Raytheon
Network Centric Systems

Mission Assurance Process Performance Baselines

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Agenda

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- Raytheon Network Centric Systems Composition
- The Challenge
- The Solution
- Corrective Action Aging
- Overdue Corrective Action
- External CARs
- External Audits
- Internal Audits
- Supplier Assessments

Raytheon Company

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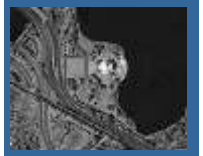
Customer Success Is Our Mission

Raytheon Company

Bill Swanson
Chairman, CEO and President

Chairman and CEO
Bill Swanson
$23.2B

Missile Systems	Space & Airborne Systems	Integrated Defense Systems	Network Centric Systems	Intelligence & Information Systems	Raytheon Technical Services Company	Global Companies
						
T. *Lawrence*	*R. Yuse*	D. Smith	*C. Schottlaender*	*L. Dugle*	*J. Harris*	T. Culligan
						
						*Raytheon Systems, Ltd*
						
						*Raytheon Canada*
						
						Raytheon Australia
$5.4B	**$4.4B**	**$5.2B**	**$4.5B**	**$3.1B**	**$2.6B**	

Raytheon Network Centric Systems Composition

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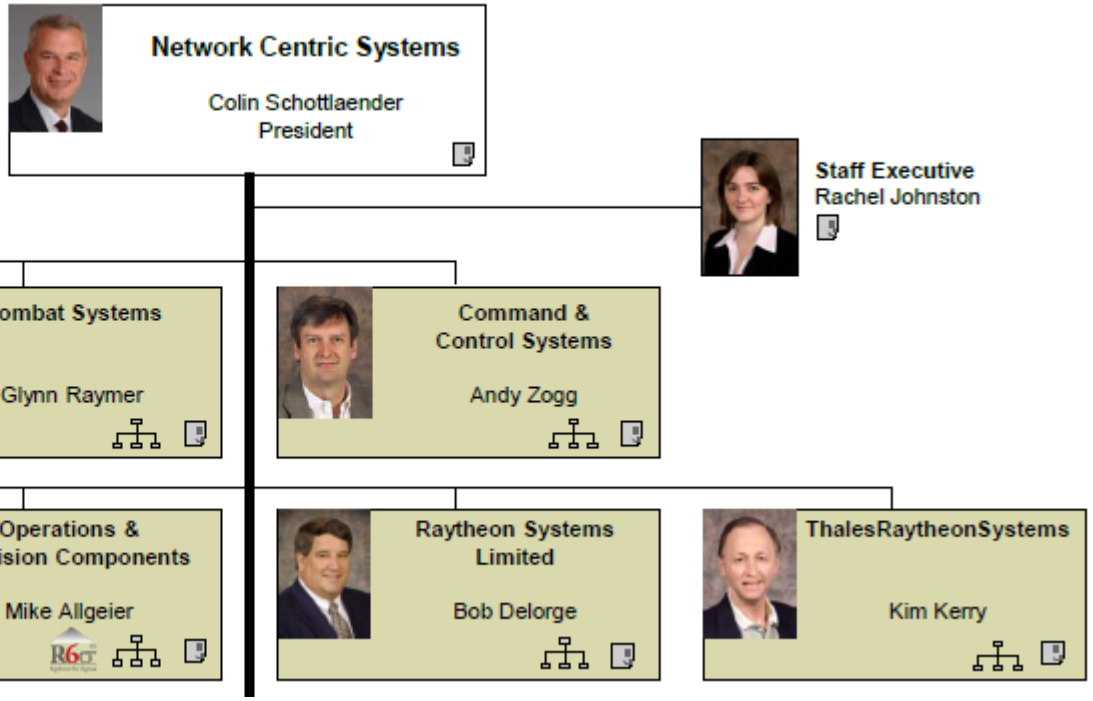

The Challenge

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- Process Evaluations conducted at the project level
  - No organizational picture of process performance
- Process Performance tracked at the regional level
  - Multiple tools used
    - Excel
    - Oracle
    - CAWeb
    - SQIDS
    - Filemaker Pro
    - ClearQuest
    - iTracker
- No organizational visibility into issues identified or processes evaluated
- Process Evaluations were engineering centric
  - Separate from ISO audit function
- Issue identification variability
- Increase in DCMA audit and escalation activity

