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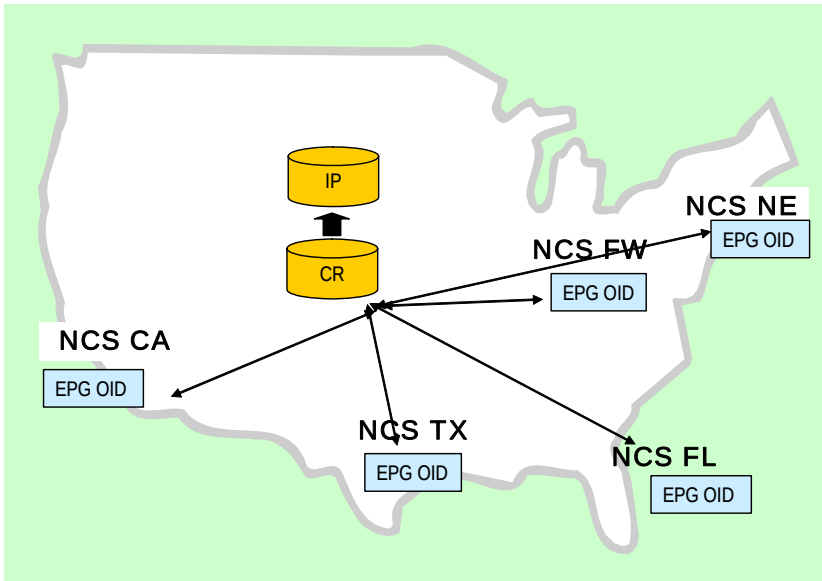
Customer Success Is Our Mission

When OID Crosses Time Zones, Disciplines and Customer Base

Network Centric Systems
Engineering
Laurie Haack
Michele Wall

November 15, 2006



Introduction

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- 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

Author contact info

Raytheon
Network Centric Systems

Michele Wall

Manager and Certified Raytheon Six Sigma Expert

NCS Organizational Improvement Coordinator

Network Centric Systems

Raytheon Company

Marlborough, MA

Michele_P_Wall@raytheon.com

781-640-0598

Laurie Haack

Senior Principal Software Engineer

Engineering Process Group

Network Centric Systems

Raytheon Company

Fullerton, CA

lahaack@raytheon.com

714-446-4286

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Customer Success Is Our Mission

Overview

Solution

Journey

Lessons Learned

Network Centric Systems

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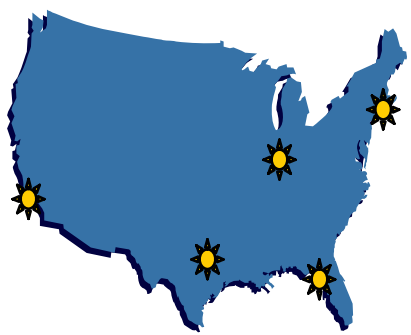
NCS develops and produces mission solutions for networking, command and control, situational awareness and air traffic management

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

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- 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

- 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

- 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.

Each business must do their own analysis of benefit.

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NCS Organization Improvement Process

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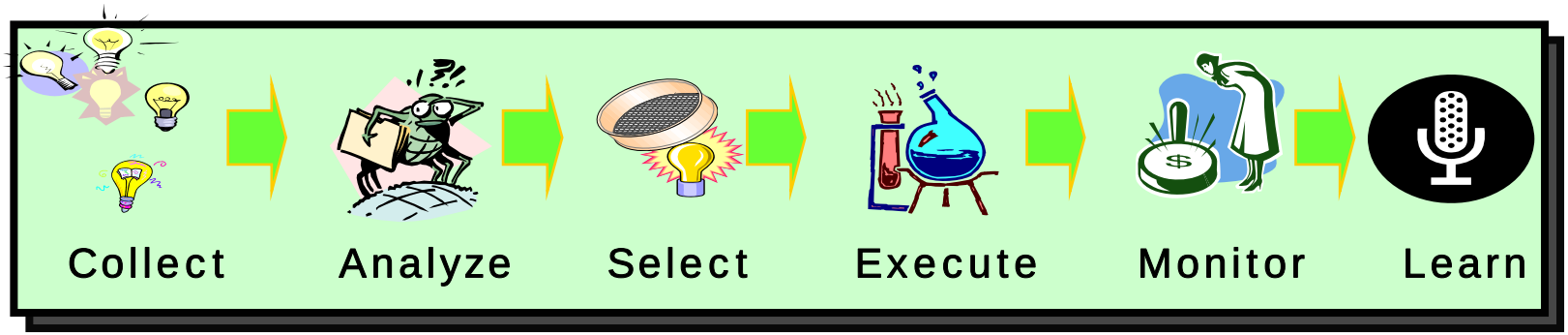

	Collect	Analyze	Select	Execute	Monitor	Learn
What	Proposal Advisory	Proposal Advisory	Project	Project	Project	Project
Stage	Submit Screen	Evaluate	Evaluate Rank	Execute	Execute Complete	All
Tool	IPPDB	IPPDB	IPPDB	IPPDB R6σ DB	iMetrics	Various
Who	All	Engineers OIC Council EPST	Council EPST NCS ETQ LT	Engineers	EPST Council Metrics Council	All
When	24x7	Monthly & Weekly	Annually & Quarterly	24x7	Monthly	24x7

Six Step Process that leverages R6σ and Existing Org Structure

NCS Organization Improvement Process Guidance & Support

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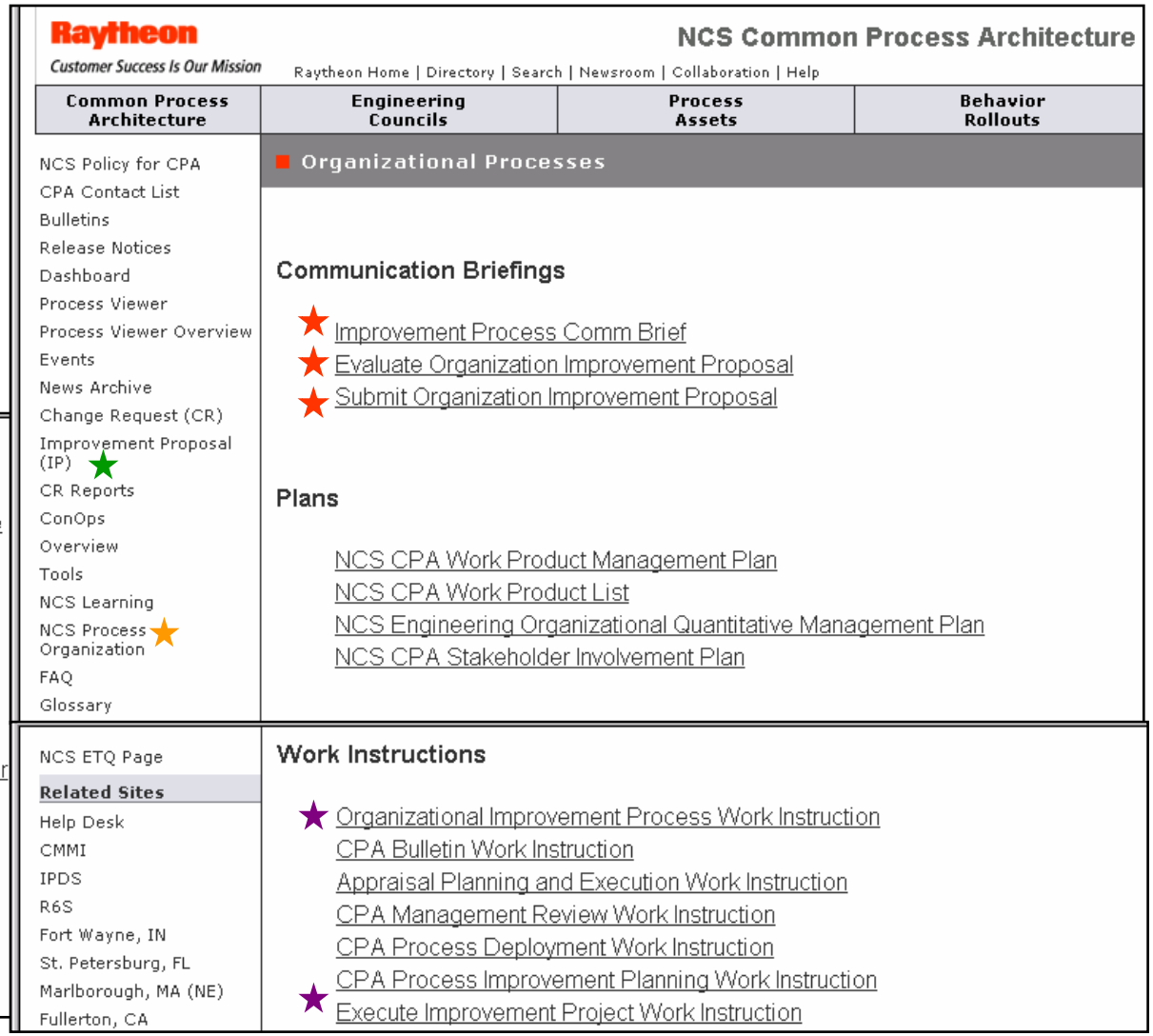
- Work Instructions
- Enablers
- Tools
- People
- Communication
- R6σ

