GENERAL DYNAMICS
Advanced Information Systems

Using Design for Six Sigma (DFSS) to improve the ease-of-use of a Process Asset Library (PAL)

Fred Roberts
November 15, 2006

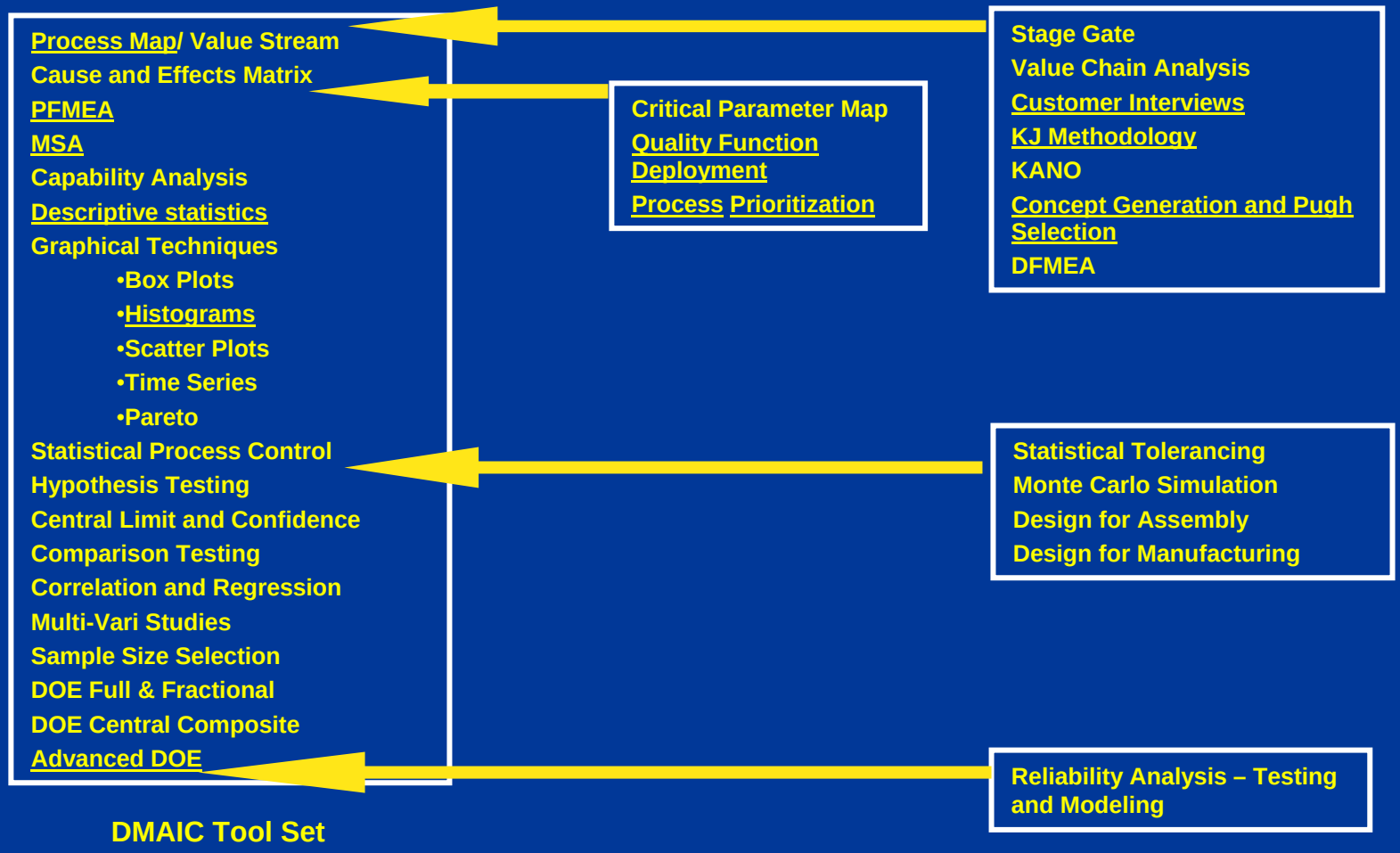
Agenda

- Design For Six Sigma (DFSS) Roadmap
- Six Sigma Tools – DMAIC & DFSS
- DFSS Phases
  - ↗ Concept
  - ↗ Design
  - ↗ Optimize
  - ↗ Verify
- Results
- Summary

