Integrated Change Control for the Concurrently Developed Complex Systems – Lessons Learned

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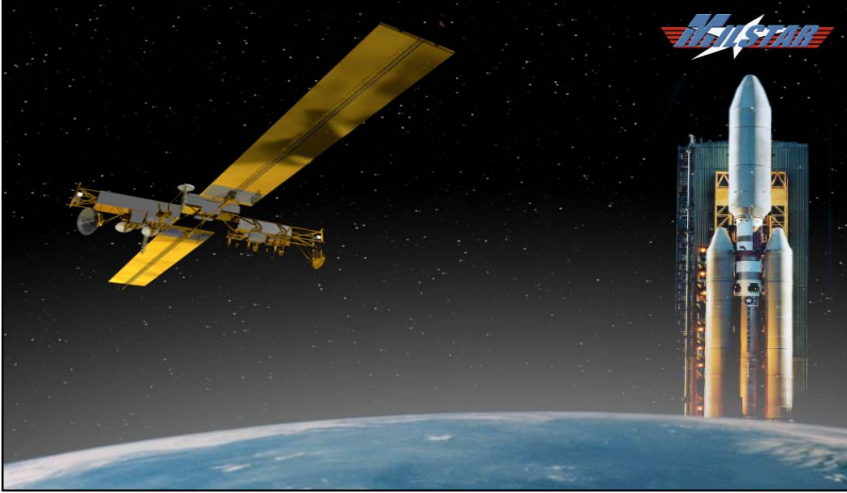
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Before We Begin…

There were many contributors to this effort.
Thank you everyone who helped!

Advanced Extremely High Frequency (AEHF) System

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- Mission – Provide protected satellite communications for strategic and tactical defense missions

- Designed to augment and eventually replace the Milstar system

- AEHF Program Office is located at the Space Missile Center (SMC), Los Angeles Air Force Base

AEHF Program Challenges

- Concurrent development and acquisition of major AEHF system elements
- Concurrent development of interfaces
- Most elements have different
  - *Contracts*
  - *Contracting agencies*
  - *Contract schedules*
  - *Development teams*
- Backward compatibility requirements with existing operational systems
- Operational systems are in the process of changing while in sustainment mode
- New, post contract award requirements
- International Partners
- Budgetary and regulatory requirements and constraints

Change Dilemma…

- Change is inevitable on a large, multi-year, concurrent development program
- Change is disruptive by its nature
- Managing change is not easy
- Having a well defined and understood process for managing change is imperative
- Processes need to be constantly adjusted to reflect the needs at hand

In the Beginning…

- AEHF Program Office Change Process existed since the beginning of the program

- December 2003 – SMC/CMMI Program Office Assessment recommends review of the existing change process

- September 2004 – Comprehensive review of the AEHF Change Process is initiated

- July 2005 – "New and Improved" AEHF Change Process makes its debut

What We've Learned About the AEHF Change Process Since…

- Define, document, and implement the process
  - *Identify what needs to be accomplished, e.g., Engr. Change vs. Contr. Change*
  - *Know your stakeholders*
  - *Provide enough detail to map it into the process above (e.g. Group to Wing)*
  - *Define Entry and Exit criteria for each step*
  - *Identify Artifacts created and modified*
  - *Define realistic, nominal timelines*
  - *Apply a "KISS" principle at every opportunity*
- Train, train, and train again
- Execute and measure process performance
- Implement Process Volume controls
  - *Addresses multiple, simultaneous changes and resource contention*
- Adjust the process as needed
  - *Conduct process improvement activity (e.g., VSM)*
  - *Implement changes as needed and as possible*
  - *Avoid "Big Bang" approach to changes, "evolutionary" vs. "revolutionary"*
- Be vigilant about your process