Enablers

- CPA Bulletin Template
- CPA Process Senior Management Review Template
- ★ Improvement Project Plan and Report Template
- Organizational QM Plan Template
- iPlan Import Just-in-Time Training
- ★ Improvement Project Quad Chart Template
- ★ ETQ IP EVMS Enabler
- ★ ETQ Focus Area EVMS Consolidation Tool Enabler
- ★ ETQ Focus Area Status Report Enabler
- ★ ETQ IP Inchstones for Behavior Development Enabler
- ★ ETQ IP Inchstones for Pilot Project Enabler
- ★ ETQ IP Gate4 or Gate5 Enabler
- ★ ETQ IP Gate5 Checklist Enabler
- ★ ETQ Focus Area Project Status Report Enabler
- ★ ETQ IP ROI Tool Enabler
- ★ Pilot Plan and Results Report Enabler
- ★ Pilot Plan Checklist Enabler



IP Infrastructure includes direction, people, tooling and enablers.

Work Instructions

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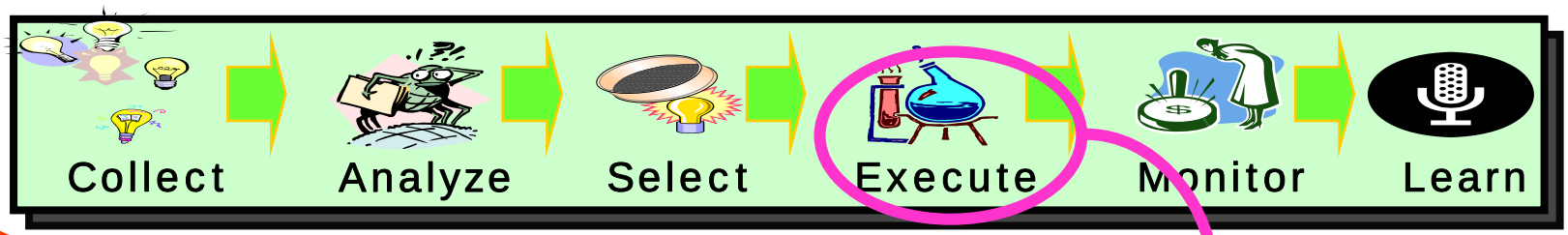

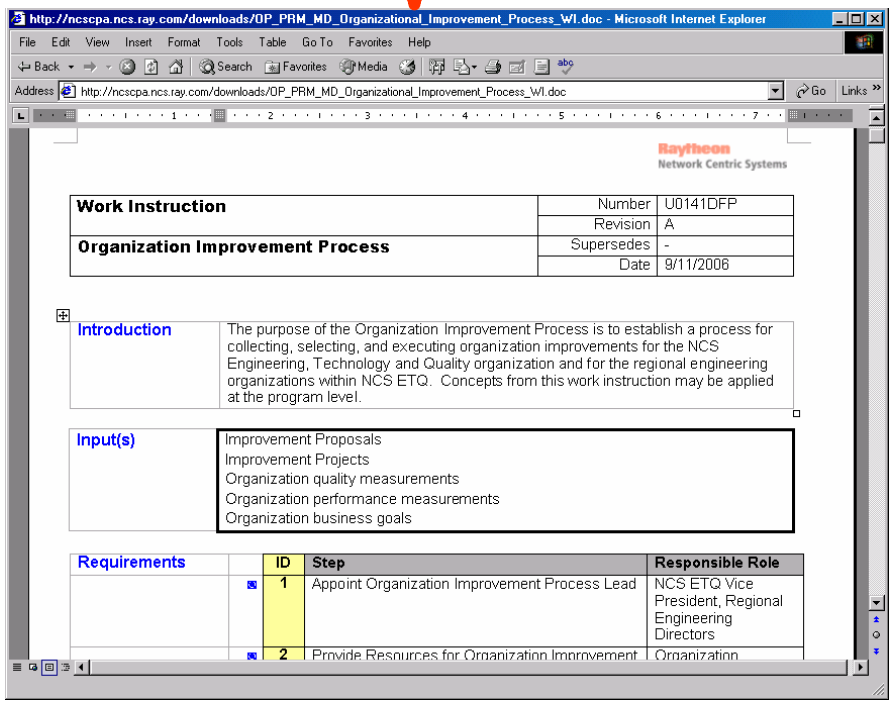

http://ncscpa.ncs.ray.com/downloads/OP_PRM_MD_Organizational_Improvement_Process_WI.doc - Microsoft Internet Explorer

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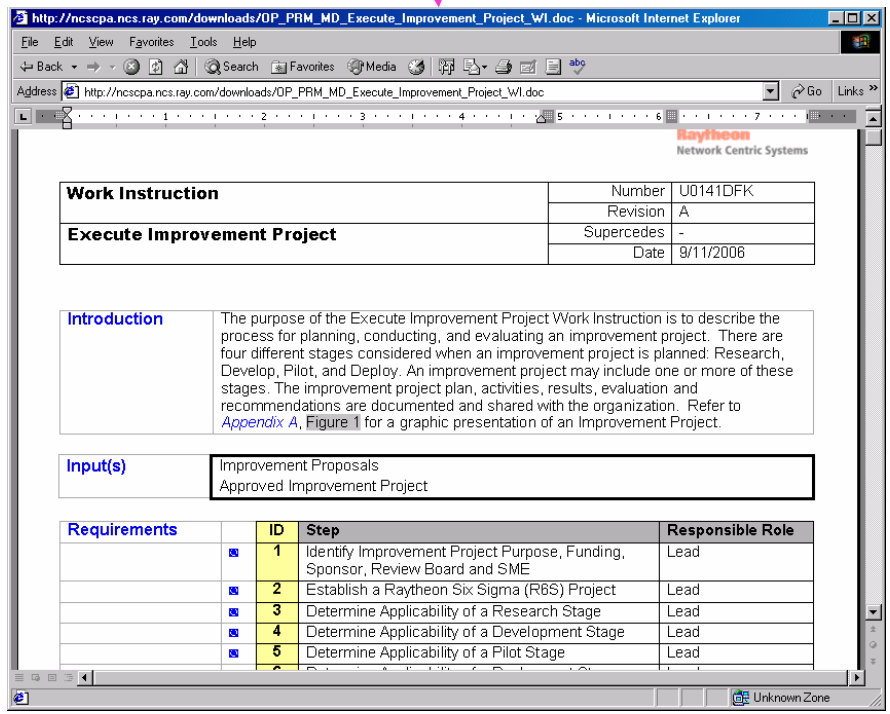
Work Instruction	Number	U0141DFP
	Revision	A
Organization Improvement Process	Supersedes	-
	Date	9/11/2006

Introduction	The purpose of the Organization Improvement Process is to establish a process for collecting, selecting, and executing organization improvements for the NCS Engineering, Technology and Quality organization and for the regional engineering organizations within NCS ETQ. Concepts from this work instruction may be applied at the program level.
Input(s)	Improvement Proposals Improvement Projects Organization quality measurements Organization performance measurements Organization business goals

Requirements	ID	Step	Responsible Role
	1	Appoint Organization Improvement Process Lead	NCS ETQ Vice President, Regional Engineering Directors
	2	Provide Resources for Organization Improvement	Organization



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Work Instruction	Number	U0141DFK
	Revision	A
Execute Improvement Project	Supercedes	-
	Date	9/11/2006

Introduction	The purpose of the Execute Improvement Project Work Instruction is to describe the process for planning, conducting, and evaluating an improvement project. There are four different stages considered when an improvement project is planned: Research, Develop, Pilot, and Deploy. An improvement project may include one or more of these stages. The improvement project plan, activities, results, evaluation and recommendations are documented and shared with the organization. Refer to *Appendix A*, Figure 1 for a graphic presentation of an Improvement Project.
Input(s)	Improvement Proposals Approved Improvement Project

Requirements	ID	Step	Responsible Role
	1	Identify Improvement Project Purpose, Funding, Sponsor, Review Board and SME	Lead
	2	Establish a Raytheon Six Sigma (R6S) Project	Lead
	3	Determine Applicability of a Research Stage	Lead
	4	Determine Applicability of a Development Stage	Lead
	5	Determine Applicability of a Pilot Stage	Lead

