

Simulating Information Warfare

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Simulating Information Warfare

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TheSMiGroup
LINKING BUSINESS with INFORMATION

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Full Spectrum IO

Conducting Information Operations means...

Integrating and synchronizing traditionally independent capabilities and activities in support of the commander's mission.

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Evolving IO M&S Requirements

- ◆ Represent information as a commodity
- ◆ Represent tasking assets and collection of information
- ◆ Represent the realistic flow of information to units around the battlefield
- ◆ Represent processing information
- ◆ Represent perceptions built from information flowing into the unit
- ◆ Base commander's decisions on the unit perception
- ◆ Enable the protection of friendly and attack of enemy decisions, information, and information systems

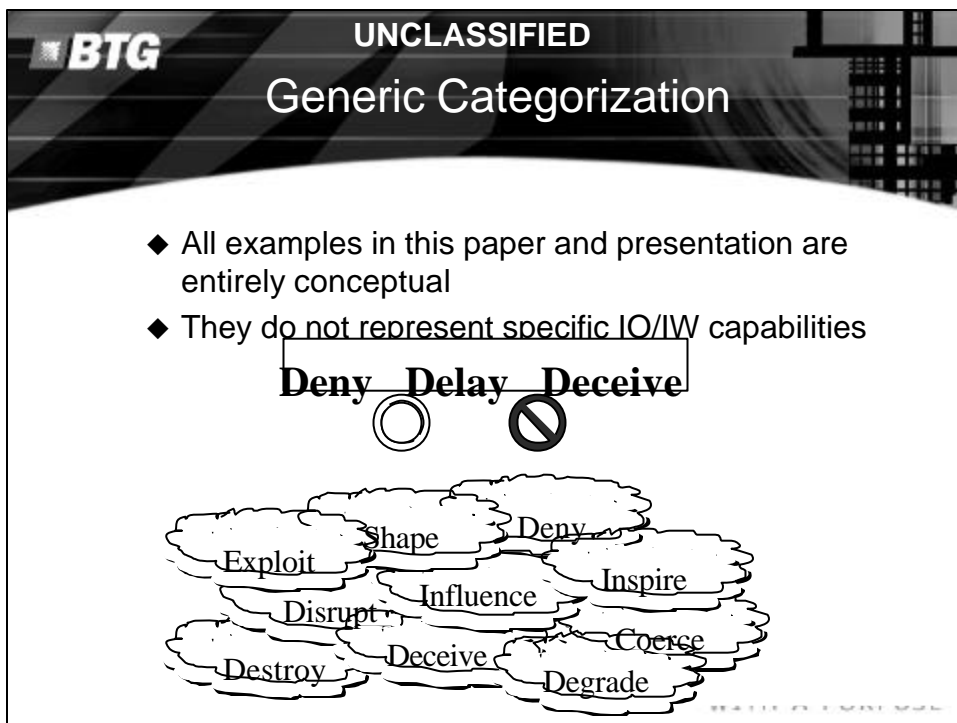
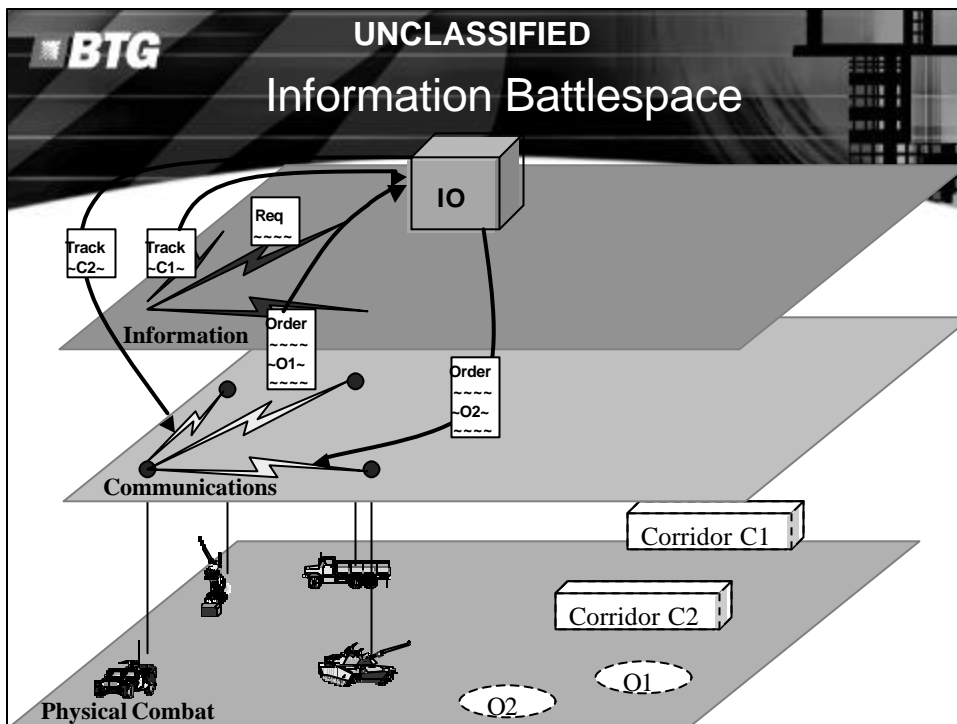
Link IO to Operational Outcomes

