IIA Six Sigma Presentation

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Agenda

1) Introduction

2) What is Six Sigma
    1) Models
    2) Principles

3) Types of Data & Types of Tools

4) Where can it be applied

5) How it has been applied to Audit & Finance

Introduction

Who I am and what I have done is not important; however, the journey I have taken has highlighted the nature of Six Sigma's evolution.

…and I am the guy who doesn't care.

So, What is Six Sigma?

Sometimes called Six Sigma

Sometimes Lean Sigma

Sometimes Lean Six Sigma

Sometimes Business Process Improvement (BPI)…as long as someone can spin a consulting gig more acronyms will follow.

Six Sigma – What it Isn't

Six Sigma is **NOT** about telling a "good story"…….

it is about getting an unemotional view of a problem and possible solutions – getting to the true "story".

Six Sigma is **NOT** about finding blame…….

it is a process focused problem solving methodology where the process and not the people is what needs to be "fixed".

Six Sigma is **NOT** a firefighting technique…….

it is about fixing a problem and having controls in place so that the problem does not have to be "fixed" again.

Our Decision Making Process as related to problem solving

Decision Making Process

Types of Problems You Will Normally Solve

1. **Intuition, gut feel, I think, I want …..**
2. **We have Raw Data and look at it**
3. **We make graphs / charts of the data**
4. **We use advanced statistical tools to evaluate the data**

Simple (Guess & Mess)

Complex (Statistical Analysis)

How Many Times Have We Heard This ? "I Think The Problem Is…"

So, what model of Six Sigma

DMAIC: Define, Measure, Analyze, Improve, Control
(Focus on Mean and Variance)

DFSS: Design for Six Sigma
(Design a new system/product for Six Sigma Capability)

LEAN: Focus is on waste reduction
(does not recognize variability)

It is a CUSTOMER and PROCESS way of looking at problems and how to fix them.

Customers – a reminder

A Customer can be External or Internal

External Customers:

End user of Data (SEC, Shareholders)

End user of product

Purchaser of product

Internal Customers:

User of data (Finance, Accounting)

Anyone that receives the output of a process

Quality in a product or service is not what the supplier puts in. It is what the customer gets out and is willing to pay for. A product is not quality because it is hard to make and costs a lot of money, as manufacturers typically believe. This is incompetence. Customers pay only for what is of use to them and gives them value. Nothing else constitutes quality.

Peter Drucker
(1909 - 2005)

What is it that you make?

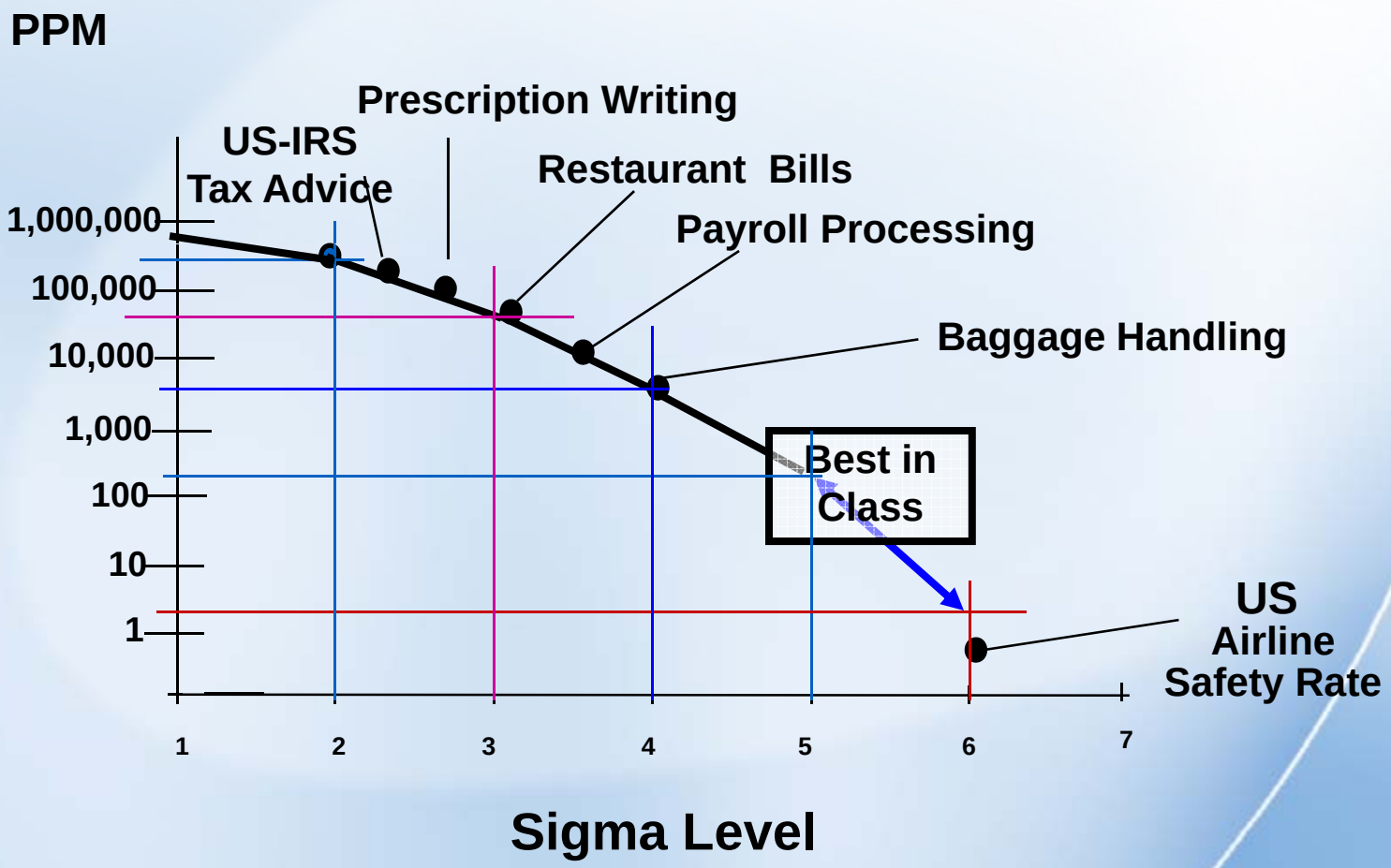
So, what does Six Sigma mean in numbers?

Σ	% Non-Defective	*Parts per Million Defective*
2	69.1%	308,537
3	93.32%	66,807
4	99.379%	6,210
5	99.9767%	233
6	99.99966%	3.4

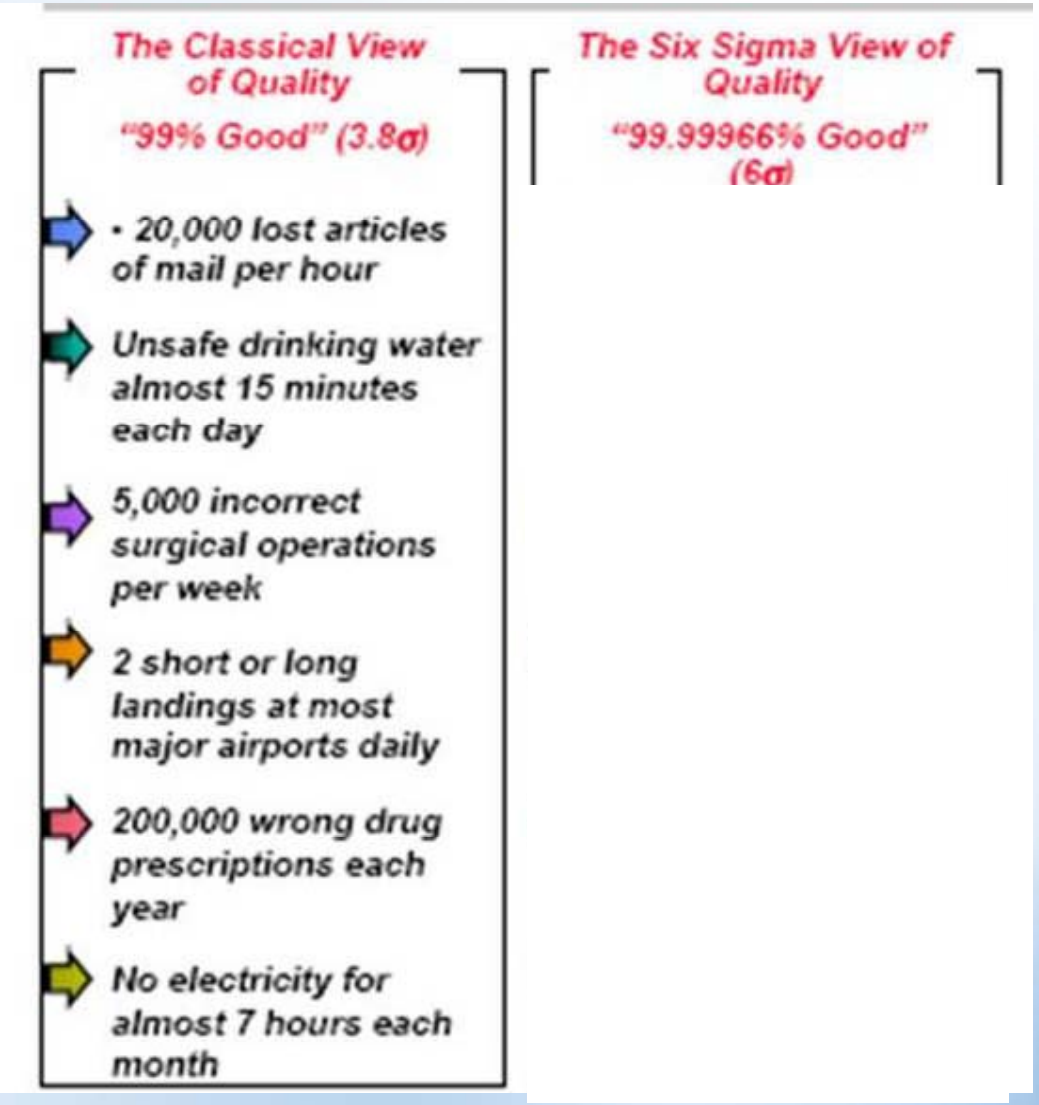
Why is 99% not good enough?

Note: Assumes 1.5 shift (not to be explained later)

What Does 6 Sigma Mean In Our Daily Lives ?

