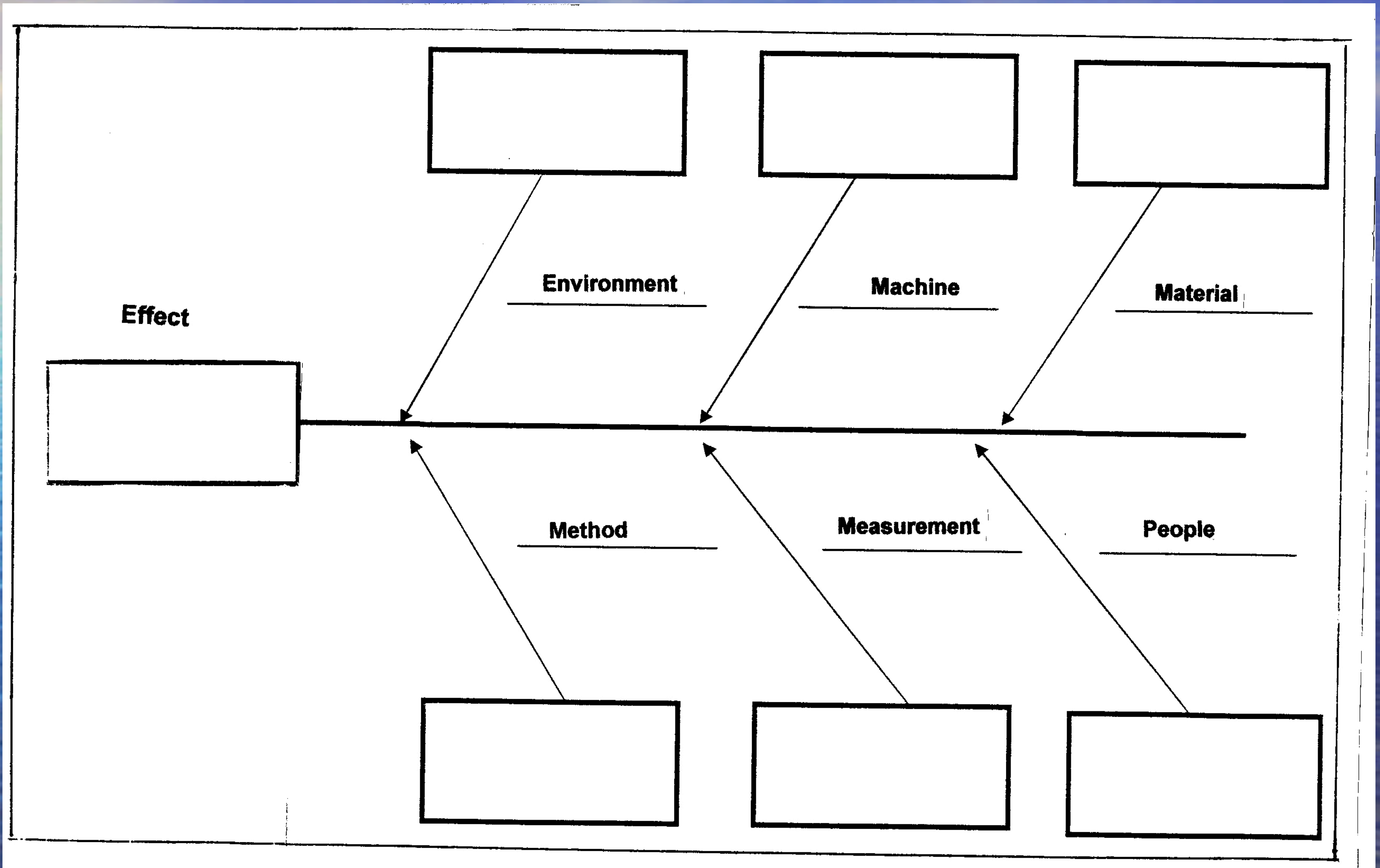
Pareto – ABC Technique
(Restaurant Example)



