

**GSAW 2007**

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**Software Acquisition Best Practices  
for Ground Systems**

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**March 27, 2007**

# The Big Issues and Challenges in Acquiring Ground Systems

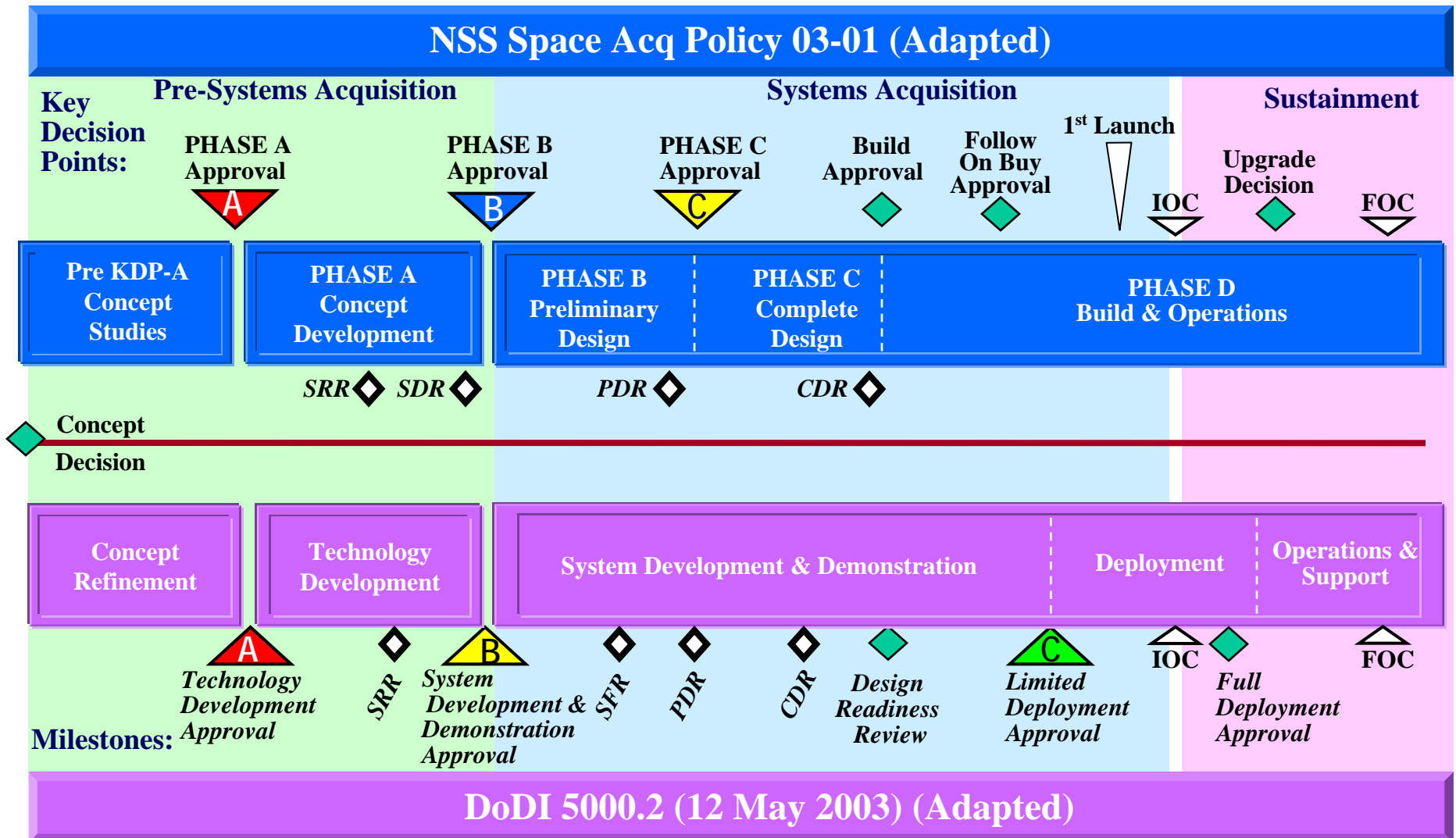
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**Executability**