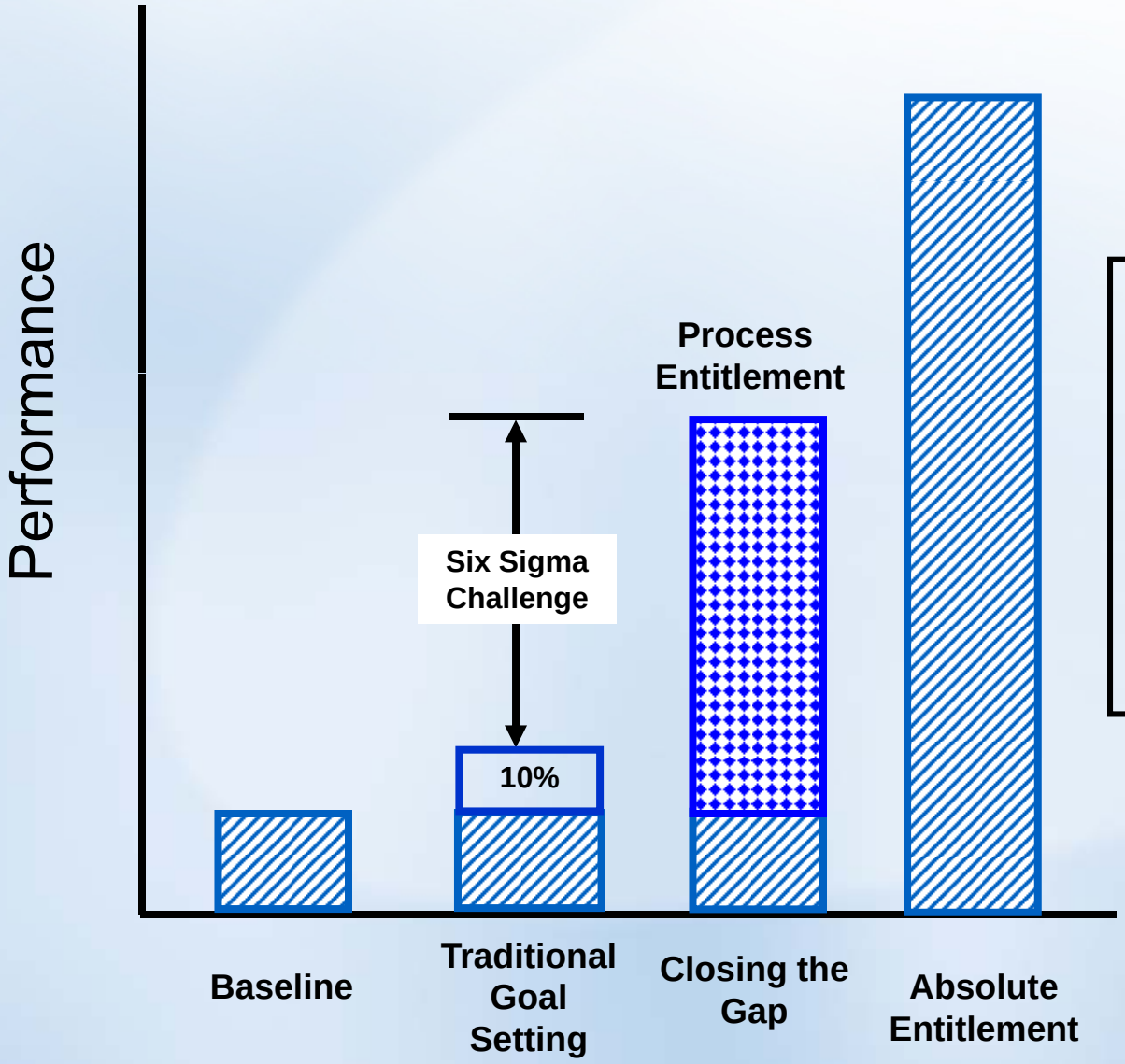


So, why is 99% not good enough?



Setting Clear Expectations

What is Entitlement?

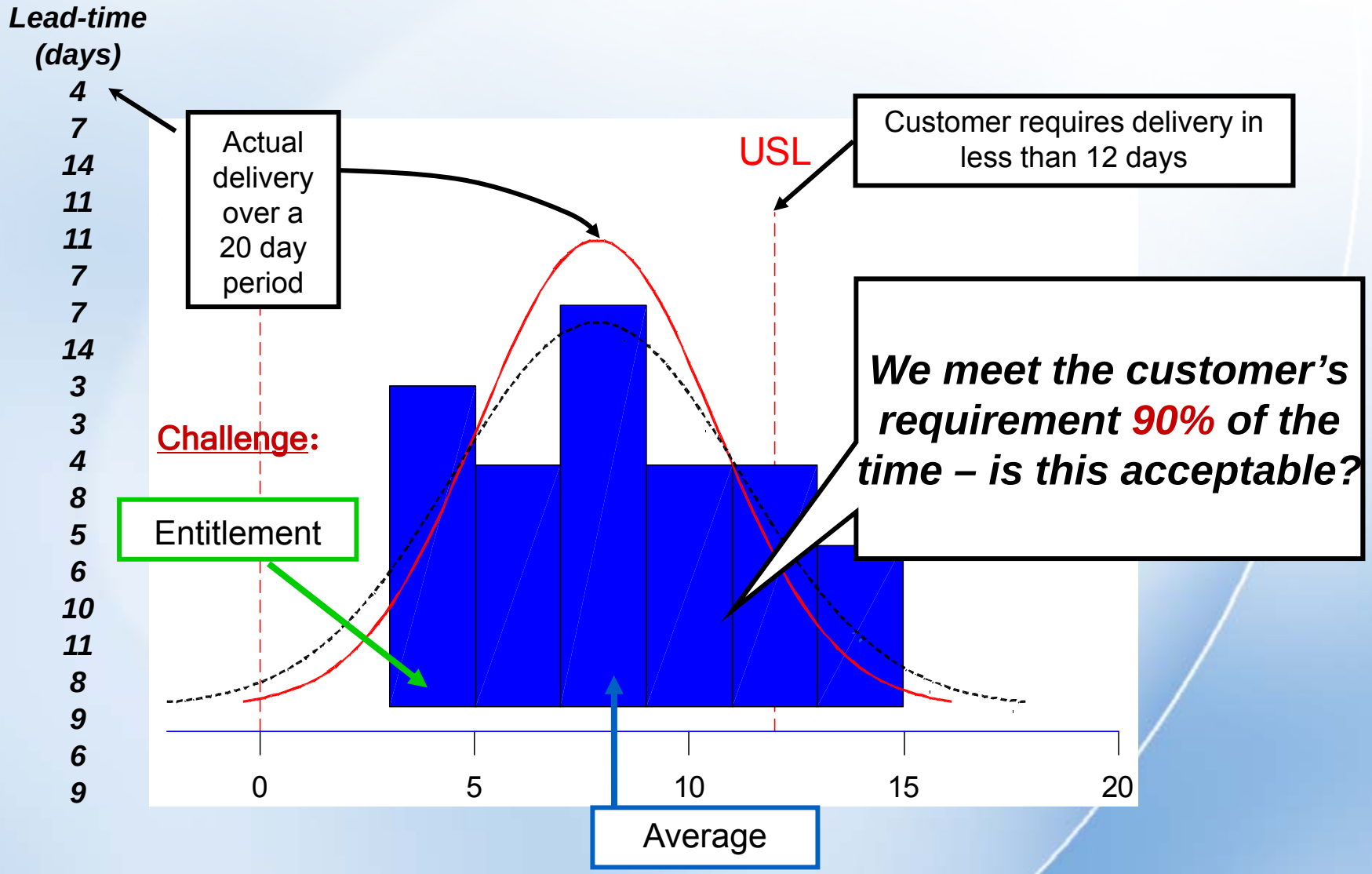


Process Entitlement:

The expected performance level of a process when the major sources of variation are identified and controlled.

Process Capability:

Lead Time is the Output



Variation

- Variation is in everything
  - We cannot eliminate it, but we can reduce it or its effects
- One negative effect of variation is poor process capability
  - Increased non-conformances
  - Increased inventory
  - Increased cycle time
  - Increased cost
- Let's review when variability is an issue…

The Nature of Variation

- First, Not all variation is bad
  - New products
  - New services
- Unintentional variation degrades performance
- Variation buffers
  - Inventory
  - Time
  - Capacity
- **Six Sigma focuses on reducing**
  - **Variation due to process**
  - **Variation due to flow**

Defect and Defective vs. Project Defect

What is a defect?

- Anything that results in customer dissatisfaction. Anything that results in a non-conformance. It is possible to have multiple defects. For example: missing address **and** wrong price on an invoice.

What is a defective?

- Anything defect that results in customer dissatisfaction. Anything that results in a non-conformance. For example: either the missing address **or** wrong price would make the invoice defective.

It must be measurable!

- Time
- Quantity
- Cost
- Quality

What is a Six Sigma Project defect?

- The measurable level at which a defect occurs.
  - **Yields < 97.3%**
  - **Call answered in >4 rings**
  - **Invoice taking > 30 minutes to process**
  - **Any time shipping cost > 2% of total invoice**
  - **An audit report in <= 14 days**

The measurable defect level where the project is complete (you no longer have a project defect) For example: Invoice Accuracy < 98% would not imply that all invoices are not defective but that 98% of them are.