The Solution

- Adopted the Raytheon Corrective Action System (RCAS)
  - Corrective Action, Audits, and Supplier Modules
- Nationalized the Process Evaluation Process
- Extended the Process to all functions
- Set goals for
  - On time process evaluation conduct vs plan
  - On time corrective action response, implementation and closure
  - On time customer corrective action closure
  - Reduction in overdue corrective actions
- Developed and delivered training to all regions regarding management expectations regarding corrective action

What we did

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- Established Regional Audit Program
- Expanded audits to functions outside of engineering
- Expanded to include ISO, CMMI, Corporate and NCS P&Ps
- Audits are now risk based to determine frequency
- Review with Program Leadership and Engineering
- Developed a series of measures and performance baselines
  - Reported monthly to leadership
  - Baseline reduction activities are continuously brainstormed
  - Embarrass the local leaders
  - Regional competition

Establish Process Performance Measures

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- Regional Process Evaluations
  - Scheduled vs. completed
  - Issues per Evaluation
- CAR Cycle time
- Customer CAR Volume (level 2 and above)
- Supplier Process and Product Evaluations
- Supplier Corrective Action Cycle time

Establish Quality Objectives

- On time process evaluations
- Timely Corrective Action closure
- Reduction in cycle time
- Timely Supplier CA closure

- Measurements are taken at the regional and organizational level

Establish Process Performance Baselines

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- Process performance baselines are defined as each measures distribution and range of results
- The goal is to understand the variation and improve the process
  - Process evaluations on schedule
  - Reduction in CAR cycle time

Corrective Action Aging

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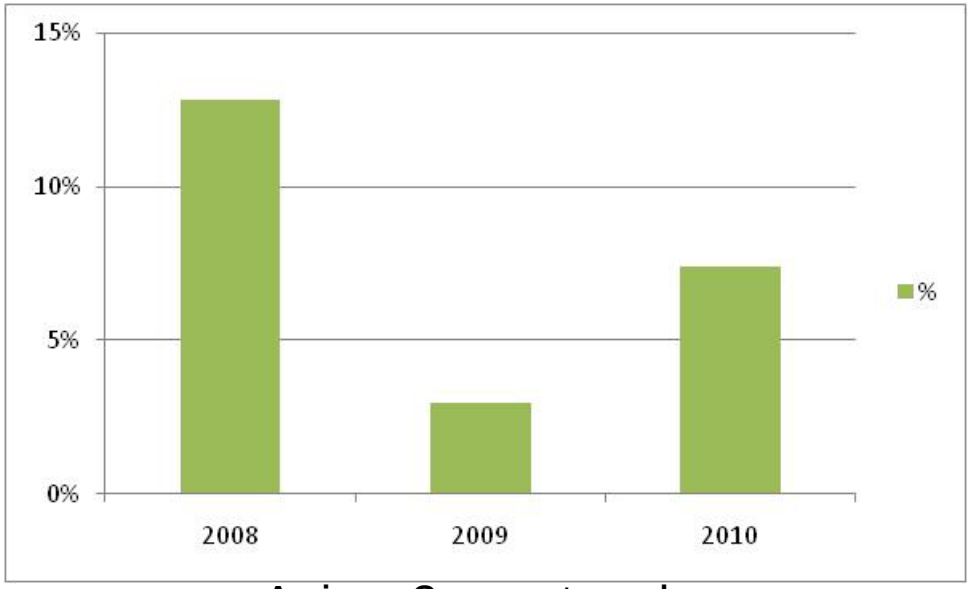
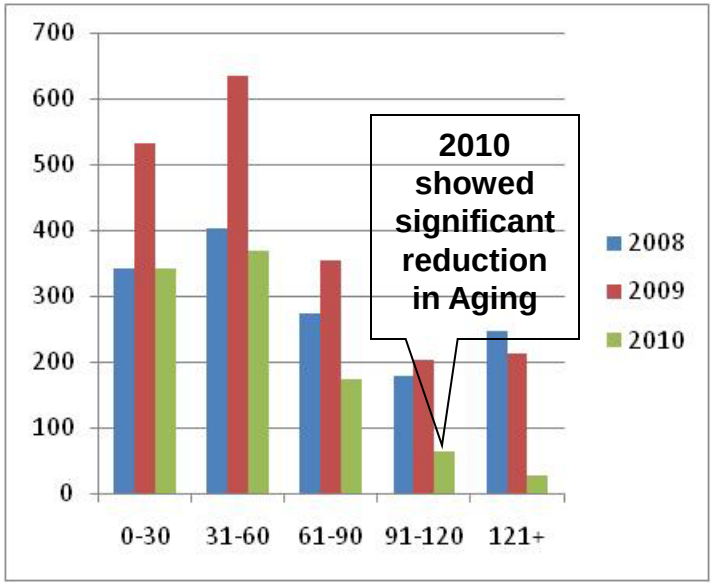