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

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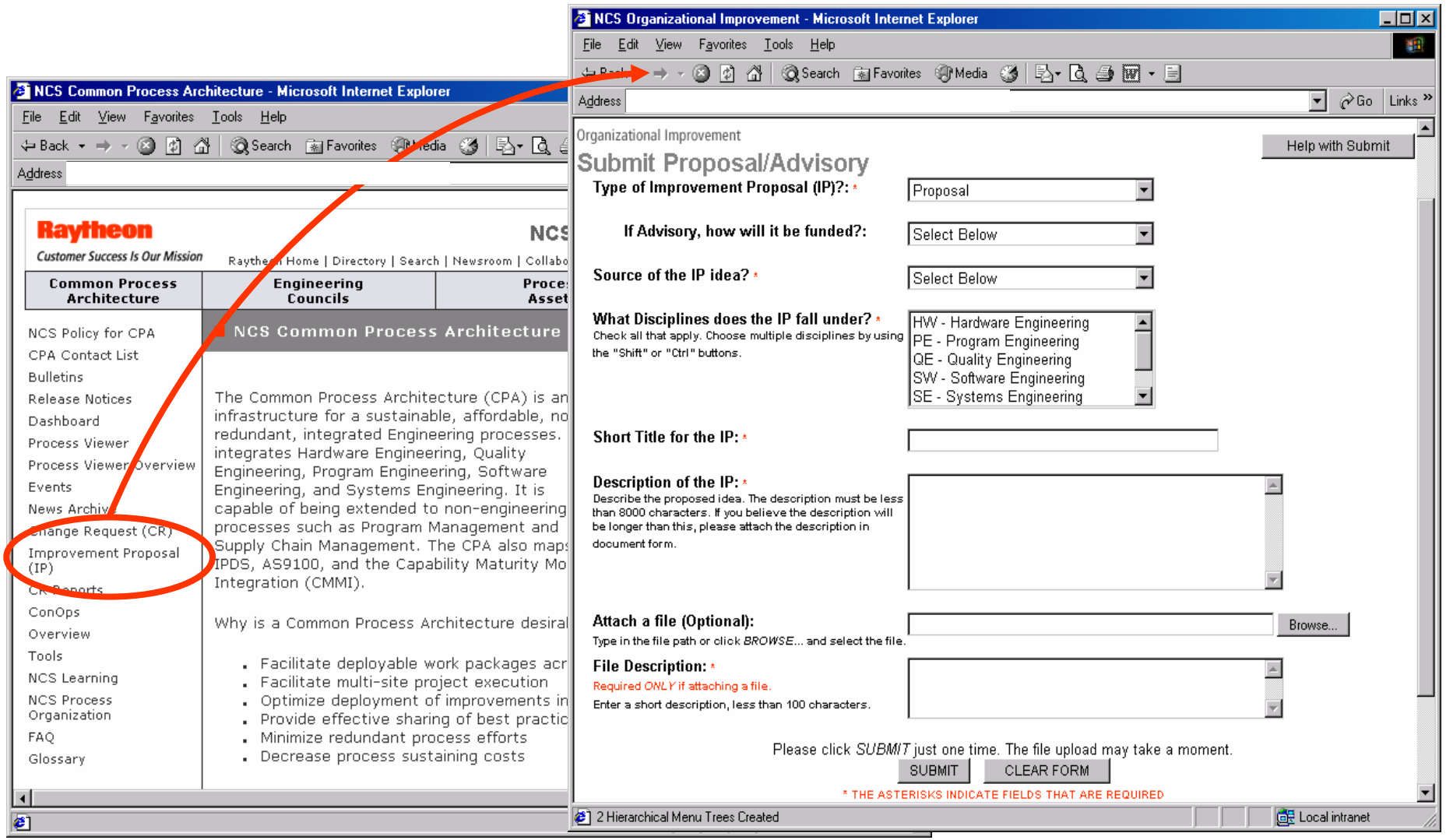

Link is easily Available

Proposal Submission Form is Simple

Tools (2 of 3)
IPPDB MetaData Available to All

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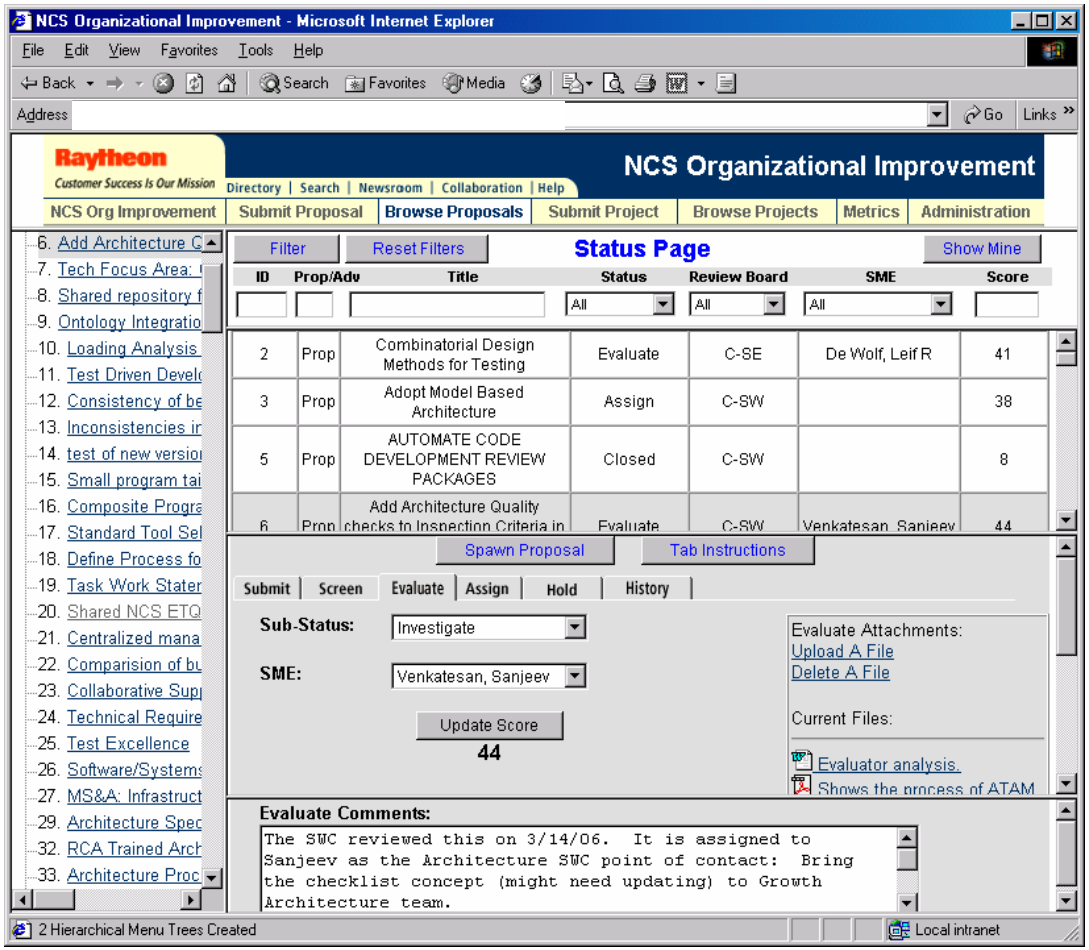

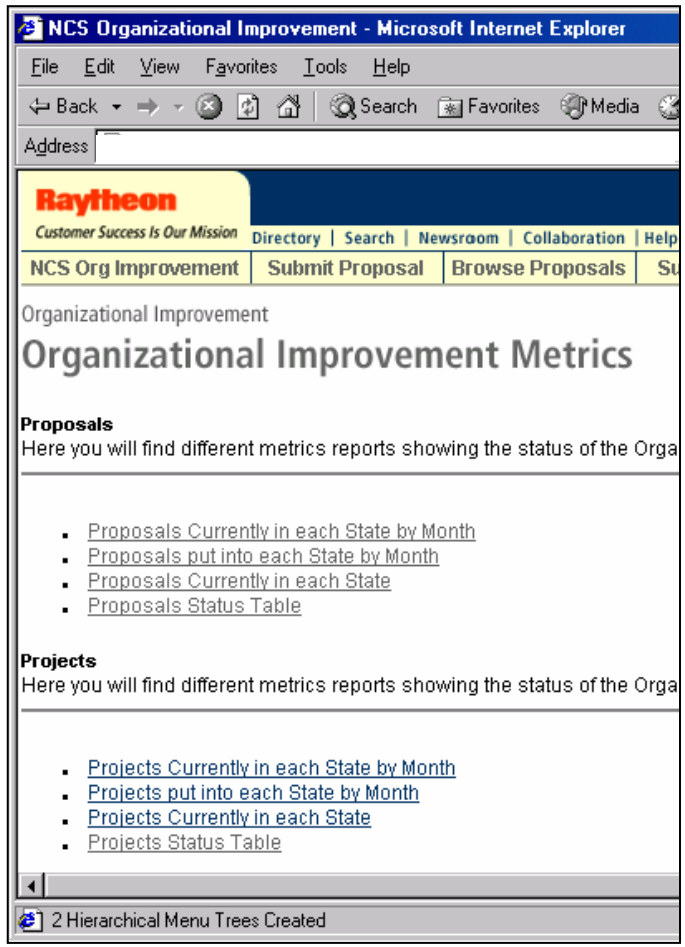

Proposal and Project Frames list all content, support filtering of summary information and allow access to detailed information about a proposal

Metrics to monitor process execution that also include an export to Microsoft Excel

Tools (3 of 3)
R6σ – Raytheon Six Sigma

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- 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

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Common Process Architecture

Agenda

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

Improve It!