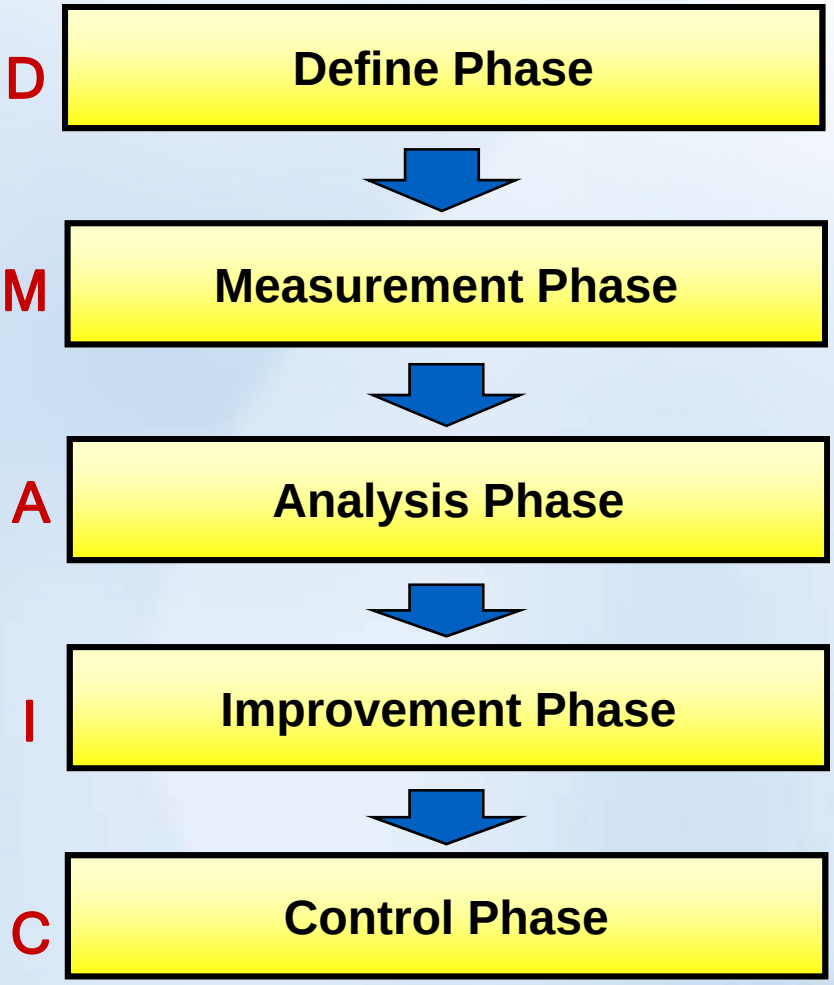
A TASK is the defect you are fixing….a PROJECT is when you are changing something to prevent the defect!

7 Simple Questions (for all projects)

1. What is wrong?
2. How wrong is it?
3. Why should we fix it?
4. How can we fix it?
5. When can we fix it?
6. Did it really get fixed?
7. What can we do so that we don't need to fix it again?

Acknowledgement: R. Tanner in, "Six sigma unchaining the beast within"

The Process Improvement Methodology



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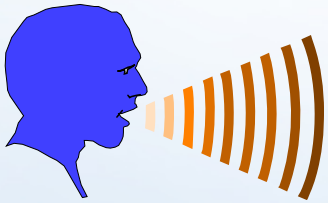
VOC

The Voice Of the Customer

Voice of the Customer (VOC)



Voice of the Customer

Not designed by customers, inspired by customers

*

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* From a Auto manufacturer's perspective

Listening to Customers means getting beyond the features or solutions or specifications they ask for or want to understand the **need** these things represent.

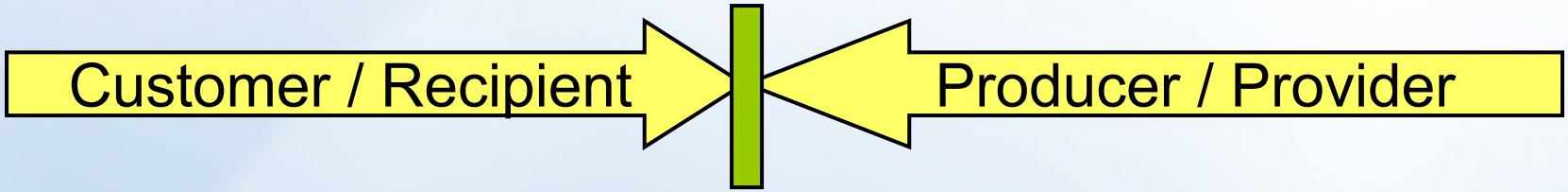
Differentiate between Needs and Solutions or Wants

Gather VOC and translate them into Customer CTQ s

1. Gather Key Needs of the Customers (VOC)
    1. Product/Services provided were identified in SIPOC/Process Map
    2. Customers – internal & external were identified in SIPOC/Process Map
2. Translate VOC into our language
    1. Specific
    2. Measurable
3. Specify Customer CTQ s

Translate Expectations into Requirements ….

- Requirements add clarity by assigning a measurable value



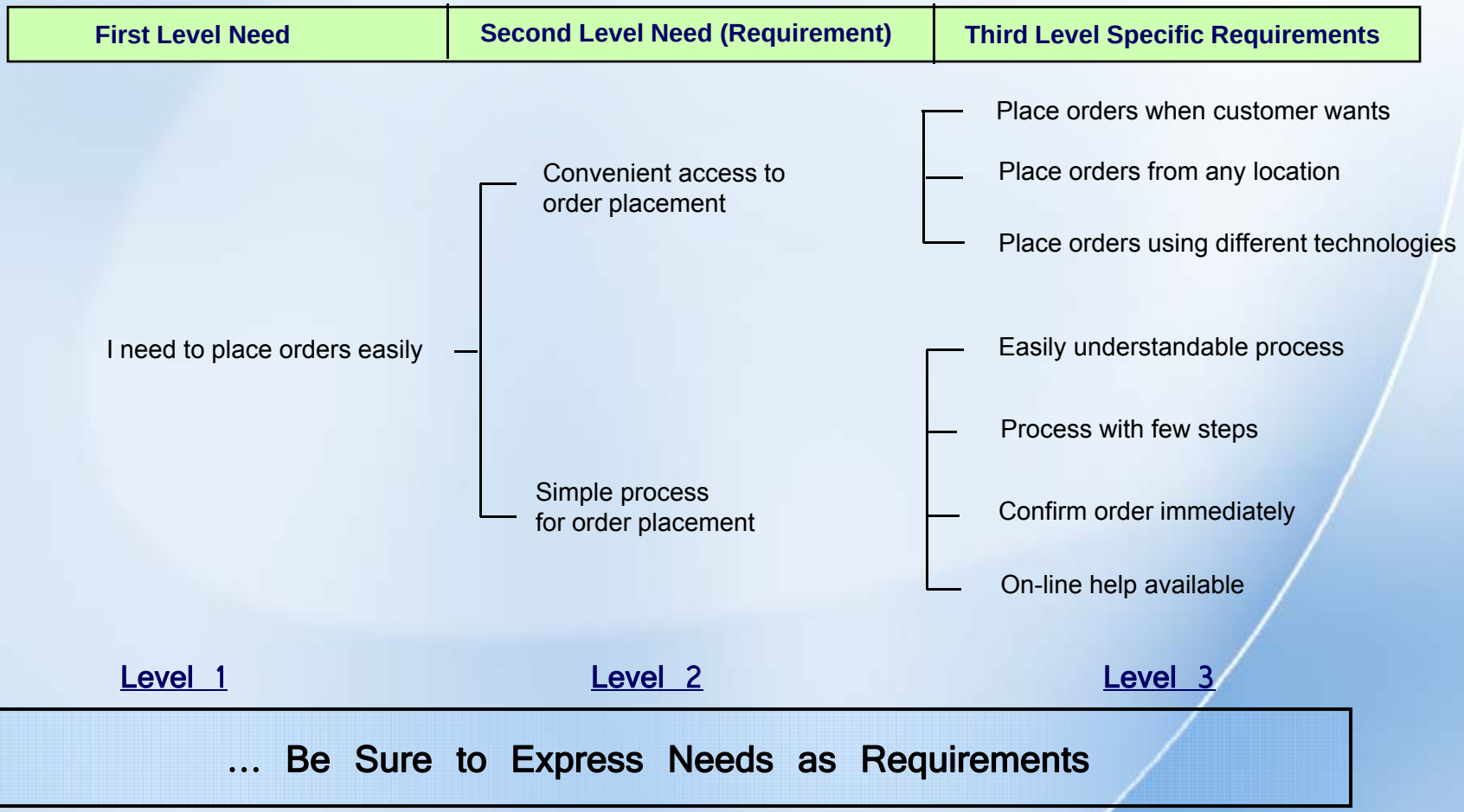
- **Expectation** (Need) — **Measure** — **Requirement**

Expectation	Measure	Requirement
Hot	Temperature	Greater than 50 C
Good	Taste	4 or more 1 to 5 scale
Full Cup	Volume	No less than 10 oz
Cheap	Price	No more than $1.00

- Work with the customer to structure these requirements so they are:
  - **Specific**
  - **Quantifiable**
  - **Understandable in our language**

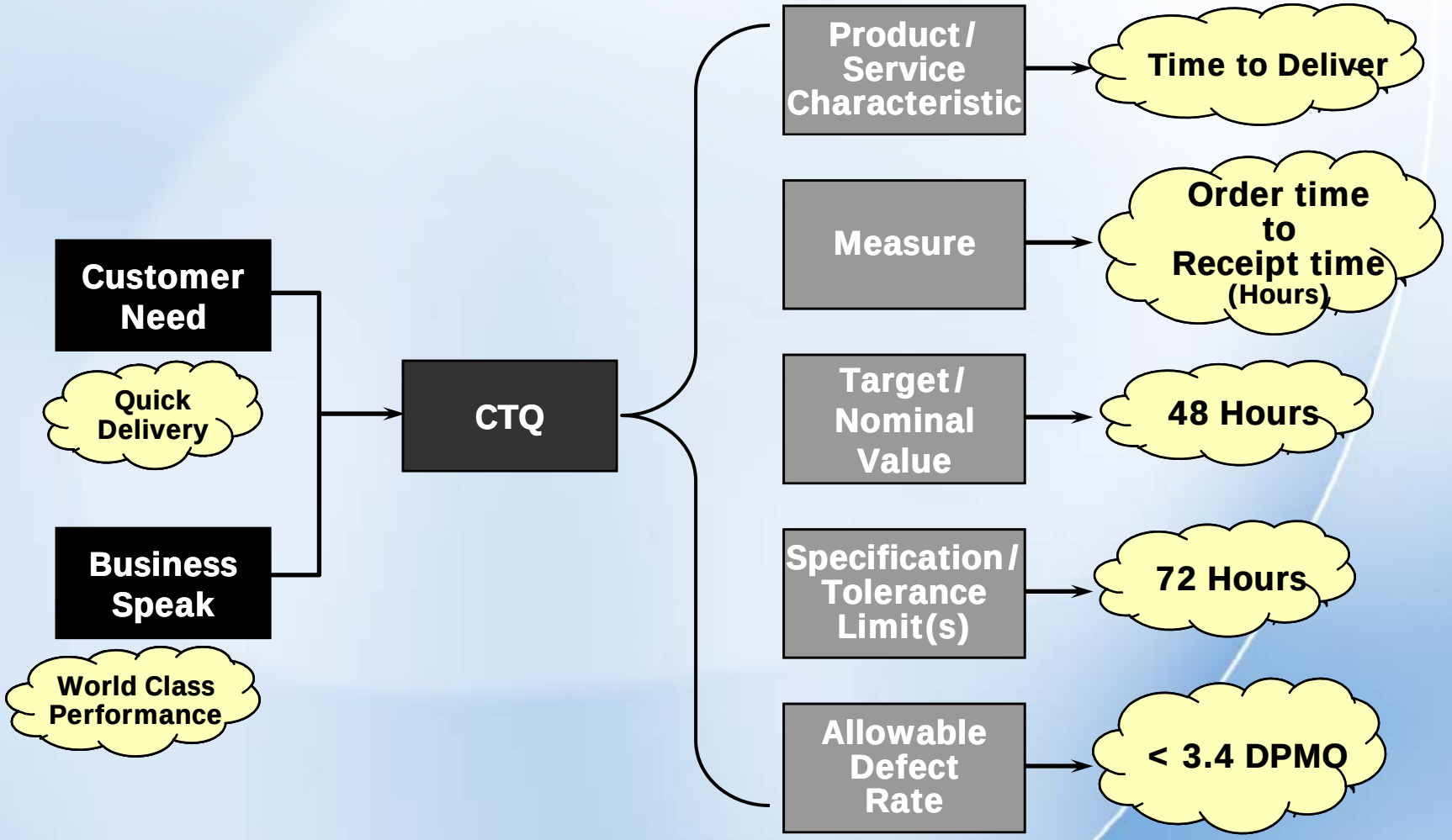
Specifying Customer CTQ s
- Organizing VOC Data - Example