Aging 3-year trend



Breakdown of CA Aging

Baseline is less than 25% of open corrective actions are over 60 days

Corrective Action Aging
NCS August Fiscal Month End 2010

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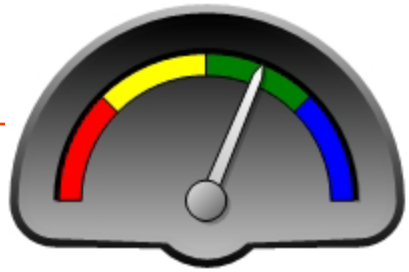
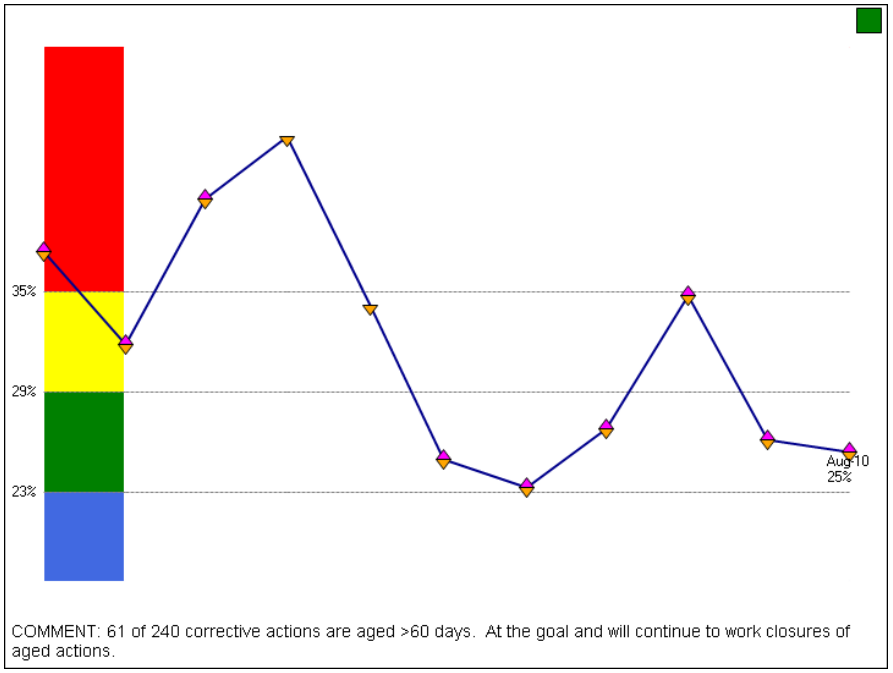


	Open>60 Days	% Open >60 Days	
Dallas-Lemmon	8	73%	⇩
Falls Church	0	0%	
Ft. Wayne	3	13%	
Fullerton (RFO)	0	0%	
Fullerton (TRS)	0	0%	
Goleta	5	20%	⇧
Largo	7	10%	⇧
Marlborough	4	22%	⇩
St. Pete	7	28%	⇧
Texas	16	46%	⇩
Towson	3	100%	⇩
Waterloo	8	62%	⇩
RSL			
Totals	61	25%	