AFSO21 VSM
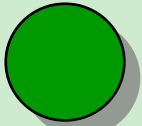## AEHF Change Process Current State – July 2006
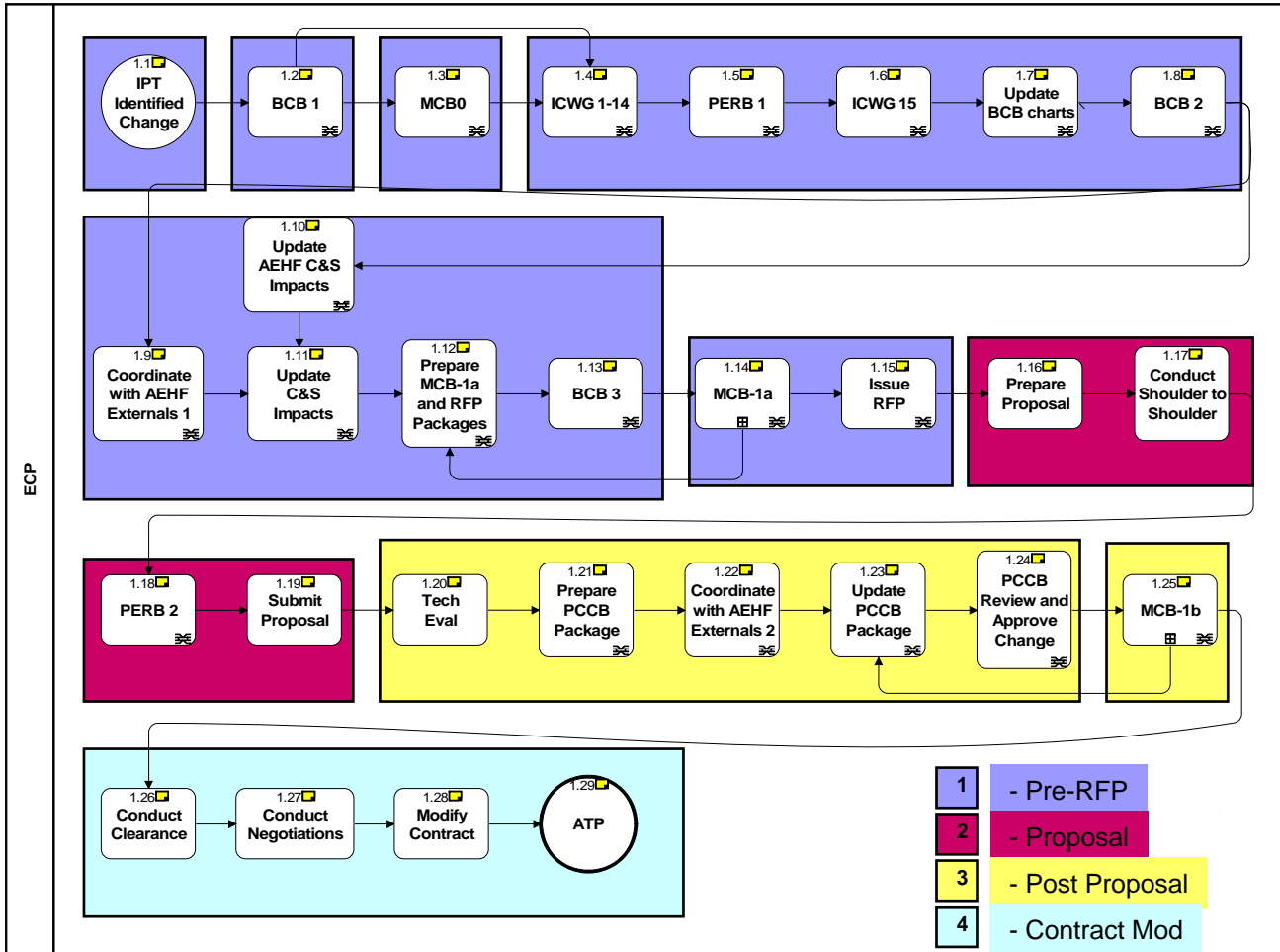
- 1 – Pre-RFP
- 2 – Proposal
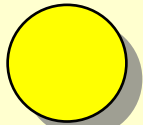- 3 – Post Proposal
- 4 – Contract Mod

AFSO21 VSM Process Activity Value Definitions

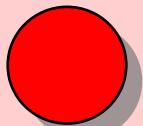## **Pure Value Activities**

- **Activities that change the form, fit or function of the product/service <u>and</u>**
- **Activities that, when asked, the customer is willing to pay for <u>and</u>**
- **Activities done right the first time.**

Business Value Activities

- **Activities causing no value to be created but that cannot be eliminated based on current state of technology or thinking**
- **Required (regulatory, customer mandate, legal)**
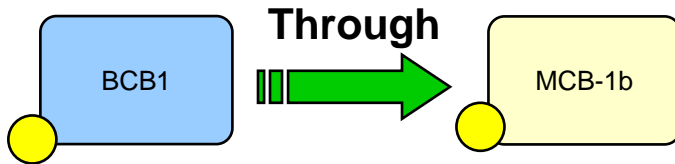- **Necessary (due to non-robustness of process, currently required)**

