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Six Sigma & IT

~ Contents of the Talk ~

- Background
  - What is Six Sigma?
  - Where is IT relative to other industries in Six Sigma adoption?
- What's going on 'out there' - conferences, institutes, education?
- Is Six Sigma compatible with Software & IT Development?
- Some case studies from Bank of America
  1. **Using Metrics to Choose the right methodology**
  2. **Yield modeling & Sigma calculation to prove the point**
  3. **Design For Six Sigma – using the Voice of the Customer & Process to design a solution**
  4. **Design of Experiments & Simulation to keep pace with the Business**
- The CMMI & Six Sigma
- An integrated lifecycle model
- Q&A/Discussion

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So what is Six Sigma all about?

Six Sigma Provides a common way to measure the quality of our processes

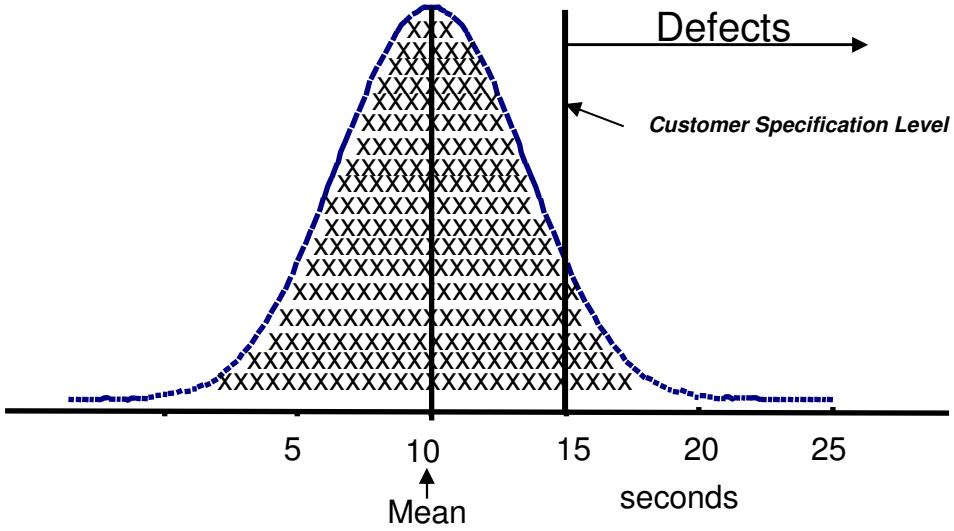
Sigma is also a measure of defect and variation

Everything is a process
All processes have inherent variability
Data is used to understand the variability and drive process improvement decisions

For example, clients expect a price quoted in 15 seconds…...

Each “x” below represents an actual individual customer experience.

This chart is a histogram which shows the distribution, or frequency, of each possible result experienced by the customer.



Sigma	Defects per million	Yield
2σ	308,000	69.2%
3σ	66,800	93.32%
4σ	6,210	99.379%
5σ	230	99.977%
6σ	3.4	99.99966%
7σ	0.019	100%

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It's all about ***Process***

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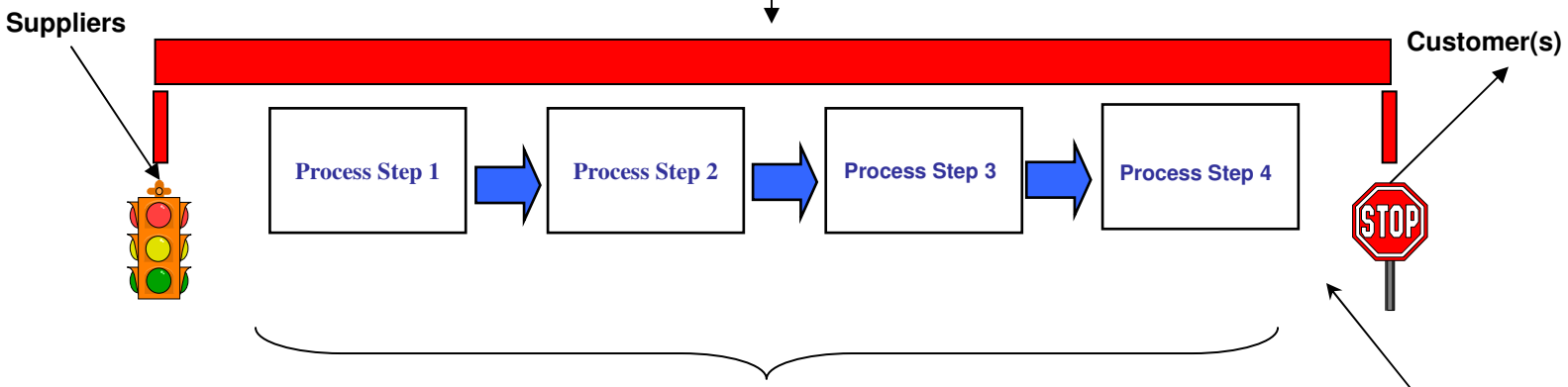
$$Y = f(x_1 \ldots . x_n)$$

Suppliers **I**nputs **P**rocess **O**utput **C**ustomers



These are the X's

This is where the Y fits

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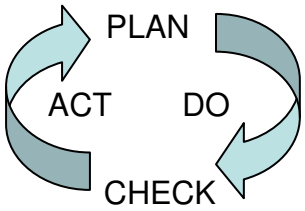
DMAIC

~ In reality, is a continuous process ~

(Seen this before?)



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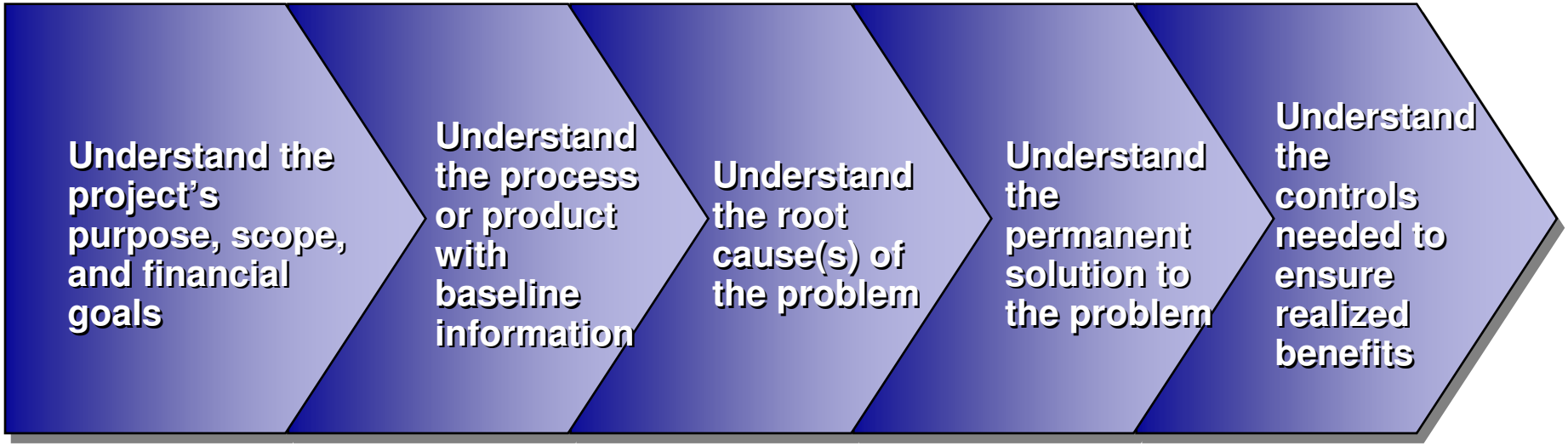
DMAIC Deliverables



Define

- *Project Charter*
  - *-Business Case*
  - *-Problem Statement*
  - *-Scope*
  - *-Timeline*
  - *-Goal Statements*
- *Primary/Secondary Metrics*
- *High level process map*

Measure

- *Detailed process map*
- *Cause & Effect Matrix*
- *FMEA*
- *Cause & Effect Diagram*
- *Activity of the Product*
- *Activity of the Associate*
- *Activity of the Equipment*
- *Data Collection Plan*
- *MSA*
- *Control Chart*
- *5S*
- *RTY*
- *Sigma Level*
- *COPQ*

Analyze

- *Hypothesis Test*
- *Regression Analysis*

Improve

- *Standard Work*
- *Load Chart*
- *5S*
- *Standard WIP*
- *Poka Yoke*
- *DOE*
- *Pilot/Model*
- *FMEA*
- *Control Chart*
- *Hypothesis Test*

Control

- *Control Plan*
  - *-Roles & Responsibilities*
  - *-Response Plan*
  - *-Audits*
  - *-Training & Cross-training*
  - *-FMEA Validation*
- *Continuous Improvement*
  - *-Replication/Lessons Learned*
- *Transitioning*
- *Project closure*