- Structure of Requirements Tree - Ordering Process for Materials



Specifying Customer CTQ s

– Establishing Measures, Targets & Specification Limits



The Basic Measures

- Types of Data
  - Continuous
  - Attribute
- Measures of the Center of the Data
  - Mean
  - Median
- Measures of the Spread of Data
  - Range
  - Variance
  - Standard Deviation
- Properties of a Normal Distribution

Types of Data

- **Attribute Data (Qualitative)**
  - Categories
  - Good / Bad
  - Machine 1, Machine 2, Machine 3
  - Shift number
  - Counted things (# of Errors in a document, # units shipped, etc.)
- **Variable Data (Quantitative)**
  - Continuous Data (Decimal subdivisions are meaningful)
    - Time (seconds)
    - Pressure (psi)
    - Conveyor Speed (ft/min)
    - Rate (inches)
    - etc.

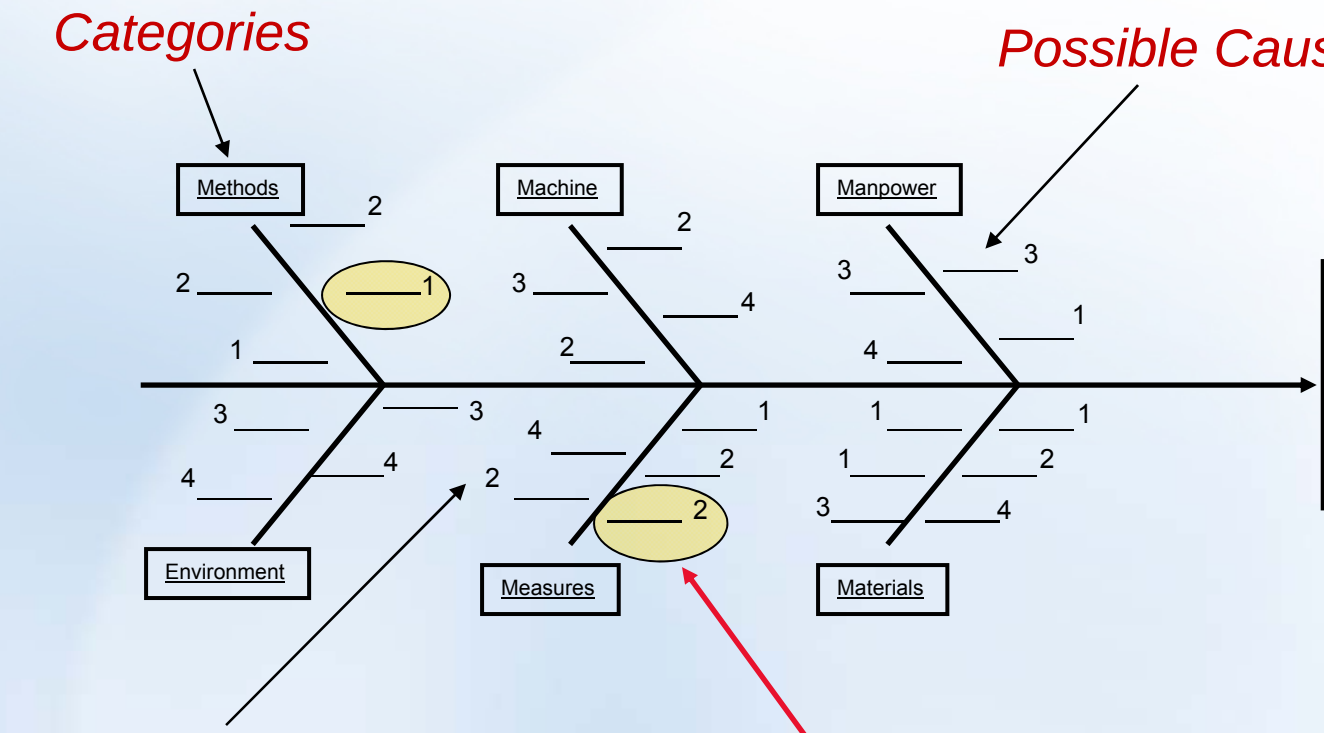
Tools

Subjective – as warm and fuzzy as I get
C&E Matrix
FMEA

Process Mapping
SIPOC
Fishbone

Statistical – not so fuzzy and warm
ANOVAs
T-tests
Regressions

Fishbone Diagram - Brainstorming



Impact / Implementation	High	Low
Easy	1	2
Hard	3	4

A fishbone is a structured brainstorming tool designed to identify possible root causes for problems.

Building a Fishbone Diagram

1. Draw Fishbone on Flip Chart

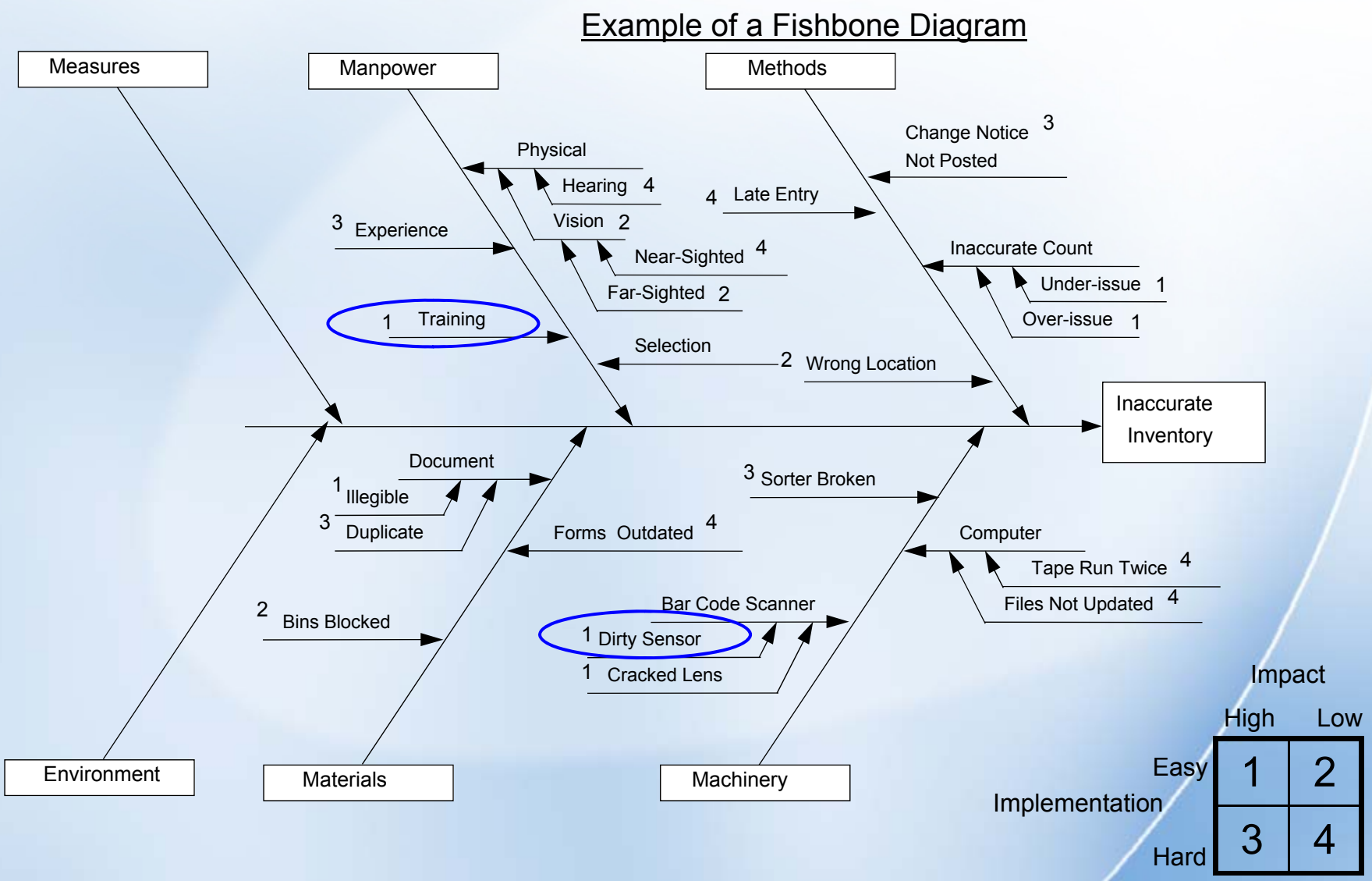
2. Define your Problem Statement (List the effect or defect you are trying to influence and make sure it is measurable)

3. Label with Branch Categories appropriate to your problem.
    1. Manpower, Machine, Method, Measures, Materials, Environment
    2. People, Plant, Procedures, Policies
    3. What Ever Classification Makes Sense
4. Categorize Possible Causes.