Breakdown by Site



Business Level Trend

Meeting goal – continuous improvement in reducing cycle time

Over Due Corrective Actions
August 2010

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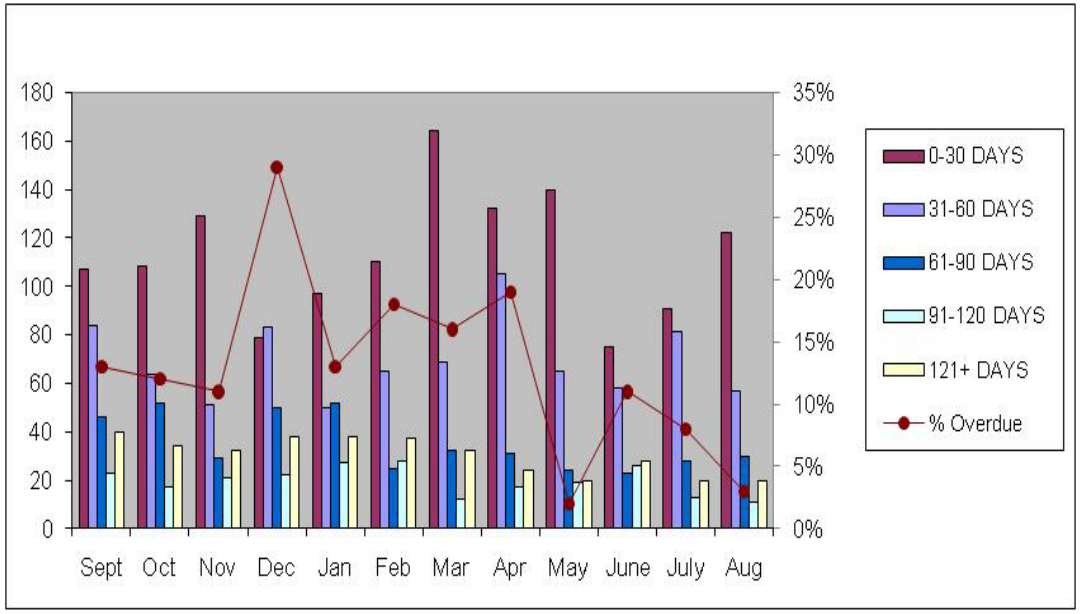

Business Level Trend

Site	Overdue CAs	% Overdue	Total CAs
Dallas-Lemmon	0	0%	11
Falls Church	0	0%	4
Ft. Wayne	1	4%	23
Fullerton (RFO)	0	0%	10
Fullerton (TRS)	0	0%	5
Goleta	0	0%	25
Largo	0	0%	68
Marlborough	2	11%	18
Orlando		0%	0
Bardmoor	0	0%	25
Texas	3	9%	35
Towson	0	0%	3
Waterloo	0	0%	13
RSL			
Totals	6	3%	240

Breakdown by Site

Exceeding the goal (2nd month)
Oversight continues to improve delinquent CAs

CUSTOMER CARs
August 2010

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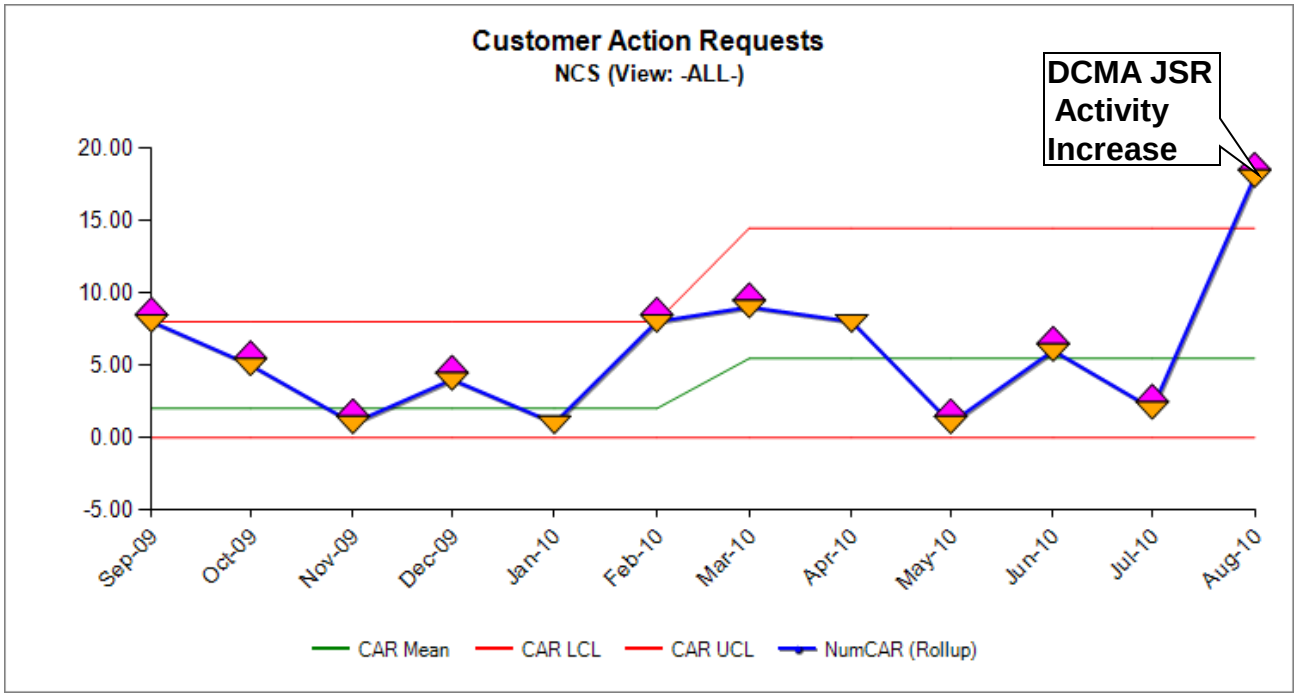