**Mission Assurance**

# Example DoD and NSS Acquisition Models Tailored for Software-Intensive Systems without Production



# Reducing Space System Acquisition Risk with Software Acquisition Best Practices

## NSS Space Acq Policy 03-1

Pre-Systems Acquisition

Systems Acquisition

Sustainment

Key Decision Points:

PHASE A Approval



PHASE B Approval



PHASE C Approval



1<sup>st</sup> Launch



IOC



FOC



Pre KDP-A  
Concept  
Studies

PHASE A Concept  
Development

PHASE B  
Preliminary  
Design

PHASE C  
Complete  
Design

PHASE D  
Build & Operations

SRR



SDR



PDR



CDR



Software Product  
& Process Risk  
Reduction

Contractor  
Capability  
Evaluation

Software-  
Inclusive System  
Requirements

Software-  
Inclusive System  
Architecture

Realistic Software  
Size, Cost and  
Schedule Estimates

Robust Software  
Architecture

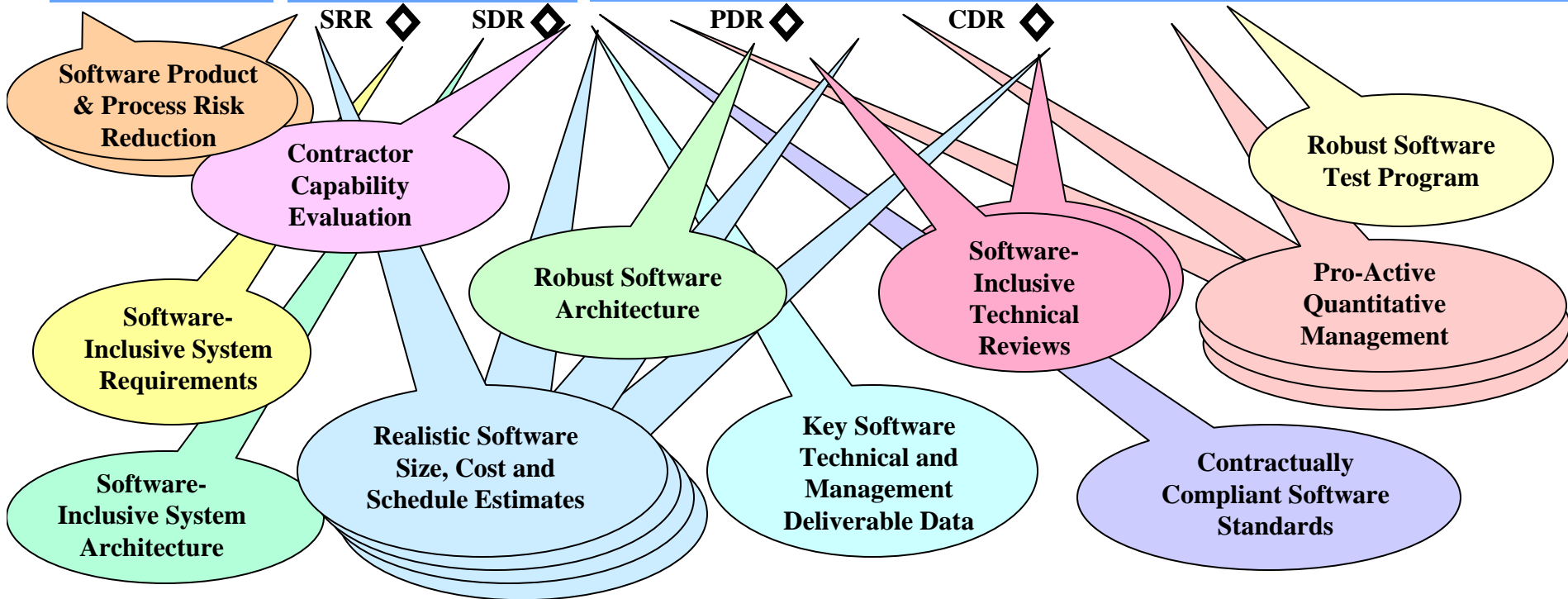
Key Software  
Technical and  
Management  
Deliverable Data