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Common Process Architecture

Organization Improvement Process

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Common Process Architecture

Organization Feedback

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Common Process Architecture

How to Submit an Organization Improvement Proposal

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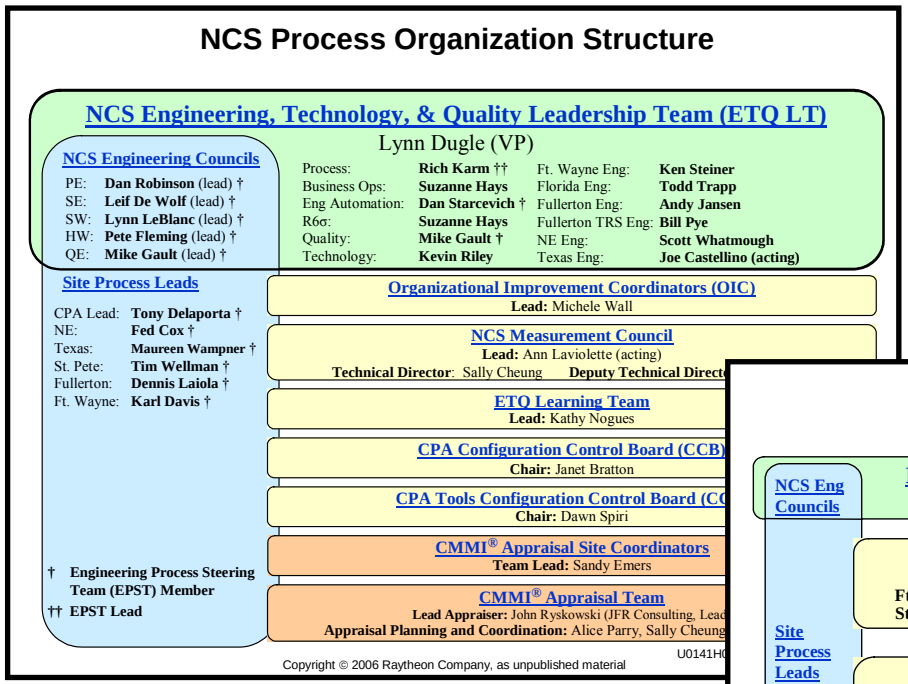
Common Process Architecture

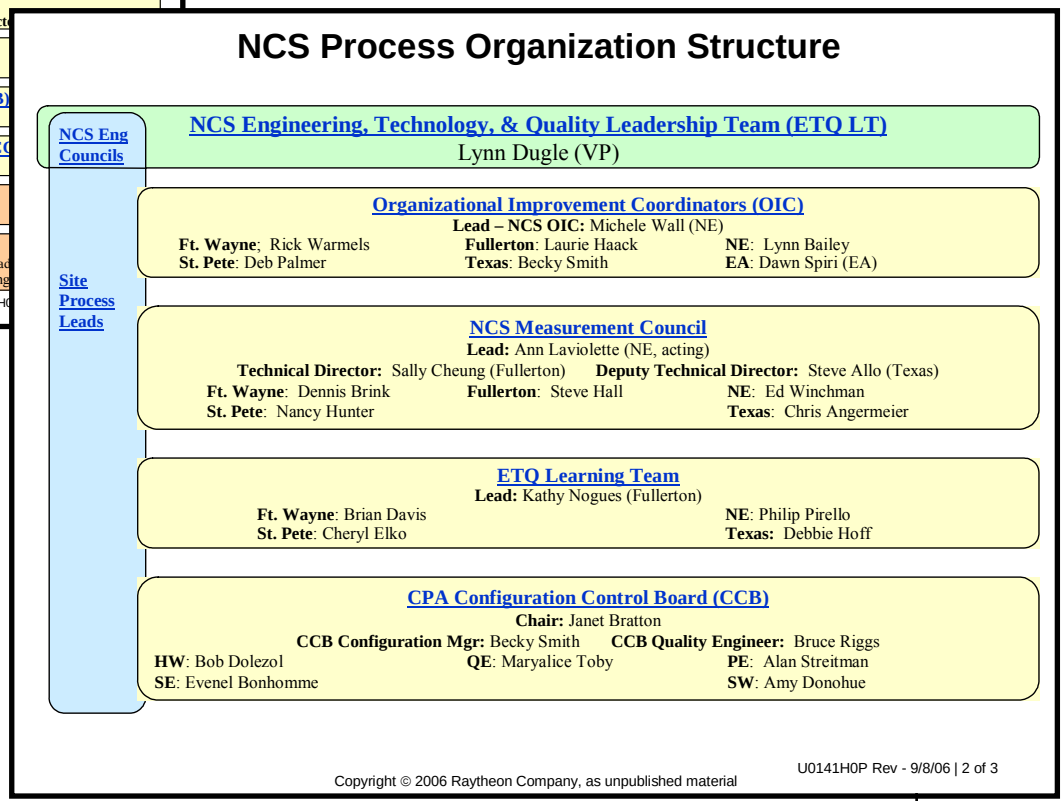
How to Evaluate an Organization Improvement Proposal

It is impossible to over communicate

People



Every leader has organizational improvement responsibility. There is no separate improvement organization.



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.

Org Improvement Annual Planning

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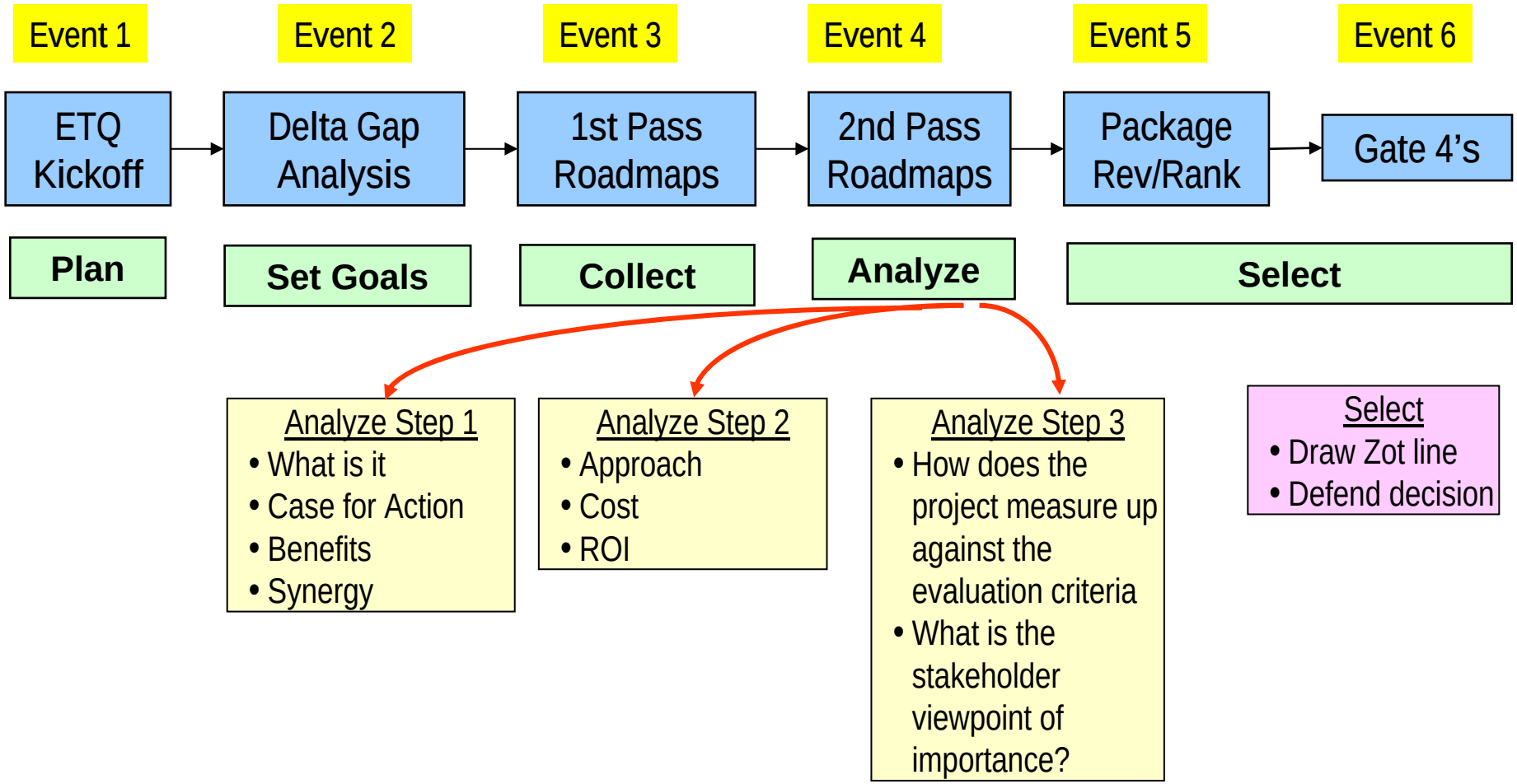