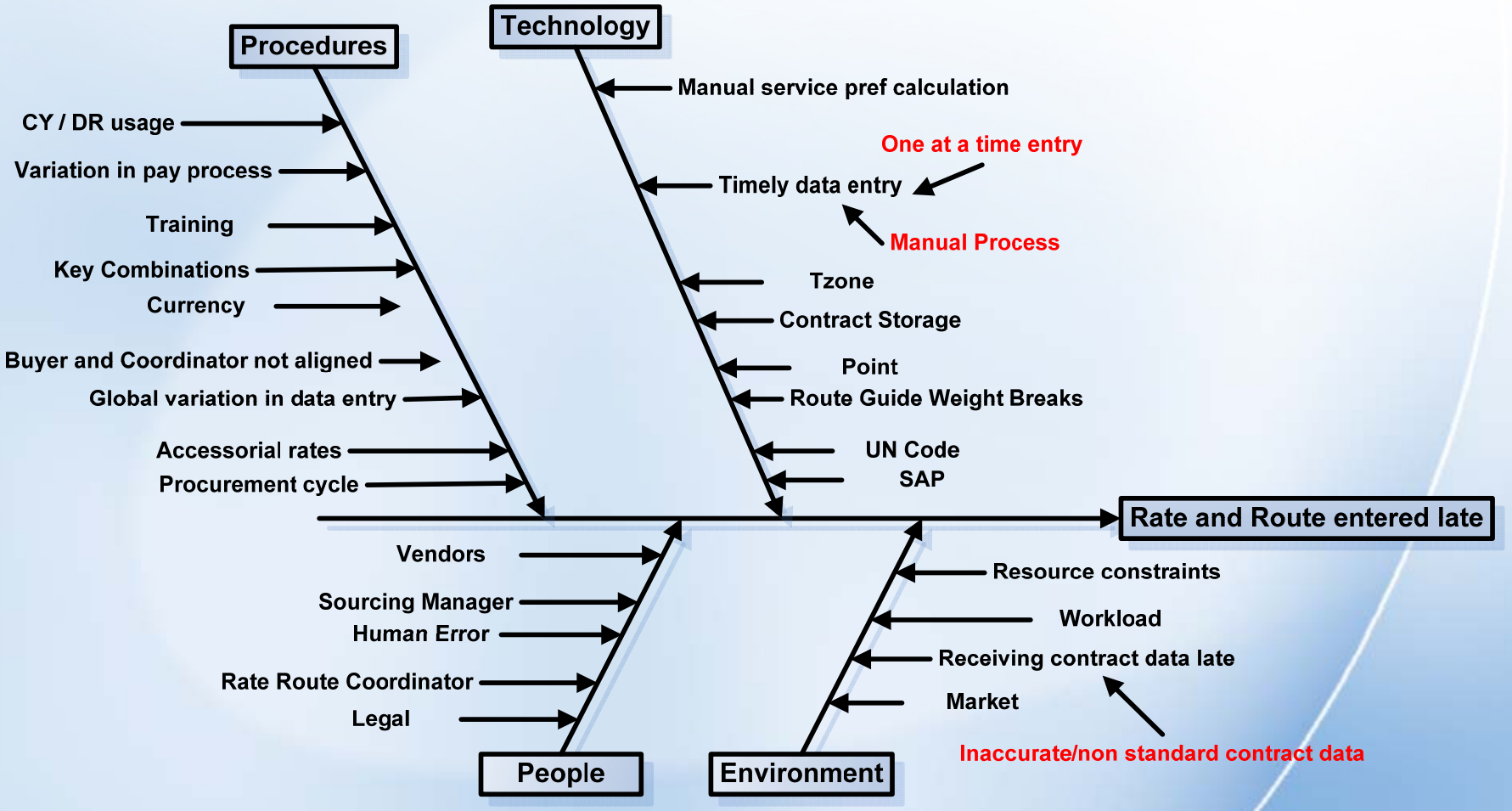
5. Add impact numbers.

6. Brainstorm possible causes by asking the 5 Whys
    - 1st Why = Excuse
    - 2nd Why = Symptom
    - 3rd Why = Blame
    - 4th Why = Cause
    - 5th Why = Root Cause

Example of a Fishbone Diagram



Fishbone: Freight Audit



SIPOC – Suppliers | Input | Process | Output | Customers

SIPOC

Supplier(s)	Inputs		Outputs	Customers
		Process Name		
		Process Description		
		Process Boundaries		

The process starts:		**What is included:**	
The process ends:		**What is excluded:**	

A SIPOC is used to capture the relationships between the inputs, outputs, suppliers and **CUSTOMERS** of the Process. (Note the focus)

SIPOC

Supplier(s)	Inputs	Process Name	Outputs	Customers
F	E	A	D	C
		Process Description		
		B		

Process Boundaries			
The process starts:	G	What is included:	G
The process ends:		What is excluded:	

Start with Process Name (A) next the Description (B) then Customer (C), then Outputs (D), next Inputs (E) then Suppliers (F) and finally Scope (G)

As-Is SIPOC Freight Audit

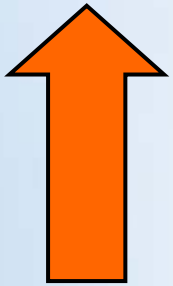
SIPOC

Supplier(s)	Inputs		Outputs	Customers
Contract administrator	Completde bid and service prefrence assignments		Liner Guide	Supply Chain
Contract administrator	information from quote response		Updated Liner Guide	Supply Chain
Rate and Route Coordinator	information from quote response	**Process Name**	completed route request	Supply Chain
Contract administrator	Completed bid and service preference assignments	Liner rate route maintenace	Liner Guide	Freight Forwarder
Contract administrator	information from quote response		Updated Liner Guide	Freight Forwarder
Strategic sourcing manager	quote response		information from quote response	Rate and Route Coordinator
Contract administrator	Completde bid and service prefrence assignments		Liner Guide	Rate and Route Coordinator
Supply Chain	new business need	**Process Description**	route request email	Rate and Route Coordinator
Strategic soucring manager	consolidated forecast	Liner rate and route master entry after new bid, and new buisness request.	new bid request	Liner Carrier
Strategic soucring manager	new business information		new business quote request	Liner Carrier
Strategic soucring manager	volume forecasts		consolidated forecast	Strategic Sourcing Manager
Supply Chain	sales forecast data		volume forecast	Strategic Sourcing Manager
Liner Carrier	new business quote request		quote response	Strategic Sourcing Manager
Rate and Route Coordinator	route request email		new business information	Strategic Sourcing Manager
Liner Carrier	New bid request		new bid data	Strategic Sourcing Manager
Strategic sourcing manager	quote response		information from quote response	Contract Administrator
Strategic soucring manager	new bid data		Completde bid and service prefrence assignments	Contract Administrator
Rate and Route Coordinator	Liner Guide		rates, routes, and route guides	SAP Master Data
		Process Boundaries		

The process starts:	Submission of supply chain forecast of liner shipment volume	**What is included:**	Liner rate and route master data entry upon new liner bid; rate and route master entry as a result of new business reuqest; Global
The process ends:	Rate and route master data entered in SAP master data	**What is excluded:**	Forecast creation. bid creation process on GT nexus website, orderand shipment creation and/or resolution, invoice resolution

SIPOC to Identify Outputs and Customers…

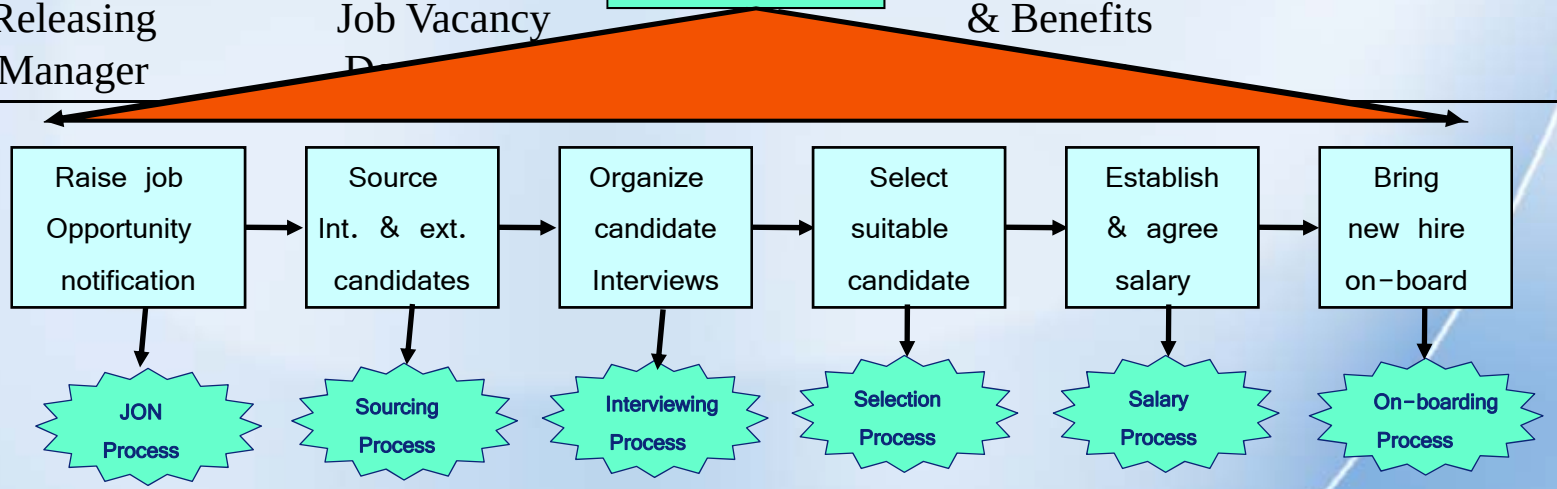
Suppliers	Inputs	Process	Outputs	Customers
Hiring Manager	JON Form	Professional Recruitment	New Hire	Hiring Manager
Interviewing Team	Open Position	Recruiting candidates for open positions	Payroll Notification	Candidates
Candidates	Applications		Refusal Letters	Executive Team
Search Firm	Interviewers		Interview Summaries	
Releasing Manager	Job Vacancy Description		Compensation & Benefits Package	



The chosen objective is the "Process"

Start Creating Project Pipeline by…

Suppliers	Inputs	Process	Outputs	Customers
Hiring Manager	JON Form	Professional Recruitment	New Hire	Hiring Manager
Interviewing Team	Open Position	Recruiting candidates for open positions	Payroll Notification	Candidates
Candidates	Applications		Refusal Letters	Executive Team
Search Firm	Interviewers		Interview Summaries	
Releasing Manager	Job Vacancy D…		Compensation & Benefits	