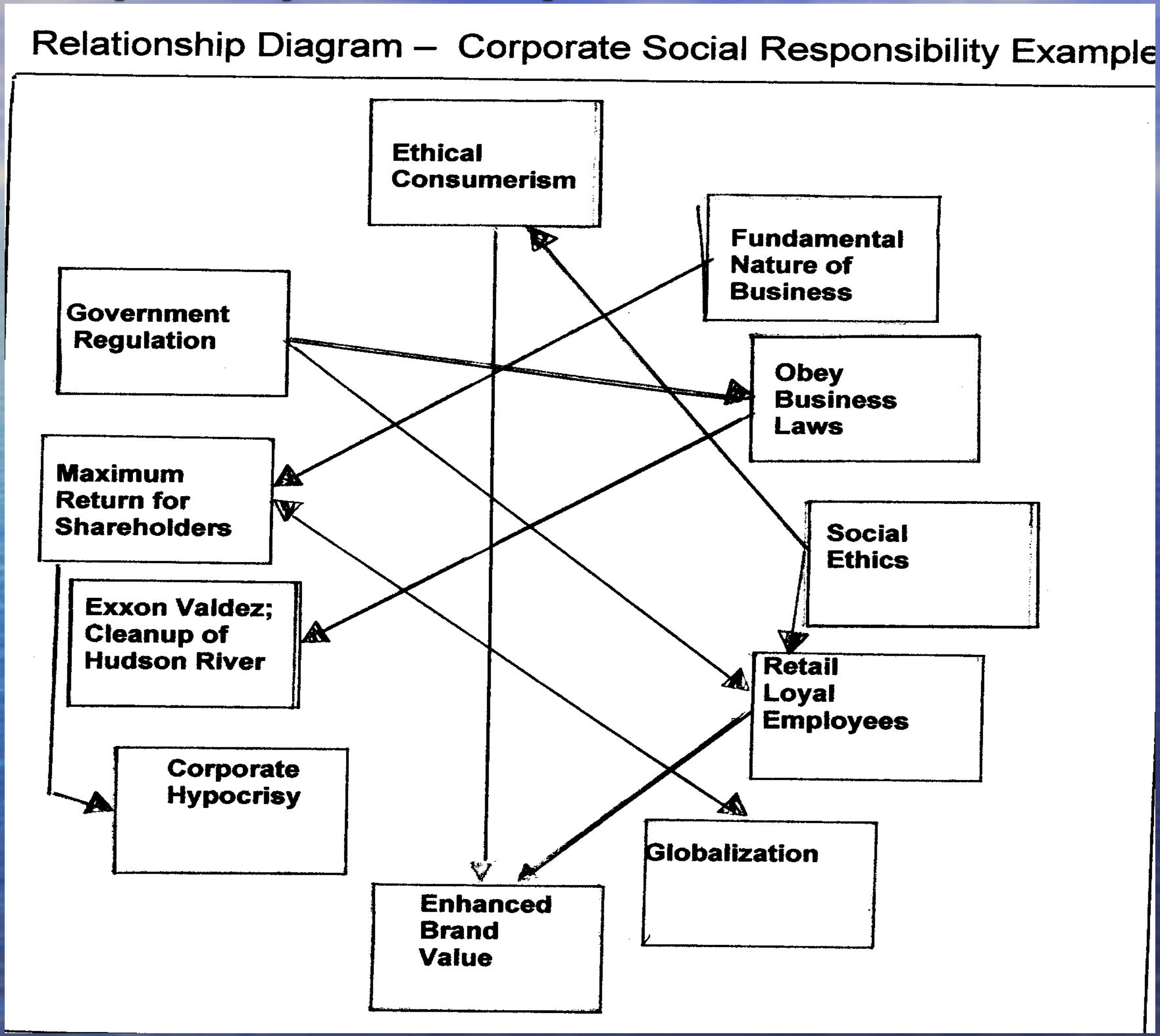
Pareto ABC – Value Driven

- Balance Value and Cost
  - **High Value** – *Specialties*, e.g., Braised Duck, Lobster: Key Value, High Control, Low Quantity, *Daily* Orders
  - **Medium Value** – *Standard* Items, e.g., Pork, Chicken: Moderate Control, High Quantity, *Weekly* Orders
  - **Low Value** – *Staples*, e.g., Napkins, Salt, Plates, Pans Less Control, Longer Planning Cycle, *Monthly* Orders
- Value-Driven Activities Focus on Quality and Restaurant Reputation.

Fishbone, Ishikawa, Cause & Effect



Relationship Graph- (CSR)
(Used to Identify Multiple Effects)



Statistical Sampling - Survey

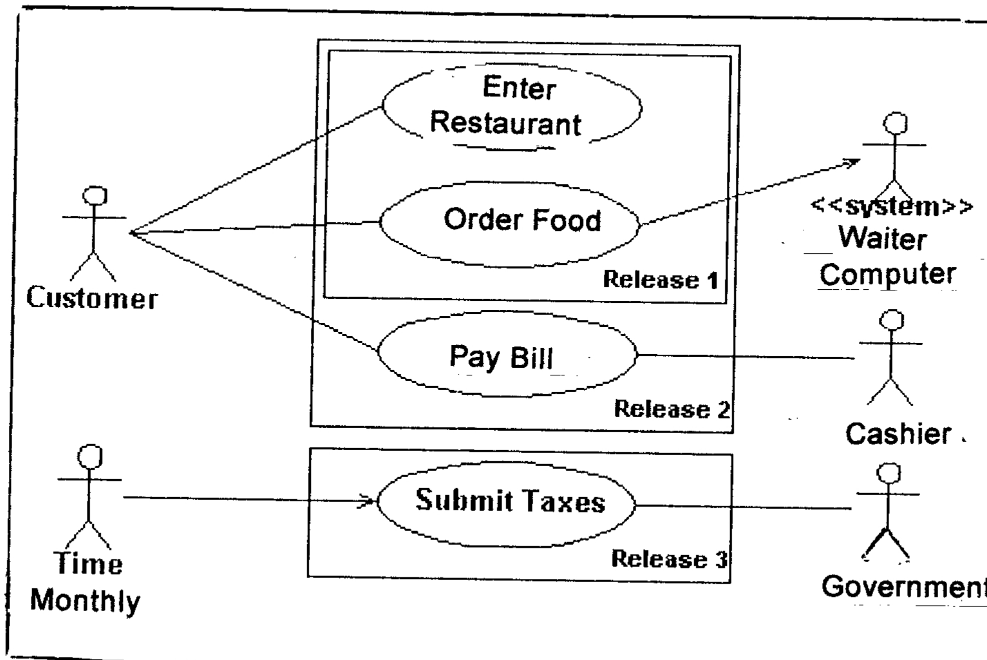
- (After Brainstorming, After VOC)
- What are the Questions?
- Focus Group; Interviews?
- Direct Mail? – Only 6 % Response

(More on Statistics later in the program)