We have a strong Annual Planning Process

Results to Date

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Notional project names

ID	TYPE	TITLE	STAGE	LEAD	Review Board	Rank	Focus Area	Eval Score
1	Appr	Adopt revolutionary development technology	Execute	Pochahantas	C-SW	4	Process	13
2	Appr	Streamline Supply Chain Interface						
3	Appr	Improve Requirements Handoff						
4	Appr	Improv Defect Containment						
5	Appr	prove Test						
6	Appr	se Customer isfaction						
8	App	w Method						

41 Executing Projects

- 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

Projects are Executing in all disciplines and focus areas

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Journey

Lessons Learned

Where did we want to go?

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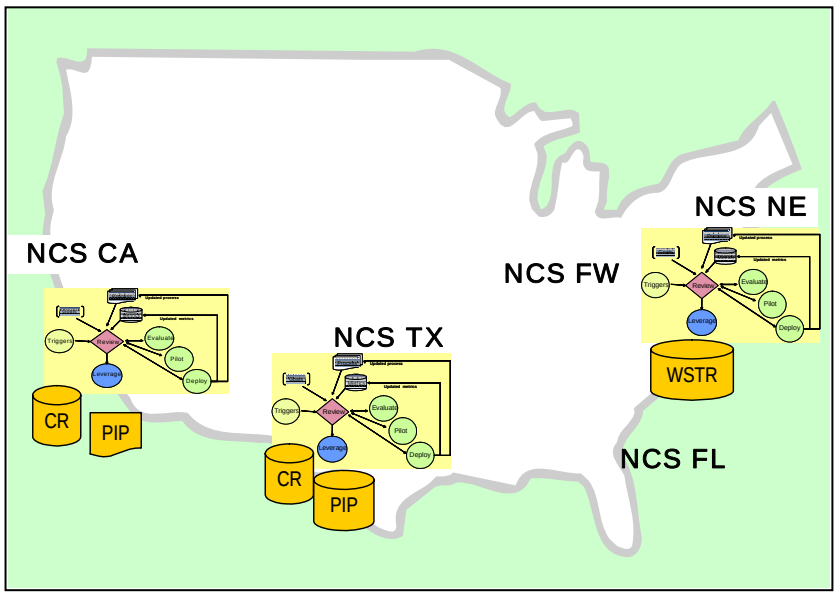
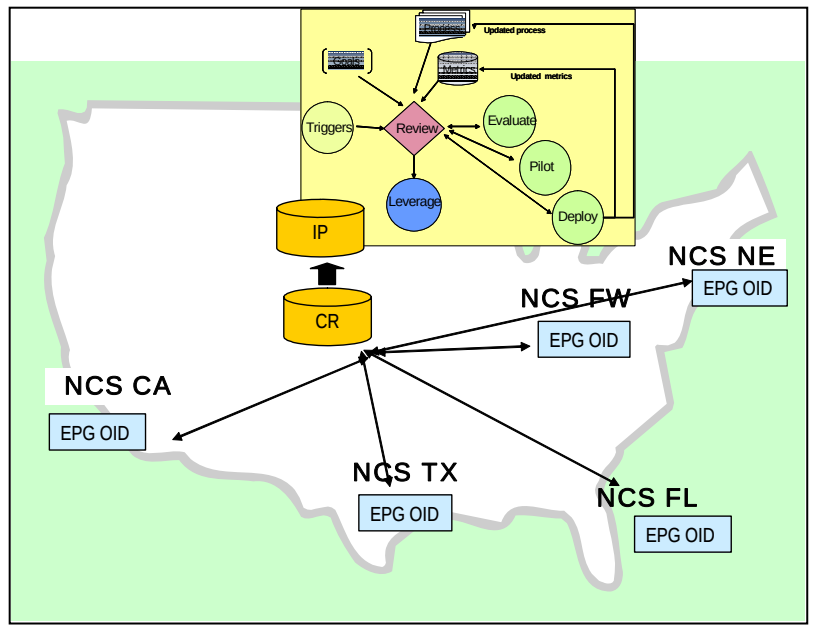
- Move from separate improvement processes across sites, various disciplines to integrated improvement
- To get improvements in engineering performance that are reflected in the business bottom line



Scope is local. Goals are local.
Process is local. Metrics are local.



Scope is NCS. Goals are NCS.
Process is NCS. Metrics are NCS.

Challenges/Barriers
Hold on Sherlock…it's not so easy

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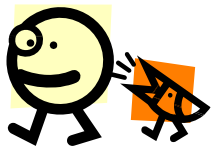
~4000 engineers, 5 sites, multiple time zones … and 5 disciplines at each site!!!

- What - no face to face – will never work
- That's not what we do and we're level 5



- 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

- 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

- It can't cost more
- The process, infrastructure and tools may not scale well

This is a BHAG "Big Hairy Audacious Goal"

The Journey

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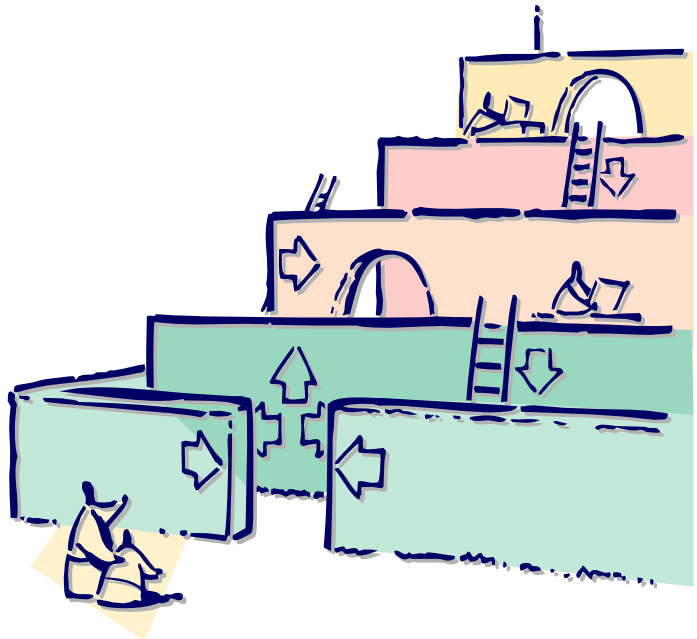
- Build a team and identify stakeholders
- **Align the team on a common vision**
- Ensure team commitment
- **Take stock of regional assets**
- **Take stock of company assets**
- **Identify common components and use a DAR type process to look at alternative solutions – address difficult questions first**
- 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