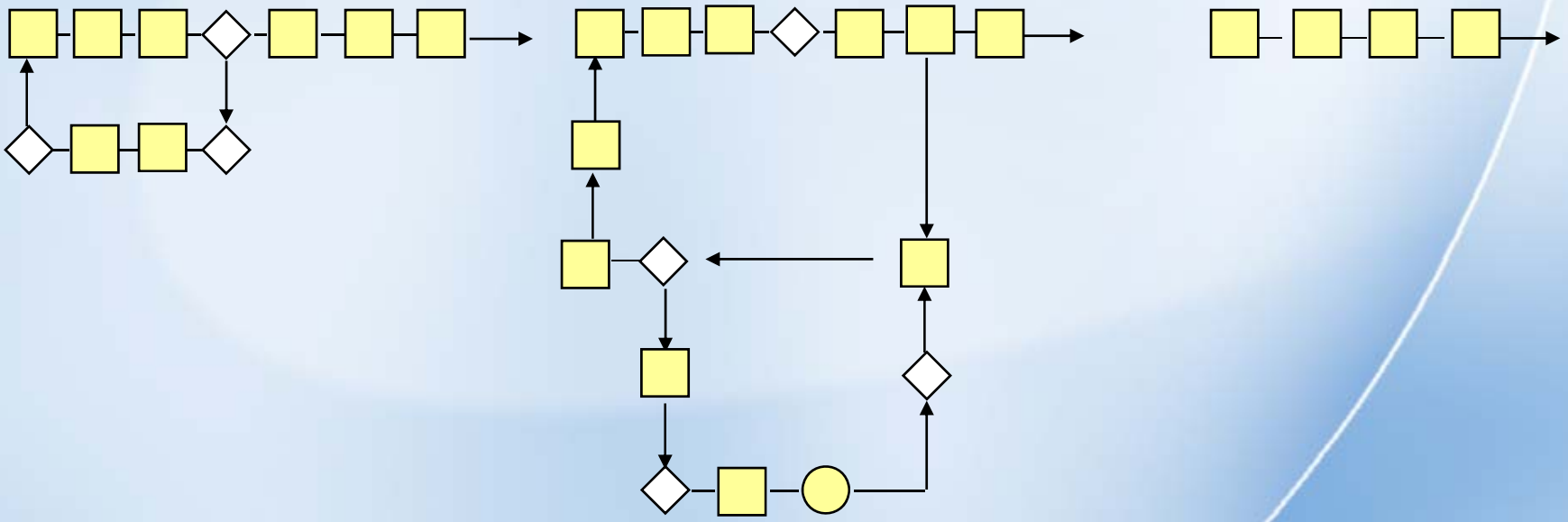


…Identifying Problem Areas in Business Processes

Process Mapping

There are usually 3 versions of a Process Map

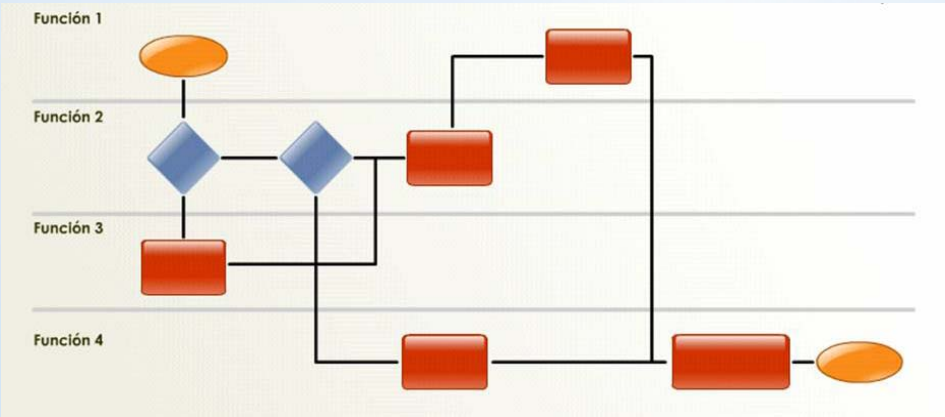
What you *Believe it is*... **What it *Actually is*...** **What you *Want it to be...***



Cross Functional Map (Swim Lane)

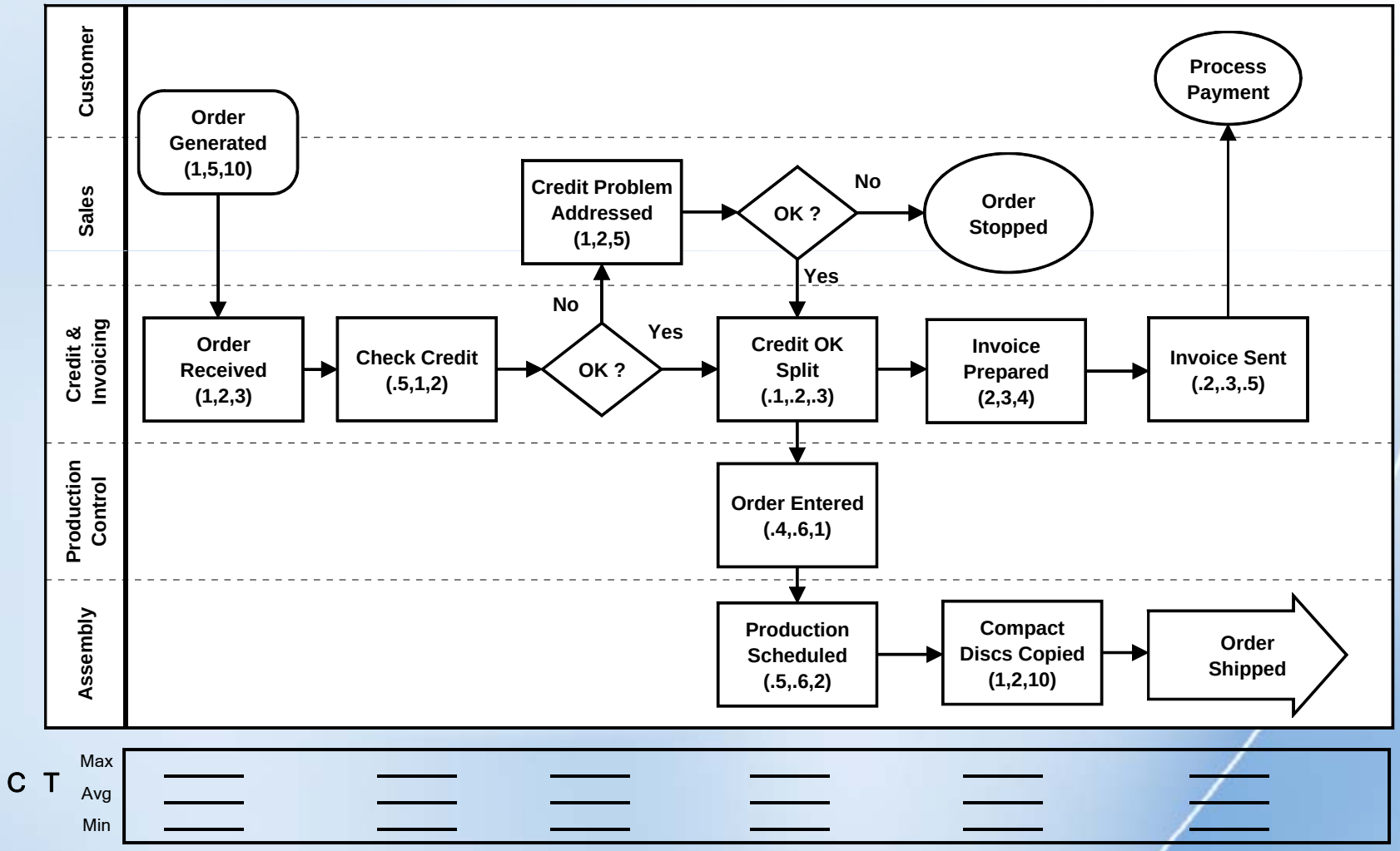
A Swim Lane Is …

- A detailed process map.
- Shows task sequence and decision points.
- Shows hand offs between functions or departments



Example: Cycle Time Documentation

- The example below shows an order generation, invoicing, and delivery process.



Where can it be applied

Only in places where there is a process.
Manufacturing was traditional.
Transactional is norm now.

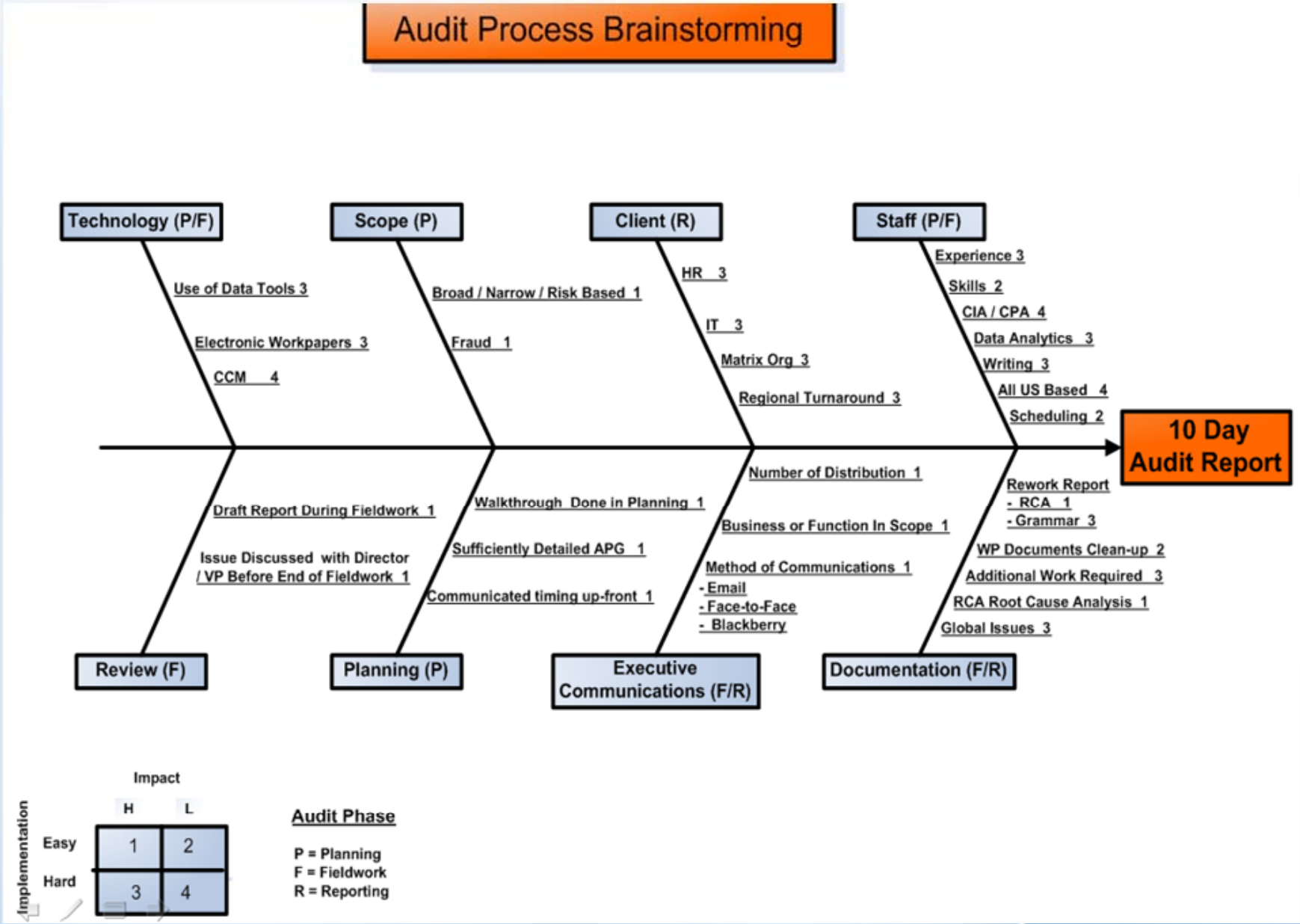
Look around. Hospitals, military anywhere efficiency is needed or cost and risk is an issue.