DFSS Roadmap

Define	Concept	Design	Optimize	Verify
Define Scope	Understand Value	Map the Product or Process	Conduct Experiments	Create Roll out Plan
Define Objectives	Gather Voice/ Image of the Customer	Refine Design Concept	Analyze and Optimize redesign	Finalize FMEA
Assign Black Belt	Create/ Prioritize Requirements	Understand Variation	Simulate Performance	Document Control Plan
Develop Charter	Create/ Select Design Concepts	Minimize Complexity	Pilot Test	Implement Control Mechanisms
Form Team	Minimize Risk	Conduct Functional Analysis	Minimize Risk	Verify Long Term Process Capability
		Minimize Risk	Update Control Plan	

DMAIC & DFSS Tools



Design For Six Sigma: **Concept**

Gather Voice/Images of Customer

- The perception that the PAL was hard to use came from “hearsay.” Data on the nature and scope of the dissatisfaction did not exist.
- We used the Voice of the Customer (VoC) process and a Customer Selection Matrix to understand what causes dissatisfaction with using the PAL.

Image KJ: Good/Bad CPF

…65% sure people spend 1 hour/day lost in the CPF. #121

The CPF is easy to use

Users benefit from easy access to the CPF Architecture

- The structure is easy and self-explanatory#57
- •The CPF is a good reference for me#1
- •CPF is online! It's good!#89
- •The CPF is well organized hyperlinks and templates are useful.#4

The usability of the CPF continually improves

- The CPF has improved dramatically in the last year for Business Development#31
- •The CPF was difficult to use a while ago but now it is organized#5
- Because it is easy to use people will use the current document by pulling it off the network#133

The comprehensive CPF does not need improvement.

The CPF contains all necessary information

- •The CPF is comprehensive, everything you can imagine is in there, if you have enough time to find it. #22
- One-stop shopping! Provides everything I need to do my job in one place Easy to navigate to templates & guides used. Can focus on work in stead of the process#74
- •All in one place! Improvement over LotusNotes which had too many databases#83

The CPF is perceived as not needing changes

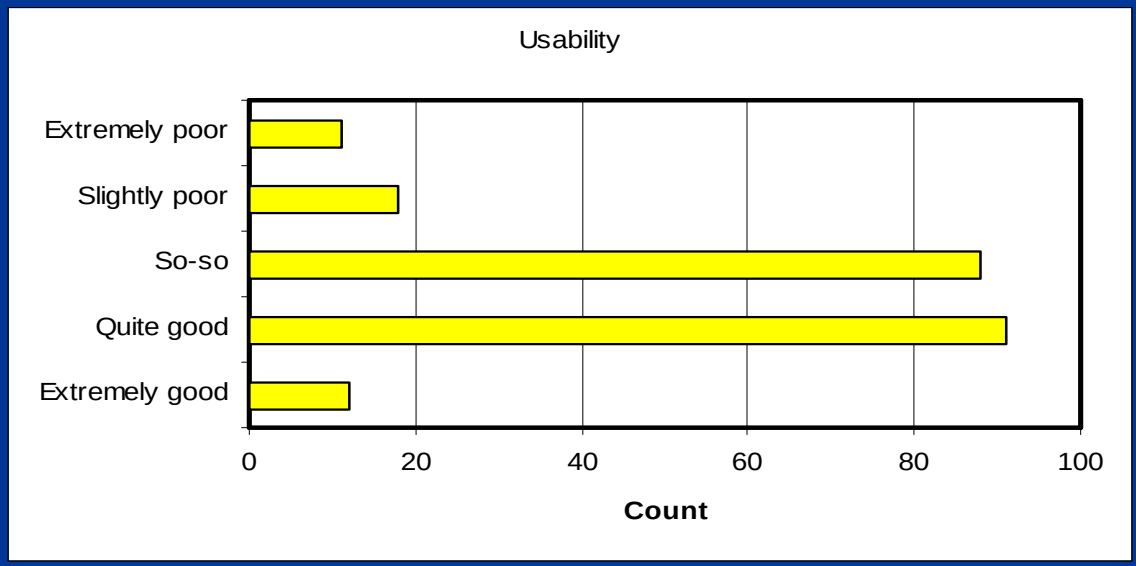
- I really don't have any frustrations with the CPF#32
- I don't know what I would change about the CPF#7
- •Can't think of any way to improve the CPF #25