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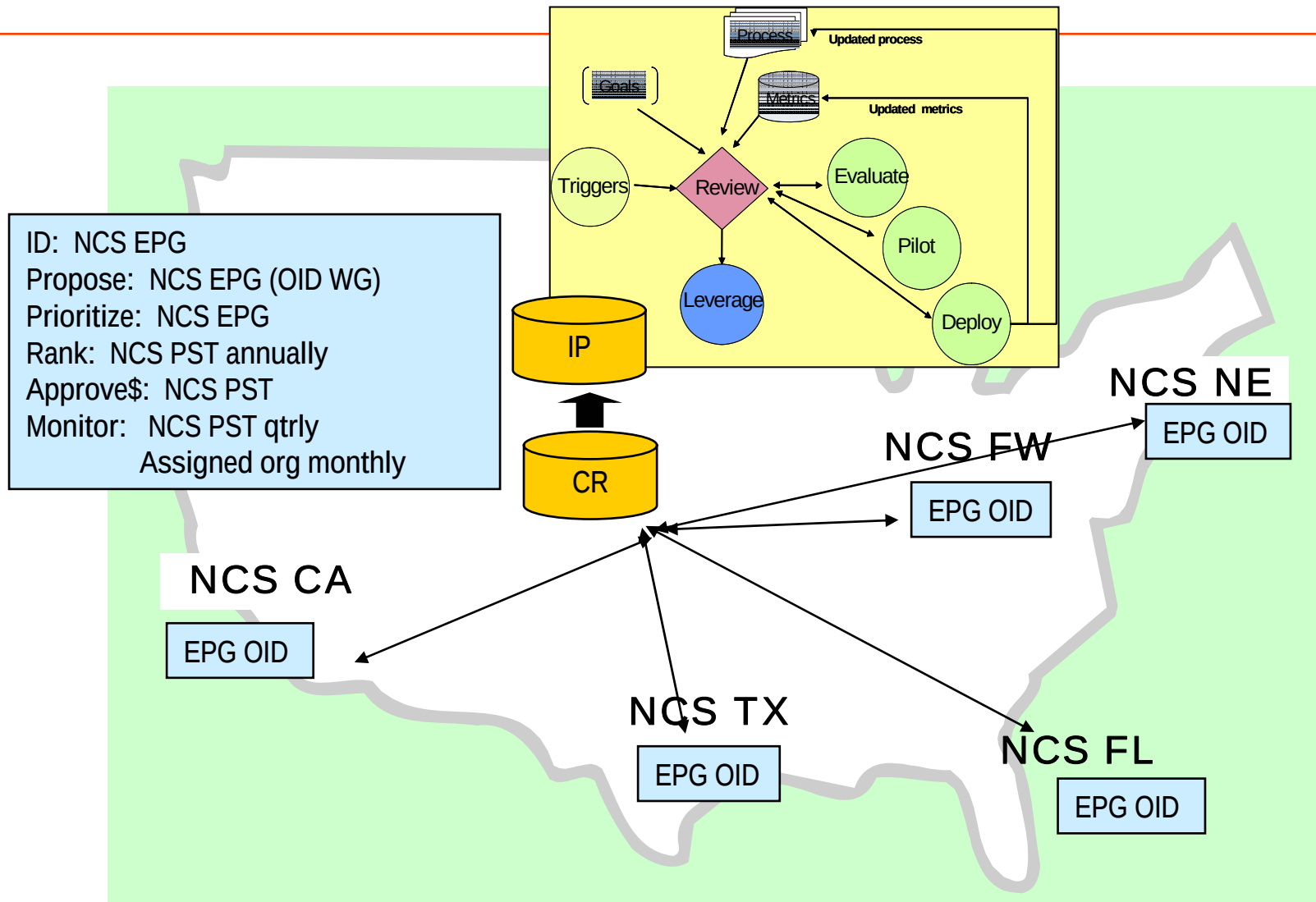

Scope is NCS. Goals are NCS. Gaps are NCS ETQ. Process is NCS. Metrics are NCS.

Take Stock of Regional Assets

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- Solution Components
  - Work Instruction
  - Templates
  - Tools
  - Training
  - Review Boards
  - Approval Boards
  - Documentation

	SW						SE	HW	PM	QE
	Work Instructions	Templates	Tools	Review Boards	Approval Bodies	Training				
NE	-Blue Book -SEPG-020 -SEPG-002 -Roles/Resp	-R6S Template -Eval Template -Pilot Template -Deploy Template	-R6S Toolkit -Web Status -Web PAL -web submit -WSTR DB	-SEPG CCB -PTIC	-LT Steering Committee -Project Lead	not OID specific				
FU	-RFO 5-2 -Bulletin 5,13-15 -RFO 5-2-4 -RFO 5-2-5 -RFO 5-2-6 -RFO 5-2-7 -RFO 5-2-7-201 -RFO 5-2-8 -RFO 5-2-13 -RFO 5-2-4-103 -RFO 5-2-4-104 -RFO 5-2-4-105 -RFO 5-2-4-204	-Form 21832 -RFO 5-2-4-404	-R6S Toolkit -Website -Excel Log	-ECCB	-Appropriate leader -R6S ENG Baseline	-Piloting -Chng Mng -PI 101	same as SW			
TX	-SW Dir-000 -800P105 -800P020 -800P019	-Plan and Report Template	-R6S Toolkit -web status -web submit -PI DB	-OIB	-SEPG -SWEC LT -Tech Team	not OID specific				
FL										
IN										

Analyze Regional Assets for Commonality and Potential Reuse

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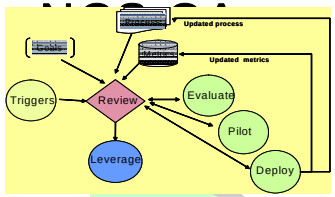
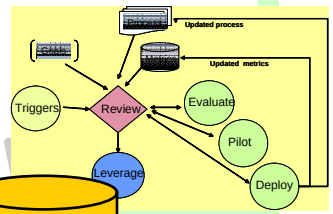
In common
Use EPG & LT & project Leads
Event driven new projects
Continual review of new idea
Ideas from anywhere
Continual monitoring of projects
Key person or WG for coordination

Differences
Annual strategic project planning
Tooling

NCS NE

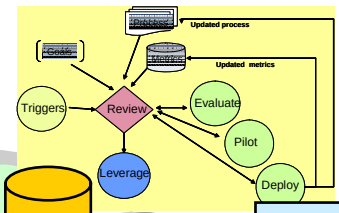


NCS FW



WSTR

NCS TX



CR PIP

CR PIP

NCS FL

ID: EPG CCB
Propose: EPG OID
Rank: Baseline Assessment
Approve$: LT + Technology
Monitor: EPG OID, LT

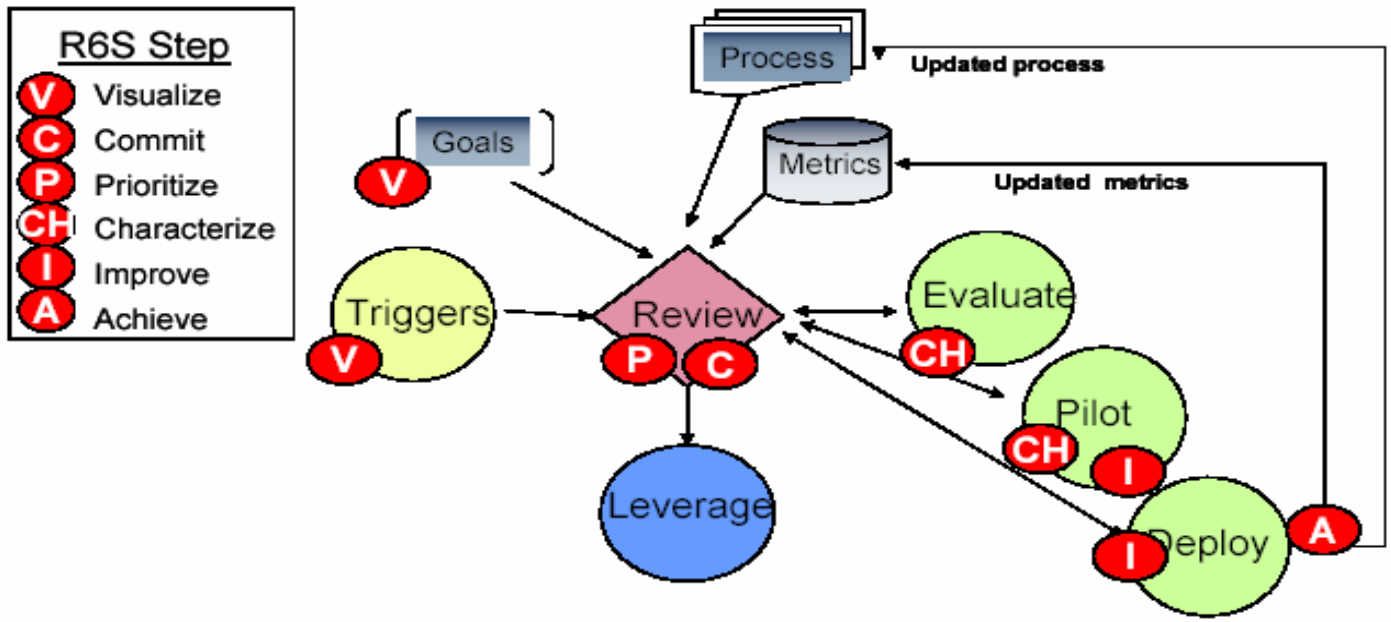
ID: SEPG OID Coordinator
Propose: Theme Lead
Rank: LT + Technology
Approve$: LT
Monitor: OIB

ID: SEPG CCB
Propose: PTIC
(Process Technology Insertion Committee)
Rank: PTIC constant
Approve$: SWEC LT
Monitor: PTIC + LT

Sites all had mechanisms to submit ideas, approval boards, and coordination POC. Differed in tooling and selection cycles.

