



Network Centric Operations
Industry Consortium

Overcoming Roadblocks to Interoperability

Modeling, Simulation & Demonstration

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Modeling, Simulation & Demonstration Working Group Co-Chair

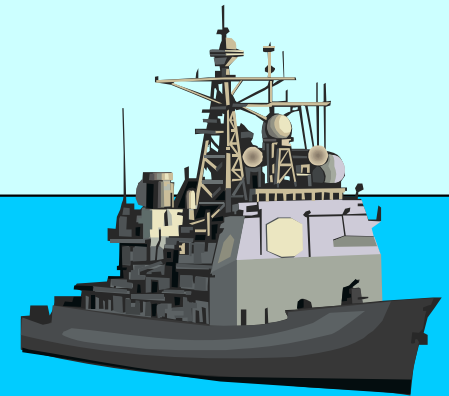
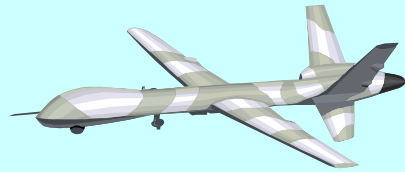
Battlespace Information 2007

March 19, 2007

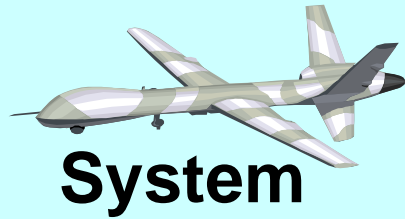
System of Systems Interoperability

- System of Systems Interoperability is an integration issue.
- Network Centric Operation implies System Of Systems on line Integration when the operation takes place.
 - NCOIC System Engineering Process to prepare on line System of Systems integration

Network Centric Operations



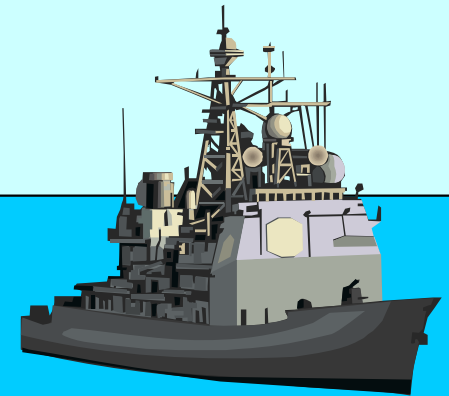
System of Systems



System



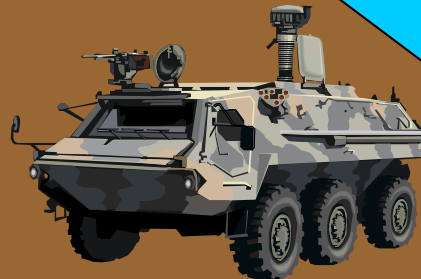
System



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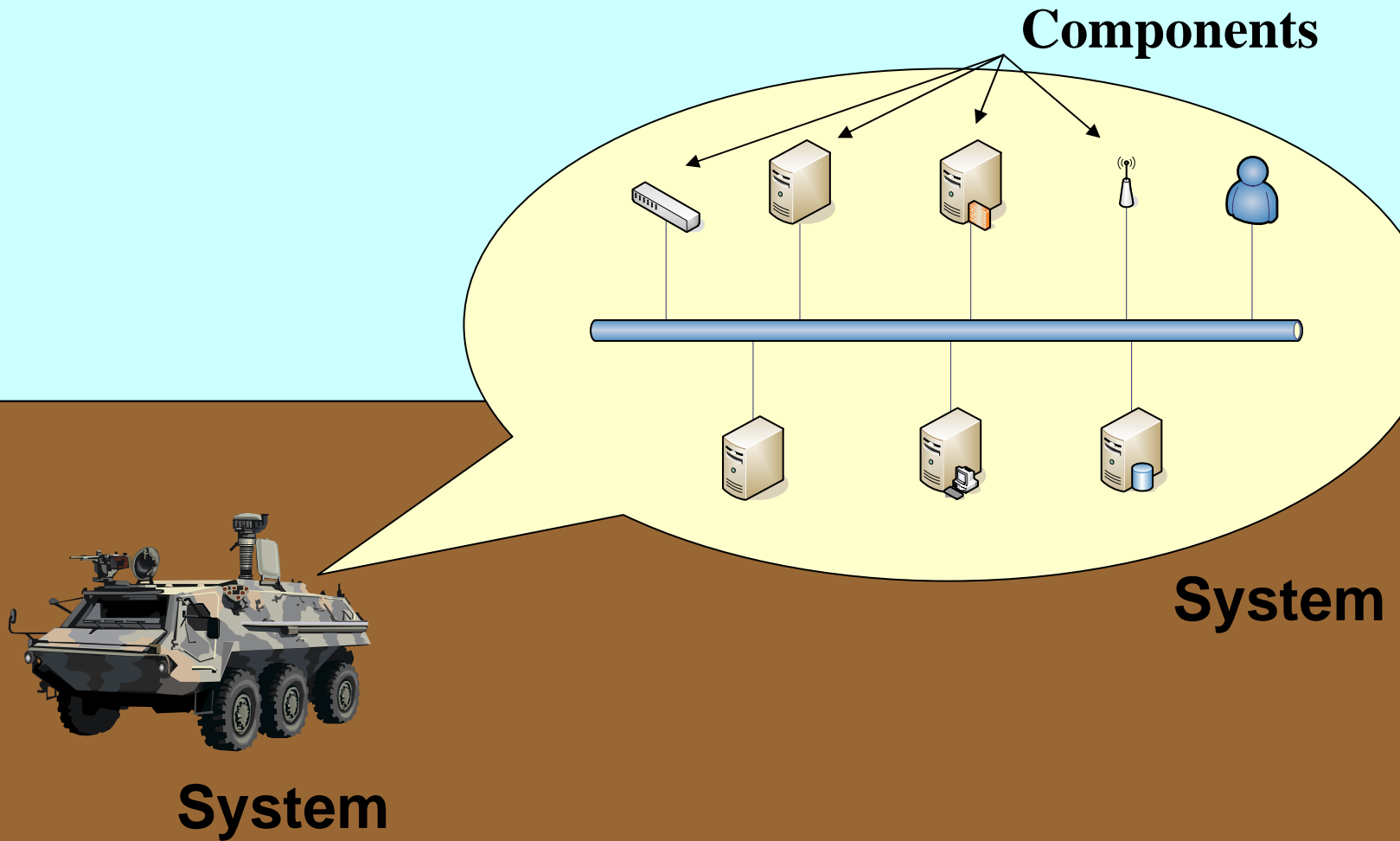