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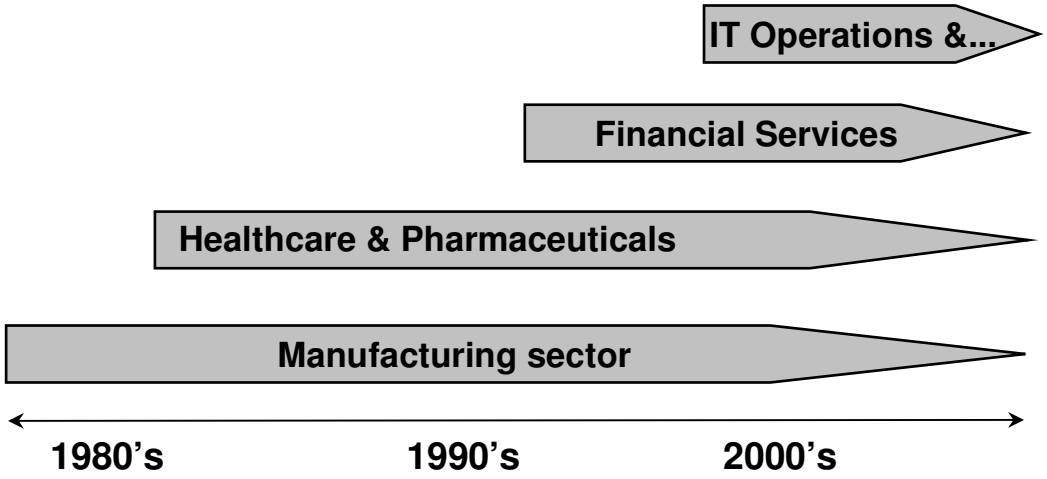
Six Sigma Adoption progress



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What's going on 'Out There' with Six Sigma & IT?

Six Sigma for Software Development and IT 2007
Boston Hyatt Harborside & Hotel • Boston, **MA**
Main Conference – May 22-23, 2007 • Workshops – May 21, 2007

Day 1 – MAY 22, 2007

8.30 Registration And Coffee

8.45 Chair's Opening Address

9.00 What Constitutes A Process In Software Development And IT? Where To Begin With Six Sigma For Process Improvement In Your Organization

9.45 Applying Process Improvement In A Creative Environment

10.30 Coffee And Networking

11.00 Developing Strong Project Management: Giving Each Project A Focal Point

11.45 Using Six Sigma To Set Targets: Making Cost/Time Estimation A Data Based Decisions

12.30 Bringing Efficiency Into Software Development And IT: How Lean Can Significantly Reduce Costs In Your Organization

1.00 Networking Lunch

2.30 Speeding Up Results – Seeing The ROI Sooner

3.15 Training And Spreading Six Sigma In Software Development And IT: Maximizing The ROI Of Time And Energy

3.50 Coffee And Networking

SENIOR LEVEL PANEL SESSION
4.00 Understand What Is Required To Gain And Maintain Top Level Commitment To Your Six Sigma Program

4.45 Application Of Six Sigma In Your Customer Facing Functions

5.30 Chair's Closing Remarks

5.45 Close Of Day One

Day 2 – MAY 23, 2007

8.30 Registration And Coffee

8.45 Chair's Opening Address

9.00 Making The VOC (Voice Of The Customer) Heard: Maximize Customer Loyalty And Satisfaction

9.45 Capturing Data: Understanding What Constitutes Usable Data In IT And Software Development

10.30 Coffee And Networking

11.00 Application Of Six Sigma In Your Customer Facing Functions

11.45 Making The CMMI And Six Sigma Marriage Long-Lasting And Prosperous

12.30 Networking Lunch

2.00 Driving Quality Into Software Testing – Banishing Defects Before They Impact The End User

DISCUSSION SESSION
2.45 Answer All Your Outsourcing Questions

3.30 Coffee And Networking

4.00 Reducing Time To Project Completion: Using Six Sigma To Consistently Hit Deadlines

4.45 Accurately Monitoring And Demonstrating The Value Of Your Function To The Other Areas Of Your Organization

5.30 Chair's Closing Remarks

5.45 Close Of Day Two
End of conference

PRE-CONFERENCE WORKSHOP DAY, MAY 21, 2007

WORKSHOP A: 9.00 – 11.30

Six Sigma For Software Development 101

WORKSHOP B: 11.45 – 2.15 including working lunch

Delivering To Your Customer:

WORKSHOP C: 2.30 – 5.00

Using The Advanced Tools Six Sigma Has At Its Disposal To Power Process Improvement In Your Organization

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And from the SEI's SEPG Conference.....

Wednesday March 28th, 2007 2:20--3:00
Dell Case - Integrating Six Sigma and CMMI
Andressa Covatti, Dell Inc.

This case study will provide a brief overview of the ***Information Technology Infrastructure Library (ITIL),*** *and illustrate how* ***Design for Lean Six Sigma*** *used it as a guideline to create a world-class* ***Configuration Management*** *process that earned a U.S. patent for a Fortune 100 financial institution. ITIL is a collection of "best practices" that describes desirable attributes of effective IT processes - i.e., "what" should be done, but not "how". While many organizations are turning to this framework to improve Information Technology management, they often struggle with defining the "how" - this case study illustrates use of Lean Six Sigma within the ITIL framework.*

IT professionals either exploring the possibility of utilizing ITIL best practices, or are at any stage if implementation will benefit from this presentation.

Thurday March 29th, 2007 12:00--1:30
Design for Six Sigma Meets Agile - Exploring the Fit
David Hallowell, Six Sigma
Advantage, Inc.

Many software organizations have reported important results related to the use of traditional Six Sigma DMAIC methods to support CMMI Process Areas and to accelerate improved levels of certification. More recently, awareness about the CMMI fit and leverage for Design for Six Sigma methods and tools has been increasing. Most DFSS roadmaps, with their review tollgates and emphasis on 'up front' requirements come across as a phased, waterfall development model. That was useful in hardware product development, but unfortunately limiting in the application to software. If given just a cursory look, software professionals, especially those in an Agile development environment, can discount DFSS as irrelevant.

This workshop dispels the myths about linear waterfall DFSS and rescues many of the tools and notions for what they offer to all software development environments - classic or Agile.

Case studies and artifacts from projects are used to illustrate key tools and options related to their use.

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B of A's new Agile-based *Iterative* SDLC & Six Sigma

Sometimes, methods are used as window-dressing on projects & are in fact being run in an ad hoc manner. And so I asked the question, "What of Six Sigma most helped you on the project?"

- **Response: "**The requirement to construct a performance ***Baseline*** - without this, the design of the new SDLC might have been too influenced by the *Voice of the Customer*." There are facts, and there are facts!!

*The **Iterative model** looks like it has all the good things of Six Sigma baked into it (e.g. the customer as part of the project team, driving/selecting release requirements (stories), therefore totally VoC-driven;....., but was it truly infused with Six Sigma thinking?*

- **Response:** "Six Sigma's demand for a *Control Plan*, made us introduce *Iteration Tracking*, and the retention of this information, as history, to enable continuous improvement, based on fact, to make the process more and more efficient"; the plethora of metrics that come out of the Iterative model was definitely a result of Six Sigma's intense focus on measurement.

Case Study # : 1

Problem Statement

- ***Multiple*** rapid development processes with limited documentation are being used across the organization, resulting in ***inconsistent*** process performance, ***minimal repeatability***, and ***limited transparency*** into the work being performed and products being delivered

Goal Statement

- Provide the company with a standard Iterative process for delivering software solutions to meet client time and quality needs
- Primary Metric: Completion Time, Defects per Release
- Secondary Metric: Business Partner Satisfaction

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~ Case Study # 1: Defining the Project ~

Project Charter

Business Case, Opportunity/Problem Statement, Goals, Scope, Team

Business Case Summary

- Implement a standard, documented, and efficient Iterative process reducing defects to within specification limits
- Provide quality products at optimal cost while increasing the speed at which we deliver them to the business. Increase visibility into the work activities and products being delivered
- As requirements dictate, provide opportunities for process flexibility within prescribed limits
- Reduce and/or eliminate the learning curve among practitioners, standardize terminology, and increase mobility between organizations
- Tie to Hoshin/MBF –Plan #1.2 – World Class Processes

Boundaries & Scope

- Scope: Process and tools used for qqq projects meeting Iterative criteria, validated through the CMWBT pilot. All GTS&F technology organizations are expected to adopt beginning in October 2006
- Process Starts: Scheduled work request
- Process Ends: Software delivered to production meeting quality requirements
- Project Start Date: January 17, 2006
  Target Pilot Start Date: May 15, 2006
  Target Availability Date: October 2, 2006
- CTQs: Completion Time, Defects per Release, Business Partner Engagement Level, Business Partner Satisfaction

Problem Statement

- Multiple rapid development processes with limited documentation are being used across the organization, resulting in inconsistent process performance, minimal repeatability, and limited transparency into the work being performed and products being delivered

