Critical Role of Software Engineering in Development Planning and Sustainment

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Software – 21st Century Glue
Key Points

• Ever increasing SW performance and capital asset portfolio
• SW - 21st Century modernization pathway to delivering rapid, affordable performance to the war fighter for the life cycle
• Early SW choices have major, decades long technical and program consequences
• Renewed emphasis on Development Planning demands engagement, active role of SW community to design approaches enabling life long system performance enhancements
• Consistent, continual application of SW engineering for life cycle critical for war fighter success
DOD SW Portfolio (SLOC)

- Functionality
- System Performance
- Capability Enhancement
- Architecture
- Technology

- Cost
- Affordability
- Workforce

$ Sustainment/Yr

$ Investment

1 B

2 B

10 B 10 M

100 B 200 B

$ Investment

Software: Performance & Capital Asset Portfolio
Increasing Reliance on SW as Key Modernization Strategy Pathway

**Dynamic War Fighter Needs**

- SW Enabled Functions Nearing 100%
- Sustainment Time 4.5X Longer Than Dev-Prod

**Increasing Role of SW as Means to Achieve New Performance Gains**
Future Consequences of Early SW Decisions

Cumulative LCC
Cost to Fix

100%
10000X
1000X
100X
10X
25%
X

Percent of Baseline LCC Incurred, Non-Space Systems
Percent of Baseline LCC Incurred, Space Systems
Percent of Baseline LCC Committed
Cost to Identify & Resolve a Defect, and Incorporate Change

Early Technical Decisions
Sustainment
Can Facilitate Performance Enhancement for Decades

Adapted from Boeing study on ICBM Life Cycle Cost, 1973
Renewed Emphasis on Role of Development Planning

Development Planning

Materiel Development Decision (MDD)

Time - Decades

Full Rate Production Decision Review
Early Engineering Engagement Critical to Development Planning Success…

Software Engagement
Knowledge, Tools, Practice
...Continuity of SW Engineering Critical to Program Life Cycle Success

This is how we often think about SW Engineering...

How We Should Plan and Resource

Consistent, Continuous Engagement

Time in Decades
Software Engineering in Sustainment

Contents of Typical SW Release in Sustainment

15% Enhancements
15% Perfect Changes
70% Repairs

Measures for Maintenance Study, July 2010, USA/USAF
Future SW Sustainment Demands

Distribution of Effort

- Maintenance: 30%
- Sustaining Eng.: 25%
- IV&V/IV&T: 15%
- Acq. Mgmt.: 15%
- Interoperability: 10%
- Info. Assurance: 5%

Measures for Maintenance Study, July 2010, USA/USAF
Continuous Systems Engineering: Critical to Life Cycle Program Success

- Sustainment – the 21st Century route to performance enhancements for war fighter
- Must make right SW choices early in design enabling rapid, affordable enhancements in sustainment
- Imperative SW community proactively engage in Development Planning to influence best choices
- Develop knowledge, practices, and tools to make value contribution
- Consistent, continuous SW engineering engagement for multi-decade success

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Questions
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