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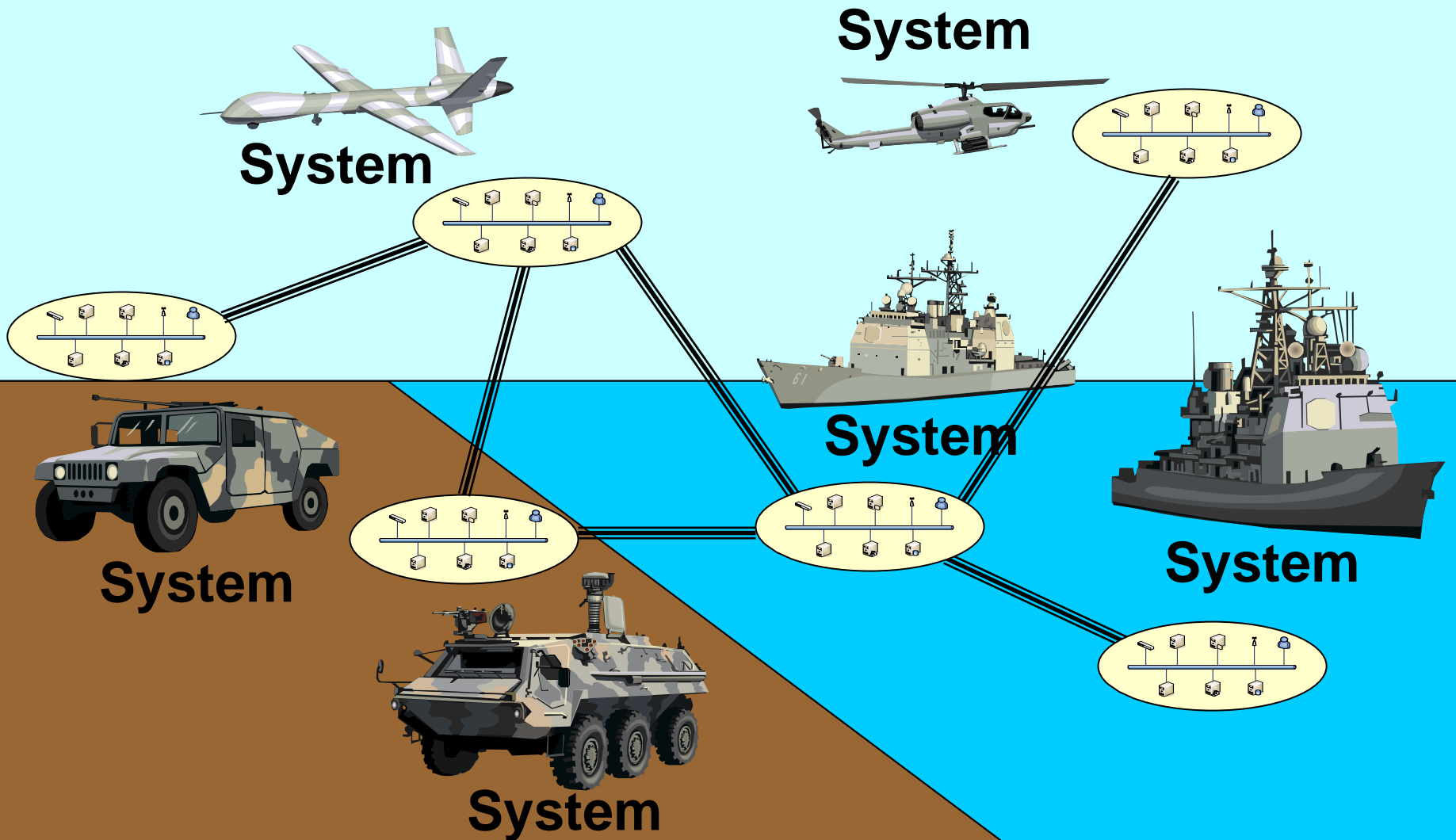