Non Value Activities

- **Activities that consume resources but create no value in the eyes of the customer**
- **Pure waste**
- **If you can't get rid of the activity, it turns to yellow.**
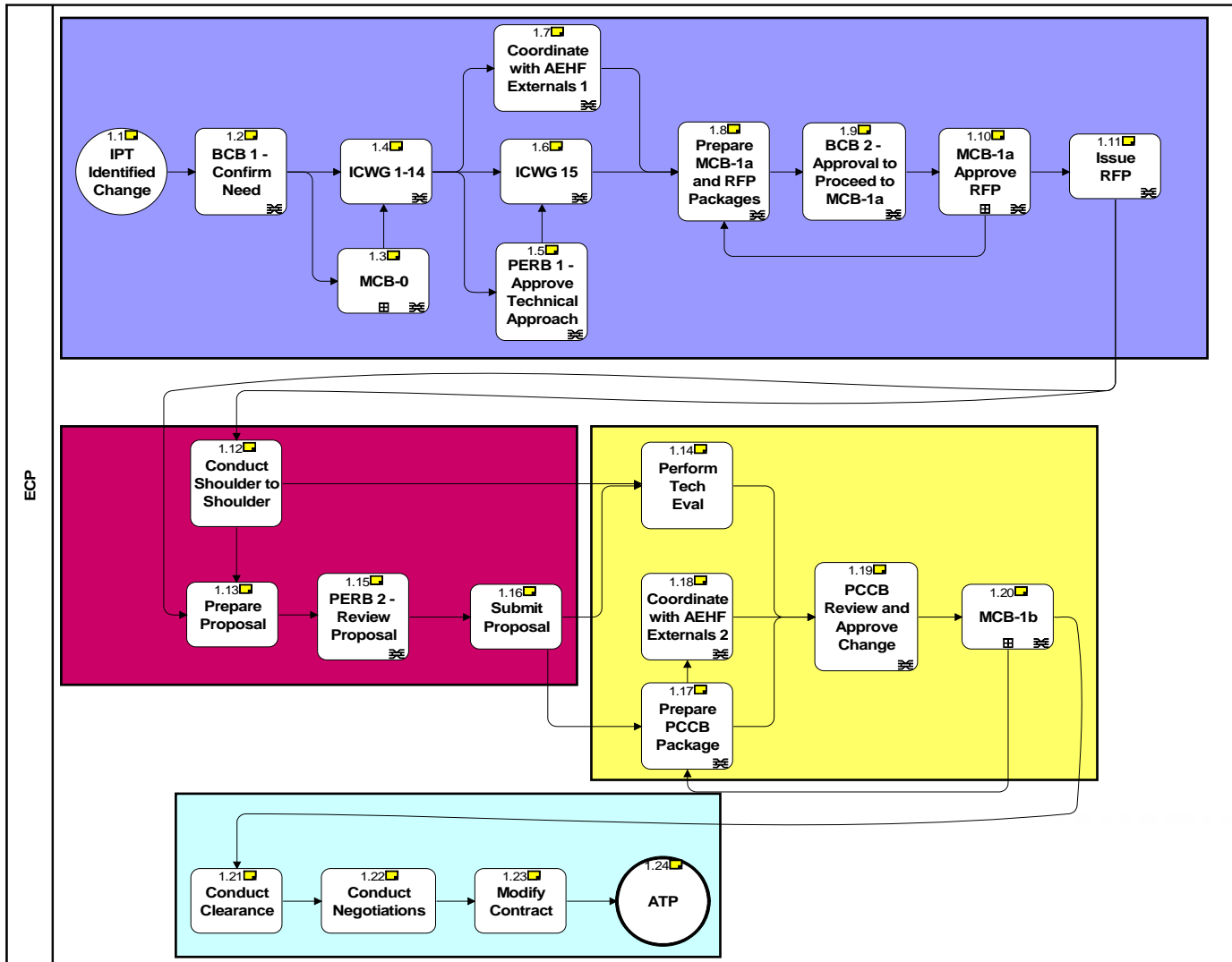
AFSO21 AEHF CP Initial State VSM Analysis

BCB1 **Through** MCB-1b

TOTAL	
Task	
Trigger	
Done	
Cycle Time (days)	321
Touch Time (days)	40.25
TAKT Time	
No. of People	492
Items in In-Box	
No. of Approvals	143
Distance Item Travels	
ESH Issue	
% Rework	
Top 3 Rework Issues	

25 STEPS	
10 GREENS	40%
8 YELLOWS	32%
7 REDS	28%

Wait Time (%)	87%

AFSO21 VSM AEHF Change Process Future State – July 2006

Legend:

1	- Pre-RFP
2	- Proposal
3	- Post Proposal
4	- Contract Mod

AFSO21 Value Stream Mapping Event – July 2006
AEHF Change Process

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- What Existed
  - *25 Steps, 321 Days of cycle time (Excluding Mod Phase)*
- What We Did
  - *Eliminated steps – Consolidated board meetings*
  - *Optimized Process Flow*
    - Performing technical and programmatic coordination in parallel
    - Improved Organizational Impact Analysis
  - *Started Activities Earlier – Improved Shoulder-to-Shoulder (StS) process to allow the Tech Evaluation to begin during the Proposal preparation phase*

