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Systems Engineering and the Design of Arms Control Monitoring Regimes

Sharon DeLand, Jay Brotz, Peter Marleau

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Introduction

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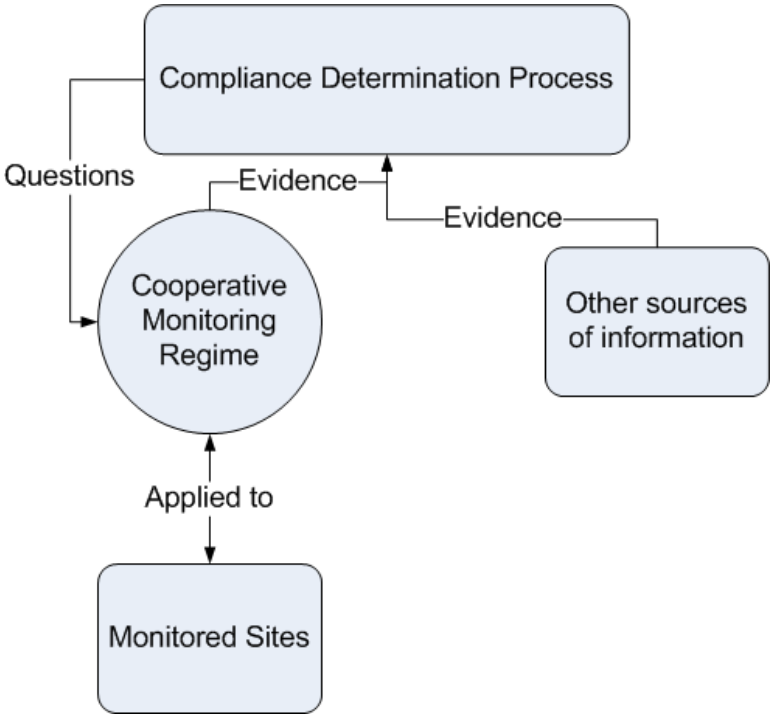
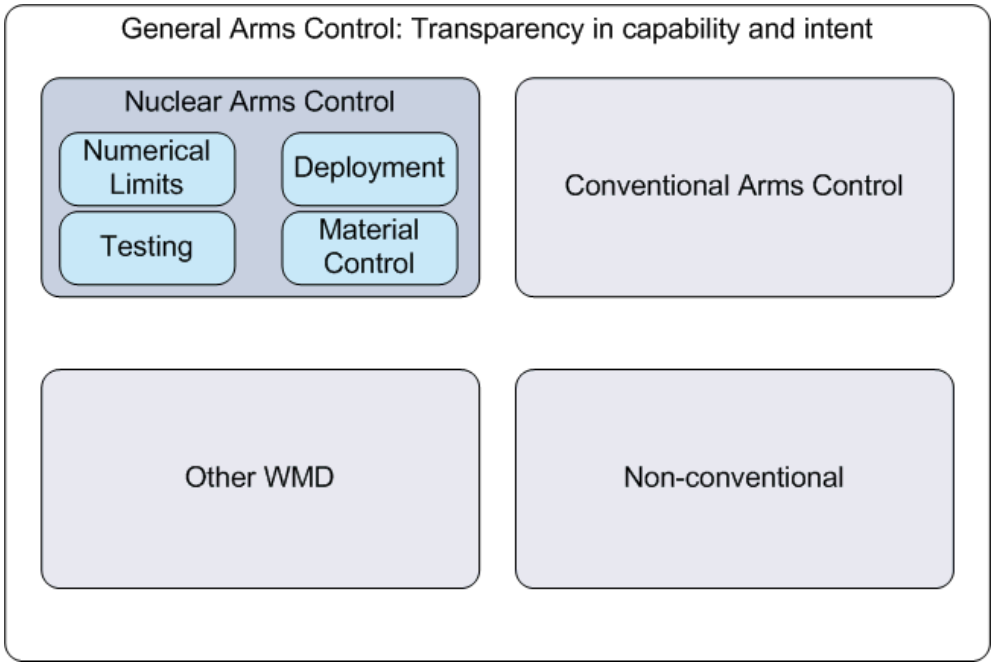
- Monitoring regimes need to satisfy complex (and often ill-defined) set of objectives
- Systems engineering offers an analysis methodology and traceability to aid in the design, implementation, and evaluation of successful systems
- Paper focuses on three concepts
  - Context Diagram
  - Traceability
  - Verification and Validation

Context Diagram

Describes the boundary of the system and its environment and descirbes the interaction of the system with other entities