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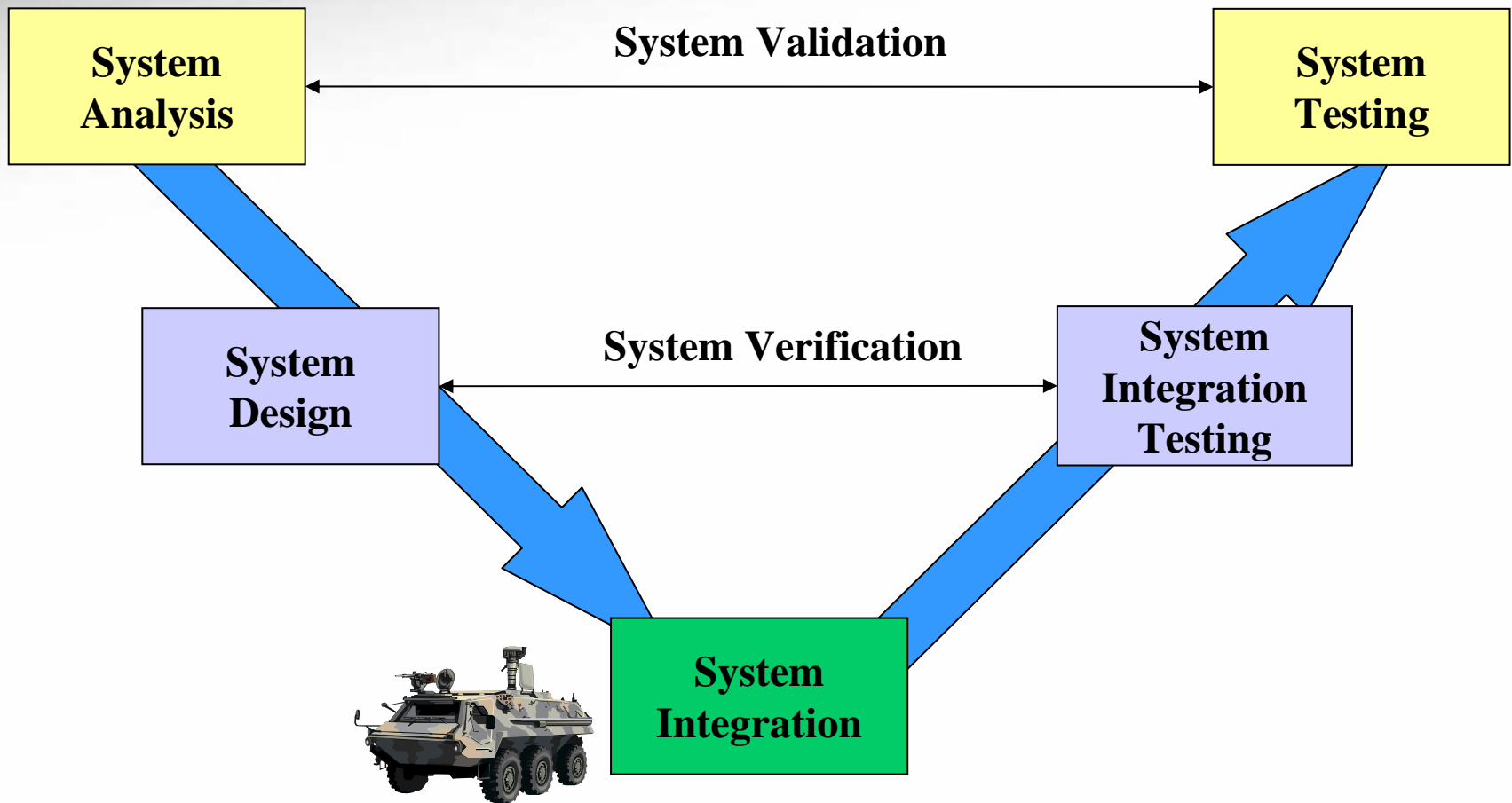
Single System