The CPF needs improvement

- ..Not organized well Not defined by stages Doesn't spell out what is required, what isn't; Lacks summary of what to do; All over the place; Stove piped for the SBUs; Lacks flow #76
- •If you look at the CPF there is a process there but I don't think it is organized correctly. #100
- At the time it (CPF) was the right thing to do to get it going. No issue with the people. Going forward needs improvement#110

Survey of a random sample (7%) of the entire population

- Results of Ease Of Use Survey:



Extremely Poor	**11**	**5.0%**
Slightly Poor	**18**	**8.1%**
So-So	**88**	**40.0%**
Quite Good	**91**	**41.4%**
Extremely Good	**12**	**5.5%**

How we handled the So-So group.

The So-So or neutral group was viewed as not dissatisfied. This group does use the CPF and will have preferences on differing aspects of the CPF usability. They could be the "swing vote" if we adversely affect them.

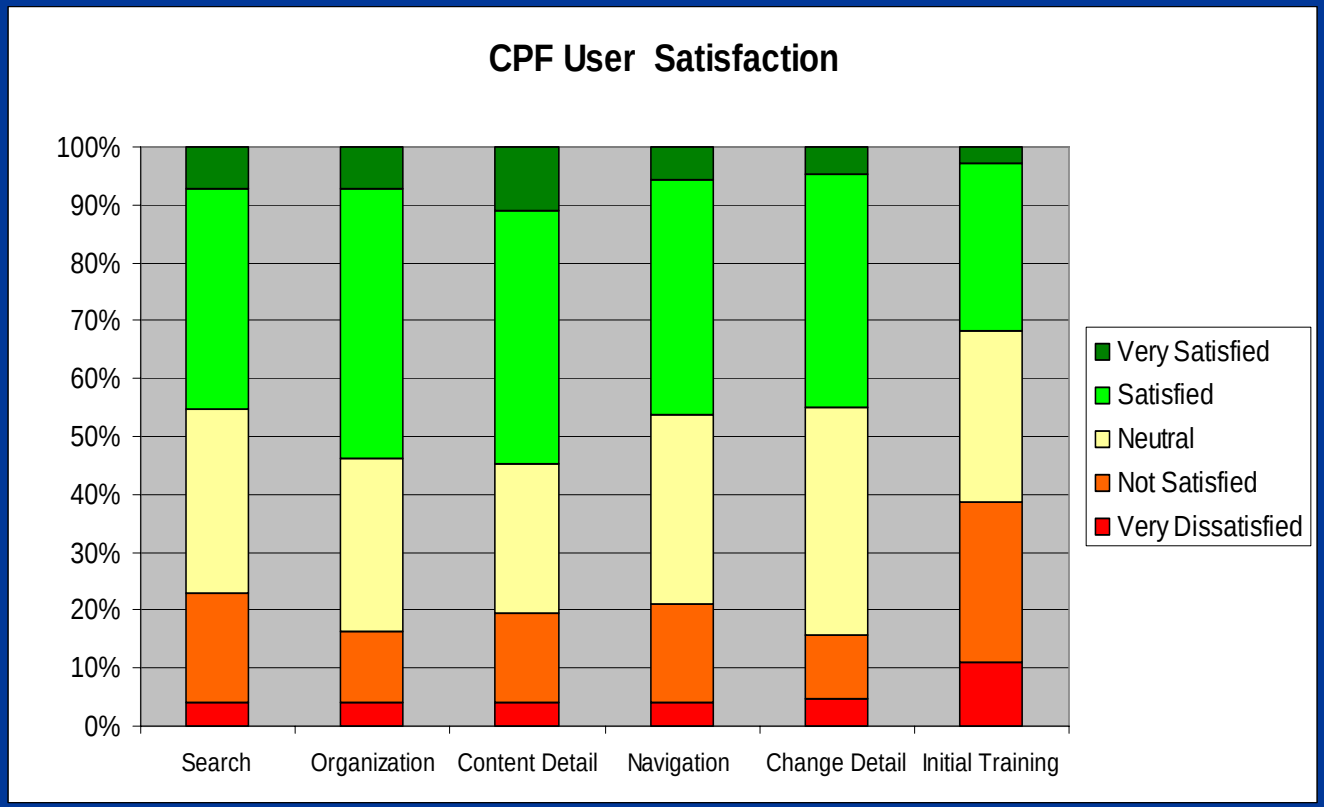
Design for Six Sigma: **Concept**

Survey Core Questions

How satisfied are you with the following components of Common Process Framework in providing you with what you need to do your job?

	Very Satisfied	Satisfied	Neutral	Not Satisfied	Very Dissatisfied
The current search capability	❑	❑	❑	❑	❑
The organization of materials	❑	❑	❑	❑	❑
The level of content detail	❑	❑	❑	❑	❑
The current navigation capabilities	❑	❑	❑	❑	❑
The level of detail regarding changes to documents	❑	❑	❑	❑	❑
The initial training you received	❑	❑	❑	❑	❑

Design for Six Sigma: **Concept**



Design for Six Sigma: **Concept**

Advanced DOE: Conjoint Analysis

Feature	Relative Importance	Level (Average Utility)		
Organization of the contents of the Common Process Framework should be …	2.6%	structured around the sequence of how work is performed	structured around functional areas	
		0.254	0.241	
As I go from Policy to Procedures to Instructions I prefer to see …	30.4%	the detail increase	minimal detail throughout	detail throughout
		0.355	0.131	0.253
I prefer to navigate the Common Process Framework using …	17.9%	pictures and diagrams with links	text and links	
		0.291	0.203	