Goal Statement

- Provide BAC with a standard Iterative process for delivering software solutions to meet client time and quality needs
- Primary Metric: Completion Time, Defects per Release
- Secondary Metric: Business Partner Satisfaction

Team Summary

- **Core Team:** aaaa,bbbb,cccc
- **Extended Core Team:** dddd,eeee,ffff
- **MBB/Coach:** gggg,hhhh,iiii
- **BB Candidate:** xxxx
- **Process Owners:** mmmm,nnnn
- **Champion(s)/Sponsor:** CCCC

Why? *A very succinct way of defining why you are doing your project*

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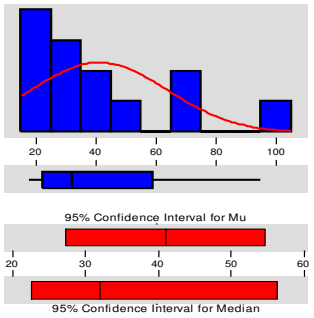
~ Case Study # 1 ~

Six Sigma DMAIC Measurement Phase

CTQ Baselines *Prioritized*

Descriptive Statistics



Variable: Completion Time

Anderson-Darling Normality Test

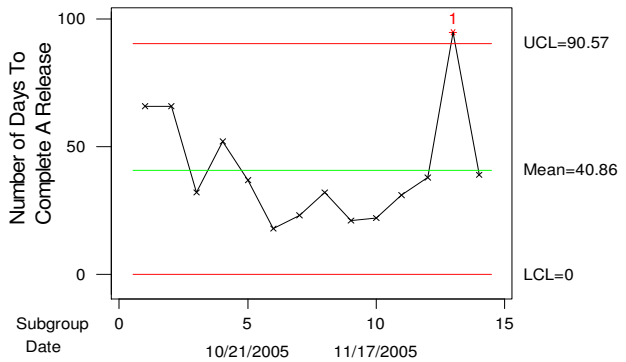
A-Squared:	0.742
P-Value:	0.040
Mean	41.0000
StDev	22.7083
Variance	515.667
Skewness	1.30056
Kurtosis	1.25658
N	13
Minimum	18.0000
1st Quartile	22.5000
Median	32.0000
3rd Quartile	59.0000
Maximum	95.0000

95% Confidence Interval for Mu: 27.2775 54.7225

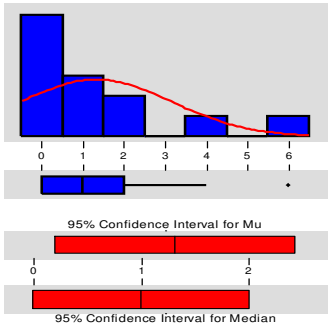
95% Confidence Interval for Sigma: 16.2838 37.4854

95% Confidence Interval for Median: 22.6846 56.4151

Completion Time



Descriptive Statistics



Variable: Number of Defects

Anderson-Darling Normality Test

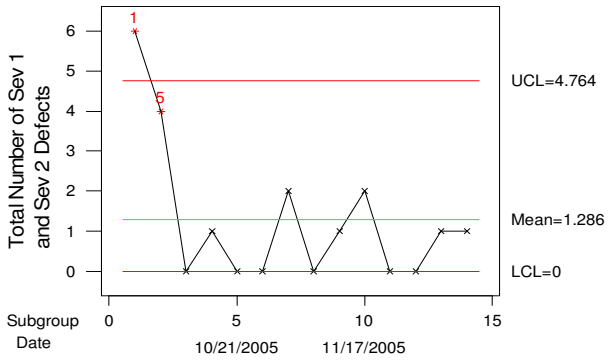
A-Squared:	1.273
P-Value:	0.002
Mean	1.30769
StDev	1.84321
Variance	3.39744
Skewness	1.72977
Kurtosis	2.70657
N	13
Minimum	0.00000
1st Quartile	0.00000
Median	1.00000
3rd Quartile	2.00000
Maximum	6.00000

95% Confidence Interval for Mu: 0.19385 2.42154

95% Confidence Interval for Sigma: 1.32174 3.04266

95% Confidence Interval for Median: 0.00000 2.00000

Number of Sev 1 & 2 Defects



Why? *Makes you study your starting point (current state) from a measured performance perspective*

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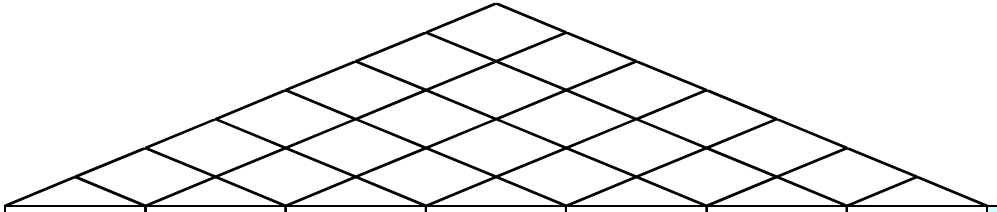
Case Study # 1 – *Voice of the Customer (VoC)*

Requirement Prioritization ~ *QFD 2*

~ CTQs to Design Elements ~



Functions (Hows) ?	Create work request	Requirements/ Design	Establish environment to build work effort	Build Code	Plan and Execute Test	Approval	Release to Production	Importance
CTQs (Whats) ?								
Completion time < 10 weeks	1	9	9	9	9	3	9	**4**
Defects	0	1	1	9	9	3	9	**3**
Business Partner Engagement	9	9	3	3	9	9	1	**1**
Business Partner Satisfaction	3	9	0	3	3	9	9	**2**
l Measure (CTQ) Priority	19	66	42	72	78	48	82	

Why? *Ensures you decompose your process against measurable targets (CTQs)*

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Case Study # 1 ~ Designing the Solution ~

Step 3 - QFD3 (Design Elements to Process Steps)

Process Steps (Hows) ? / Functional Reqs (Whats) ?	Product Planning	Features List/Repository	Release Planning	Iteration Preparation	Iteration Planning	Develop	Test	Iteration Close	Acceptance Test	Approve
Reduction in Critical Defects per Release	3	9	3	3	3	9	9	1	9	
High level of business partner engagement	9	9	9	3	3	3	3	3	9	9
High business partner satisfaction	9	9	9	3	3	1	3	1	9	9
Process Automation	1	1	1	1	1	1	1	1	1	1
Business Partner checkpoints & approvals	3	3	9	1	3	1	1	3	9	9
Process Governance	9	1	1	1	1	1	1	1	1	9
Process Training & Support	1		9	9	9	3	3	3	1	1
Clarity of roles and responsibilities	1		1	1	1	1	1	1	1	1
Predictable & Accurate Delivery	9	9	9	3	9	9	9	1	9	1
Faster Application Development	3	3	9	3	9	9	9	1	9	3
Priority	**313**	**316**	**393**	135	255	249	261	91	**415**	272

Why? *Drives the 'Voice of the Customer' into your new design, right down to the process steps*

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Case Study # 1 ~ The Business Case ~
Business Impact Analysis

Savings Impact	Value	Type	Estimated Month to Control
Reduction of Defects to Within Pilot Specification Limits	$ 2,778K	3	1st-3rd Qtr 2007

Variables			Model / Computations	
Total Number of Practitioners	294		Number of teams	42
Team Size	7		Average Number Releases / Team	8
Mean Completion Time (Baseline)	40.86		Total # Releases / Year	336
Mean Completion Time (Pilot)	38.83			
Number Sev 1&2 Defects (Baseline)	1.286		Total Bugs Released to Production / Year (Baseline)	433
Number Sev 1&2 Defects (Pilot)	0.7		Total Bugs Released to Production / Year (Pilot)	236
			Potential Reduction in Defects / Year	197
Cost to Repair Critical Defect	$14,100		Cost of Defects (annual savings)	$2,777,700

nth Benefits Start	Jan	2007											
Benefit Type Metric			**Jan-07**	**Feb-07**	**Mar-07**	**Apr-07**	**May-07**	**Jun-07**	**Jul-07**	**Aug-07**	**Sep-07**	**Oct-07**	**Nov-07**	**Dec-07**
Baseline			$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
After Change/Target			($175,000.)	($175,000.)	($175,000.)	($175,000.)	($175,000.)	($175,000.)	($175,000.)	($175,000.)	($175,000.)	($175,000.)	($175,000.)	($175,000.)
Monthly Metric Planne			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Financials			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Baseline			($175,000.)	($175,000.)	($175,000.)	($175,000.)	($175,000.)	($175,000.)	($175,000.)	($175,000.)	($175,000.)	($175,000.)	($175,000.)	($175,000.)
After Change/Target														
Depreciation			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other direct expenses														
Total Incre	$0													
			$175,000	$175,000	$175,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$252,700
Predicted Net Value	**$2,777,700**													

Why? *All projects cost money justifying & demonstrating the* ***Total Cost of Ownership*** *benefits is a must*

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~ Case Study #1 – So what did they achieve? ~

- Pilot results indicate this model works well for enhancements of existing functionality; pilot did not include projects that developed entirely new applications

- The Iterative SDLC
  - Provides a flexible process that gives transparency to business partners
  - Is responsive to changing needs from the business sponsor and technology partners
  - Provides enough structure to enable a clear definition as to what would be accomplished within an iteration/release
  - Provides tools to support all aspects of the lifecycle
  - Predictive deliveries and improved product quality

- Cost of Poor Quality is a strong indicator of value

- Business Partner satisfaction is high

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~ Case Study # 2 ~

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Business Case Summary

Lack of base health & welfare monitoring as well as comprehensive application level monitoring methods & procedures has created too much manual intervention & effort in order to sustain a stable & reliable trading environment. This is keeping the service levels lower than the optimum that is required by the client.