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IO Modeling Approaches

STEP 1	STEP 2	STEP 3
<p>Manual IO in Exercises</p> <ul style="list-style-type: none"> •IO Tools •Leverage Simulation Services and Communications Links •Manual Intervention <p>•Integral to System Equipment Layout</p>	<p>IO Against Simulation</p> <ul style="list-style-type: none"> •IO Model Federate •Leverage Infrastructure Services •Access Shared Data <p>•Independent of Software Developers</p>	<p>Modeling IO</p> <ul style="list-style-type: none"> •IO Model in Federate •Collaboration with Comms Model •Consultation by Combat Models <p>•Cooperation of Software Developers</p>

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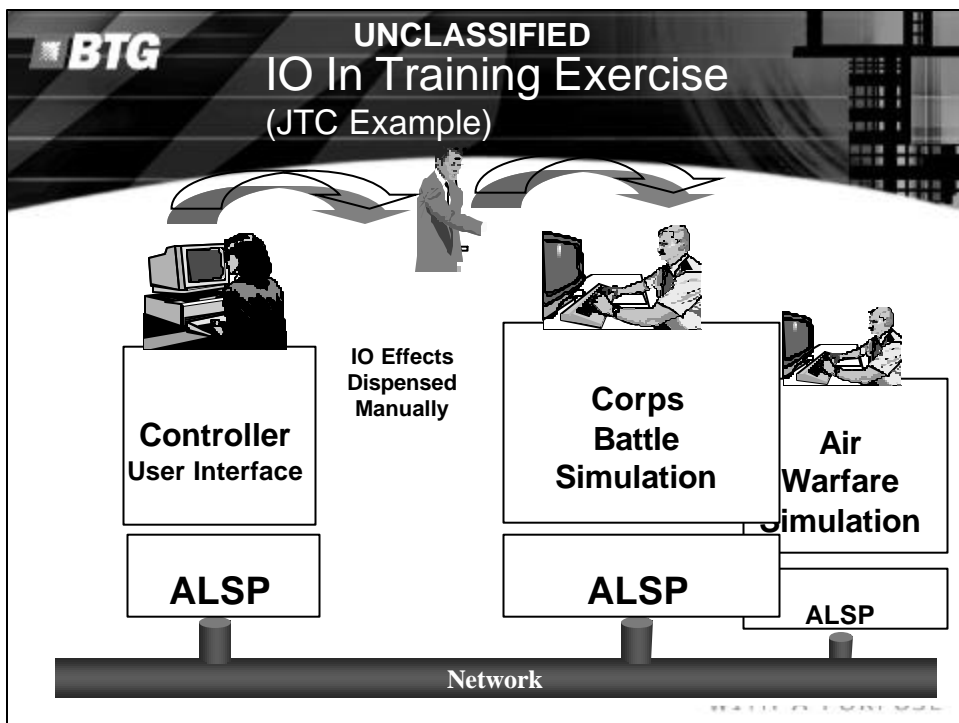
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Manual IO in Exercises

Manual Intervention
Assisted by Intuition, Analysis, and
Tools

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IO Prototype Tool

- ◆ The competing scenario objectives are between:
 - Red OPLAN to establish an integrated air defense network, and
 - Blue objectives to detect and disrupt Red's air defenses to support an air strike against a Red command center
- ◆ Scenario Elements:
 - SAM command elements and components
 - U-2, Rivet Joint, GRCS platforms & sensors
 - Four (4) F-15E strike package
 - Flexible IO exploit & attack options
 - Doctrinal information

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Notional IADS Network

Legend:

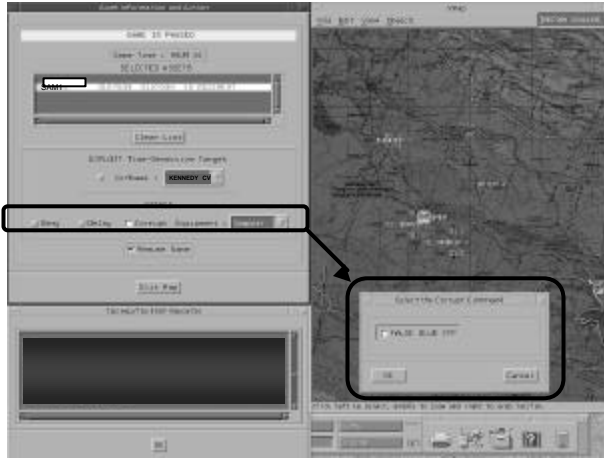
- Computer Data Link
- Land Line
- RF (secondary)
- ↔ Commander Interactions
- ☒ Early Warning Radar
- ☑ Target Acquisition Radar
- ☐ Fire Control Radar
- ☒ Missile TEL

Diagram Labels: AOC HQ, HQ SOC, SAM TEL, SAM Battery HQ, SAM Regiment HQ, Sector Ops Center.

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Sample IO Attack

- ◆ Exploitation
 - Situation Awareness & Intelligence
 - Access to target data
- ◆ Offensive Operations
 - Influence target perception, action, orders
 - Apply IO Technique
- ◆ Impacts
 - Disruption of Red operations
 - Blue opportunity to exploit disruption



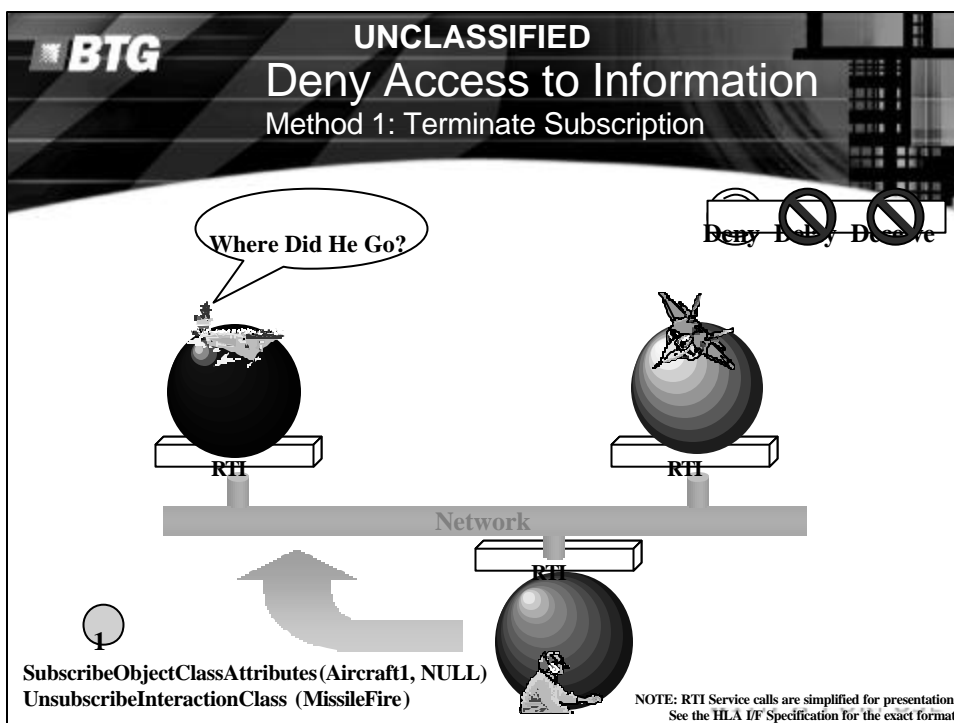
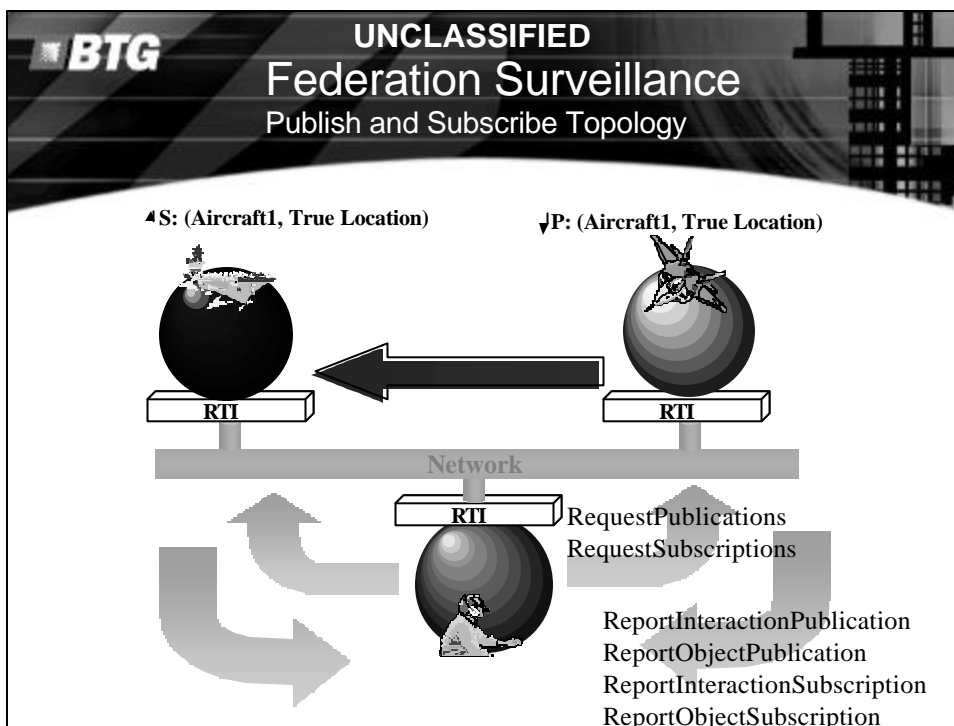
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IO Against the Simulation