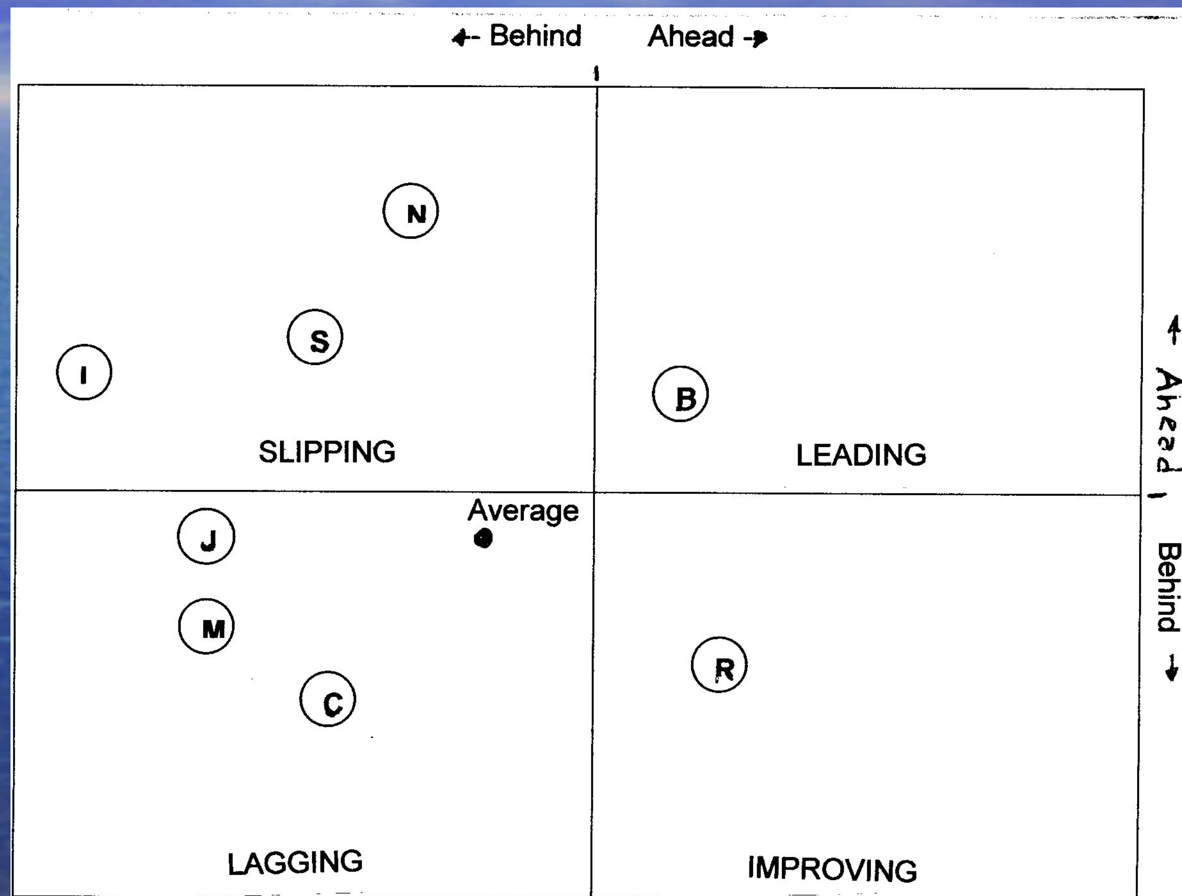
Use Case

Design Tool – Scenarios, Actors – (People, Objects)

- Probes Sequences, Causes, Effects
- Visualization of the “Old” Methods Analysis; Time and Motion Studies (A Tool Managers Understand)



Market Analysis Chart – Intra-Industry Comparisons



↓ Week ↑ Year SLIPPING	↑ Week ↑ Year LEADING
↓ Week ↓ Year LAGGING	↑ Week ↓ Year IMPROVING

Break

- L-Matrix

L – Matrix – Remittance Processing – Money Transfer

L-Matrix Example

	Bank # 1	Bank # 2	Post Office	Money Store	Int'l Transfer
Convenient for Sender	○	○	△	●	○
Convenient for Receiver	○	○	●	○	○
Safe	●	●	●	○	●
Low Cost	○	○	△	●	△
Language Help	△	△	△	●	△
	19	19	21	39	17

Low = 1 △ **Medium = 3** ○ **High = 9** ●

PDCA – DO ("Define" Tools) - Overlapping

- RACI – Responsible, Approve, Consult, Inform
- Pareto
- Cause & Effect
- Stratification
- L-Matrix
- Run Chart
- Relationship Graph
- QFD
- Use Case

Quality Audit Process

- For any type of Audit:
  - Compare Requirements to the Business Process
  - Perform Observations
  - Produce Documentation (Findings)
  - Reach and Present Conclusions
- Quality Audit measures the compliance with Quality Goals

RACI

Responsible, Accountable, Consulted, Informed

Model: (One of Many Formats)

Project #, Name ______________________________ Date: ____________

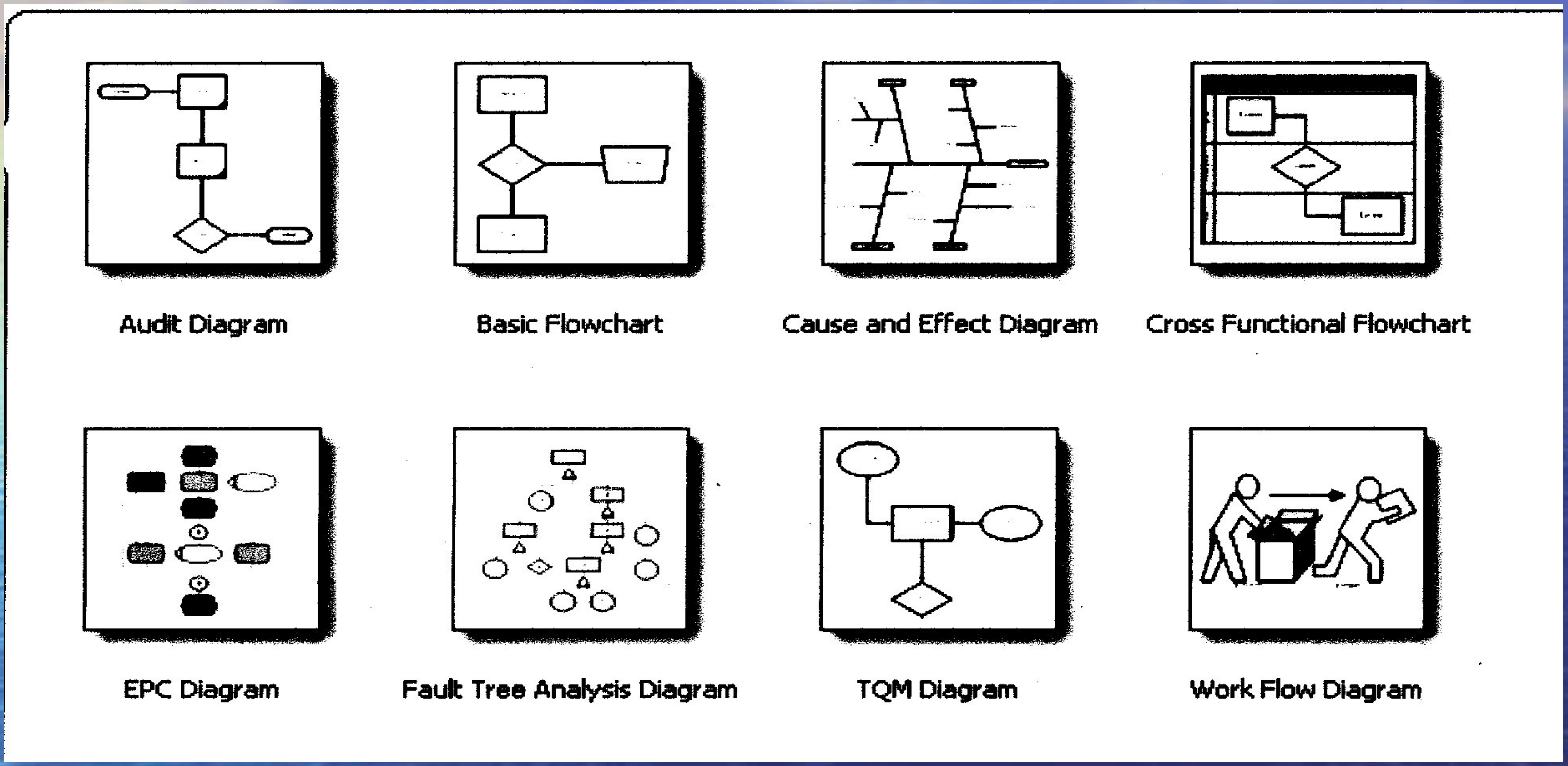
Activity	A	B	C	D	E
Allocate	R	I	A		
Requirements		R		I	I
Design	I	A		R	C
Develop		A	I	C	R
Testing		A	I	C	R
Delivery	C	R	I	A	I