Use of Yield modeling & Sigma Level calculation

Sigma level of the current process as it is today. Data collected from Sep – Nov 20, 2006.
Data excludes 2 outliers in order to analyze normal data.

Downtime Duration

High Impact issues only

Upper Spec Limit for individual issue	30 Min
Lower Spec Limit for individual issue	5 Min
Sigma Level	2.24
Percentage Yield	77.01%
DPM	229,909

The percentage yield represents the percent of time we meet our Upper & Lower Spec limits when the system is down

Z-value for Upper Spec Limit	2.21	The probability of downtime, for high impact issues, being greater than 30 minutes is 1.37%
Z-value for Lower Spec Limit	0.78	The probability of downtime, for high impact issues, being less than 5 minutes is 21.62%

So we miss the customer expectations by 1.37% of the time, but beat them by 21.62%

Why? *Baselining your current process helps set realistic improvement goals and helps you measure your improvements*

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~ Case Study # 2 ~

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Post Production control & *continuous improvement*

#	Process Function (Step)	Potential Failure Modes (process defects)	Potential Failure Effects (Y's)	SEV	Class	Potential Causes of Failure (X's)	OCC	Current Process Controls	DET	RPN	Recommend Actions	Responsible Person & Target Date	Taken Actions	SEV	OCC	DET	RPN
1	Detect	Not knowing what to detect	Issue not detected	9		Outdated or wrong configuration of monitoring system	1	After issue occurs, add detection	9	81	1. Create committee to formalize & gather monitoring requirements. Establish procedures on regular basis to review and update monitoring requirements using JIRA. 2. After configuration changes are applied to production system, support & developers should validate deployment.	1. Committee Members (David Pe Chair) 2. Support team & development team Target date - second week of December 2006					
2	Detect	Not configured properly	Issue not detected	9		Outdated or wrong configuration of monitoring system	1	After issue occurs, correct configuration	3	27	1. Create committee to formalize & gather monitoring requirements. Establish procedures on regular basis to review and update monitoring requirements using JIRA. 2. After configuration changes are applied to production system, support & developers should validate deployment.	1. Committee Members (David Pe Chair) 2. Support team & development team Target date - second week of December 2006					
.																	
.																	
.																	
32	Take Action	Error in ETA time	Impact to client revenue or increased operational risk	9		Not properly trained	3	Review action with multiple teams	3	81	1. For every category of monitored component, defined standard alert and error messaging templates should be produced to reduce complexity. 2. Update application to generate more meaningful alert and error messages. 3. Establish appproval procedures to include appropriate senior management based on criticality of issues. 4. Update operational handbook for correct procedures when changes occur 5. Review alerts generated and continuously modify current settings in ordert to reduce duplicate & irrelevant errors.	1. Committee Members (David Pe Chair) 2. Committee Members (David Pe Chair) & Dev Team 3. Support team 4. Project Mgmt Team 5. Support team Target date - first week of February 2007					
33	Take Action	Didn't resolve issue or problem not addressed	Client dissatisfaction or reduction in trust	9		Identify wrong root cause	3	Communicate to client & continue investigation	3	81	1. For every category of monitored component, defined standard alert and error messaging templates should be produced to reduce complexity. 2. Update application to generate more meaningful alert and error messages. 3. Establish appproval procedures to include appropriate senior management based on criticality of issues. 4. Update operational handbook for correct procedures when changes occur 5. Review alerts generated and continuously modify current settings in ordert to reduce duplicate & irrelevant errors.	1. Committee Members (David Pe Chair) 2. Committee Members (David Pe Chair) & Dev Team 3. Support team 4. Project Mgmt Team 5. Support team Target date - first week of February 2007					

Why? *Helps eliminate or at least manage risks in your future state process design*

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~ Case Study # 3 ~

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Business Case Summary

Simplify the Operating environment, improve reporting and measurement tools, reduce costs. Conduct a capacity optimisation analysis resulting in cost reduction recommendations
The Cost Per Trade (CPT) project requires accurate data on server population, owner, usage (production vs. non production), and capacity.
For Global Markets this Project will identify the root causes for incorrect server inventories and design process improvements to improve inventory accuracy.

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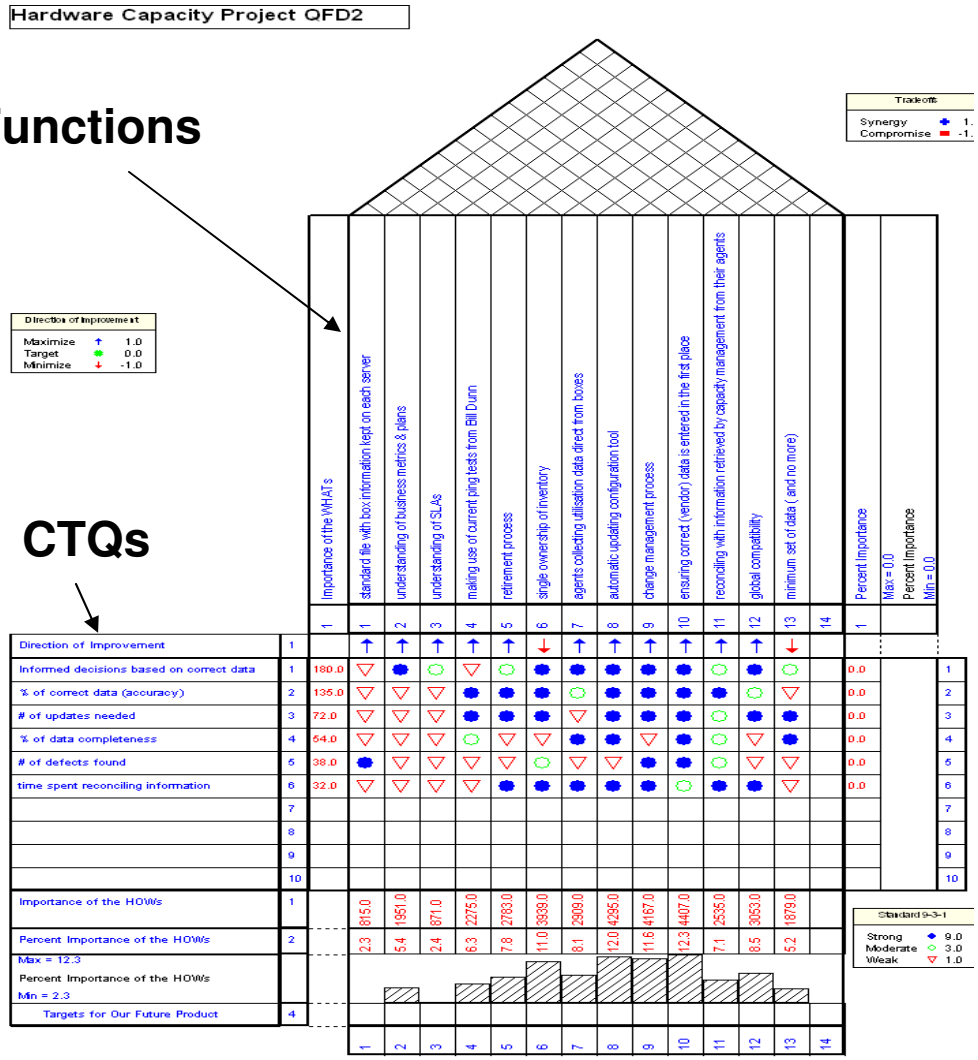
~ Case Study # 3 ~