System of Systems Integration



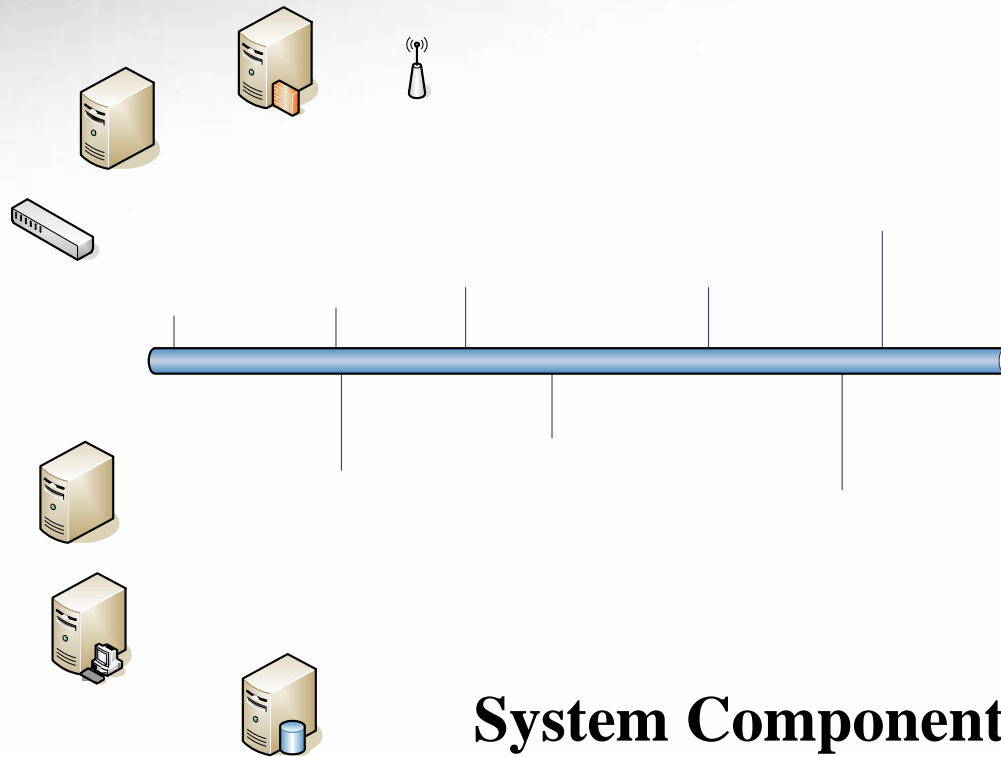
Usual System Engineering Process



Vocabulary Precisions

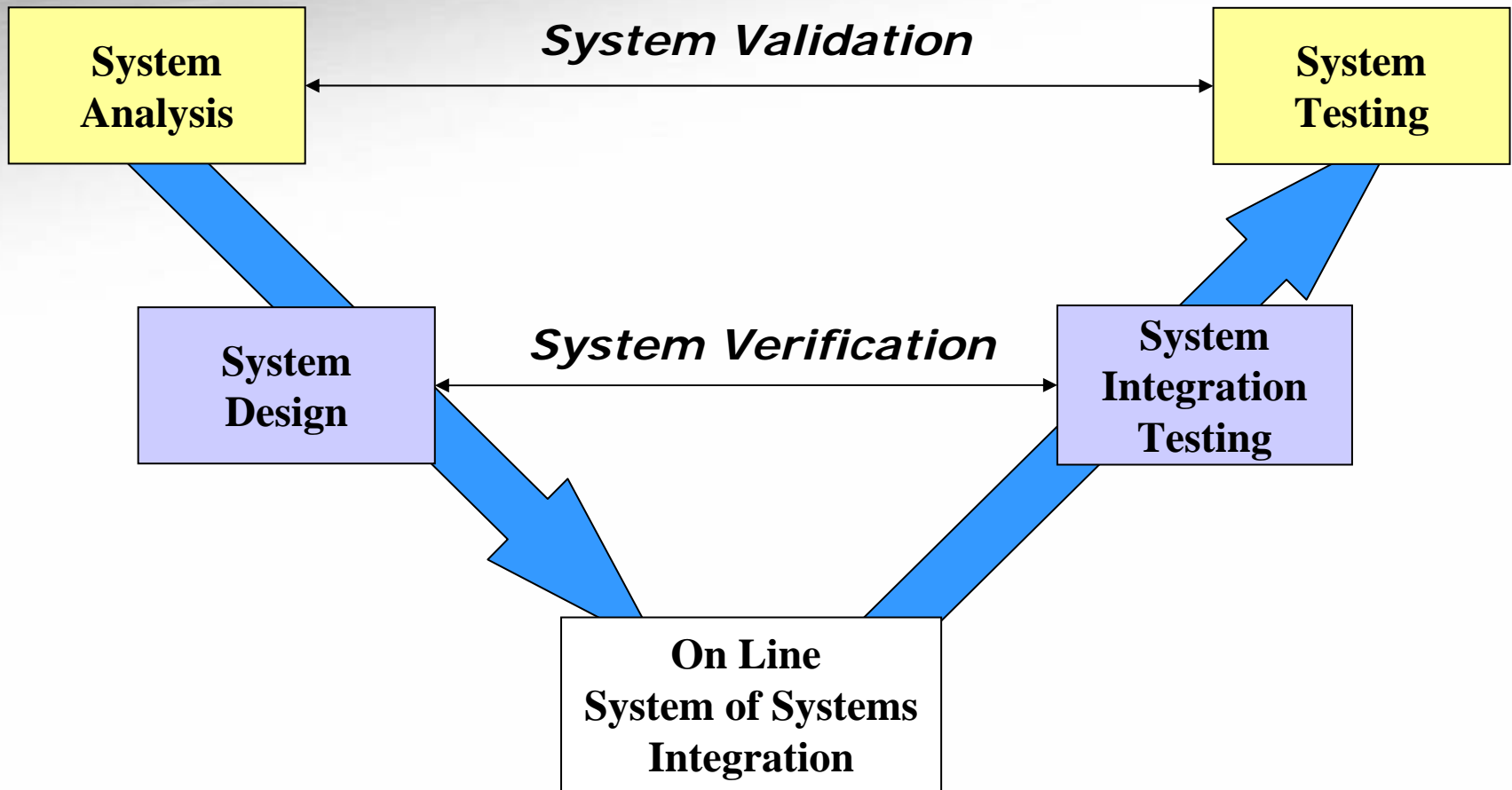
- Analysis activities address :
 - The problem
 - User Requirements, Operational Scenario, User Needs.
- Design activities address :
 - The solution
 - Design, Architecture, Technical issues
- Integration activities address :
 - System Building
- Verification activities address:
 - Architecture
 - Design issues
 - Technologies
- Validation address
 - Operational scenario execution for system validation.