Software-  
Inclusive  
Technical  
Reviews

Contractually  
Compliant Software  
Standards

Robust Software  
Test Program

Pro-Active  
Quantitative  
Management



# Software Acquisition “Best Practice” Contract



## SOW

- Comply with SDP
- Do COTS SW trade studies
- Hold SW technical reviews
- Undergo periodic software process appraisals



## Contract Reqs

- Software-inclusive system requirements
- COTS software support requirements



## Deliverable Data

- Software plans
- Reqs & architecture
- Test documentation
- Metrics reports
- O&M documentation



## Special Provisions

- Electronic access to all software products
- Access to prime & subcontractor software technical & mgmt data



## Compliance Docs

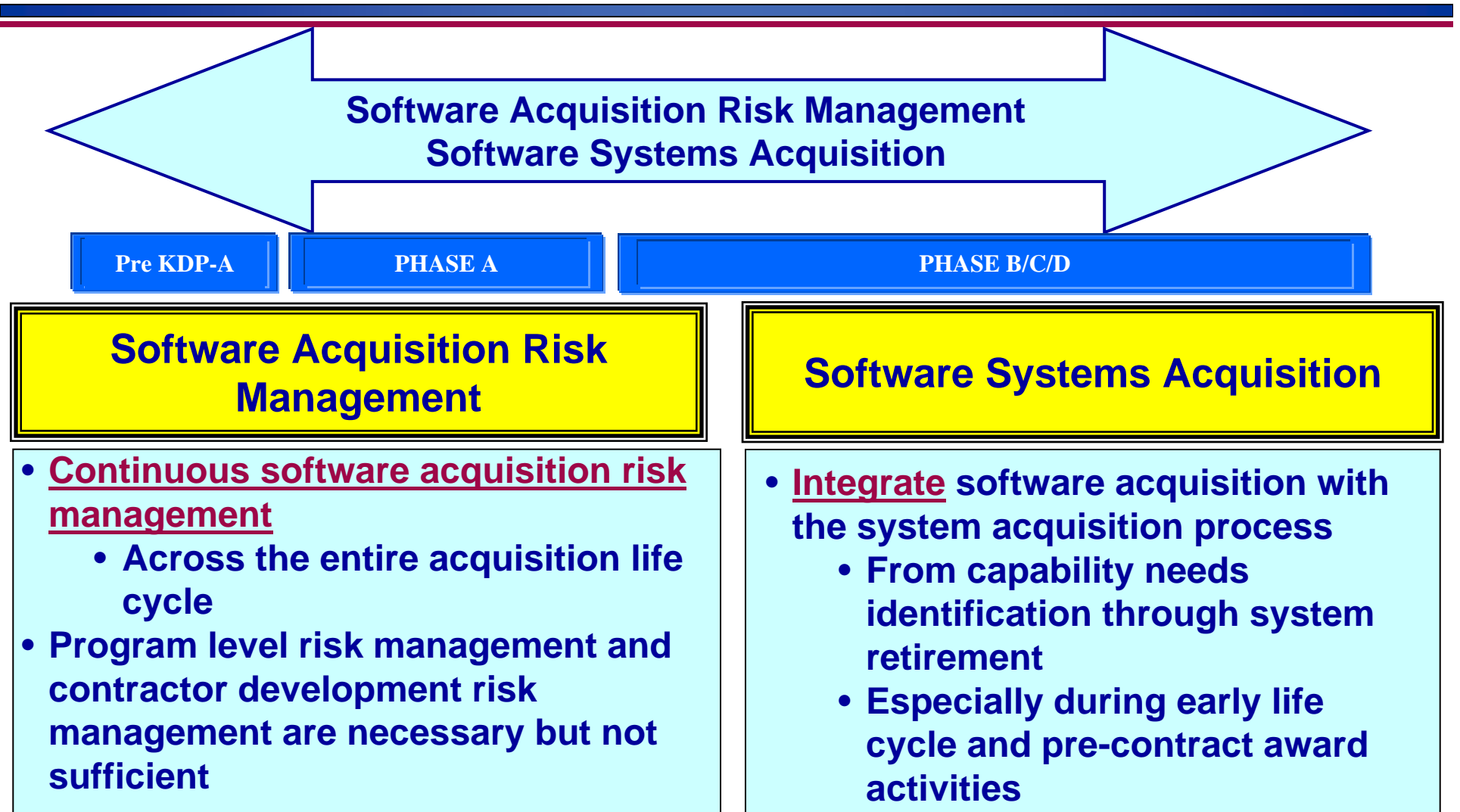
- Full life cycle software standard
- Other software-related standards