Design for Six Sigma: **Concept**

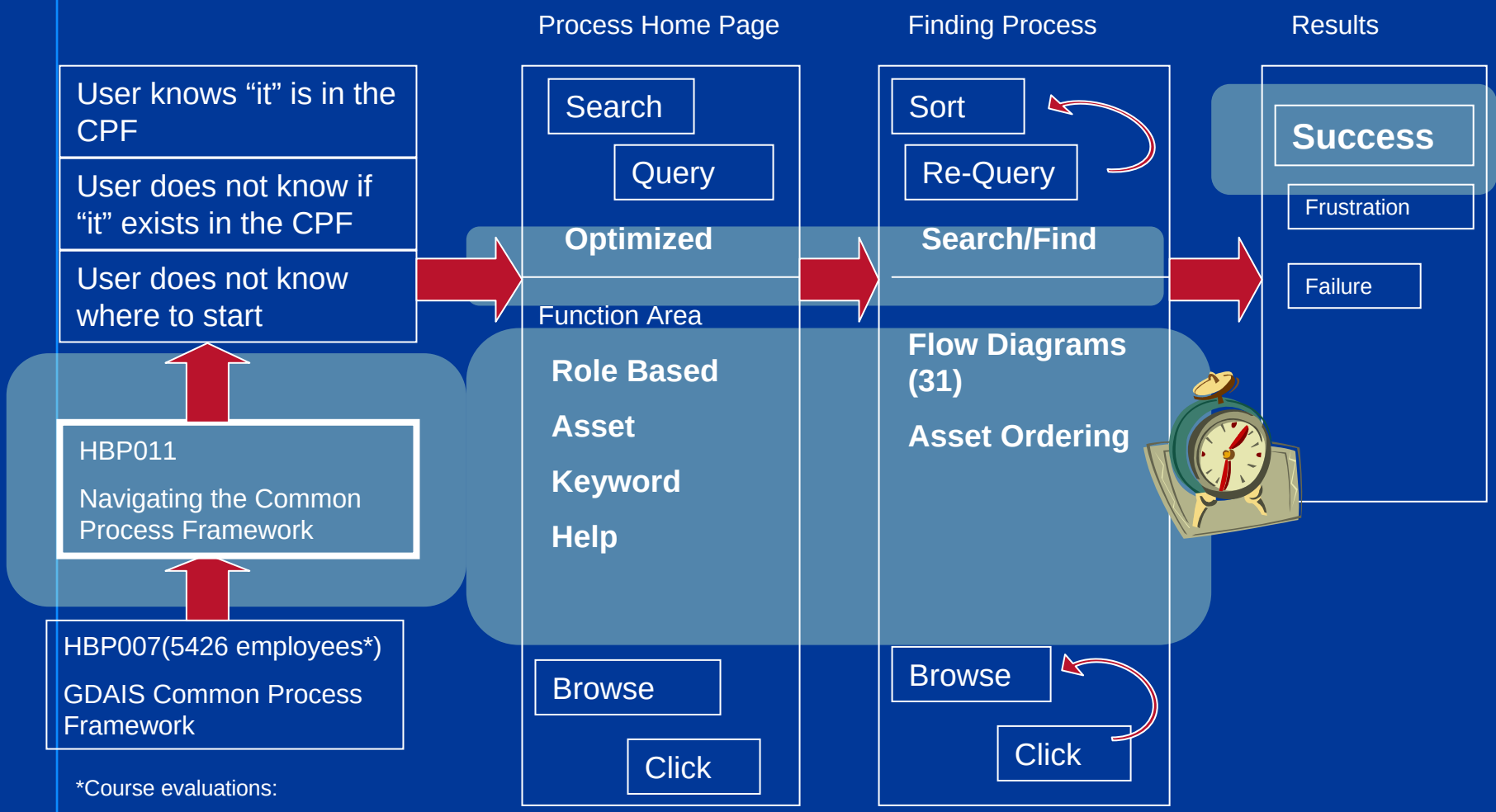
PUGH for Training Delivery

Requirements/Objectives	Current HBP007		HBP011				
	CBT	Instructor (Classroom)	CBT	Instructor (Classroom)	Mentoring	Instructor (WebEx)	Discovery
Measure Skill transfer	80%	100%	-	S	+	+	-
Personal Contact	no	yes	S	S	S	-	-
Measure Training Effectivness	no	no	S	+	+	+	S
JIT	yes	no	S	S	-	+	+
Efficient	yes	no	S	S	-	+	-
			1 '-'	1 '+'	S	3 '+	2 '-

S = Same as Current
"+'" = Positive wrt Current
"-" =Negative wrt Current

Design for Six Sigma: **Design**

Refine Design Concept (i.e., Can-Be)



*Course evaluations:

Instructor Led 57; CBT 87

GENERAL DYNAMICS
Advanced Information Systems

Design For Six Sigma: **Design**

Understand Variation

- The prioritized requirements were used as a basis for formulating the questions in our survey to confirm the relative importance of the individual requirements. The fact that we were dealing with perceptions and preferences made this a difficult process.
- The tool selected supported anonymity and large sampling(~7%) which allowed us to know who responded, which helped in segmenting the population.
- The Measurement System Analysis showed very little variability in responses.