Single System Integration



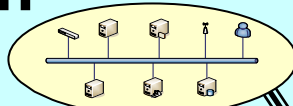
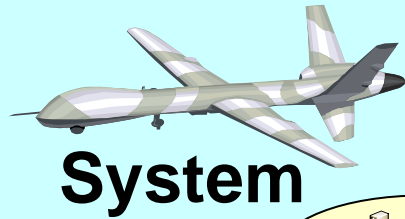
**Build the
System by connecting
Single Components**

NCO System Engineering Process

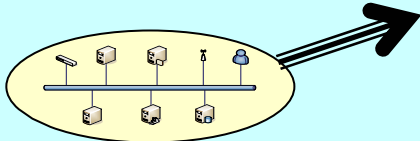
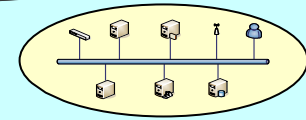


Network Centric Operations

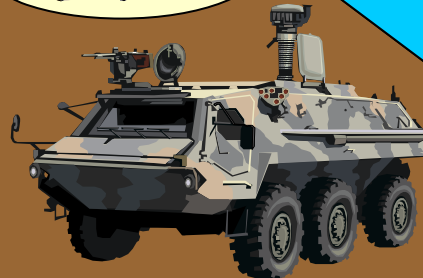
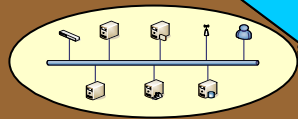
System of Systems Integration at Run Time