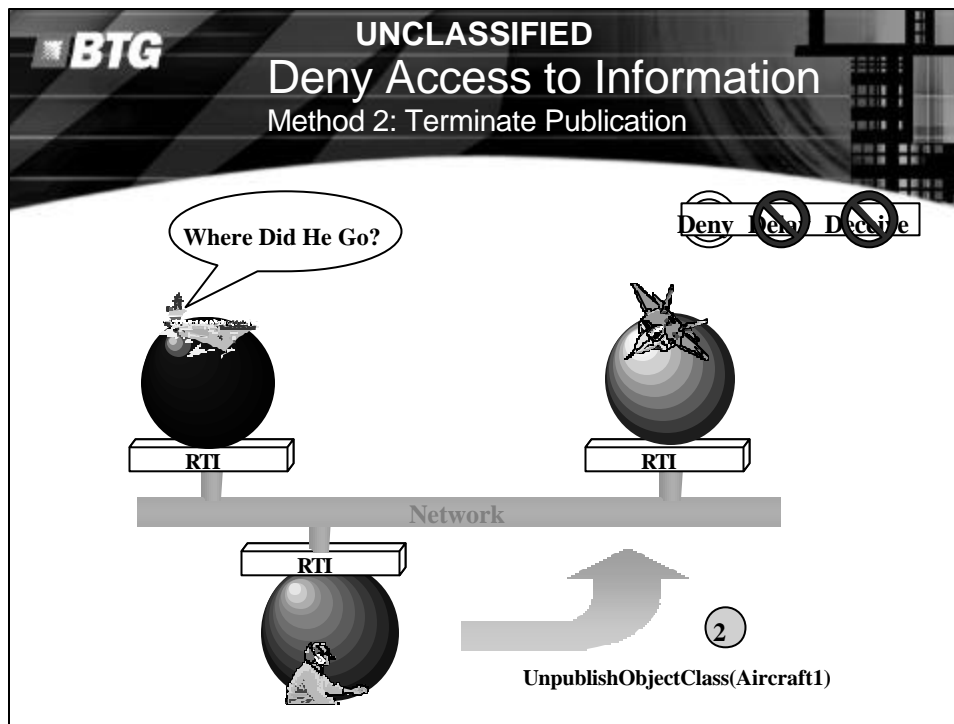
Concepts for IO Federates and IO Models within Federates