- Results
  - *Excluding Mod Phase*
  - *19 steps – 24% Improvement*
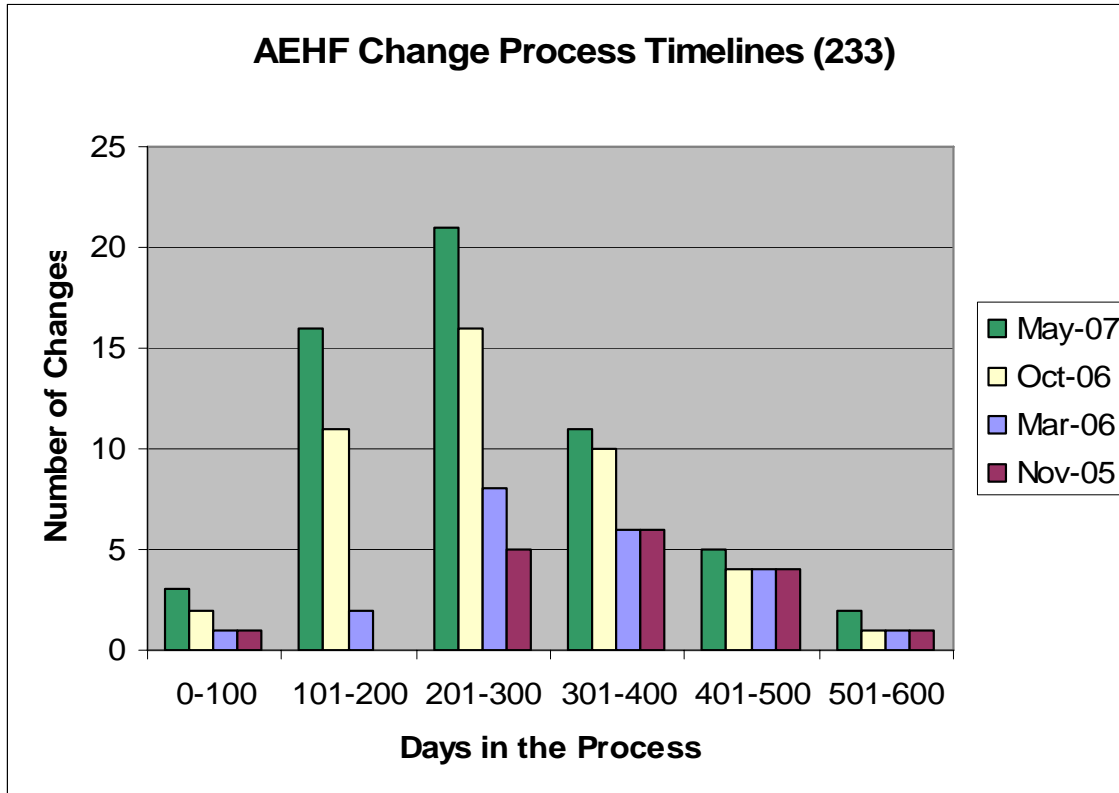 - *Cycle time 196 days – 39% Improvement*

Metrics – How Are We Doing?
Start through Contract Modification

AEHF Change Process Timelines (233)

- 17 ECPs/CCPs put on contract (05/05 – 10/05)
- 23 ECPs/CCPs put on contract (05/05 – 03/06)
- 44 ECPs/CCPs put on contract (05/05 – 10/06)
- 58 ECPs/CCPs put on contract (05/05 – 05/07)

- Median
  - *11/05 – 303 days ~ 43 weeks*
  - *03/06 – 252 days ~ 36 weeks*
  - *10/06 – 243 days ~ 35 weeks*
  - *05/07 – 233 days ~ 33 weeks*

- 30% Improvement including Mod Phase

VSM Lessons Learned

- VSM technique is a valuable tool in identifying "waste" in a process
- Keep the team lean and effective – 10-15 people
- Must have representation from all stakeholders
- Participants need to know the current process
- Participants need to have basic training in process improvement techniques
- Need experienced event facilitators
- Do not allow changes in team membership once the event starts
- Team leaders need to stay engaged throughout the event, especially during the "heavy lifting" activities
- Team leaders must be careful not to dominate the discussion
- Team leaders must make sure the discussion does not deviate to far from the plans
- Be vigilant to keep the "out-of-bounds" items out of discussions
- Have fun!

CMMI AEHF Program Office Assessment 2007 – Excerpts

- SMC Tailored CMMI® / Acquisition models, no numerical rating or process quality

- AEHF Best Practices – Within the Model
    - *A rigorous Change Management process is used to baseline and maintain requirements*
    - *All types of program changes are analyzed via the Change Management process*
    - *A rigorous Change Management System of boards and reviews includes the relevant stakeholders*

- Strengths Above the Model
    - *Baseline ECO Board (BEB) Master Matrix and waterfall chart are used to regulate change management process flow*

Summary

- A comprehensive Change Process has successfully supported the AEHF program for the past 3 years

- Further improvements are possible, necessary, and are being implemented

Any Questions?

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