System



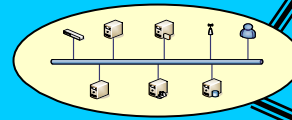
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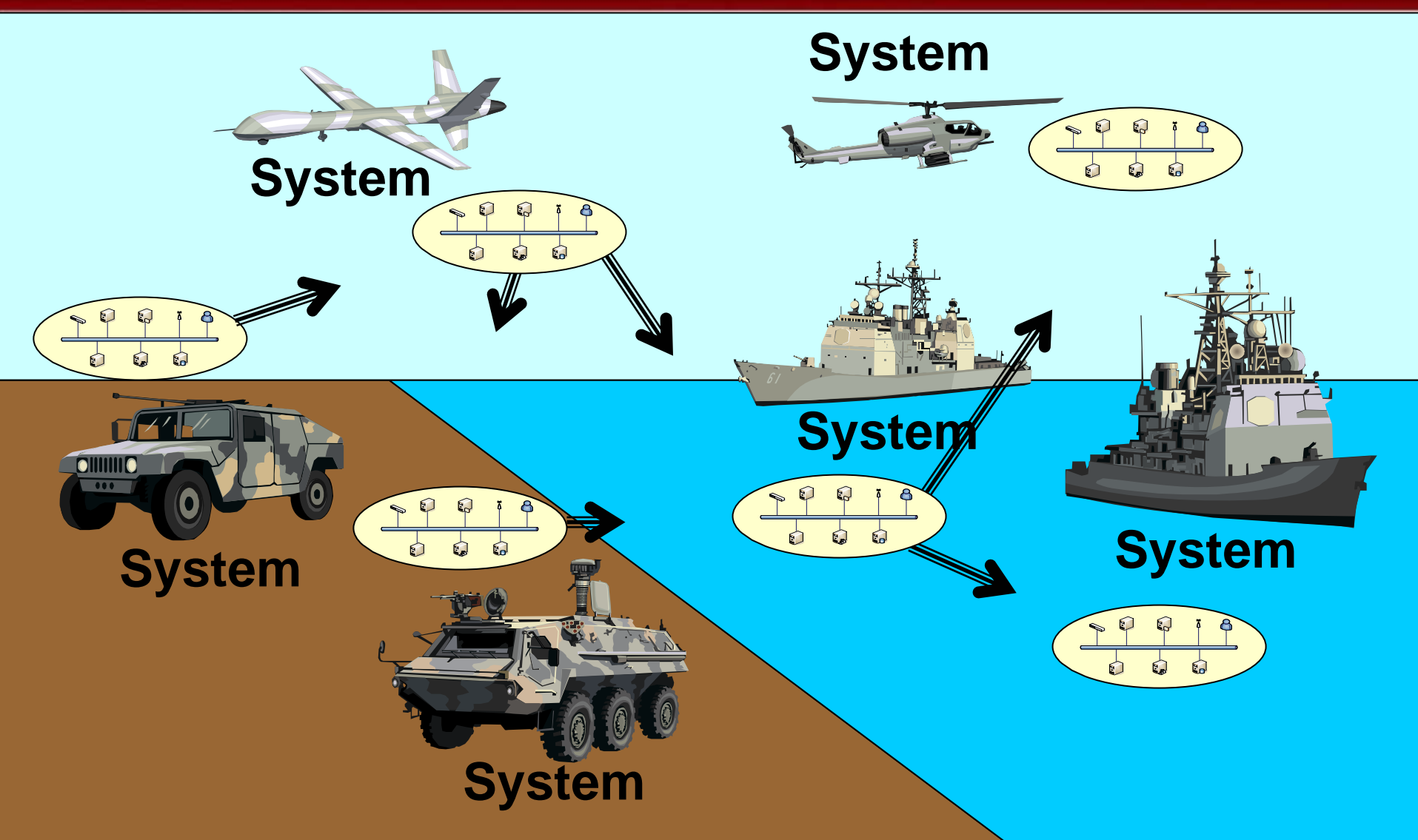
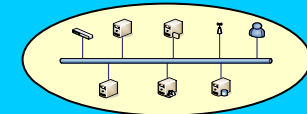