All CARs are in work and being reviewed weekly with Mission Assurance Leadership

Process Evaluation
Performance Baseline

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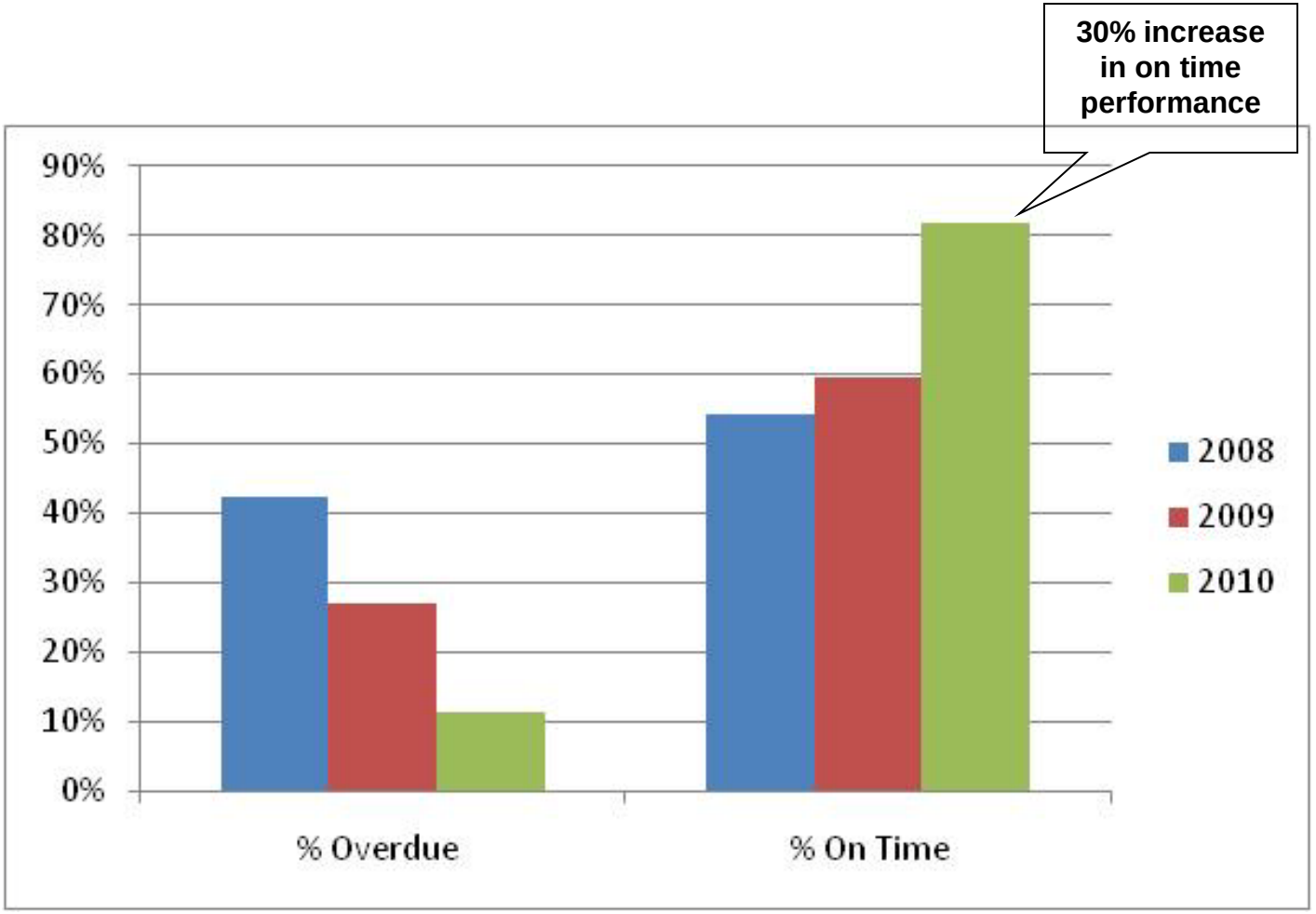