Legend: A = Exec, B = PM, C = Fin, D = Tech, E = QA

Checklists
(Useful for Aircraft Takeoffs, Vacation Packing, "David's Bridals", Project Planning)

Seq	Activity Name	Due	Done	Chk
1	Prioritize Projects			
2	Pick Top Priorities			
3	Inform Stakeholders			
4	Define & Approve Charter			
5	Prepare Budget			
6	Gather Requirements			
7	Approve Development Approach			
8	Plan Schedule			
-	--- Gateway ---			
N+1	Revise Scope & Schedule			
-	--- etc. ---			

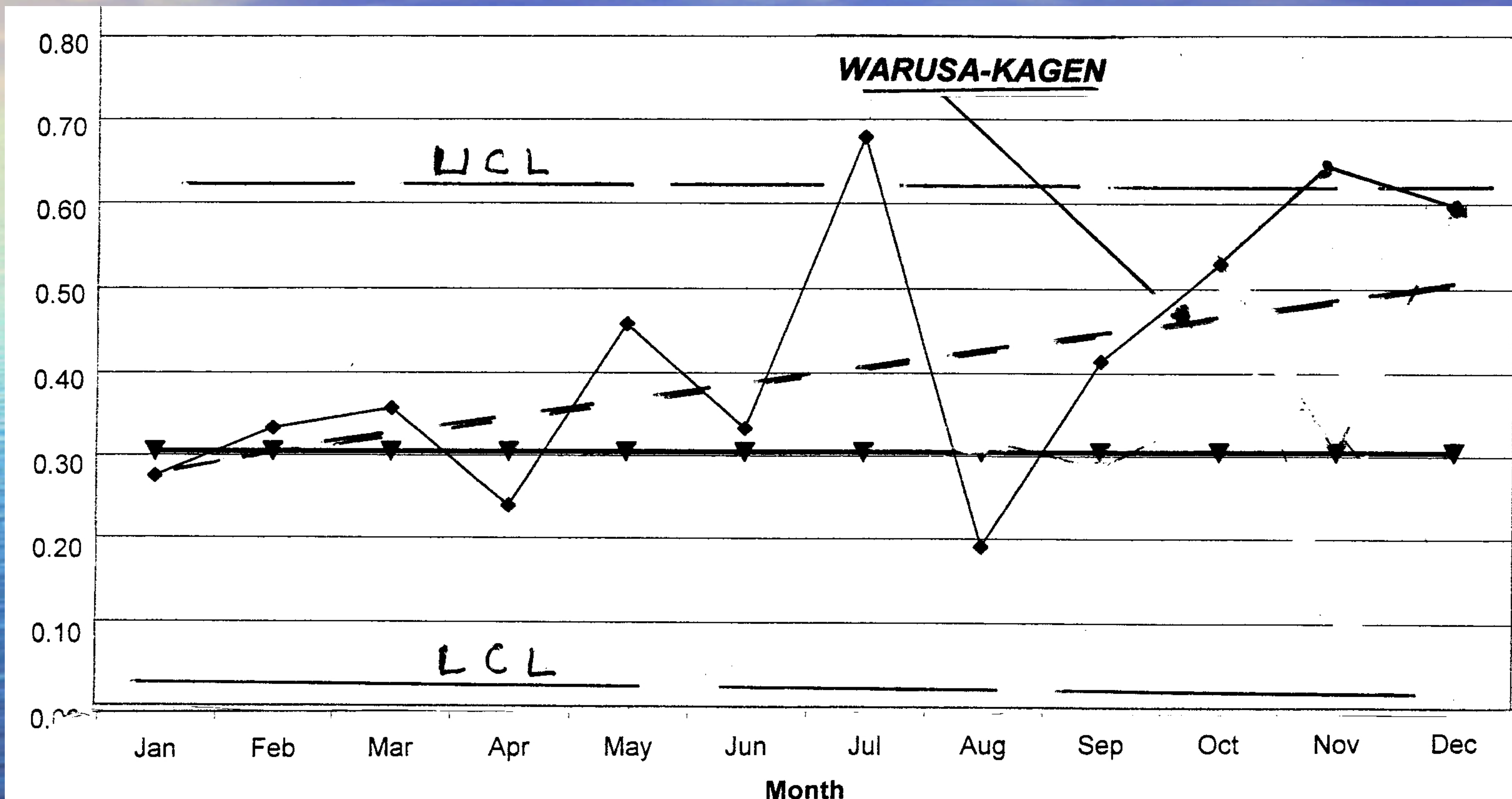
