



# Aerospace Mission Design and Analysis Across the Engineering “V”

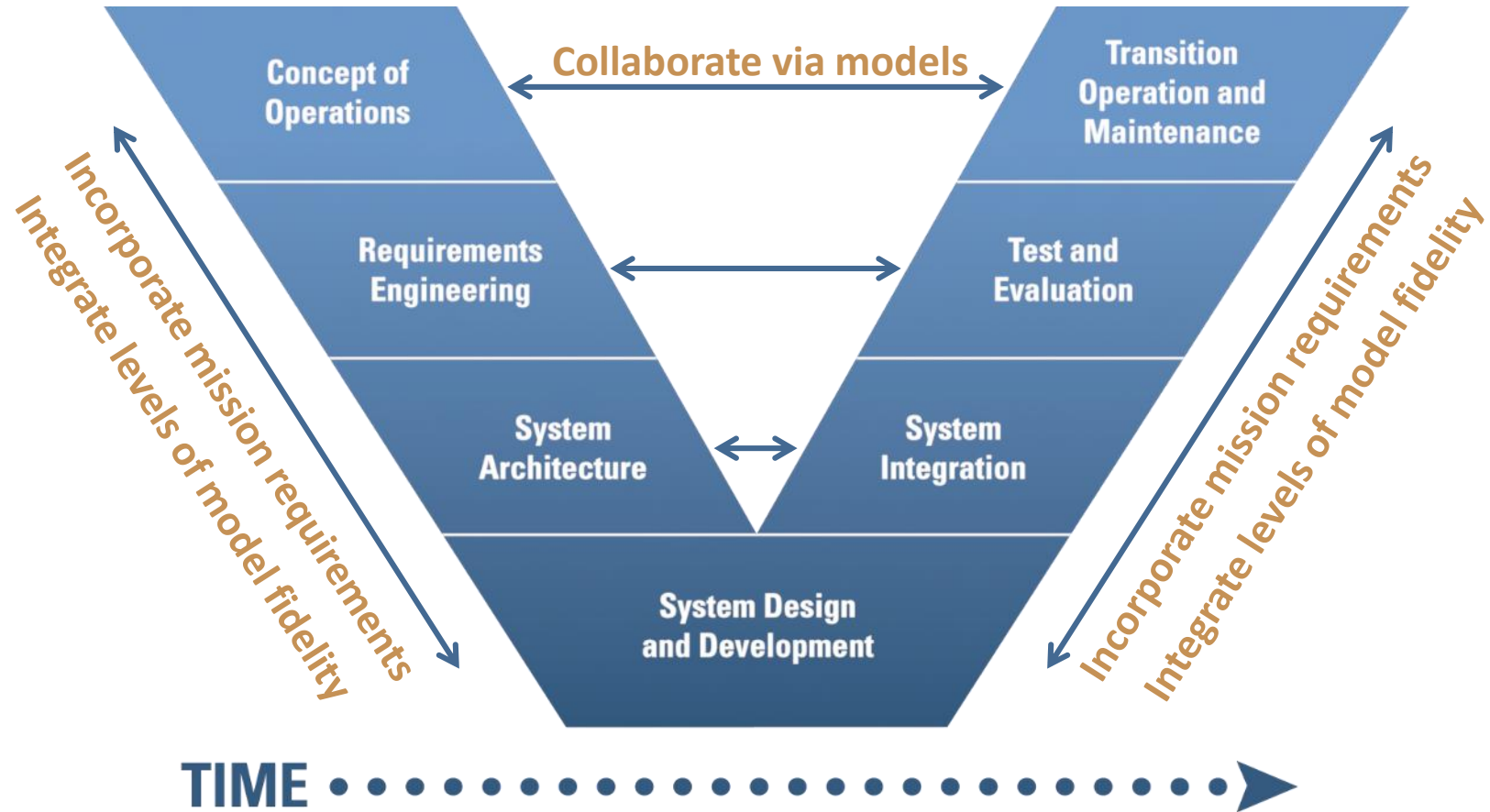