## Award Fee Plan

- Software quality
- SW architecture for evolution and legacy transition

# Best Practices that Span the Acquisition Life Cycle



# Conclusion

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- **Software acquisition best practices do not guarantee success**
  - ❖ They are not a panacea!
- **Using best practices, however, can reduce risk in complex software-intensive ground system acquisitions**

# References

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- L. A. Abelson, R. J. Adams, and S. Eslinger, *Metrics-Based Software Acquisition Management*, Aerospace Report No. TOR-2004(3909)-3405, May 2004.
- R. J. Adams and S. Eslinger, *A Framework for Software Products Within a System Context (2<sup>nd</sup> Edition)*, Aerospace Report No. TR-2002(8550)-3, May 2002.
- R. J. Adams and S. Eslinger, *COTS-Based Systems: Lessons Learned from Experiences with COTS Software Use on Space Systems*, Aerospace Report No. TR-2001(8550)-1, September 2001.
- R. J. Adams, S. Eslinger, P. Hantos, K. L. Owens, L. T. Stephenson, J. M. Tagami, and R. Weiskopf, *Software Development Standard for Space Systems*, Aerospace Report No. TOR-2004(3909)-3537, Revision B, March 2005.
- R. J. Adams, S. Eslinger, K. L. Owens, and M. A. Rich, *Software Acquisition Best Practices: Experiences from the Space Systems Domain*, Technical Report No. TR-2004(8550)-1, September 2004.
- R. J. Adams, S. Eslinger, K. L. Owens, and M. A. Rich, *Reducing Software Acquisition Risk: Best Practices for the Early Acquisition Phases*, Technical Report No. TR-2006(8550)-1, January 2006.
- R. J. Adams, S. Eslinger, K. L. Owens, and M. A. Rich, *Software Acquisition Best Practices Tutorial*, Technical Report No. TR-2005(8550)-1, September 2005.
- P. Hantos, *Evolutionary Acquisition and Spiral Development Tutorial: Revision B*, Technical Report No. TR-2006(8550)-2, 30 October 2006

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# Acronyms and Abbreviations

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<b>Acq</b>	<b>Acquisition</b>
<b>CDR</b>	<b>Critical Design Review</b>
<b>COTS</b>	<b>Commercial Off-the-Shelf</b>
<b>Docs</b>	<b>Documents</b>
<b>DoD</b>	<b>Department of Defense</b>
<b>DoDI</b>	<b>DoD Instruction</b>
<b>FOC</b>	<b>Full Operational Capability</b>
<b>GSAW</b>	<b>Ground Systems Architecture Workshop</b>
<b>IOC</b>	<b>Interim Operational Capability</b>
<b>KDP</b>	<b>Key Decision Point</b>
<b>Mgmt</b>	<b>Management</b>
<b>NSS</b>	<b>National Security Space</b>
<b>O&amp;M</b>	<b>Operations and Maintenance</b>
<b>PDR</b>	<b>Preliminary Design Review</b>
<b>Reqs</b>	<b>Requirements</b>
<b>SDP</b>	<b>Software Development Plan</b>
<b>SDR</b>	<b>System Design Review</b>
<b>SFR</b>	<b>System Functional Review</b>
<b>SOW</b>	<b>Statement of Work</b>
<b>SRR</b>	<b>System Requirements Review</b>
<b>SW</b>	<b>Software</b>