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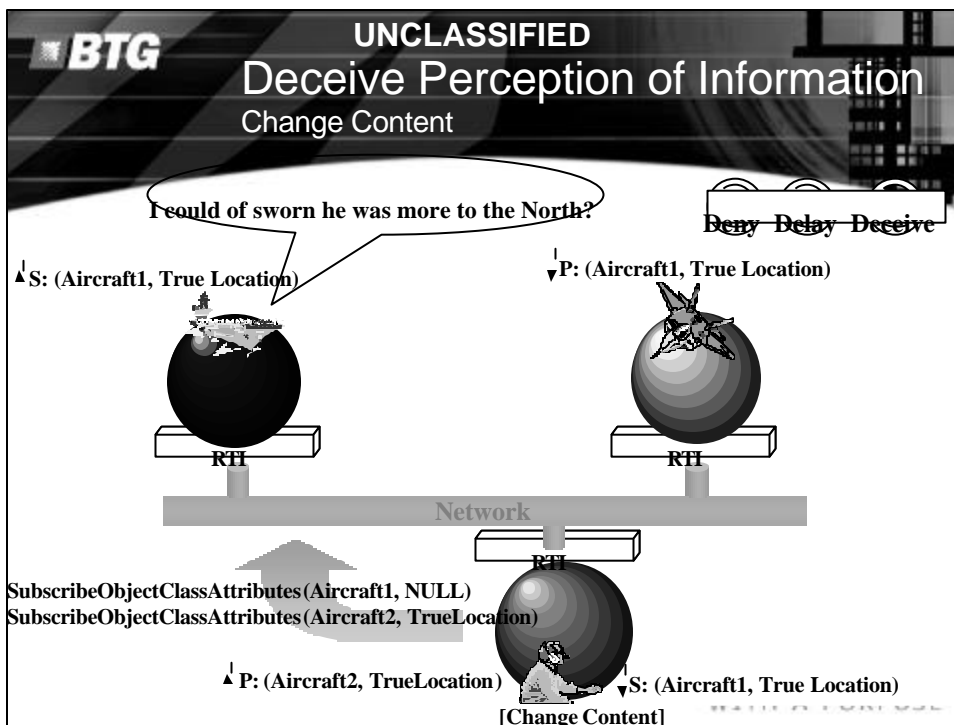
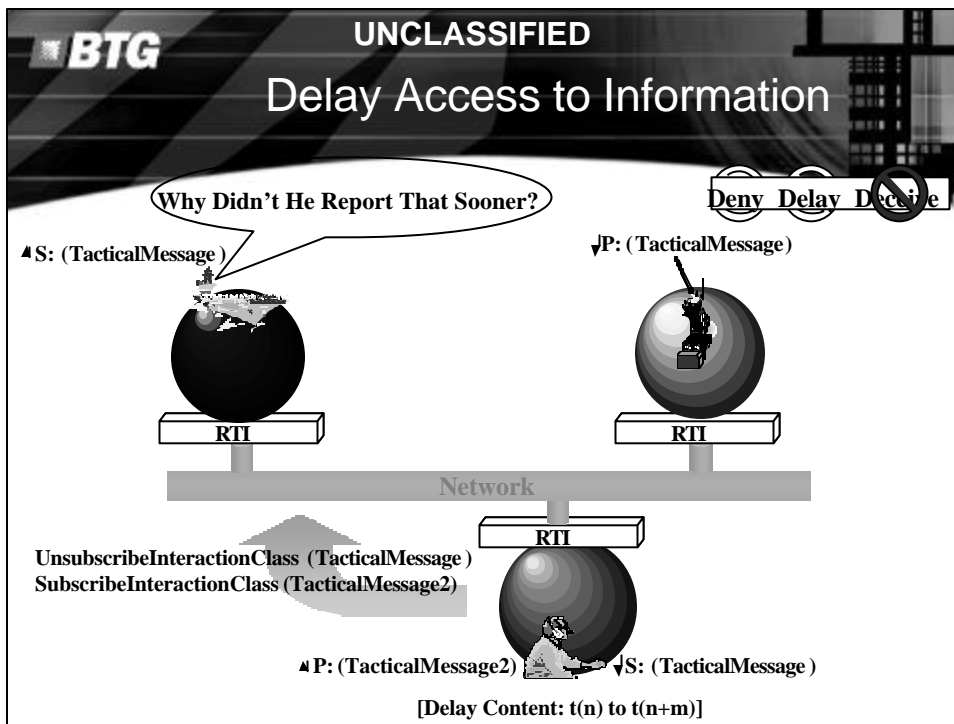


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Characteristics of Technique