~ Using QFD as a Design tool ~



Why? *Drives the 'Voice of the Customer' into your new design*

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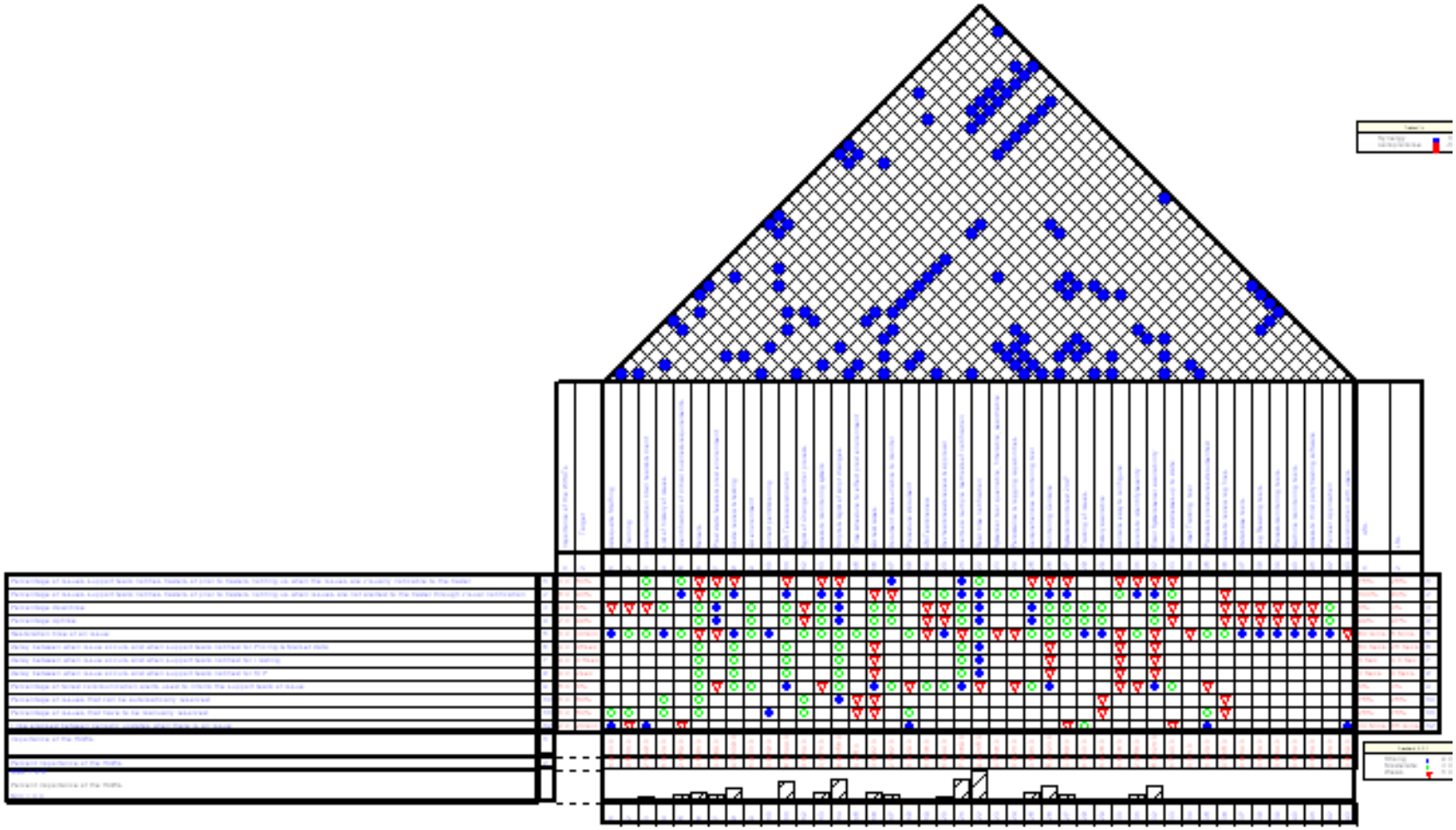
~ Case Study # 3 ~

~ Using QFD as a Design tool (2) – some Houses are bigger than others! ~



Why? *Turns prioritizing Customer needs into more of a science*

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~ Case Study # 4 ~

Capacity Modeling - quite possibly a perfect marriage of Six Sigma and IT

(*Based on a real-life, current project)*

Problem Statement

The existing application capacity management is ***inefficient***, ***non-standard*** and reactive across xxx division. Capacity Management is becoming a ***regulatory topic.*** Operating near capacity can impact system ***stability***

Goal Statements

- **Reduce the costs** associated with purchase of excess technical capacity for production and testing environments.
- **Reduce operational losses** due to insufficient capacity in production.
- **Confirm scalability** of our infrastructure to external regulators and provide a framework for global use.
- Estimated **target savings of $1M** (across multiple generations

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The Approach

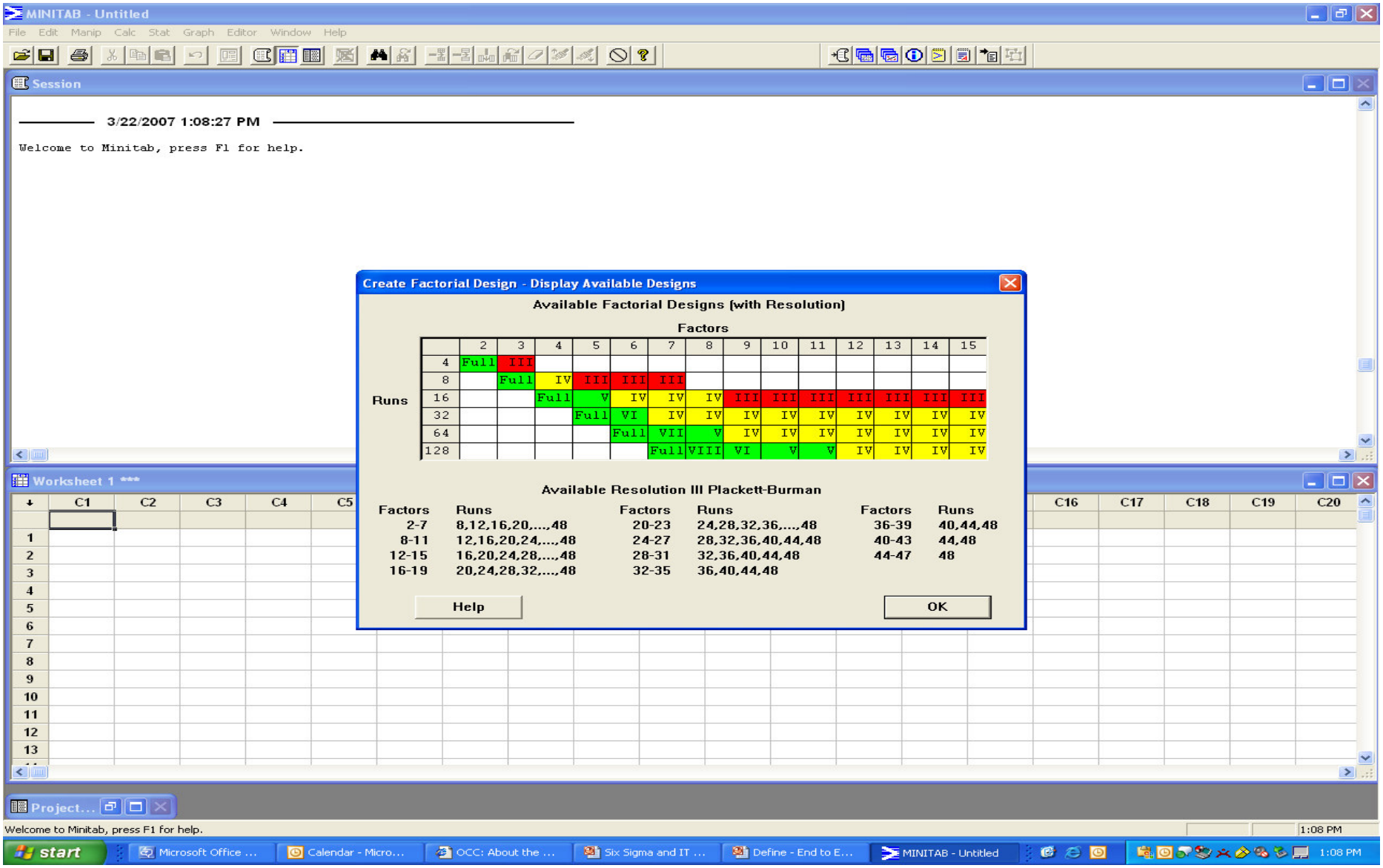
- Baseline the current environment – the systems, business volumes, the infrastructure; measure the performance/capacity of the current environment
- Create a simulation model (sufficiently abstracted) of the environment, and 'plug it into' a *heavy-duty* Six Sigma framework:

  1. Do a Design Of Experiments (DOE) to determine an adequate # of tests, parameter values (factor settings).
  2. Use those factor settings to determine how to parameterize the simulation model
  3. Run the model guided by the DOE test combinations
  4. Do the DOE analysis with the results from the model runs, and, using the Variance and Factor Interaction results, adjust the model and its parameter settings
  5. Repeat steps 3 & 4 (at least) until the P and VIF values are where they want them to be

- Use the model to predict future ability of the environment to respond to changes in business demands, and initiate appropriate changes to the Systems & Infrastructure

Why? *DOE will help your target the optimal # of scenarios in which to run the model*

Designing the Experiments with *DOE*



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A Simulation model (well, a picture of one.....)