Goal = 100% on time

Audit Results - Stoplight Chart

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High Risk
Medium Risk
Low Risk
N/A

	NCS		Marboro	Towson	Florida	Texas	Ft. Wayne	Fullerton	Goleta	
Hardware Detailed Design	1				1					Jan-2010
Integration, Verification and Validation	1					1				Jan-2010
Supplier Selection (General)	17		7		6	1	1	2		Jan-2010
Measurement, Analysis, Improvement	9		5					4		Feb-2010
Hardware Implementation	4				2			1	1	Feb-2010
Software Implementation	4		1					2	1	Feb-2010
Control of Design and Dev Changes	16				8			8		Mar-2010
Design and Development Review	14		2	2	1		1	8		Mar-2010
Engineering Labs	45		4		21	4	5	5	6	Mar-2010
Program Planning Engineering	14		1		7			6		Apr-2010
Micro Program Review	0									Apr-2010
Management Review	6		2		2			1	1	Apr-2010
Program Planning General	7		0	3		0		3	1	May-2010
Resource Management	3		0	0	2	0		1	0	May-2010
Product and Process Assessment	14		2	3	3	0	2	2	2	May-2010
Production Planning	4		2		2	0			0	Jun-2010
Software Preliminary Design	0		0	0	0					Jun-2010
Engineering Labs	25		4	1	4	0		8	8	Jun-2010
Production Integration and Test	10		0		2	0	8	0		Jul-2010
IPDS	7		4			0	1	2		Jul-2010
Supplier Selection Program	2		0	0	1	0		1		Jul-2010
Supplier Selection General	1		1	0	0	0		0		Aug-10
Human Resources	3		0	0	2	0		1		Aug-10

Anatomy of the Corrective Action Timeline Model

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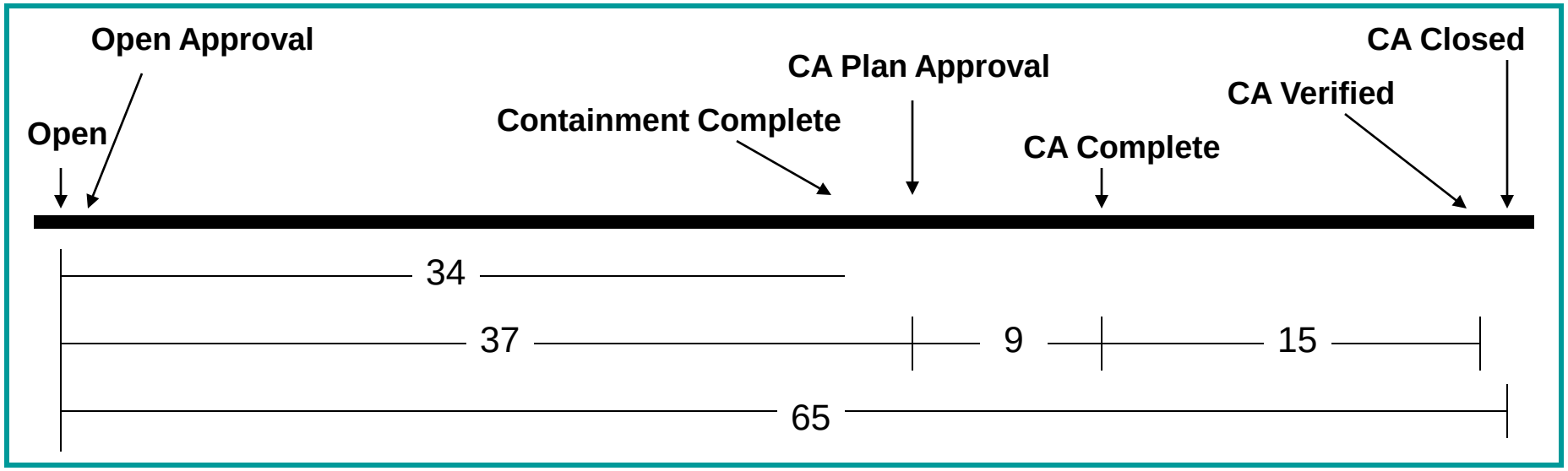