Templates – e.g. MS Visio for Project



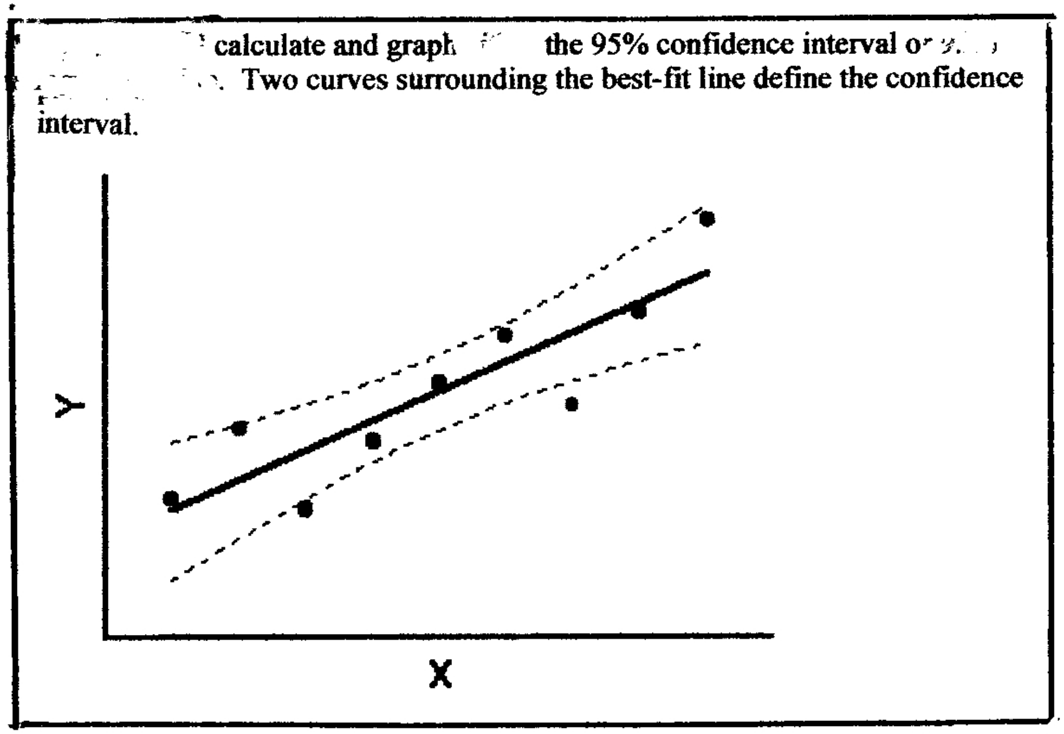
PDCA – "Check" Tools - Problem Analysis

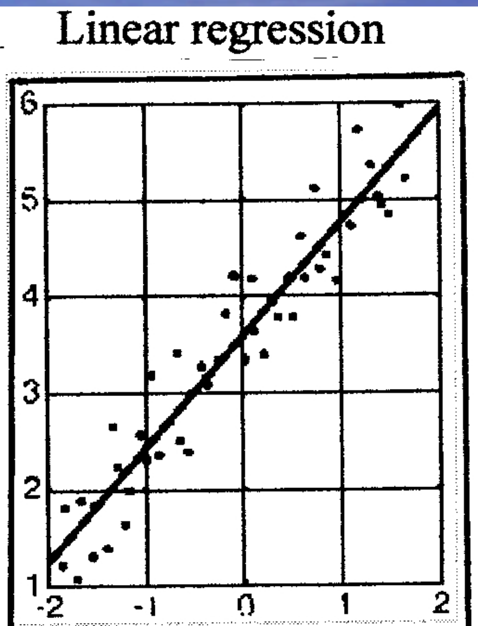
- Quality Audit – (Could Be in Design Also)
- Control Chart
- Run Chart
- Statistical Curves
- FMEA – Failure Mode Effects Analysis
- Tree Diagram
- Six Sigma Development
  - DMAIC – Define, Measure, Analyze, Implement, Control

Control Chart



Linear Regression

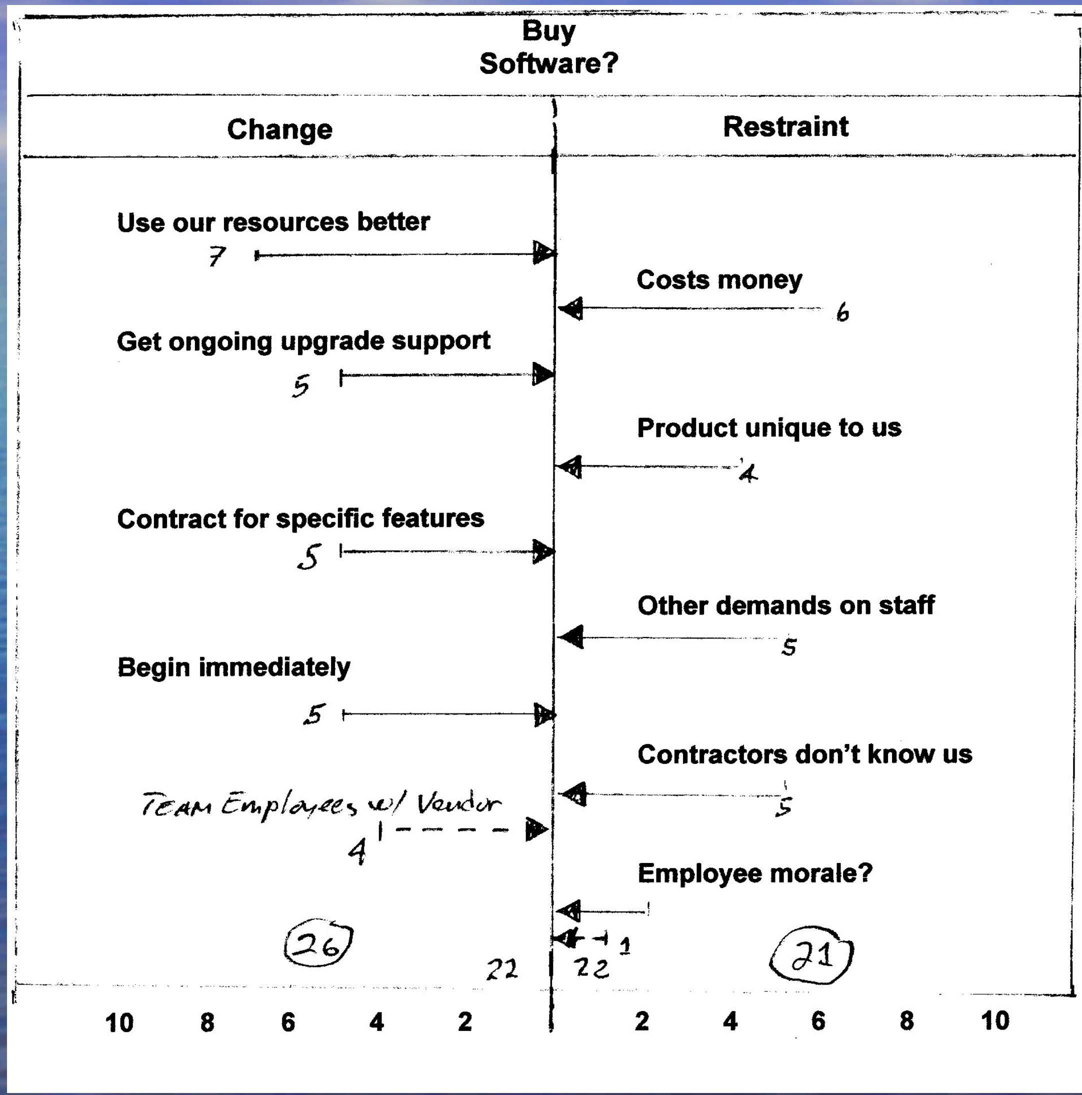




Example of linear regression with one independent variable.