Kevin Flood

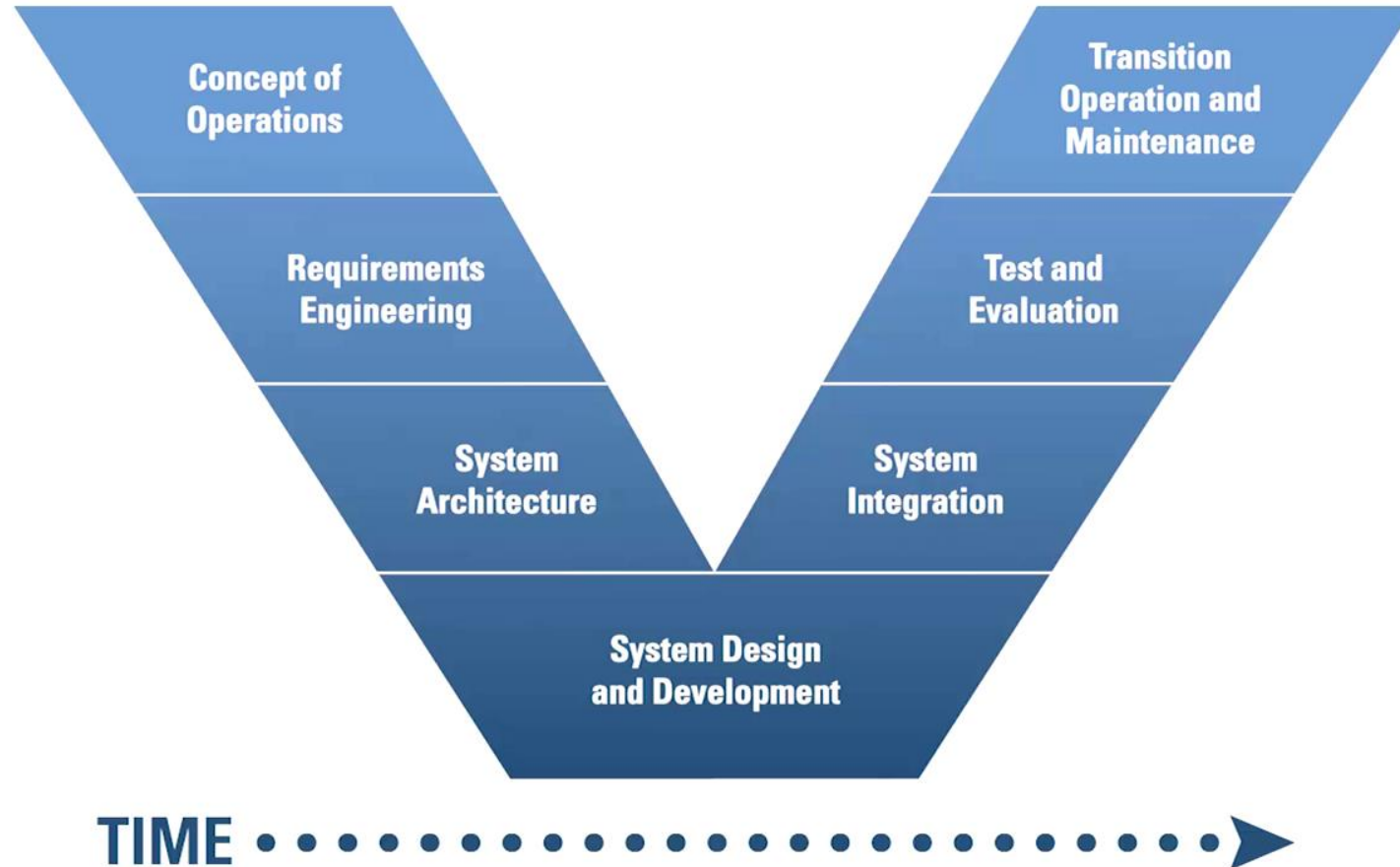
Analytical Graphics, Inc.