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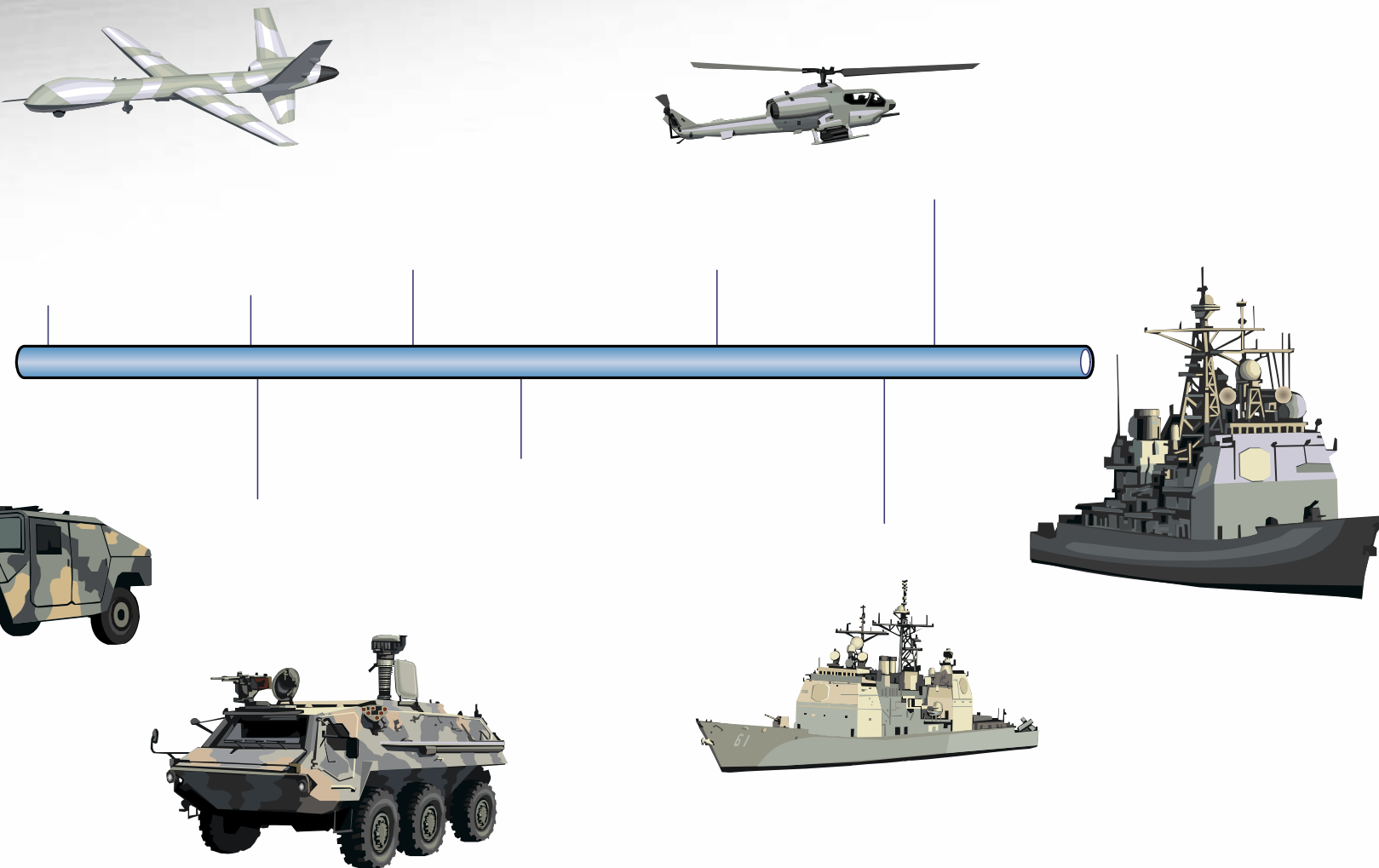
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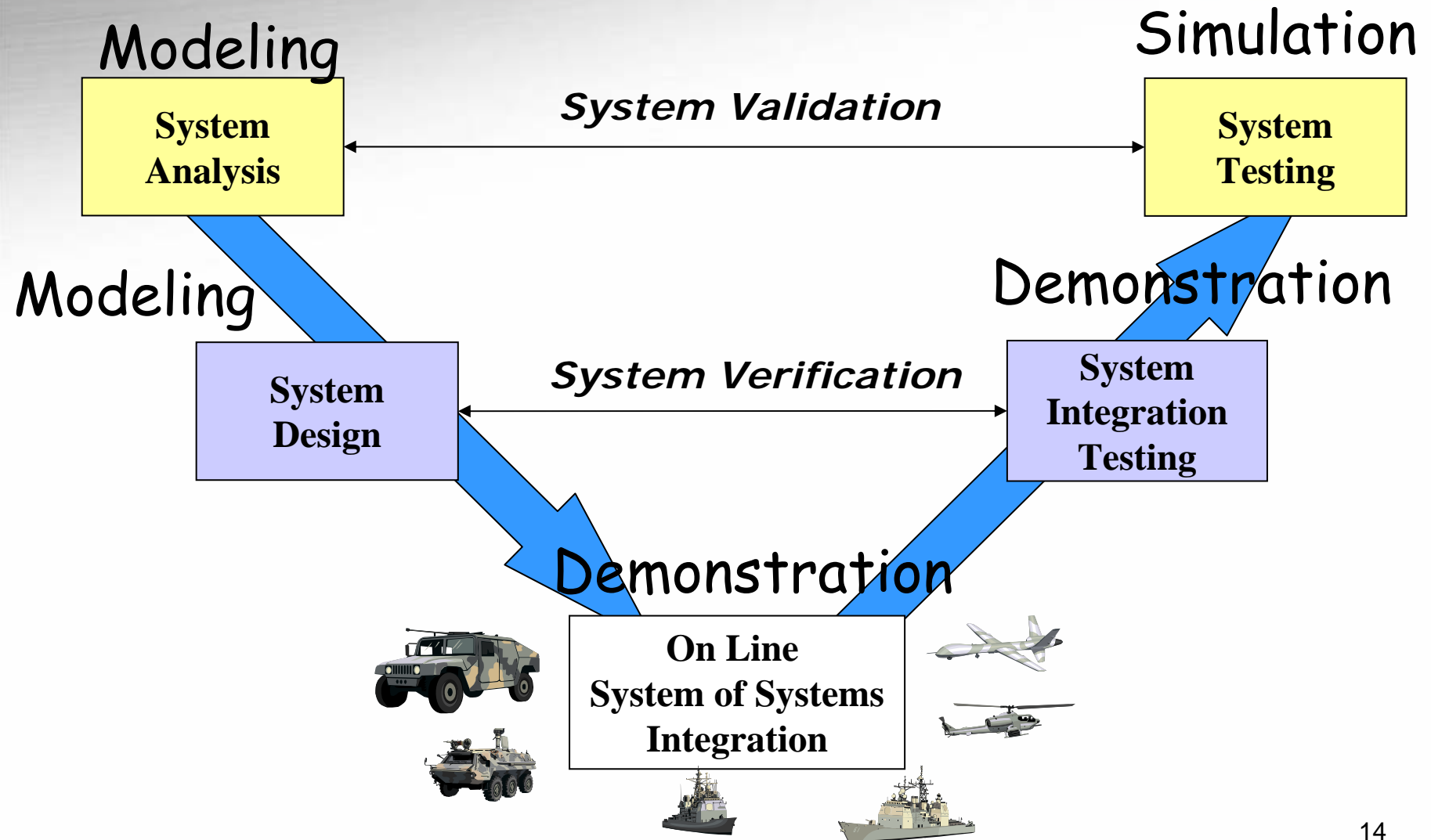
System of Systems On Line Integration on the Battlefield