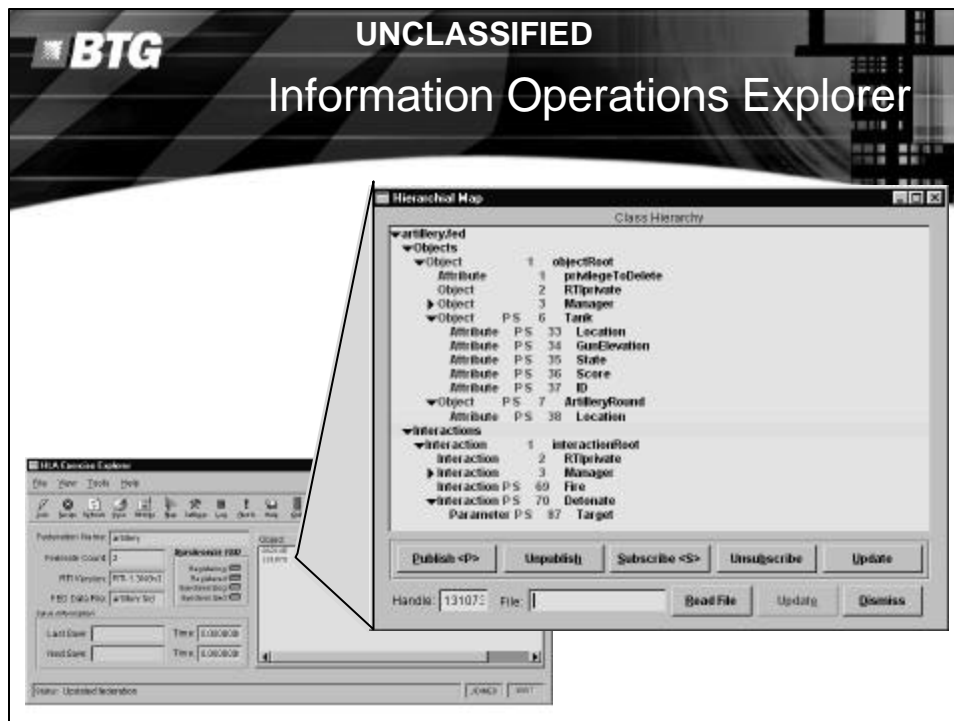
- ◆ Applies to objects by class
 - All instances of the "Aircraft1" class will disappear
- ◆ Can not be focused geographically
 - MOM does not apply to routing spaces
- ◆ MOM can be used to turn the IO attack On and Off
 - Focusing on a specific time period mitigates the global impacts of this
 - Reinstantiate Subscription or Publication when finished

Limitation ◆ If the target federate is a constructive wargame controlling hundreds of objects, then this attack is very excessive

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Characteristics of Technique

- ◆ Significant improvement over simple Deny technique
- ◆ IO Federate can process each message and apply delay as appropriate
 - Not blanket application like the Deny attack
- ◆ Since the IO federate controls the traffic this approach will work for Deny as well
 - It can be applied selectively as desired - frequency, location, etc.

Limitation

- ◆ IO Federate becomes a hub for intercepted network traffic
- ◆ Influenced message traffic is doubled
 - Original and Delayed versions are copies of each other

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Modeling Information Warfare

The Information Environment:
A Necessary Foundation for IO/IW
Modeling

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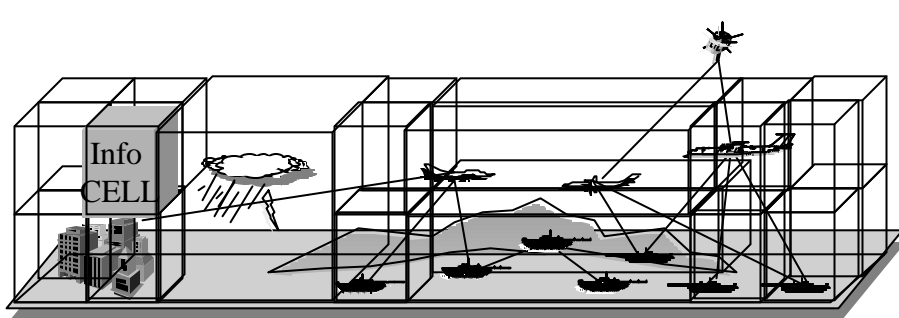
EME Relationship to Models

```
graph TD; subgraph Models; direction LR; M1[Combat Models]; M2[Intel Models]; M3[IO Models]; end; subgraph EME; direction LR; SNE[Synthetic Natural Environment]; Info[Info Models]; end; M1 --> EME; M2 --> EME; M3 --> EME; SNE --- Info; subgraph SNE_Box [SNE Models]; SNE; end; subgraph Info_Box [Info Models]; Info; end; SNE_Box --- Info_Box;
```

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Information Environment
Similar to Synthetic Natural Environment

- Scalable Grid of Info Cells
- Static & Dynamic Info Attributes
- Info Models Maintain/Update Info Cells
- IO Operations Influence State of Info Environment
- State of Info Envir Impacts Performance of Combat/Comms Models



The diagram illustrates a 3D grid-based information environment. A central cube is labeled 'Info CELL' and contains a building and a satellite. This cube is connected to a larger grid of cubes. Various assets are shown within the grid, including a satellite, a jet, a tank, and a submarine. Lines represent connections between these assets and the grid cells.