Force Field Analysis

Define Challenge, ID Forces, Find Balance, Develop Action Plan, Change Balance



FMEA – Failure Modes & Effects Analysis

(Testing Lab Example)

Severity: 1 = Low, 9 = Catastrophic

Function	Potential Failure	Potential Effects	Se v- eri ty	Current Controls	Recommende d Actions	Expected Date	Actual Date
Internal Environ- ment	Components: PC, Server, Printer, Router, Cables, etc	Prevent timely and adequate testing	3	Periodic run of equipment tests	Schedule regular replacement of components used in tests	mm/dd/yy	mm + 1
External Communi cations	T1, DSL, POTS	Slow or degraded perform- ance	6	Regular use of main devices	Regular monthly testing of backup equipment	mm/dd/yy	dd + 2 wks
Script Currency	Tests not relevant	Ineffecti ve problem- solving	7	Review plans and current develop- ment	Two-week meeting with devel. & users	Periodic bi-monthly	Start today
Disaster Recovery	Whole system down	Backup site needed	9	None	Site selection; disaster plan	mm/dd/yy	Budget issue, TBD

- Statistics – Takes *Professional* Training!
  - After Linear Regression (can use Excel)
  - Multivariate Analysis
  - Analysis of Variance (ANOVA)
  - Statistical Inference
  - Canonical Correlation
- Presentation Tools – Visio, etc.

Box-Jenkins

- Statistical Tool (Part of a Tool Set – Parameterized)
  - EWMA (Exponential Weighted Moving Average)
- Current = 20 %, Previous are discounted - 80 %
- Provides stability, cuts maintenance costs
- Recognizes excessive “drift”
- Avoids over-regulating

Note: ALWAYS plot the Data!

Six Sigma Approach - Raytheon

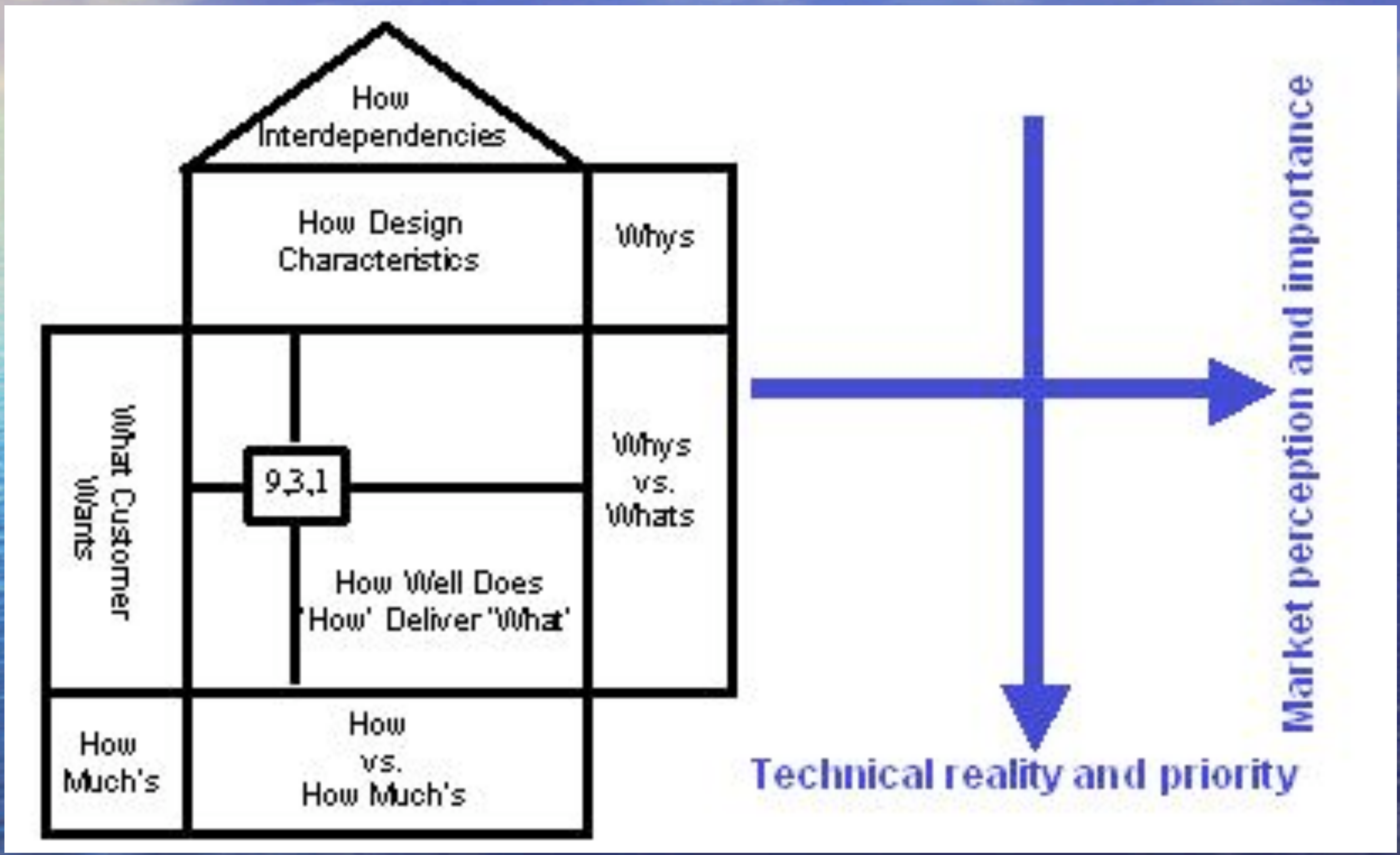
- 1 - Visualize and Imagine the Future
- 2 - Commit to change: Exec Sponsor
- 3 - Prioritize to Determine Improvement Goals
- 4 - Define Existing Process: Plan Improvements
- 5 - Improve: Design and Implement Improvements
- 6 - Achieve and Celebrate Results

