When OID Crosses Time Zones, Disciplines and Customer Base

Network Centric Systems Engineering
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Michele Wall

November 15, 2006
Introduction

- NCS has transformed from five sites with separate sets of processes to a common set of processes shared across NCS by all engineering disciplines.

- As part of that transformation, regionally independent improvements activities were replaced with an NCS-wide organizational level improvement activity.

- This has enormous implications for the ‘org’ in Organizational Innovation and Deployment.

- This presentation will
  - present the components of the NCS organizational improvement infrastructure  
  - discuss how the organization improvement transformation occurred  
  - Include a summary of key lessons learned
Overview
Solution
Journey
Lessons Learned
Network Centric Systems

NCS develops and produces mission solutions for networking, command and control, situational awareness and air traffic management.

Major programs include civilian applications, command and control systems, integrated communications systems and netted sensor systems as well as components to create these systems.

President: Colin Schottlaender
Headquarters: McKinney, Texas

Five Primary Engineering Locations with 4000 Engineers:
Marlborough, MA
Ft Wayne, IN
St. Petersburg, FL
Mc Kinney, TX
Fullerton, CA

CMMI Maturity Levels
Starting point – Three level 5s, Two level 3s
Goal – NCS-wide level 5 for SW, SE and HW
Why Take on the Big Org Challenge

- General business direction to have one customer voice and to execute seamlessly across regions
- Invest $ where the overall impact is greatest
- Would enable CMMI L5 OID
- There was minimal sharing of improvements assets or improvement project results across sites.
- Redundancies existed – several sites doing improvements projects on similar topics.
- Limited resources were split across the sites.

- The big org has so many businesses, products, and customers – prioritization is hard
- Team building cross region and cross discipline is complicated
- Communication infrastructure demands are greater
- The big org doesn’t have a personal face and a single authority below the executive level

Each business must do their own analysis of benefit.
Overview

Solution

Journey

Lessons Learned
NCS Organization Improvement Process

The Six Step Process:

1. **Collect**
   - What: Proposal Advisory
   - Stage: Submit Screen
   - Tool: IPPDB
   - Who: All
   - When: 24x7

2. **Analyze**
   - What: Proposal Advisory
   - Stage: Evaluate
   - Tool: IPPDB
   - Who: Engineers OIC
   - When: Monthly & Weekly

3. **Select**
   - What: Project
   - Stage: Evaluate Rank
   - Tool: IPPDB
   - Who: Council EPST NCS ETQ LT
   - When: Annually & Quarterly

4. **Execute**
   - What: Project
   - Stage: Execute Complete
   - Tool: IPPDB R6σ DB
   - Who: Engineers
   - When: 24x7

5. **Monitor**
   - What: Project
   - Stage: Complete
   - Tool: iMetrics
   - Who: EPST Council Metrics Council
   - When: Monthly

6. **Learn**
   - What: Project
   - Stage: All
   - Tool: Various
   - Who: All
   - When: 24x7

Six Step Process that leverages R6σ and Existing Org Structure
IP Infrastructure includes direction, people, tooling and enablers.
Organizational Improvement Process
WI Describes the Process Steps

Execute Improvement Project WI
focus is on a single project
Tools (1 of 3)
Improvement Proposal and Project Database

- Link is easily Available
- Proposal Submission Form is Simple
Proposal and Project Frames list all content, support filtering of summary information and allow access to detailed information about a proposal.

Metrics to monitor process execution that also include an export to Microsoft Excel.
Tools (3 of 3)
R6σ – Raytheon Six Sigma

- R6σ is company culture – spans business units
- EVERYONE is trained and qualified as a specialist
- Raytheon Six Sigma is part of the DNA
- There is a robust set of tools and trained experts to facilitate their use
Communication Briefings

- All have a common format
- They are targeted to be self led
- They are posted to the web site for easy down load on demand

Agenda
- What?
- Why?
- Who?
- Tools used
- Behaviors used
- Process
- Available Help
- Summary
- Expectations

It is impossible to over communicate
The OIC Role is the only improvement process addition.

- The OIC lead is a R6σ Expert.
- The OIC Team includes a representative from each major site. All OIC members review proposals.
We have a strong Annual Planning Process
# Results to Date

## Projects are Executing in all disciplines and focus areas

<table>
<thead>
<tr>
<th>ID</th>
<th>TYPE</th>
<th>TITLE</th>
<th>STAGE</th>
<th>LEAD</th>
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<td>Process</td>
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</table>

- There are over 40 projects currently executing and over 200 proposals submitted.
- Data in the form of business, quality and process performance metrics trigger a variety of projects:
  - Projects that address handshaking between functional organizations
  - Projects that target defect containment in key development stages
  - Projects that address insertion of technology and methods that require challenging paradigm shifts
  - Projects that are not gap closure - but opportunity grabbing

Notional project names

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Notional project names

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Projects are Executing in all disciplines and focus areas
Overview
Solution
Journey
Lessons Learned
Where did we want to go?

- Move from separate improvement processes across sites, various disciplines to integrated improvement
- To get improvements in engineering performance that are reflected in the business bottom line
Challenges/Barriers
Hold on Sherlock…it’s not so easy

~4000 engineers, 5 sites, multiple time zones … and 5 disciplines at each site!!!