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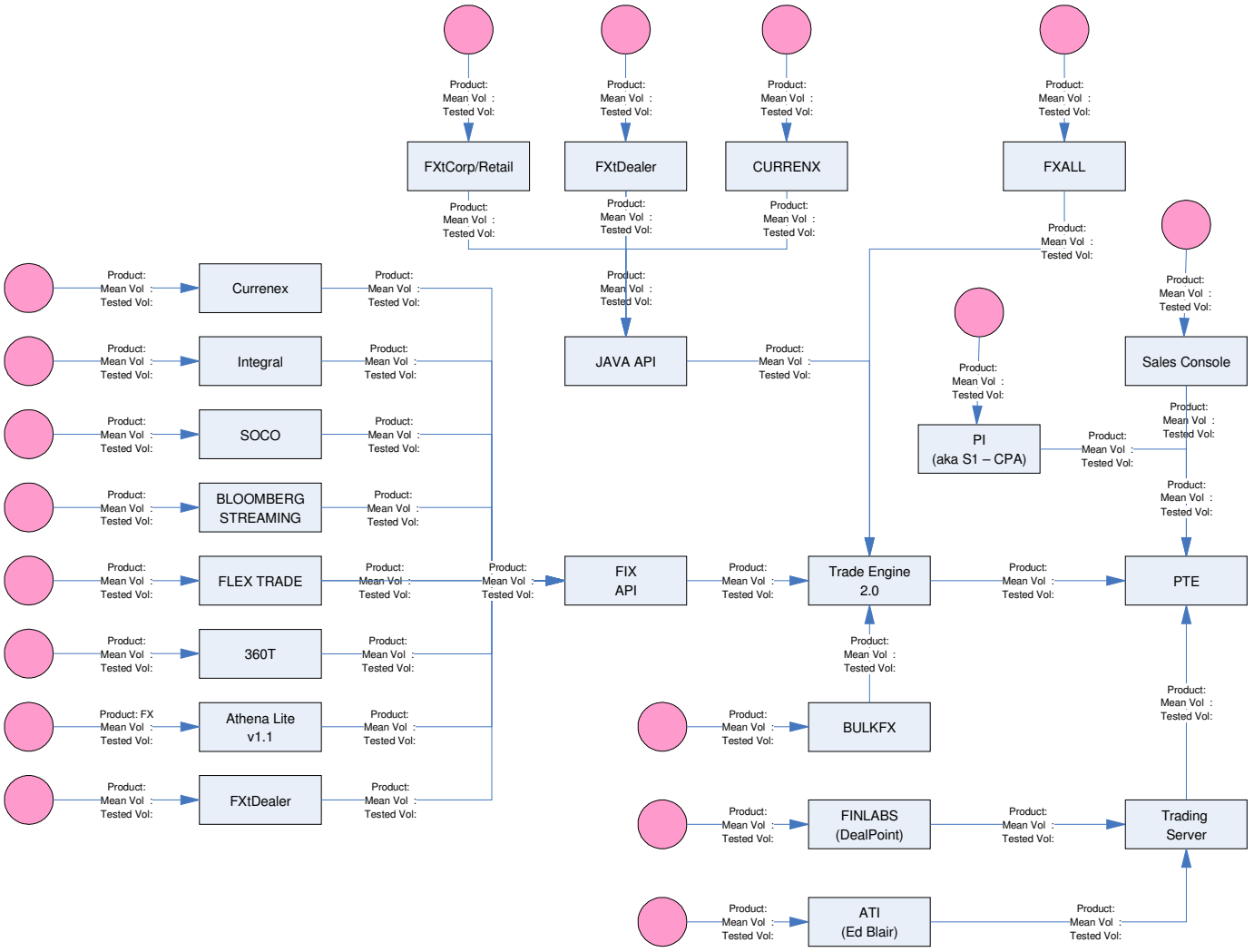

Why model? *Much more scientific (and cheaper) than running the actual app until it breaks!*

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And you can even do multiple regression analysis.....

The regression equation is y = - 3482259 + 15.1 x1 - 0.0358 x2 - 2.02 x3 - 1.03 x4 - 0.051 x5 + 1829 x6

Predictor	Coefficient	SE Coefficient	T	P	VIF
Constant	-3482259	890420	-3.91	0.004	
x1	15.06	84.91	0.18	0.863	135.5
x2	-0.03582	0.03349	-1.07	0.313	1788.5
x3	-2.0202	0.4884	-4.14	0.003	33.6
x4	-1.0332	0.2143	-4.82	0.001	3.6
x5	-0.0511	0.2261	-0.23	0.826	399.2
x6	1829.2	455.5	4.02	0.003	759

S = 304.9 R-Sq = 99.5% R-Sq(adj) = 99.2%

Why? *Well, I only said you could!.....*

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And now for something....different - integration

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- Firstly Six Sigma and the CMMI, followed by
- Six Sigma and the Software Development Life Cycle (SDLC)

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The CMMI & Six Sigma.....

- How the CMMI and 6 Sigma relate to one another
- Mapping the elements of 6 Sigma to the CMMI
- 2 ways to apply 6 Sigma in the software world
- Towards an improved Software Development Life Cycle (SDLC)
- *A Day in the Life of a Software Project*

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The CMMI is an organizational maturity framework; 6 Sigma is a project-based methodology. The 2 can co-exist & complement each other nicely

Increasing sophistication in the use of statistical measurement tools as the organization matures

6-Sigma (DMAIC)

- Define Measure Analyze Improve Control
- Define Measure Analyze Improve Control
- Define Measure Analyze Improve Control
- Define Measure Analyze Improve Control

Level 5 - Optimizing
- *Causal Analysis and Resolution*
- *Organizational Innovation and Deployment*

Level 4 – Quantitatively Managed
- *Organizational Process Performance*
- *Quantitative Project Management*

Level 3 - Defined
- *Decision Analysis and Resolution*
- *Integrated Project Management +IPPD*
- *Organizational Process Definition +IPPD*
- *Organizational Process Focus*
- *Product Integration*
- *Organizational Training*
- *Requirements Development*
- *Risk Management*
- *Technical Solution*
- *Validation*
- *Verification*

Level 2 - Managed
- *Configuration Management*
- *Measurement and Analysis*
- *Project Planning*
- *Project Monitoring and Control*
- *Process and Product Quality Assurance*
- *Requirements Management*
- *Supplier Agreement Management*