Design For Six Sigma: **Optimize**

Analyze and Optimize Redesign

- The survey results clearly show that Initial Training was a source of dissatisfaction with the usability of the Process Framework, by nearly a factor of two.
- Concurrent with the DFSS EOU project the Process Owner continued to make improvements to five of the six categories by adding views, flow diagrams, and tweaking the search engine.
- Hence, we chose training since training had the highest dissatisfaction level for our users.

Design For Six Sigma: **Verify**

Finalize PFMEA/ Control Plan

- There were five process steps in deploying the training with the following RPN (Risk Prioritization Numbers)

Identify Trainees	**48**
Schedule training for employees	**210/24 (high risk)**
Conduct Training	**6**
Evaluate Training Results	**126/14 (high risk)**
Analyze and Report	**63/28 (easy fix)**

Design for Six Sigma: **Verify**

PFMEA

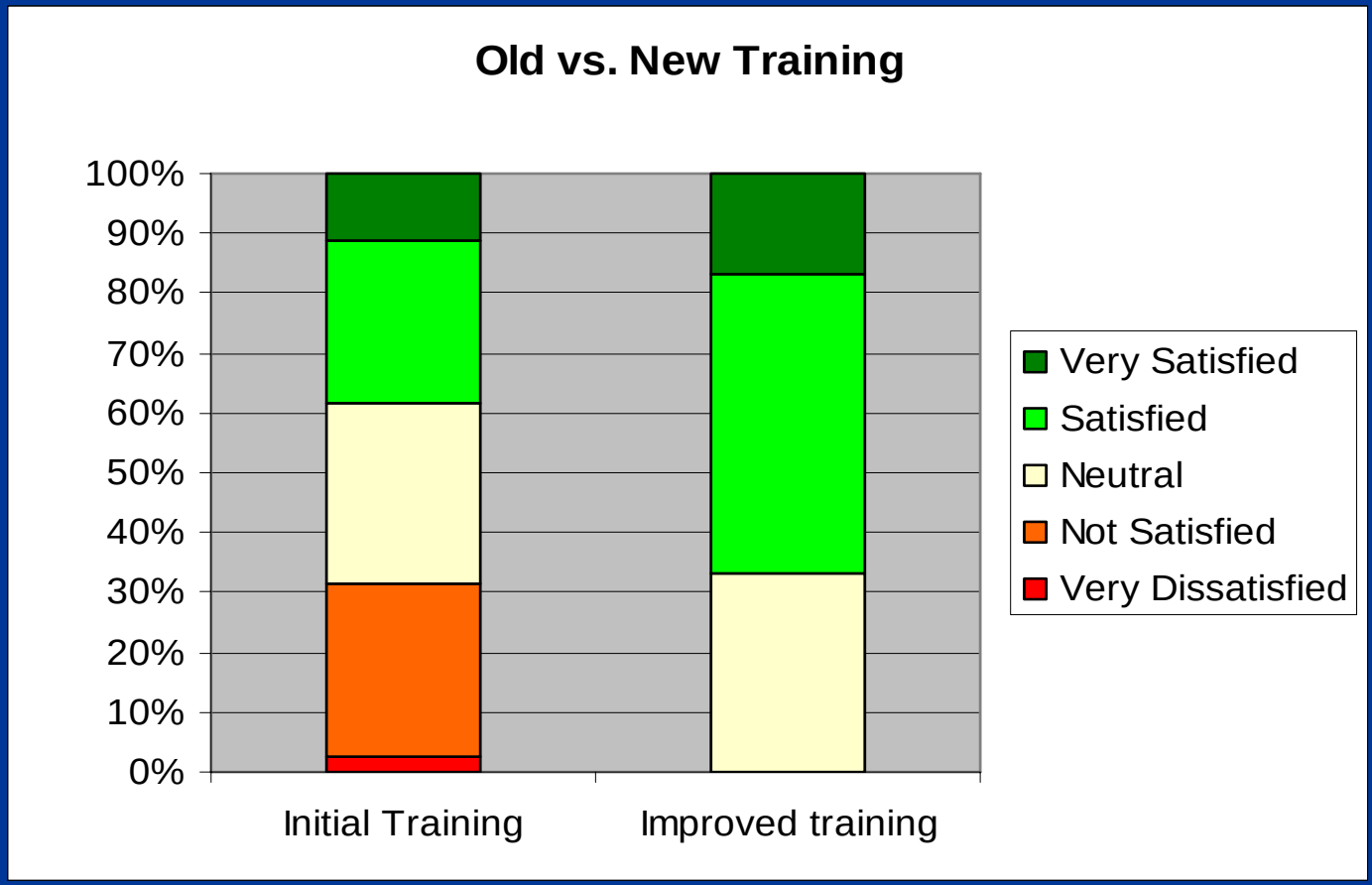
Process Step/Input	Potential Failure Mode	Potential Failure Effects	SEV	Potential Causes	OCC	Current Controls	DET	RPN	Actions Recommended	Resp.	Actions Taken	SEV	OCC	DET	RPN
Identify Trainees	Not notified of new hires	Employees not scheduled	8	Lack of automatic notification	2	Existing HR Onboarding Process	3	48							0
Schedule Training	Requirements for course not understood	Training not delivered	6	Managers don't recognize that this should be required	5	People Managers are required to take Onboarding training	7	210	Make System add this to ITP	Ralph/Fred		6	2	2	24
Conduct Training	Delevery Tool (i.e. Web EX not available)	Rescheduling increases cost, delays JIT requirements	3	IT Infrastructure problems and/or limitations	2	Helpdesk	1	6							0
Evaluate Training Results	Data not collected	No analysis	7	Evaluations not required	6	Do not Require Eval form	3	126	Require Evaluations as completion criteria	David/Cindy		7	2	1	14
Analyze and Report	No resources (available , budget,or assigned)	Inability to assess effectiveness and improve	7	Availability of instructors/ analysists	3	HR Policy on Instructors	3	63	EO Schedule/ Plan for instructors	Ralph		7	2	2	28