NCO System Integration Issue

- Integration will take place during actual operation
- NCOIC Prepare integration without actual systems.
 - System Analysis Design = Modeling
 - System Analysis Validation = Simulation
 - System Design Verification = Demonstration

NCO System Engineering Process



NCOIC System Engineering Process

- NCO System Engineering team prepares on line System of Systems integration
- Network Centric Operation System Engineering team:
 - NCOIC members
- Network Centric Operation System of Systems Components:
 - NCOIC Members Products

NCOIC System Engineering Modeling, Simulation Demonstration

- Network Centric Operation System of Systems Architecture
 - Modeling :
 - Analyze and Design
 - Simulation:
 - Validation
 - Demonstration:
 - Integration and Verification

NCOIC System Engineering Modeling

- NCOIC Modeling : NCO System of Systems Analysis
 - NCO Operational Scenario Modeling
 - NCO Operational Use Case Modeling
 - NCO User Requirement Modeling
- NCOIC Modeling : NCO System of Systems Design
 - NCO Common Information Model Modeling
 - NCO Architecture Modeling
 - NCO Patterns Modeling

NCOIC System Engineering Simulation

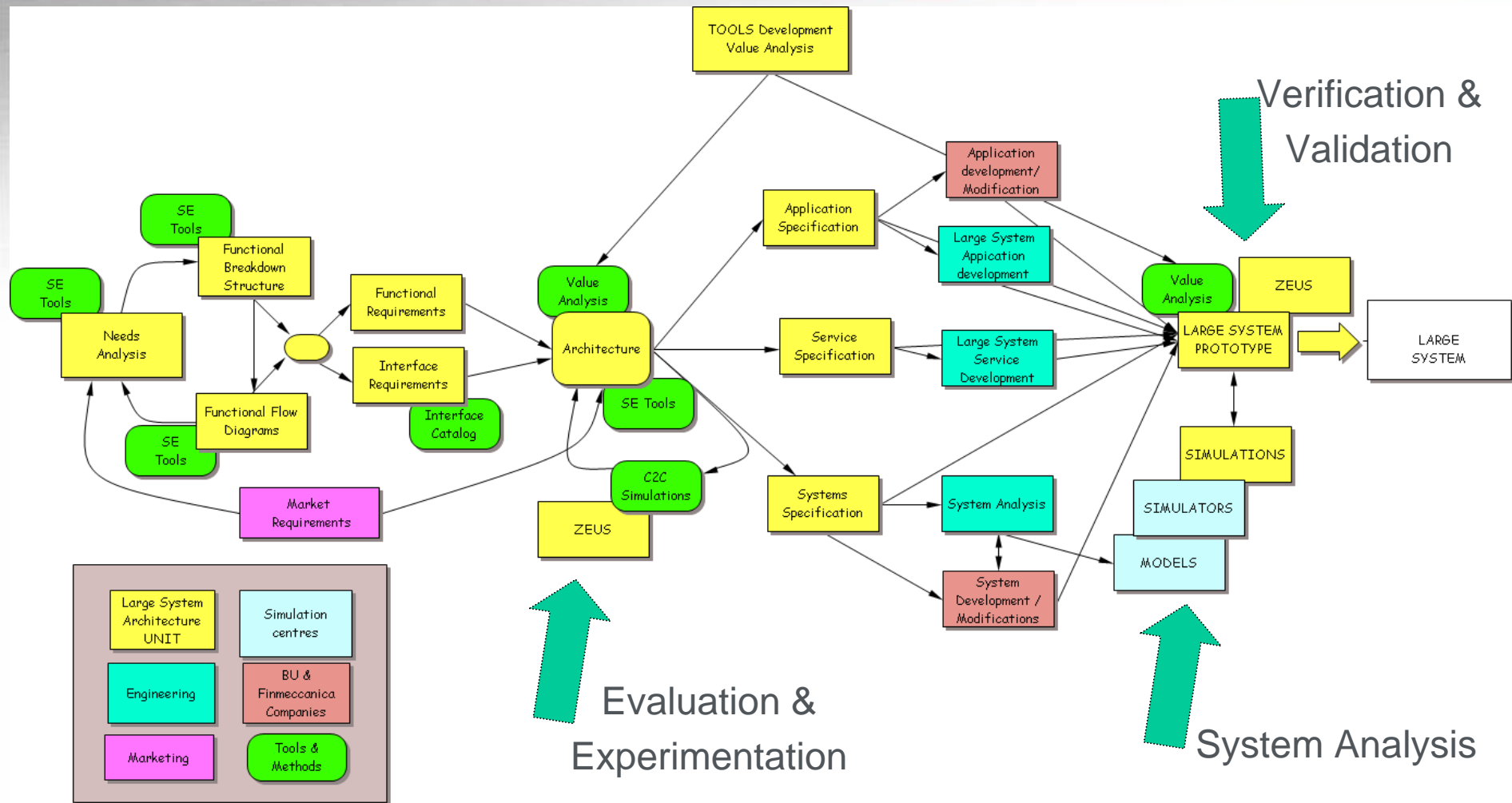
- NCO System of Systems Validation
 - NCO Operational Scenarios Validation
 - NCO System of Systems Architecture Validation
 - NCO System of Systems Integration Validation

NCOIC System Engineering Demonstration

- NCO System of Systems Design Verification
 - Operational Architecture Verification
 - Technical architecture Verification
 - Patterns Verification

- NCO System of Systems Integration Verification
 - Components Verification
 - Components Architecture Verification
 - Technologies Verification
 - COTS technologies Verification

How Simulation Supports NCO Systems Development Process



Networked M&S for NCO Experiments



NCO enabled