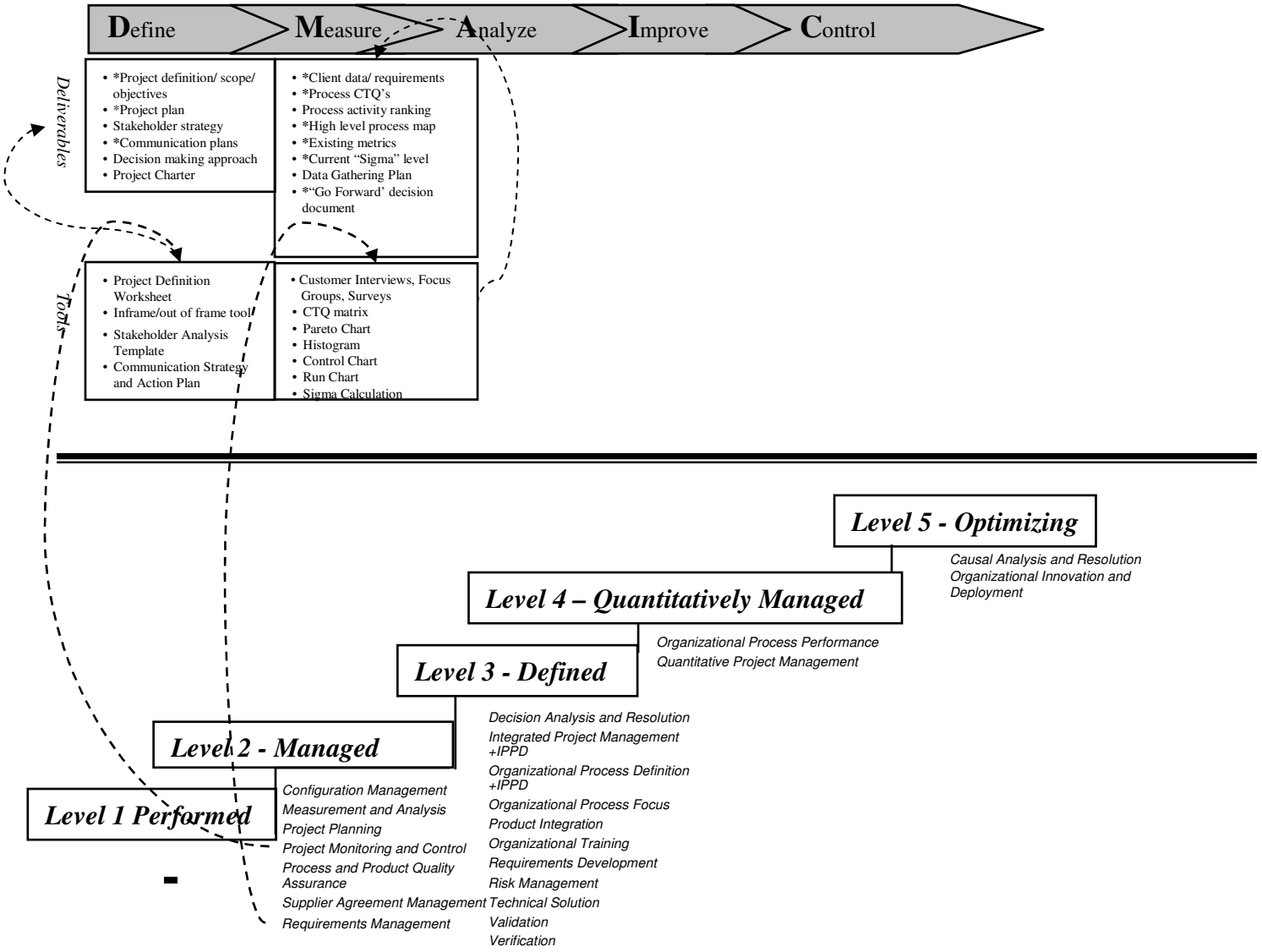
Level 1 -Performed

Surgeon General's Warning:

If you're not already at Level 2, using Six Sigma can damage your health!

***The SEI's CMMI** & its Key Process Areas, in the Staged Model*

6-Sigma (DMAIC)



The SEI's Capability Maturity Model *& its Key Process Areas*

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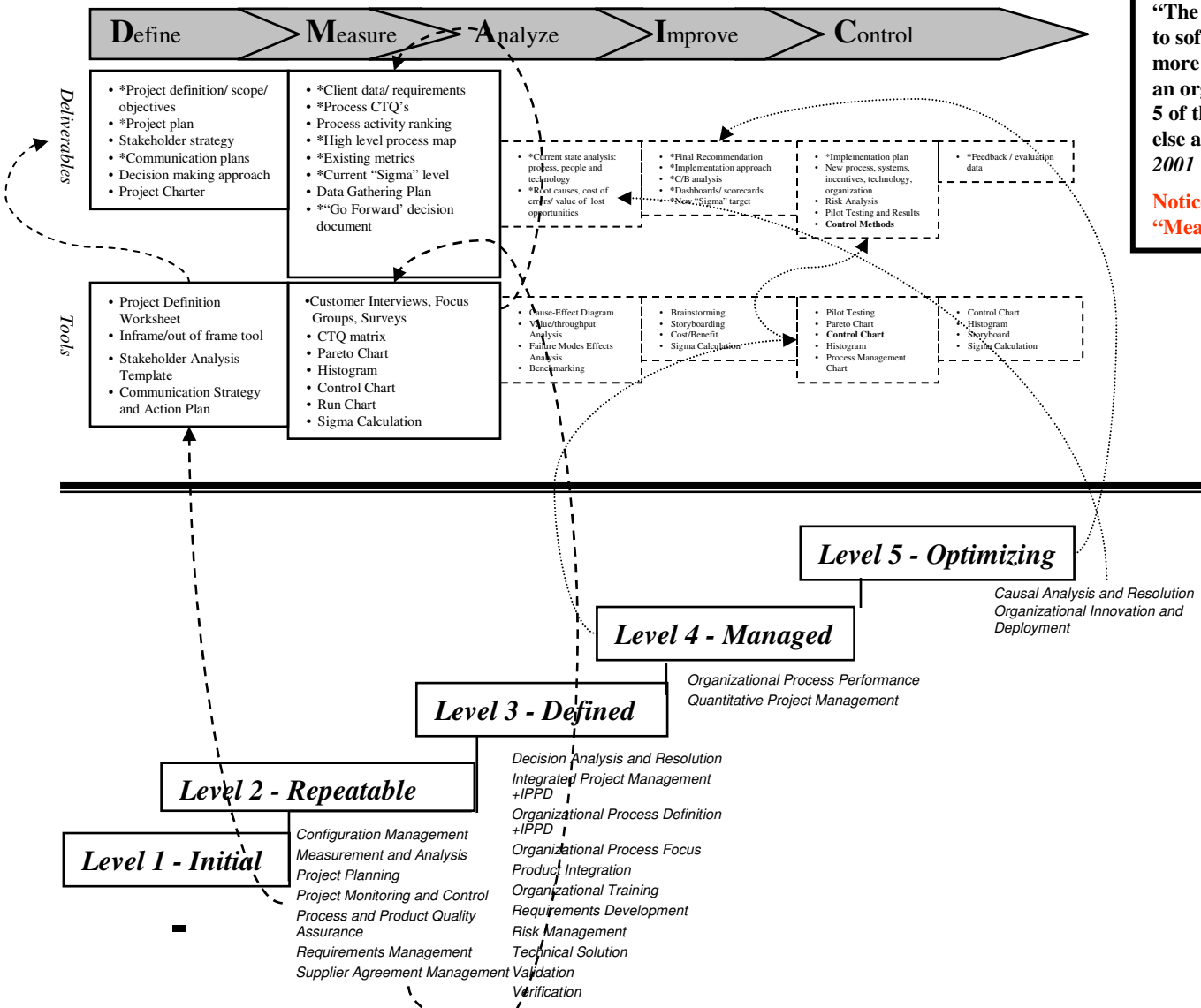
6-Sigma (DMAIC)



"The reality is that if we apply DMAIC to software projects we won't use its more *quantitative* aspects until or unless an organization's teams get to Level 4 or 5 of the CMM. Meanwhile, everything else applies! – *Statement I made circa 2001*

Notice now that the CMMI includes "Measurement & Analysis" at Level 2!

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2 ways to apply 6 Sigma to the software world

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- To **re-engineer a process** in the software lifecycle
- To **manage a** software development **project**

– 6 Sigma is primarily about process (re-)engineering; the SDLC is full of these (the CMMI identifies 22) - obvious candidate methodology for this work

– 6 Sigma is also a very disciplined, focused ***Project Management*** methodology, and with its focus on the Client, and on measurable facts, could enrich AD management capabilities

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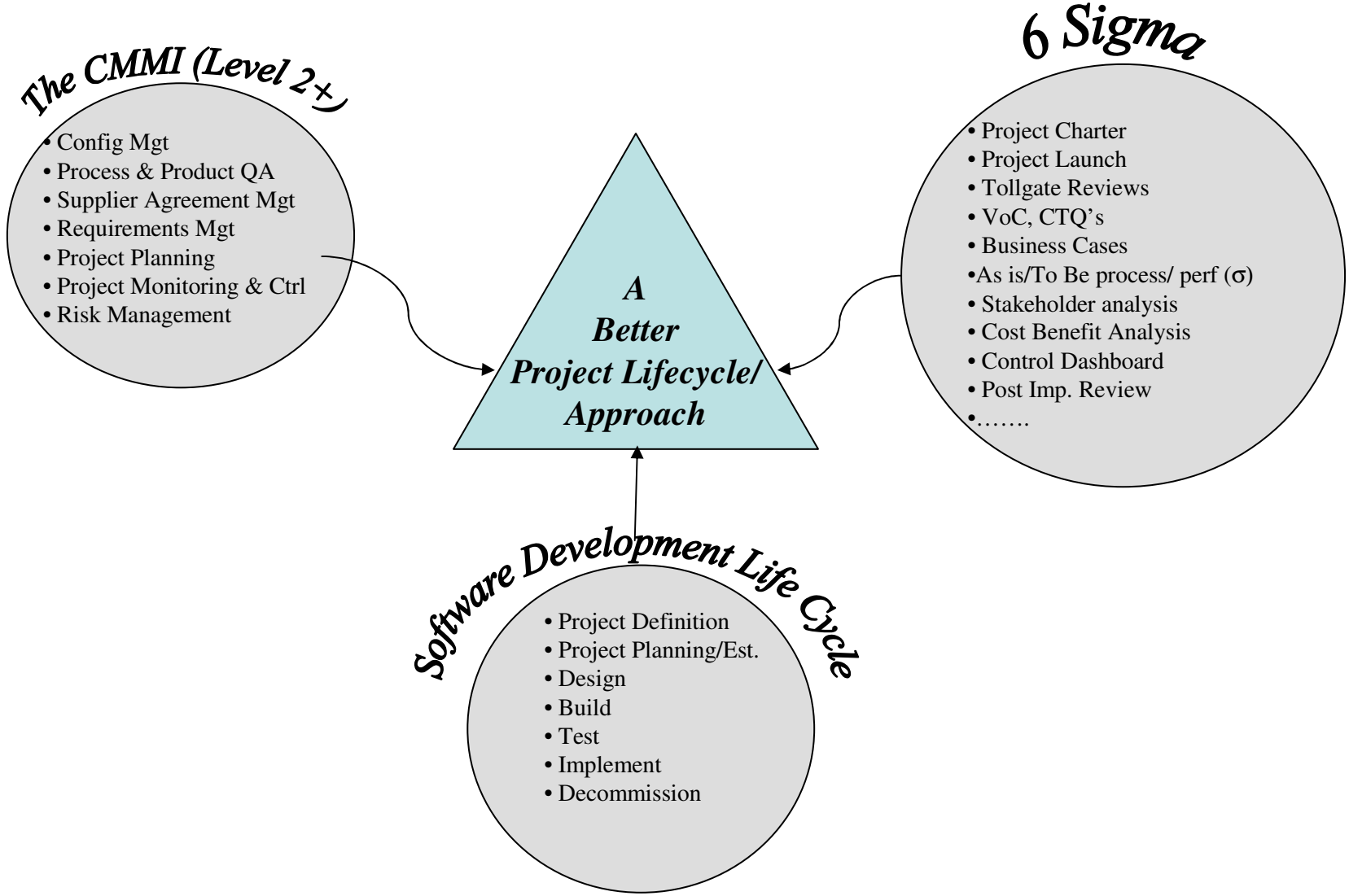
~ The ingredients for integrating the CMM, 6 Sigma & the SDLC ~