In other words, it is easier to say where it can not be applied because the list is short.

Audit Application

So, how have we used it in Audit…no, I have not forgotten the audience.

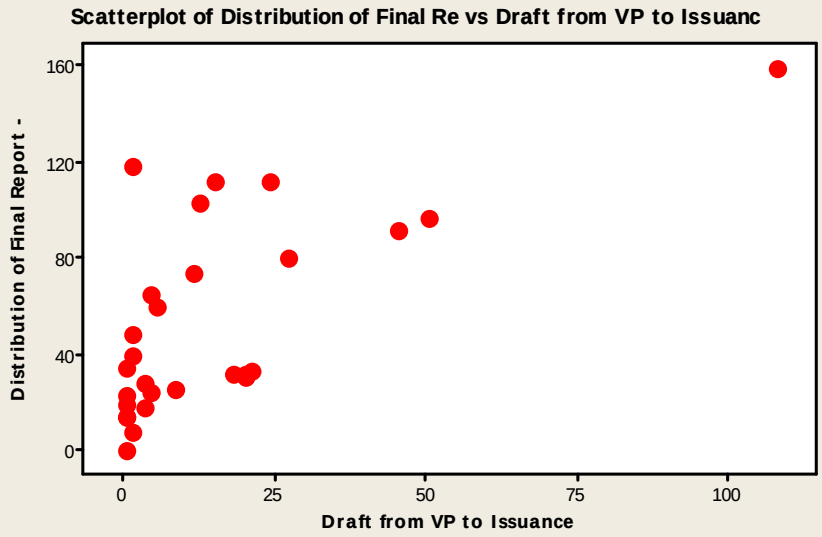
Brainstormed

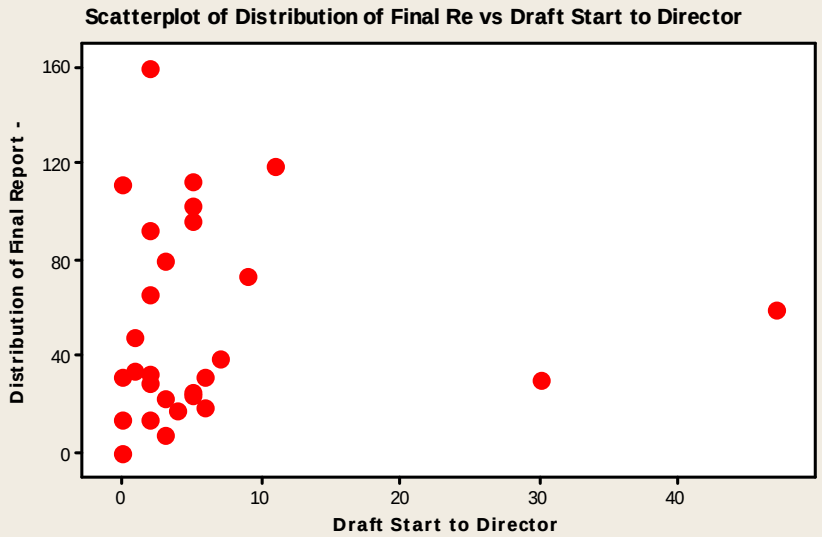


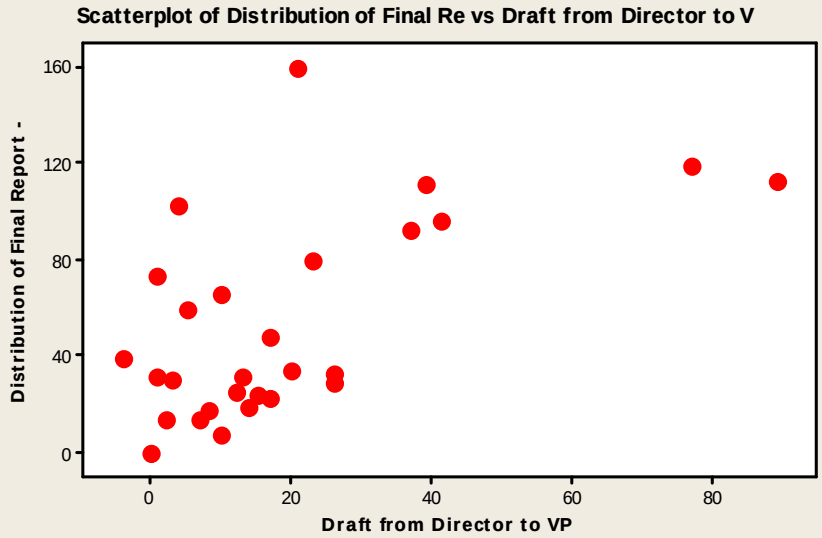
Collected Data on time and touch points

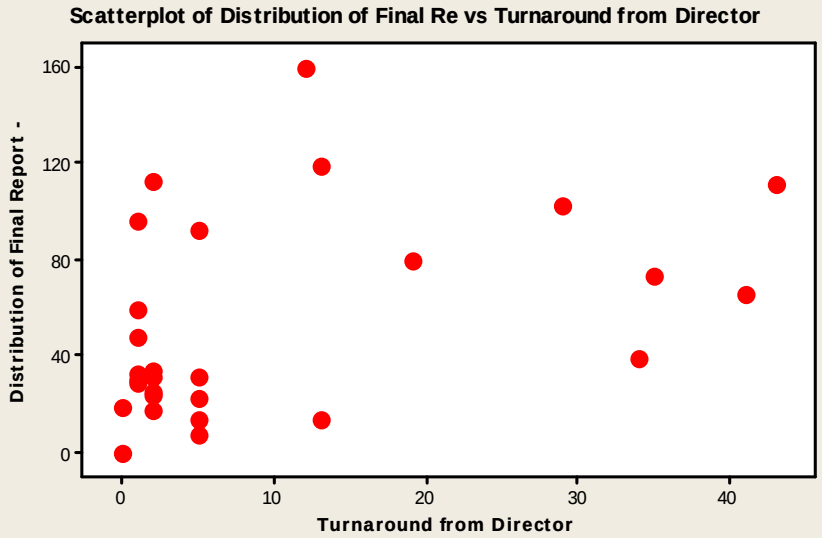
Audit number (2009-Number)	Area - Name of the Audit	Days between announcement letter and field work	Difference between end of field work and start of field work	Days start draft after close meeting	Draft Start to Director	Turnaround from Director	Draft Start to Client	Turnaround from Client	Draft from Director to VP
2009-001	HR Convergence Audit	14	25	-2	5	2	15	3	12
2009-002	US Payroll Transition	19	85	-12	3	5	13	5	10
2009-003	Treasury-China	27	15	-1	2	5	8	6	7
2009-004	Pampa Plant Shutdown	13	23	-3	3	5	9	1	17
2009-005	Ixona Japan	31	11	-2	5	2	8	12	15
2009-006	Bulapest GL Quality Review	32	11	-1	0	13	14	1	2
2009-007	Brasil Audit	12	15	6	2	41	53	3	10
2009-008	Movaris Account Reconciliation	14	53	-24	30	1	34	2	3
2009-009	Data Center Strategy Audit	76	9	-2	6	0	6	2	14
2009-010	EHSA Compliance Audit	13	0	0	0	0	0	0	0
2009-010C	EHSA Tamagona	ents please refer to	11	7	1	2	8	1	20
2009-010B	EHSA Chothin	ents please refer to	16	5	2	5	13	7	37
2009-010C	EHSA Singapore	ents please refer to	11	0	5	1	5	1	41
2009-010D	EHSA II Audit	ents please refer to	9	-72	5	2	55	16	89
2009-011	Mexico Audit	26	30	-11	11	13	27	5	77
2009-014A	Capital project - GUL Nanjing	g documents please	39	3	2	1	18	3	26
2009-014B	Capital project - Frankfurt	g documents please	18	5	3	19	22	19	23
2009-014C	North Polymer CP - Edmonton	g documents please	10	0	6	5	6	1	1
2009-015	Plant Financial Audit	83	16	-4	2	1	8	10	26
2009-016	Mexico Currency Conversion	10	11	-6	47	1	48	4	5
2009-017	PAC	21	17	0	4	2	12	1	8
2009-018	EU Data Privacy Audit	5	17	0	2	12	16	16	21
2009-019	Network Security Audit	3	25	-3	0	2	3	12	13
2009-020	FUCH Audit	13	24	-2	1	1	6	13	17
2009-021	China I and E	0	18	6	0	43	0	7	39
2009-022	Italy Hoechst	14	11	0	0	0	38	21	53
2009-023	Ixona Austria Audit	24	3	50	5	29	4	1	4
2009-024	Spondon Plant Audit	11	11	18	9	35	4	5	1
2009-025	Disaster Recovery Audit	6	70	-2	7	34	31	5	-4
Averages		21	21	-2	6	10	17	6	20
HI		83	85	50	47	43	55	21	89
Lo		0	0	-72	0	0	0	0	-4