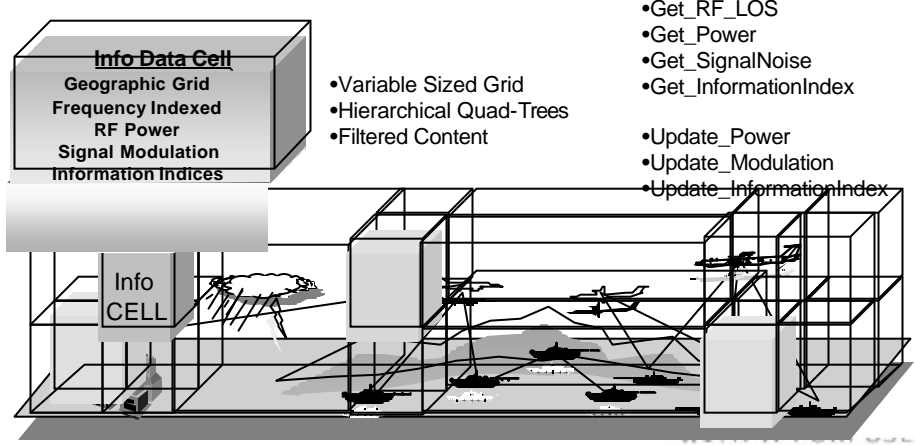
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Info Data Content and API
Accessible to all Federates

Info Data Cell
Geographic Grid
Frequency Indexed
RF Power
Signal Modulation
Information Indices

- Variable Sized Grid
- Hierarchical Quad-Trees
- Filtered Content

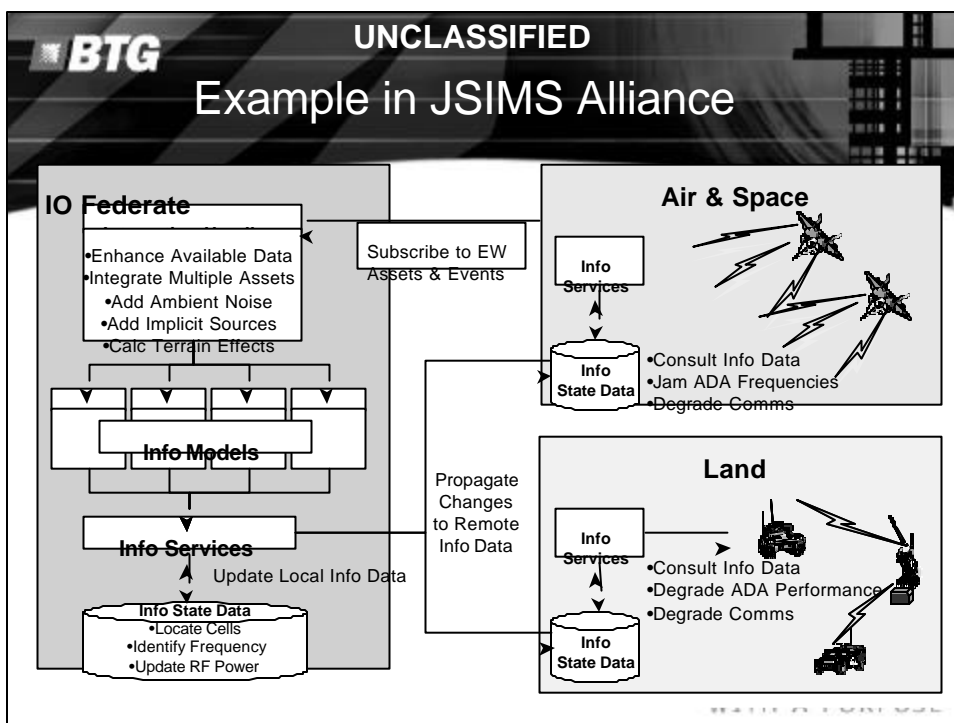
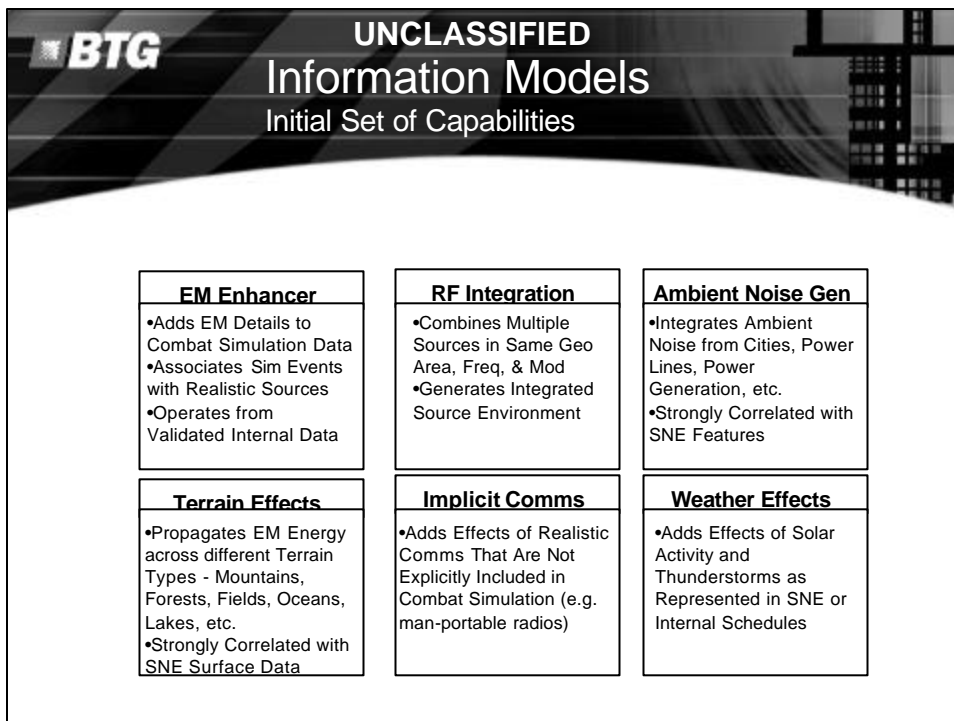
Info Services