Use *Six Sigma* approach, within a *Business Process Management* context, to deliver the optimal mix of continuity and change

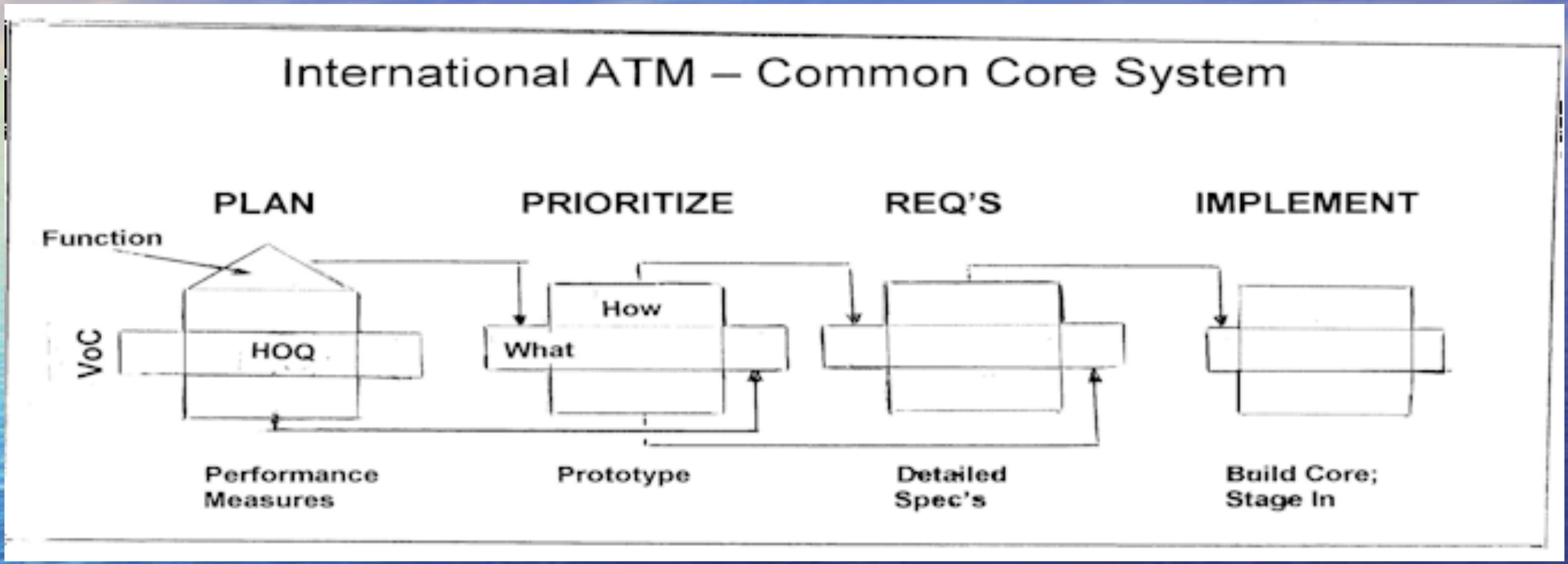
Prototype - Agile

- Iterative Development Tool
- Budgeting is "Looser" Than SDLC
- Design, Build, Change, Approve (in Cycles)
- Constant Co-Development with Business Clients
  - (No Client Involvement, No Work - Requires Constant Customer-Developer Collaboration)
- Works Well With Six Sigma, QFD

QFD Components – House of Quality



QFD – 4 Phase



International ATM – Common Core System
PLAN
PRIORITIZE
REQ'S
IMPLEMENT
Function
VoC
HOQ
How
What
Performance Measures
Prototype
Detailed Spec's
Build Core; Stage In

Kanban – CI Concept

- A "**Token**" in Exchange for Work
- Token Nowadays is usually a Scanner or RFID
  - As work is passed along the V*alue Chain*, a worker gives up a token in exchange for the next station on the chain.
  - Today, example is a store, selling a product by bar scan, signals to supplier that inventory should be augmented
  - Inventory passes from a "Push" technology to a "Pull" by virtual of acknowledging the sale via the scanner.
- Continuous improvement through instant communications
- Can be used at any stage of Planning or Analysis

TRIZ

TRIZ – Theory of Inventive Problem Solution (Rus.)

Algorithmic View of Problem-solving
Skips many broad Quality methods, e.g. Brainstorming
Focus First on Ideal Final Solution
Look for potential solutions
Remove Technical Physical Contradictions
(Appears to be best suited to Engineering problems.)

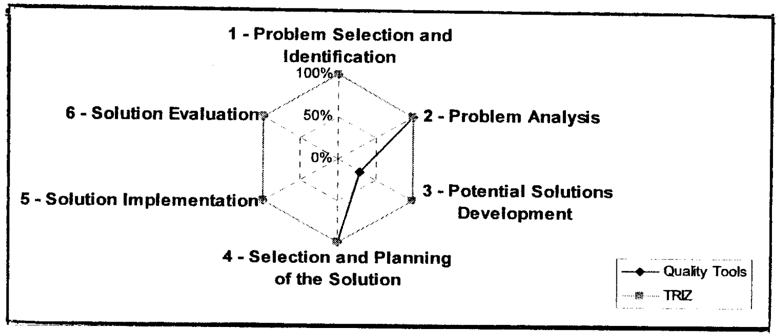
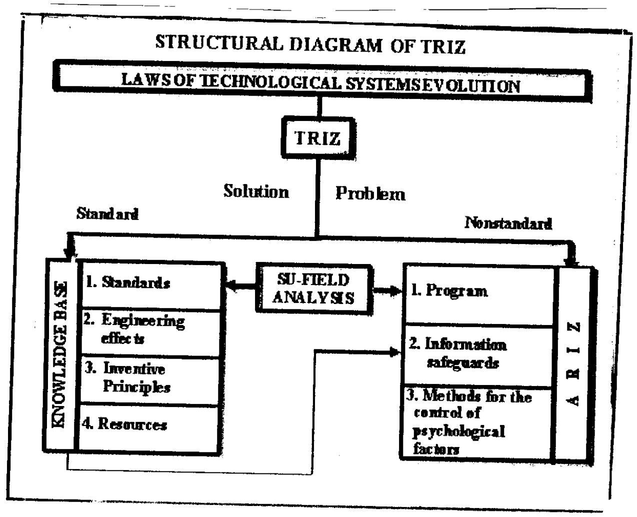