Take Stock of Company Assets

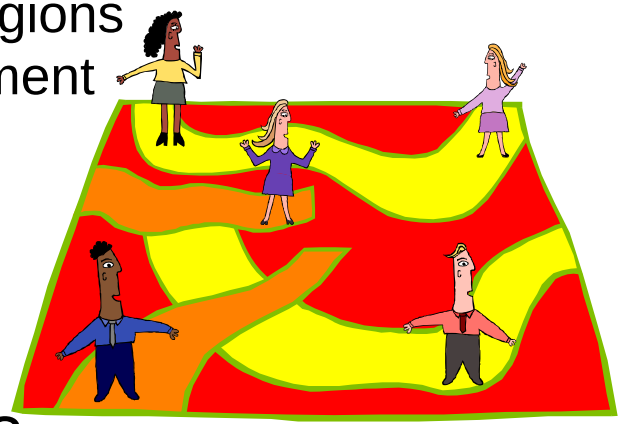
- FU, TX and NE all leverage Raytheon Six Sigma which include basic steps below
- Leveraging happens within site organization and cross sites through papers or symposiums – but after the Evaluate, Pilot and Deploy steps
- R6σ provided a common look at feel to separate regional processes



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

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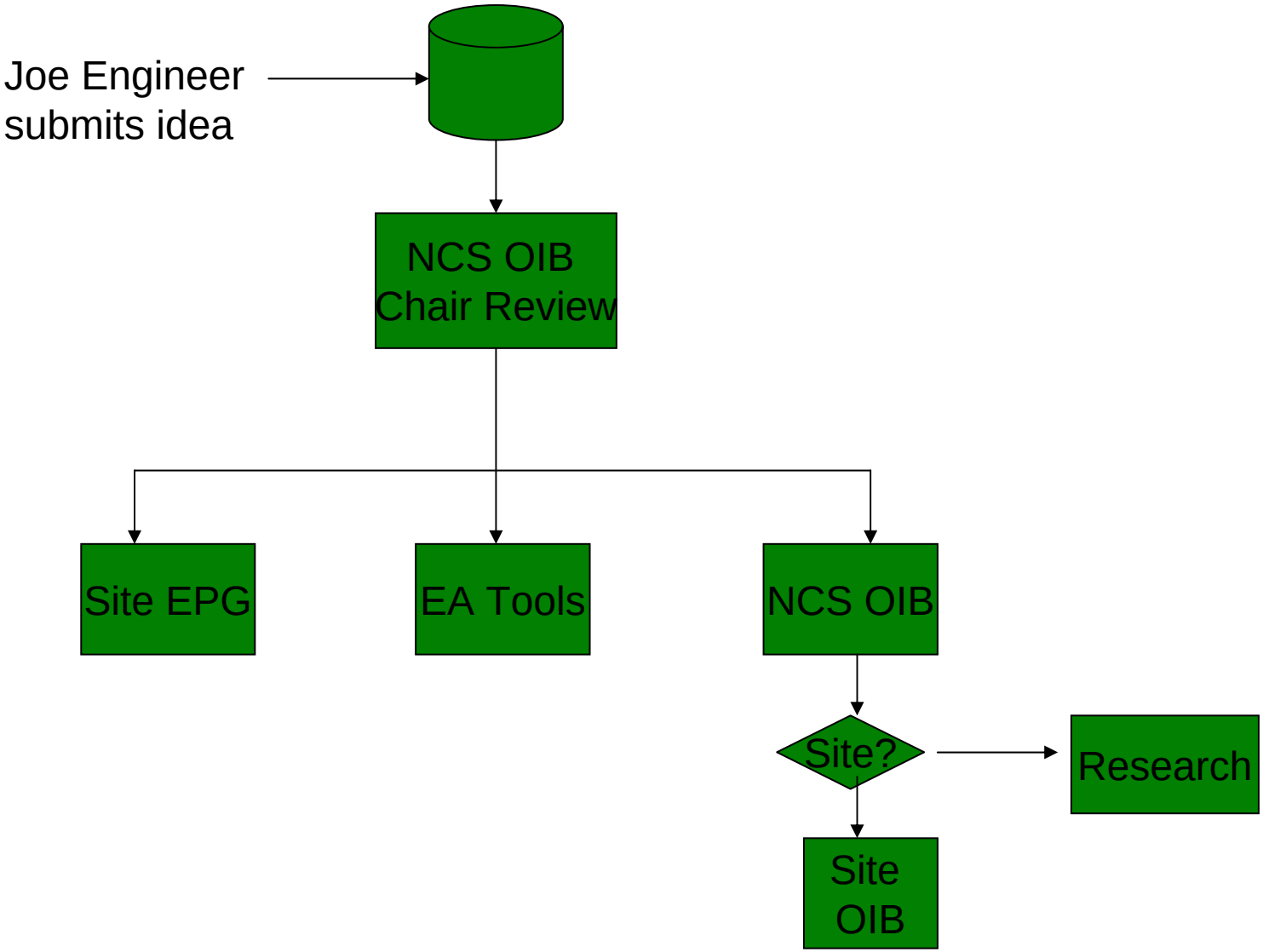

Option 2 – Discipline Improvement Boards

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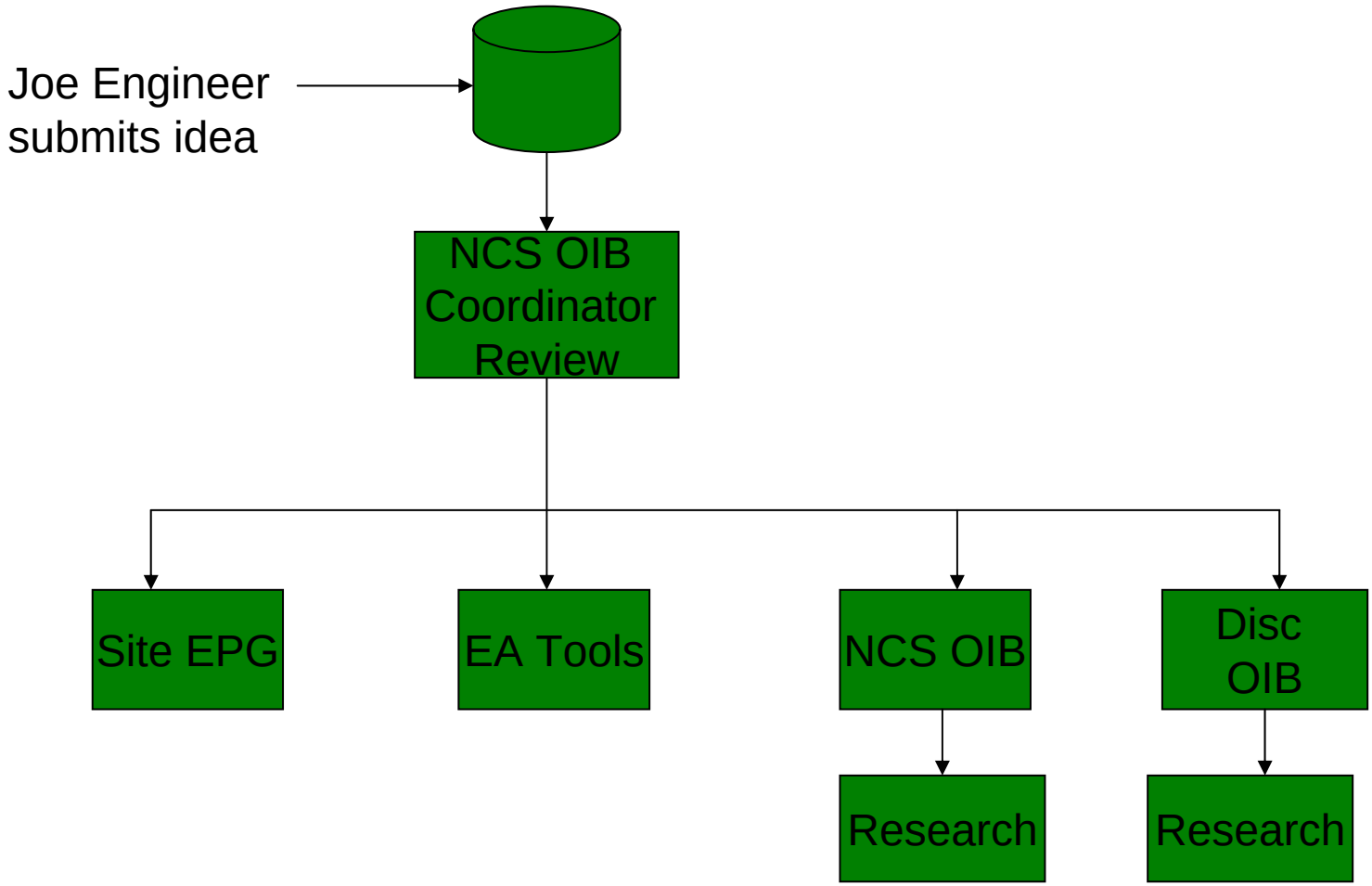