Design For Six Sigma: **Verify**

Control Plan

Process	Process Step	Output	Input	Process Specification (LSL, USL, Target)	Measurement Technique	Sample Size	Sample Frequency	Control Method	Reaction Plan
Training	Schedule Training	Scheduled	New Hire/ Re-training	100% new hire	Individual Plot	continuous	event driven	Report to Higher Level Management	
Training	Evaluate Training Results	Course Evaluation	Training has occurred	100% each student	histogram % completed	continuous	event driven	Report to Higher Level Management	Follow-up w/student
Training	Analyze and Report	Statistical Analysis	Course evaluations	Quarterly Reports	count/on time	event driven	event driven	Report to Higher Level Management	
Training	Training Materials	Revised Materials	PIR	na	Revisions	continuous	event driven	PIR Process	

Results


Old vs. New Training
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Initial Training
Improved training
Very Satisfied
Satisfied
Neutral
Not Satisfied
Very Dissatisfied

Summary

- **Process Design For Six Sigma tools:**
  - ↗ **Support the CMMI model by providing the "how" for many of the practices in the model**
  - ↗ **Support the design of effective and efficient processes**
  - ↗ **Improved the ease-of-use of our Process Asset Library**

Contact Information

Fred Roberts
General Dynamic Advanced Information Systems
2721 Technology Drive
Annapolis Junction, MD 20701

Frederick.roberts@gd-ais.com

Questions?

GENERAL DYNAMICS