Figure 1. Gap between Quality Tools and TRIZ at Solution Development Stage



Structural diagram of TRIZ

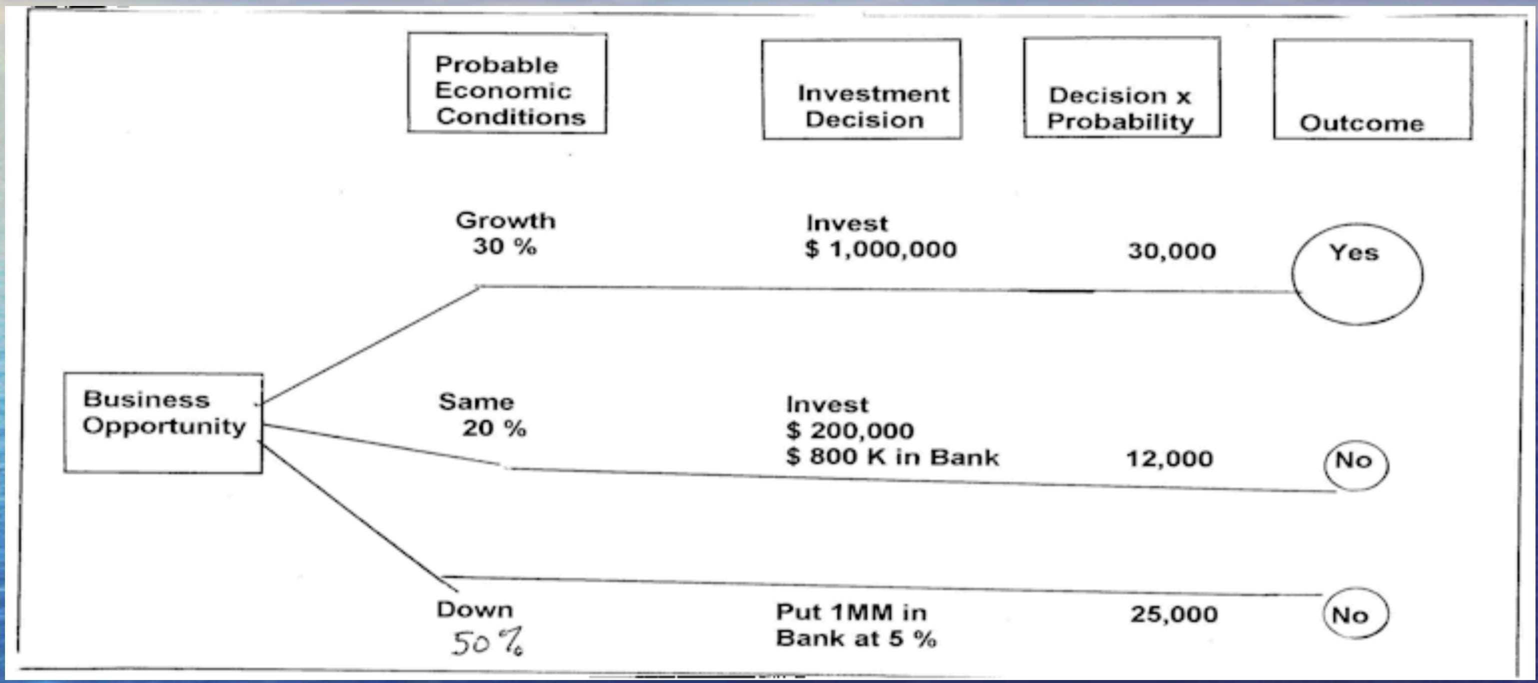
PDCA – Act (Implement)

- Action is *situational* and company-specific
  - It depends on where you are in your company and your situation
  - Roles and responsibilities should be well defined
  - PM responsibilities (**scope, schedule, costs**) still apply
  - Act and Document!

Wrap-up

- Analysts and Managers can't know and do everything
  - Select the important details; get expert help for others
  - Leave the mechanics to specialists (e.g.,Statisticians)
- Communication and Documentation are essential!
  - E.g., Brainstorming depends on the brains used
  - Benchmarking? Should we copy others?
  - All the PMI areas are subject to Quality reviews
  - Using tools is great and needed, but are not to be applied as by an automaton!
- Now, for ***Questions****?*

Tree Diagram Example



Selected Bibliography

Larry Cooke - LHC209@AOL.com

Author	Title	Publisher
Cohen, Lou	**Quality Function Deployment**, How to Make QFD Work for You	Addison Wesley, Reading, MA (ISBN 0-201-63330-2) 1997, 348 pp.
Pande, Peter S., Neuman, Robert P., Cavanagh, Roland R.	**Six Sigma Way**, The	McGraw Hill, New York, (ISBN 0-07-135864-4), 2000, 422 pp.
PMI CD Templates	**PMI Compendium of Project Management Practices**	PMI, © 2003 (Over 100 Templates).
Rose, Kenneth H.	**Project Quality Management,** Why, What, How	J. Ross Publishing, Ft. Lauterdale,FL, (ISBN 1-932159-4807),2005, 173 pp.
Tague, Nancy R.	**The Quality Toolbox, 2 ed.**	ASQ Press, Milwaukee, WI, (ISBN 0-87389-639-4), 2004, 557 pp.
Huff, Darrel	**How to Lie with Statistics**	W. W. Norton, New York, (ISBN 978-0-31072-6), 1954, 142 pp.

Deming's Red Bead Experiment

- 4000 Beads, 3200 White, 800 Red
  - Pick up with a paddle 50 at a time, want all White
    - Result: **Participants inevitably fail. Why?**
- What went wrong?

Inspections –	no effect	Quotas –	no effect
Slogans -	no effect	Exhortations –	no effect
Rewards -	no effect	Management –	no effect

- Only the *Situation* matters
  - Fix the System: 85% *Situation*, 15 % Workers
  - (Statistics **– (n x p) repeated tests will approach 20% *Red*!**