Option 3 – Theme Improvement Boards

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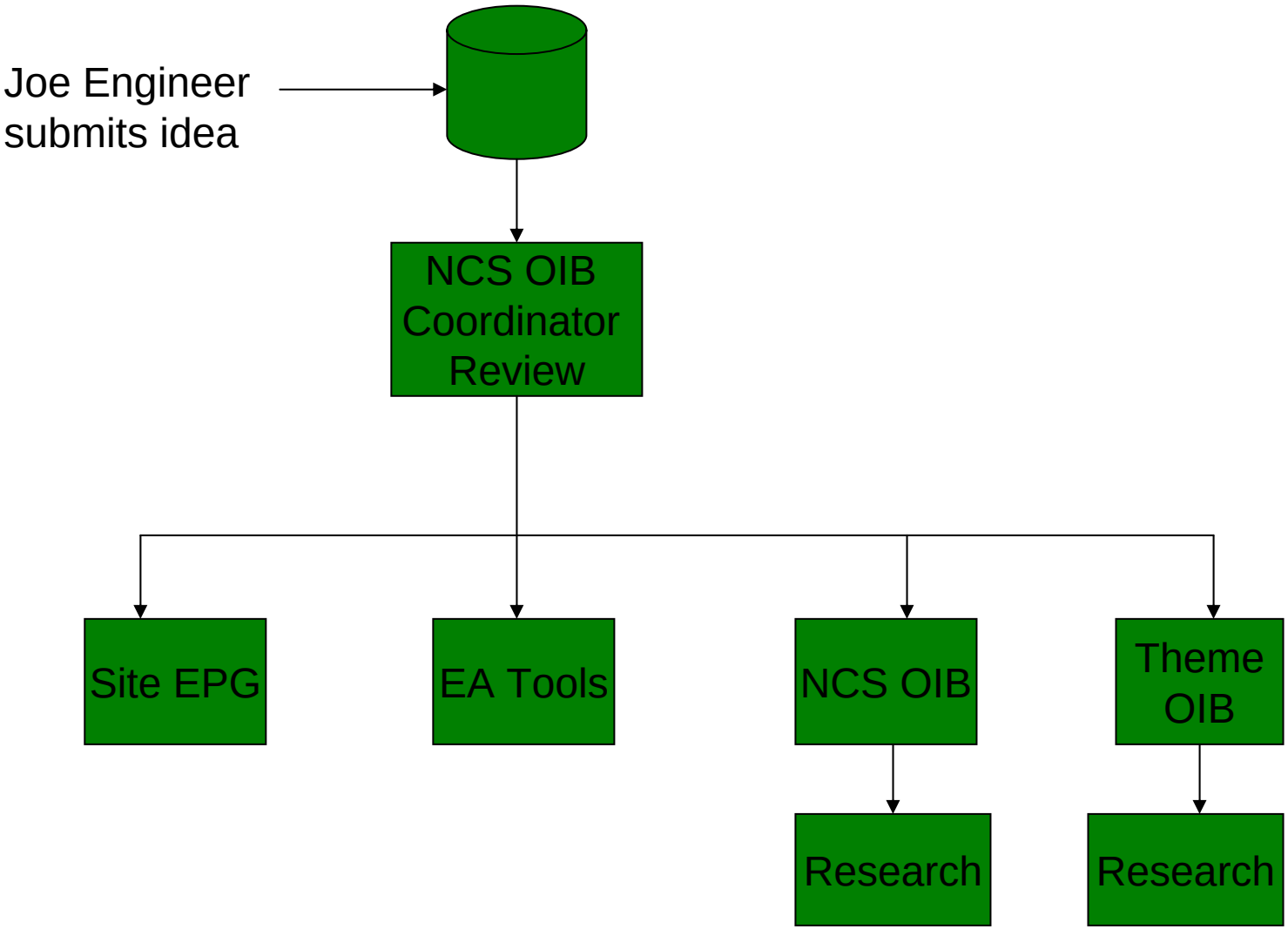

Identify the Stakeholders

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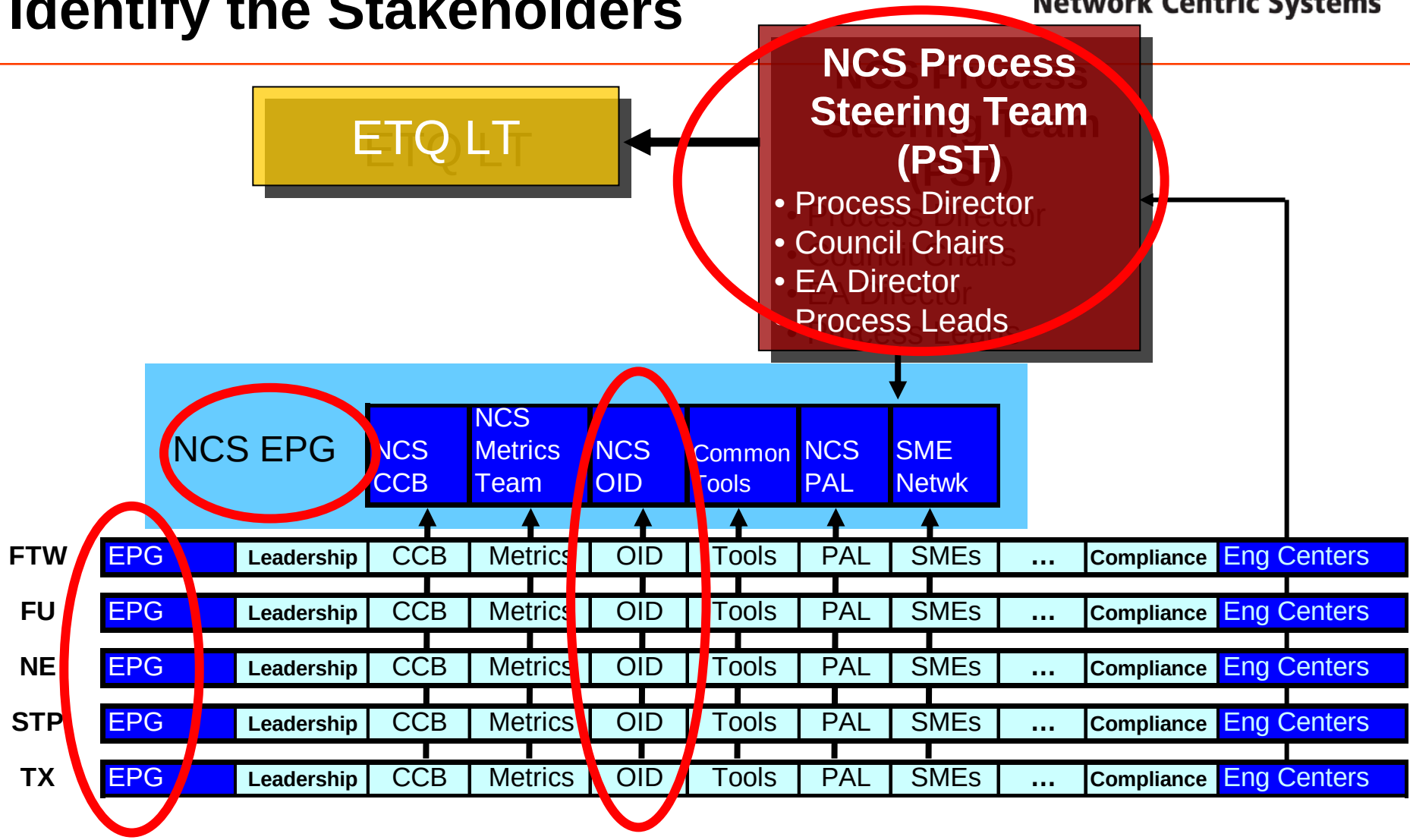

Use existing organizations

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

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Lessons Learned

Lessons Learned

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- 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

Q & A

Acronyms

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Acronym	Definition
CPA	Common Process Architecture
DAR	Decision Analysis and Resolution
EA	Engineering Automation
EPG	Engineering Process Group
EPST	Engineering Process Steering Team
ETQ	Engineering Technology and Quality
FW	Fort Wayne, Indiana
HW	Hardware
IPPDB	Improvement Proposal/Project Database
LT	Leadership Team
MSI	Mission Systems Integration
NCS	Network Centric Systems
NE	North East
OIB	Organization Improvement Board
OIC	Organization Improvement Coordinator
OID	Organizational Innovation and Deployment
PST	Process Steering Team
R6s	Raytheon Six Sigma
ROI	Return on Investment
SE	Systems Engineering
STP	St. Petersburg, Florida
SW	Software
WG	Working Group
WI	Work Instruction

References

1. Chrissis, Mary Beth, Konrad, Mike and Shrum, Sandy. “CMMI-Guidelines for Process Integration and Product Improvement” Addision-Wesley, 2003