Sustaining Software-Intensive Systems - A Conundrum

Mary Ann Lapham

Sponsored by the U.S. Department of Defense
© 2006 by Carnegie Mellon University
Agenda

What is Sustainment

Software Entrance Criteria for Sustainment

Top 10 Sustainment Challenges

Examples of Challenges

Conclusions
What is Sustainment?

Joint Publication 4-0 (Doctrine for Logistic Support of Joint Operations): “The provision of personnel, logistic, and other support required to maintain and prolong operations or combat until successful accomplishment or revision of the mission or the national objective”

DoDI 5000.2: “The first effort of the Operations and Support (O&S) phase established and defined by DoDI 5000.2. The purpose of the sustainment effort is to execute the support program to meet operational support performance requirements and sustain the system in the most cost effective manner of its life cycle. Sustainment includes supply, maintenance, transportation, sustaining engineering, data management, Configuration Management (CM), manpower, personnel, training, habitability, survivability, environment, safety (including explosives safety), occupational health, protection of critical program information, anti-tamper provisions, and information technology (IT), including National Security Systems (NSS), supportability and interoperability functions. Sustainment overlaps the Full Rate Production and Deployment (FRP&D) effort of the Production and Deployment (P&D) phase.”
Software Sustainment - Definition

Software maintenance and software sustainment are often used interchangeably. We will make a distinction.

**Software Maintenance**: “The process of modifying a software system or component after delivery to correct faults, improve performance or other attributes, or adapt to a changed environment.”

No definitive definition of software sustainment has been found, so our working definition is:

**Software Sustainment**: “The processes, procedures, people, materiel, and information required to support, maintain, and operate the software aspects of a system.”
Software Sustainment - Distinction

Software maintenance consists of:
• correcting the faults
• improving performance or other attributes
• adapting to a changed environment

Software sustainment addresses other issues not always included in maintenance, such as:
• operations
• documentation
• deployment
• security
• CM
• training
• help desk
• COTS management
• technology refresh
Software Entrance Criteria for Sustainment

- Signed Source of Repair Assignment Process (SORAP)
- Completed Operational Test & Evaluation
- Stable software production baseline
- Complete current software documentation
- Authority to Operate (ATO)
- Sustainment Plan
- Current & negotiated sustainment transition plan
- Sustainment staff training plan

Key:

- Good
- Caution
- Warning
- Critical

Example:

Note: Based on SEI experience with actual programs
Some Sustainment Challenges

Lack of funding for transition planning
Lack of signed SORAP
Unclear Information Assurance requirements to finalize ATO
Unaddressed support database transition logistics
Unclear COTS license management
Sustainer inexperience with COTS-based systems
Loss of key contractor staff and expertise
Over reliance on contractor development processes and proprietary tools
No formal training for sustainers
Lack of parallel Sustainment/Development Management Plan
Selected Examples of Challenges

COTS

Programmatic System Transition

Information Assurance (IA)

• Indicates Major Concern
COTS Obsolescence & Upgrade Planning

New complexity to handle

- Demand for features
- Unsupported releases
- No market demand

RIP

Fielded System Instances

Incremental system releases

- System development
- Tech refresh, system sustainment

COTS Vendors

System Context

Simultaneous Definition and Tradeoffs

Marketplace

Architecture & Design

System development

Demand for features

New complexity to handle
COTS “Business” Issues

- New “business” issues (licenses, data rights, warranties) to resolve
Programmatic Issues

• Transition tasks in development contract
• Funding for development contractor
• Funding for sustainer
• Transition plans created and implemented
• Sustainer training created

• Signed SORAP required
System Transition

- Staffing issues – loss of staff
- Training issues – staff up to speed
- Complete documentation – hand-off
- Expert knowledge transfer/loss
System Engineering
- Decisions
- Schedules

• Security not involved in system engineering decisions
• How secure is the overall system?
Conclusions

Sustainment is a balancing act
• Definitions (what’s included)
• Planning
• Coordination on issues
• Risk Mitigation
Contact Information

Mary Ann Lapham
Software Engineering Institute
Carnegie Mellon University
4500 Fifth Avenue
Pittsburgh, PA  15213-3890

mlapham@sei.cmu.edu
412-268-5498