- There are four distinct stages of CA Aging:

Stage	Description
Stage1A	open to containment
Stage1B	open to CA approval
Stage2	CA approval to CA completed
Stage3	CA completed to CA verified

- The correlation of each stage to the overall aging of the record:

Relationship	Correlations
A - S1A	0.0730
A - S1B	0.6193
A - S2	0.1318
A - S3	0.3054

Open to Corrective Action Approval explains 36% of the variation in cycle time

Next Steps

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- Develop a process performance model that explains variation in:
  - Response time
  - Closure time
  - Containment
  - Rejection
- Integrate the Supplier Quality and Mission Assurance organizations

NEW Challenge – Integration of Supplier Quality into Mission Assurance

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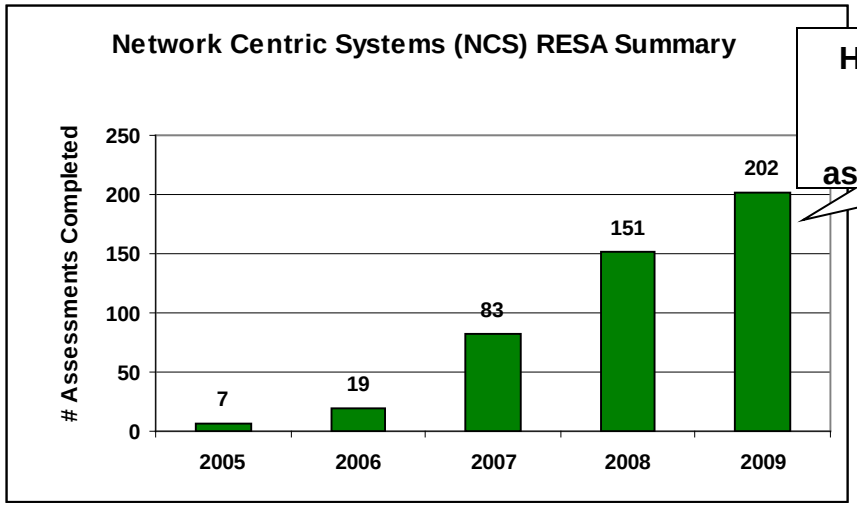
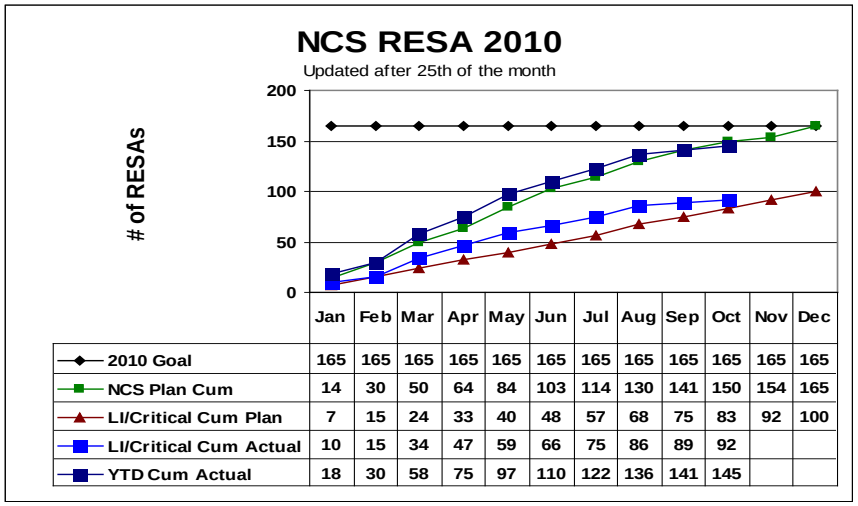
Raytheon Enterprise Supplier Assessment (RESA) Activity