- Get_Detectable
- Get_RF_LOS
- Get_Power
- Get_SignalNoise
- Get_InformationIndex
- Update_Power
- Update_Modulation
- Update_InformationIndex

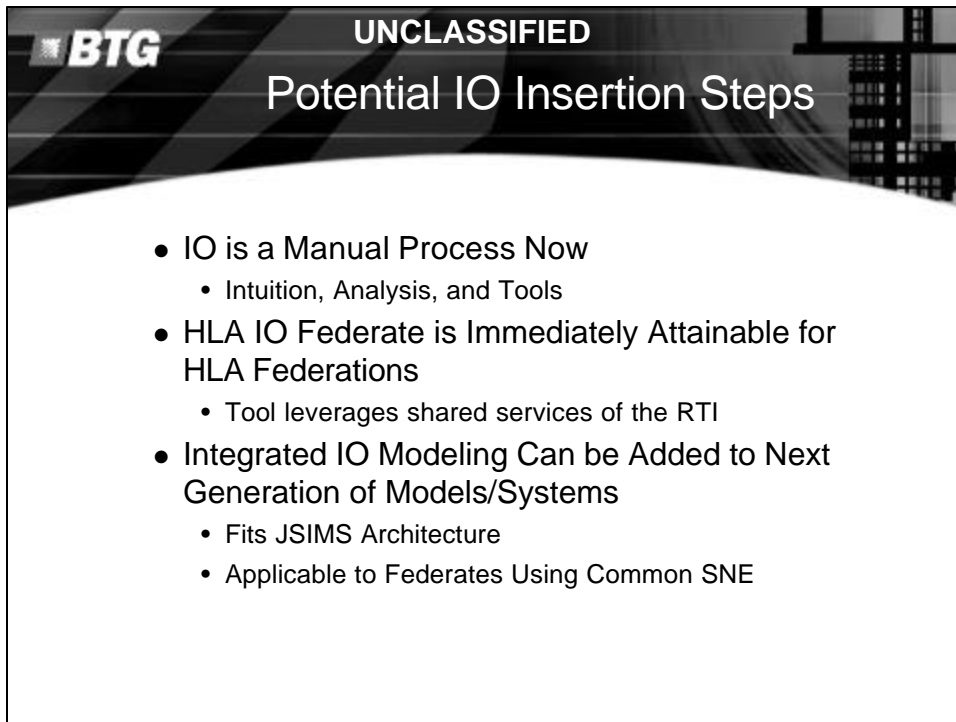


The diagram shows a 3D grid-based information environment similar to the one above. A central cube is labeled 'Info CELL' and contains a building and a satellite. This cube is connected to a larger grid of cubes. Various assets are shown within the grid, including a satellite, a jet, a tank, and a submarine. Lines represent connections between these assets and the grid cells. A separate box on the left lists the 'Info Data Cell' attributes, and a list of 'Info Services' is provided on the right.

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Potential IO Insertion Steps

- IO is a Manual Process Now
 - Intuition, Analysis, and Tools
- HLA IO Federate is Immediately Attainable for HLA Federations
 - Tool leverages shared services of the RTI
- Integrated IO Modeling Can be Added to Next Generation of Models/Systems
 - Fits JSIMS Architecture
 - Applicable to Federates Using Common SNE