Start to Analyze Data

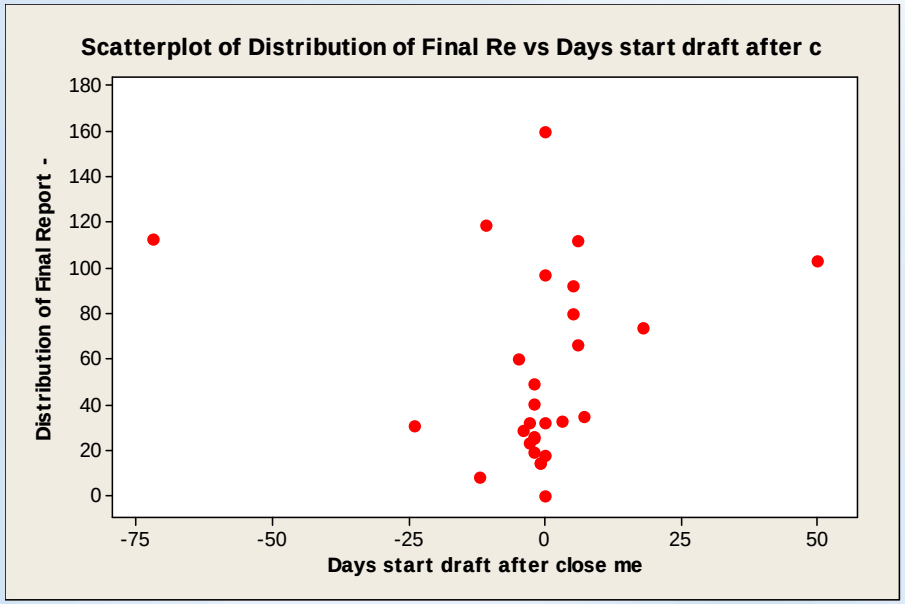


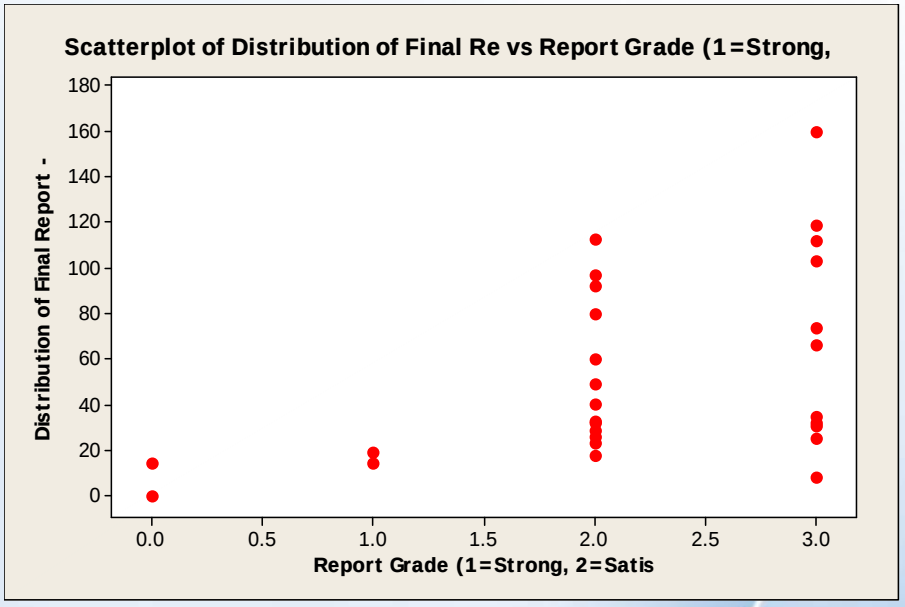






Start to Analyze Data





Start to Analyze Data

The regression equation is
Distribution of Final Report - = 9.64 - 0.304 Days between announcement lette
+ 1.23 Days start draft after close me
+ 0.872 Draft Start to Client
+ 1.35 Draft from Director to VP
+ 0.906 Draft from VP to Issuance

Predictor	Coef	SE Coef	T	P
Constant	9.645	7.805	1.24	0.230
Days between announcement lette	-0.3037	0.1870	-1.62	0.119
Days start draft after close me	1.2297	0.2384	5.16	0.000
Draft Start to Client	0.8720	0.2523	3.46	0.002
Draft from Director to VP	1.3514	0.1837	7.36	0.000
Draft from VP to Issuance	0.9061	0.1511	6.00	0.000

S = 16.4849 R-Sq = 86.9% R-Sq(adj) = 84.0%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	5	39759.2	7951.8	29.26	0.000
Residual Error	22	5978.5	271.8		
Total	27	45737.7			

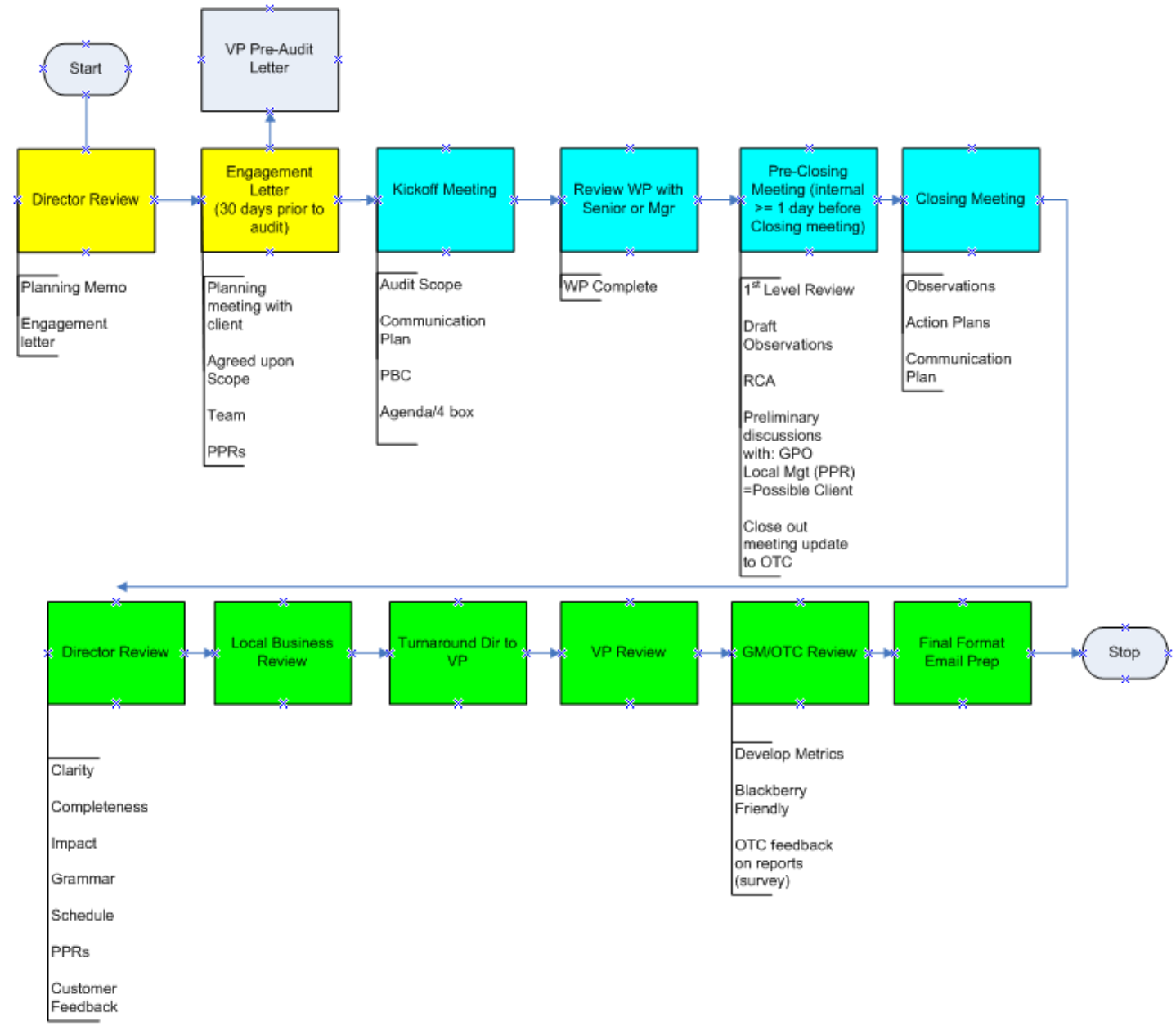
Source	DF	Seq SS
Days between announcement lette	1	3213.3
Days start draft after close me	1	3.0
Draft Start to Client	1	2483.0
Draft from Director to VP	1	24291.4
Draft from VP to Issuance	1	9768.5

Start to Analyze Data

```
The regression equation is
Report Grade (1=Strong, 2=Satis = 1.11 + 0.00989 Distribution of Final Report -
                                 - 0.0066 num of Observations
                                 + 0.543 num  of Critical Observations
                                 + 0.176 num  of Moderate Observations
                                 + 0.0994 num of Process Improvements


Predictor                          Coef   SE Coef      T      P
Constant                         1.1127    0.2607   4.27  0.000
Distribution of Final Report -  0.009895  0.002922   3.39  0.003
num of Observations             -0.00657   0.08079  -0.08  0.936
num  of Critical Observations     0.5427    0.2916   1.86  0.076
num  of Moderate Observations    0.17575   0.09518   1.85  0.078
num of Process Improvements      0.09935   0.07095   1.40  0.175


S = 0.612461   R-Sq = 59.0%   R-Sq(adj) = 49.6%


Analysis of Variance

Source          DF       SS      MS     F      P
Regression       5  11.8548  2.3710  6.32  0.001
Residual Error  22   8.2524  0.3751
Total           27  20.1071


Source                          DF  Seq SS
Distribution of Final Report -   1  4.1453
num of Observations              1  4.8098
num  of Critical Observations    1  0.8034
num  of Moderate Observations    1  1.3608
num of Process Improvements      1  0.7355
```

Audit Milestones

Wednesday, March 10, 2010



Audit

So, what were the results?

Where all is in our control, we are doing well. Still not perfect but, much better. We continue to lose time when reports are out of our hands. Meaning, a report with sit with an OTC member or GM for long periods of time. I feel good however that we are controlling the process on our side. Sitting generally at about 15 days (which is about industry average) We have hit the 10 day goal about 35-40% of the time. Up from less than 5% last year.

Where else applied by audit to drive value?

Treasury: Reduce number of banks making audit process easier and thereby cheaper

General reporting: streamlined process reducing resources required

Within each of the process steps to reduce travel and associated costs

Inside the Audit Department…..and with the Customers of the Audit Department in their processes