RESEARCH BRIEF OVERVIEW

Quantifying Flexibility For The Operationally Responsive Space Paradigm

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Researcher’s Background
Lauren Viscito

• Research Interests
  – Value-driven tradespace exploration
  – Lifecycle design issues / “ilities”
  – Operationally Responsive Space

• Education
  – M.S. Aerospace Engineering (expected MIT ‘09)
  – B.S. Astronautical Engineering (USAFA ’07)

• Professional Experience
  – FalconSat IV and V ADACS Design Team Member
Motivation

• Stakeholders do not always express all their needs
• The current practice poor regarding making choices for future changes
• Limited set of heuristics to guide where to embed flexibility
• Out of the wide variety of uncertainties that a new system faces, only a limited set of technical and development risks (e.g. those that can be handled by margins, redundancies and risk management plans) are considered
  – The unknowns that await the system, such as threats and changing needs, are only considered qualitatively
  – Any possibly upsides to uncertainty rarely included quantitatively in conceptual designs
• Start designing systems in order to exploit the uncertainty inevitable when designing complex systems
**Project Title**: Quantifying Flexibility for the Operationally Responsive Space Paradigm

**Sponsor**: Air Force Office of Scientific Research

**Goal**: Provide tools and metrics for high level decision makers to evaluate flexibility during conceptual design.

**Approach**: Collaborative engagement using a selected ORS model as the basis for exploratory research in applying methodology to cases with operational and environmental fluctuations.
Anticipated Contributions

**Expected Outcomes:**
- Further validation and refinement of MIT tradespace method
- Enhance methods and capabilities of AFOSR
- Quantification of ORS paradigm in terms of flexibility

**Broader Impact:**
- Jointly developed new knowledge in application of tradespace methods to problems with high levels of uncertainty

**Knowledge Deployment:**
- Paper for 2008 Conference on SE Research (CSER)
- Paper for 2008 RS6 Responsive Space Conference
- Future paper to highlight experiences with the research collaboration
- Case study incorporated into MIT curriculum