• What - no face to face – will never work
• That’s not what we do and we’re level 5
• SW, HW, SE, PE, program needs are different…functions versus programs

The challenge of the org
The challenge of the tools
The challenge of the process

• I need you for this and I am here now…that IP lead isn’t
• Improvements aren’t urgent

• Who will be in charge – they can’t know my needs
• Execs are not going to review my proposal
• Single point of decision at so high a level that details of improvements are difficult to assess

• It can’t cost more
• The process, infrastructure and tools may not scale well

This is a BHAG “Big Hairy Audacious Goal”
The Journey

- Build a team and identify stakeholders
- **Align the team on a common vision**
- Ensure team commitment
- **Take stock of regional assets**
- **Take stock of company assets**
- **Identify common components and use a DAR type process to look at alternative solutions – address difficult questions first**
- Develop and Deliver a Concept Brief
- Iterate until concept is approved
- Develop artifacts
- Peer review artifacts with team
- Submit artifacts for stakeholder review
- Release
- **DEPLOY**
Align the Team on a Common Vision

ID: NCS EPG
Propose: NCS EPG (OID WG)
Prioritize: NCS EPG
Rank: NCS PST annually
Approve$: NCS PST
Monitor: NCS PST qtrly
Assigned org monthly

Scope is NCS. Goals are NCS. Gaps are NCS ETQ. Process is NCS. Metrics are NCS.
Take Stock of Regional Assets

- **Solution Components**
  - Work Instructions
  - Templates
  - Tools
  - Training
  - Review Boards
  - Approval Boards
  - Documentation

<table>
<thead>
<tr>
<th>Region</th>
<th>Work Instructions</th>
<th>Templates</th>
<th>Tools</th>
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Analyze Regional Assets for Commonality and Potential Reuse

In common
Use EPG & LT & project Leads
Event driven new projects
Continual review of new idea
Ideas from anywhere
Continual monitoring of projects
Key person or WG for coordination

Differences
Annual strategic project planning
Tooling

Sites all had mechanisms to submit ideas, approval boards, and coordination POC.
Differed in tooling and selection cycles.
Take Stock of Company Assets

- FU, TX and NE all leverage Raytheon Six Sigma which include basic steps below
- Leveraging happens within site organization and cross sites through papers or symposiums – but after the Evaluate, Pilot and Deploy steps
- R6σ provided a common look at feel to separate regional processes

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Everybody utilizes R6σ – TREMENDOUS lever and common communication vehicle
Which way to go?

- Lift, Modify or New Improvement Approach?
  - Should one of the regional approach’s be adopted, is a blended approach needed, or a new concept entirely?

- “Distributed” versus “centralized” organization improvement?
  - Distributed - Regional level improvement activities with added communication mechanism between regions
  - Centralized - NCS-level organization improvement activities
  - Hybrid of both?
  - Discipline based? (HW, SW, SE, etc.)
  - Focus area or theme based?

- Who should be part of the organization improvement decision making/leadership?
  - EPG
  - Regional or NCS level Improvement Boards
  - Engineering Leadership
Formulate alternatives and analyze them

How to decide?
– Used decision analysis techniques and considered:
  ● ROI
  ● Natural organization structures
  ● Alignment with organization goals
  ● Cost effective
Option 1 – Regional Improvement Boards

Joe Engineer submits idea

NCS OIB Chair Review

Site EPG

EA Tools

NCS OIB

Site?

Research

Site OIB
Option 2 – Discipline Improvement Boards

Joe Engineer submits idea

NCS OIB Coordinator Review

Site EPG
EA Tools
NCS OIB
Disc OIB

Research
Research
Option 3 – Theme Improvement Boards

Joe Engineer submits idea

NCS OIB Coordinator Review

Site EPG  EA Tools  NCS OIB  Theme OIB

Research  Research
Identify the Stakeholders

NCS Process Steering Team (PST)
- Process Director
- Council Chairs
- EA Director
- Process Leads

Use existing organizations
Paradigm Shift

- Move improvement activities out of the jurisdiction of the regional EPGs and into the jurisdiction of the organization leadership.
  - Better alignment with org level objectives
  - Stronger sponsorship
  - Less redundancy
  - Better communication across regions
  - Better ROI
Overview
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Lessons Learned

- Use the CMMI as a common language to facilitate understanding one another's solutions
- Use OID concepts to create and deploy org improvement
- The metrics are key – at the beginning, in the middle and at the end.
- Build on what you have
  - Wherever annual planning goes on – and everybody has annual planning, - that is collecting and selecting improvements
  - Improvements need sponsorship so make it the responsibility of leadership to review and select projects. It’s where the money and resources are.
- You need a collection tool and it might as well be a communication tool too. It should be public.
- Cannot talk about OID as just the project collection, selection and execution piece, it is the loop between 4 and 5 that is key and all those processes work together.
- Get some things straight right away: Will every project that improves anything be part of this – what is the scope of an improvement? What is the relationship to CAR? What is the relationship to Technology?
- There is significant impact to appraisal preparation
Words from our leader….

“Our approach to process commonality is already reducing the process maintenance and appraisal costs, and we have invested those savings in new engineering capabilities and growth opportunities. Consistent processes and better tooling/automation enable us to respond faster with lower costs, increasing our competitive edge.”

Lynn Dugle, Vice President of Engineering, Technology and Quality, NCS Fullerton
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
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<tbody>
<tr>
<td>CPA</td>
<td>Common Process Architecture</td>
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<td>DAR</td>
<td>Decision Analysis and Resolution</td>
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<tr>
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