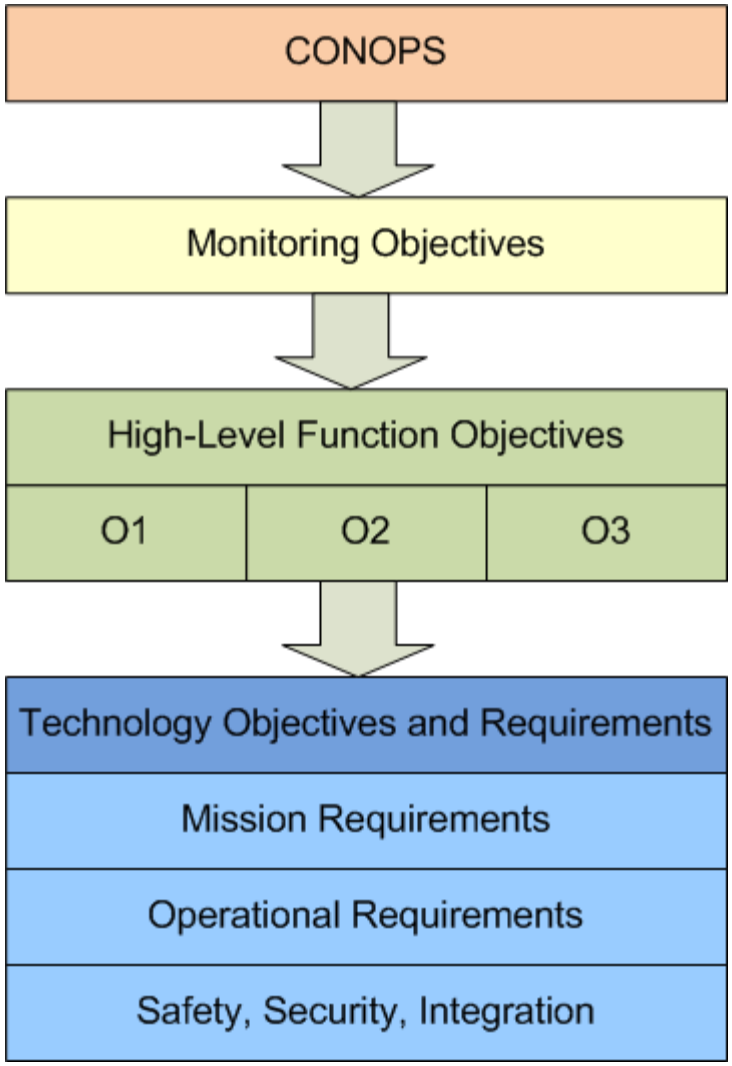


Notional context diagram



An series of diagrams would show how different regimes relate to each other and national security objectives

Traceability of Requirements/Design



Traceability of requirements helps ensure objectives are met

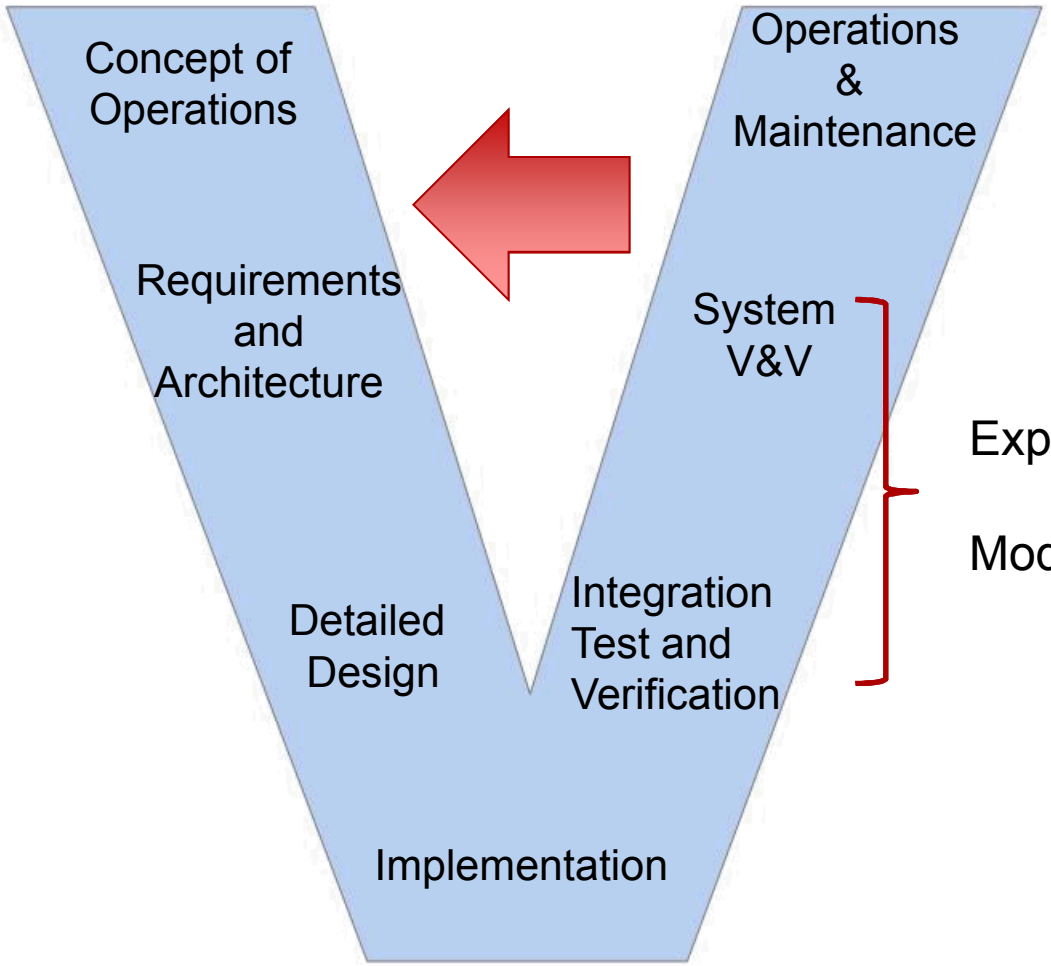
Designs define how requirements are met

As detail is added, useful to add physical design and interactions

High-level design could define what facilities are monitored and for what purpose

Detailed design defines how monitoring occurs at each facility

Validation and Verification (V&V)



Next Steps

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- Explore and develop context diagrams for existing and future regimes:
  - Understand the range of interactions a regime may need to support
  - Establish traceability to higher-level security objectives
  - Focus on implicit monitoring objectives that ultimately affect requirements and design decisions
- Outline concepts of operation, high-level requirements and high-level designs for subset of monitoring regimes
  - Consistent with many of the ongoing activities – provides additional options for capturing and sharing knowledge
  - Develop standard monitoring architectures
- Standards for validation of performance of monitoring regimes