HUGE increase in standardized supplier assessment activity



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2010 Goal	165	165	165	165	165	165	165	165	165	165	165	165
NCS Plan Cum	14	30	50	64	84	103	114	130	141	150	154	165
LI/Critical Cum Plan	7	15	24	33	40	48	57	68	75	83	92	100
LI/Critical Cum Actual	10	15	34	47	59	66	75	86	89	92		
YTD Cum Actual	18	30	58	75	97	110	122	136	141	145		

RESAs are tracked monthly with an annual goal for suppliers with emphasis on critical supplier and leading indicator programs

NEW Challenge – Integration of Supplier Quality into Mission Assurance

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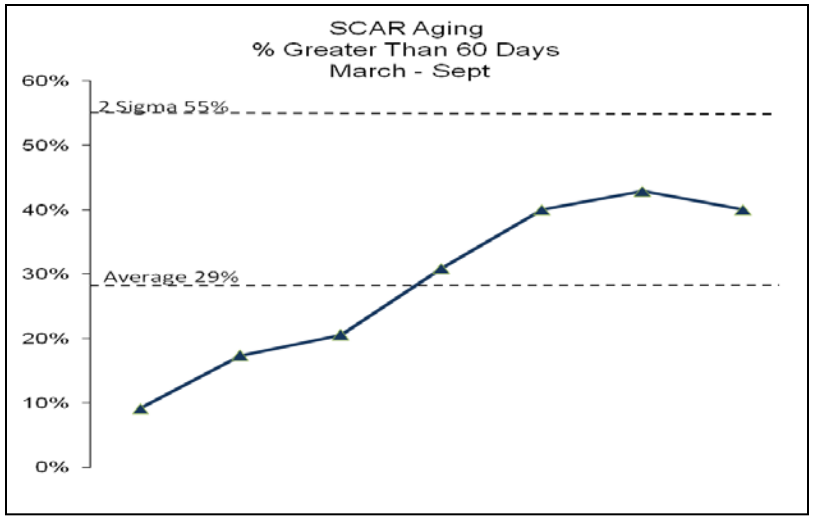
SUPPLIER CORRECTIVE ACTION REQUEST (SCAR) ACTIVITY



Site	SCARS Open On Sept 17	SCARS Open > 60 Days On Sept 17	Aug % Open > 60 Days	Previous Month to Current Month Trend	Avg Cycle Time to Close For SCARS Closed In Sept
Dallas Lemmon	2	0	0%		27
Ft. Wayne	9	0	0%		46
Fullerton (RFO)	2	0	0%	G	66
Fullerton (TRS)	1	0	0%		
Goleta	9	3	33%	G	135
Largo/StPete	18	14	78%	R	93
Marlborough	1	0	0%		37
Mckinney	19	7	37%	G	70
Richardson (ELCAN)	7	0	0%		
Expressway	1	1	100%	R	91
RSL	4	4	100%	R	
Spring Creek	0	0	0%		
Waterloo	0	0	0%		20
Total	73	29	40%	G	65

•Challenge: Standardize and Increase the supplier surveillance presence and reduce the supplier corrective action response/closure cycle

•Approach:

- 2010 Started data collection with a goal to reduce cycle time with our suppliers
- •Moving to RCAS as a common tool across NCS and the Enterprise

Lessons Learned/Results

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- Dramatic increase in on-time process evaluations
- Dramatic reduction in CAR closure cycle time
- The Hawthorne effect really works!

- Next Step: Develop a predictive model to allow us to calibrate variables that cause variation in cycle time process noncompliance

Presenter Biography-Jeff Ricketts

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Dr. Ricketts has over 25 years of experience in software intensive system development in the areas of communications, air defense and air traffic control. He has been involved in the CMM/CMMI since it's inception and has participated in 12 formal appraisals (SCE/SPA/SCAMPI). He recently was part of the Raytheon NCS hardware, software and systems engineering SCAMPI effort that resulted in a repeat level 5 rating for Raytheon's Network Centric Systems five major design centers. He holds a Doctorate degree in social statistics from Washington State University. He currently Serves as the engineering liaison for the NCS Program Leadership and Mission Assurance Organization.

Presenter Biography-Pam Griffin

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Pam has over 25+ years experience in the industry in software and quality, working on air defense training systems, systems of systems integration and communications systems. She has been involved in CMM/CMMI for the last 10 years and currently serves on the NCS Measurement Council and the Corporate Measurement Community of Practice.