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A day in the life of an AD enhancement project using DMAIC.....

Computer tools available

- MS Project
- Portfolio/ Repository Tool
- Time Tracker

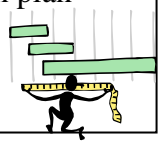
Define

(Use SEI CMMI gap analyses as source for new projects)

- Problem statement defined, including initial ROI
- Sponsor & champion committed to the project
- Project charter written
- Initial scope defined & high level plan prepared
- Team formed w/ clear Roles, Resps.
- Set up/train team in CMMI L2 processes

Measure

- Voice of the Customer to get Requirements/CTQ's
- Write spec. for (new) system/process
- Map & measure current process vs. current architectures; assess current Sigma level (cycle time & defects)
- Assess risks on project & build mitigation plan
- Refine Project Plan
- Set up QA system (for remaining phases & long-term quality control)



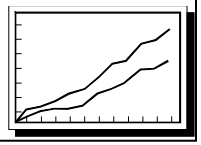
Computer tools available

- RequisitePro
- Visio
- Minitab

Analyze

- Minitab
- MS Project
- Defect Tracker
- Time Tracker
- Dev. Tools Testing tools
- Configurat'n Management

- Analyze current process for root causes of defects/ problems
- Refine Project Plan
- Re-design process/system (application/technical architecture)
- Set up development environment & tools



Improve

- Experiment (simulate or prototype) to determine performance of new process/system
- (Re-)develop or enhance system/process
- Conduct Peer Reviews throughout development
- Revise ROI for project
- Calculate new Sigma target for new process
- Define new measures to monitor performance
- Develop Implementation plan
- Re-assess risks
- Pilot new system/initial roll-out
- Execute Implementation plan
- Train users in new process(es)
- Use CMMI L2 Reqmts Mgt process to control Scope
- Set up Controls environment

- Excel
- Visio
- Minitab

- MS Project
- Portfolio/ Repository Tool
- Time Tracker

Control

- Excel
- Minitab

- Monitor performance/quality of system/process, including Sigma levels & financial benefits
- Report to management on performance
- Verify users are using new process(es), procedures
- Conduct Post Implementation Review of project, against CTQ's/Requirements

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development

A day in the life of an AD project using Design For Six Sigma…….

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Computer tools available

Define

(Use SEI CMMI gap analyses as source for new projects)

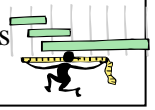
- Problem statement defined, including initial ROI
- Sponsor & champion committed to the project
- Project charter written
- Initial scope defined & high level plan prepared
- Team formed w/ clear Roles, Resps.
- Set up/train team in CMMI L2 processes

•MS Project
•Portfolio/ Repository Tool
•Time Tracker

Measure

Computer tools available

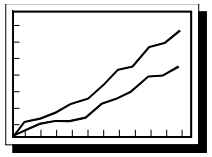
- Voice of the Customer to get Requirements/CTQ's
- Write spec. for (new) system/process
- Assess risks on project & build mitigation plan
- Refine Project Plan
- Set up QA system (for remaining phases & long-term quality control)



•RequisitePro
•Visio
•Minitab

Analyze

- Design process/system (application/technical architecture(s))
- Refine Project Plan
- Set up development environment & tools



•Minitab
•MS Project
•Defect Tracker
•Time Tracker
•Dev. Tools Testing tools
•Configurat'n Management

Improve

- Experiment (simulate or prototype) to determine performance of new process
- Develop or enhance system/process
- Conduct Peer Reviews throughout development
- Revise ROI for project
- Calculate Sigma target for new process
- Define measures (dashboard) to monitor performance
- Develop Implementation plan
- Re-assess risks
- Execute Implementation plan
- Pilot new system/initial roll-out
- Train users in new process(es)
- Use CMMI L2 Reqmts Mgt process to control
- Scope
- Set up Controls environment

•Excel
•Visio
•Minitab

•MS Project
•Portfolio/ Repository Tool
•Time Tracker

Control

- Monitor performance/quality of system/ process, including Sigma levels & financial benefits
- Report to management on performance
- Verify users are using new process(es), procedures
- Conduct Post Implementation Review of project, vsCTQ's/ Requirements

•Excel
•Minitab

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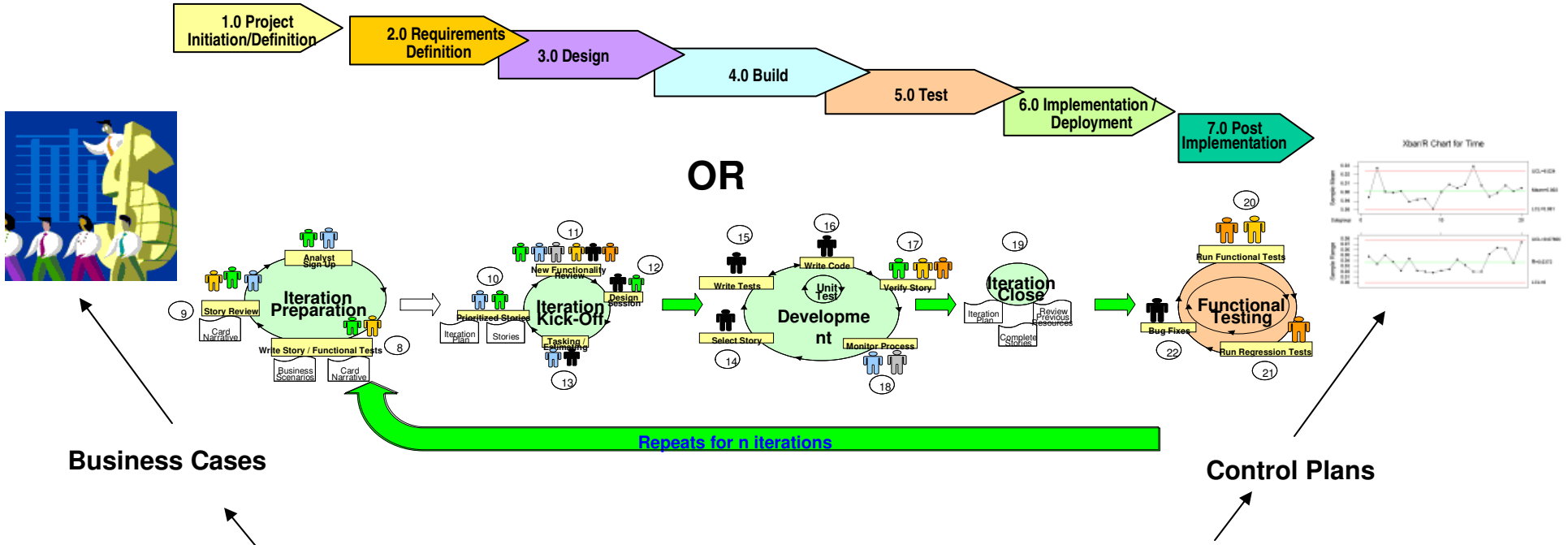
What does Six Sigma bring to the SDLC that's not already there?



The front and back ends of the lifecycles could be strengthened

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And in conclusion.....
~ *So what's the verdict? Does Six Sigma work in IT?* ~

You decide – *Discussion*

(My opinion:

- *When applied to IT Business Processes & development frameworks & standards, no question in my mind that it works, and works better than other project/problem-solving methods*

- *When applied to the 'technical' aspects of IT (building software, infrastructure....), I believe the community at large is not yet ready to embrace Six Sigma, and maybe they never will)*