# Common aerospace challenges

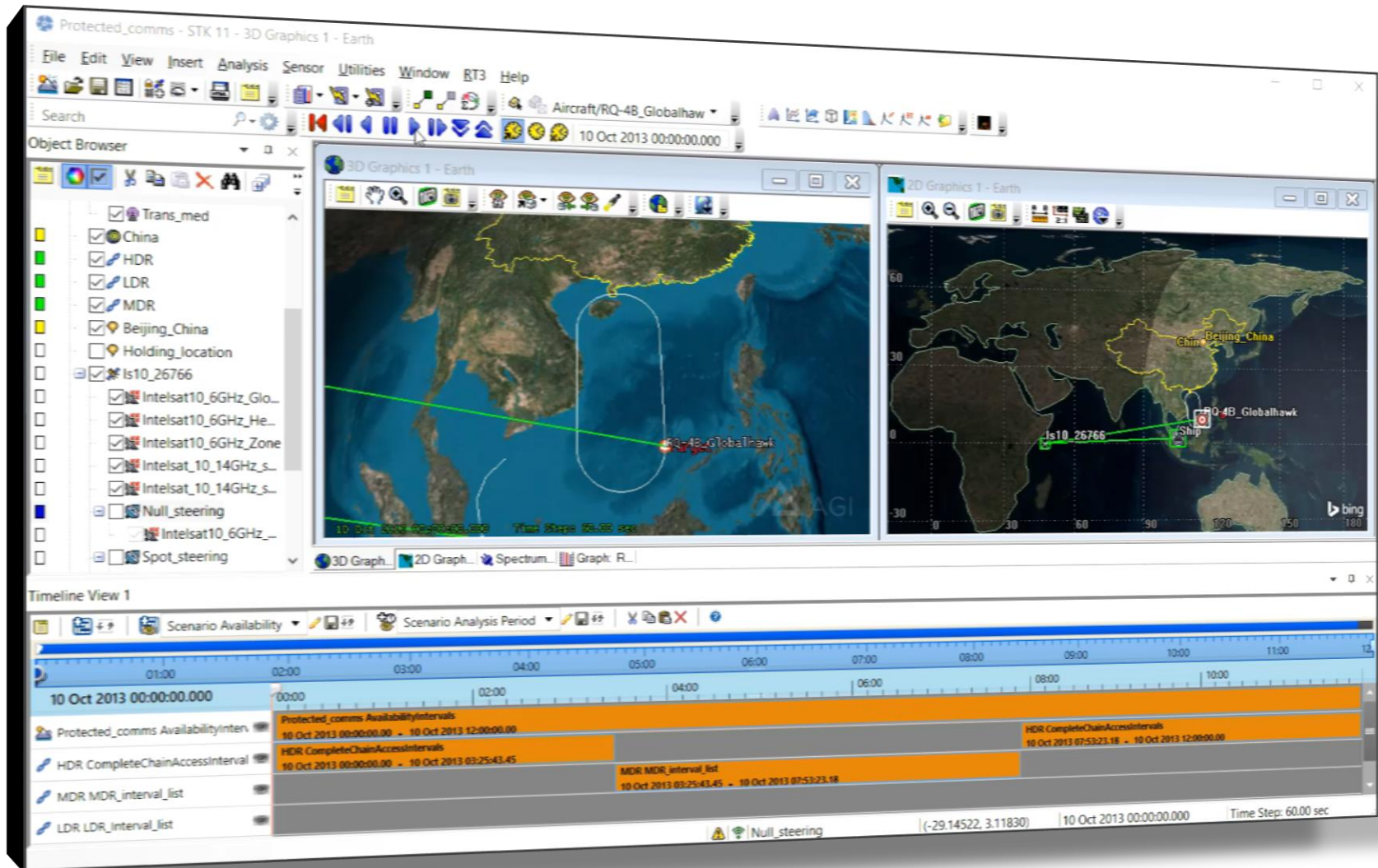
- More sophisticated missions
- More complex, faster acquisition cycles
- More demanding engineering processes





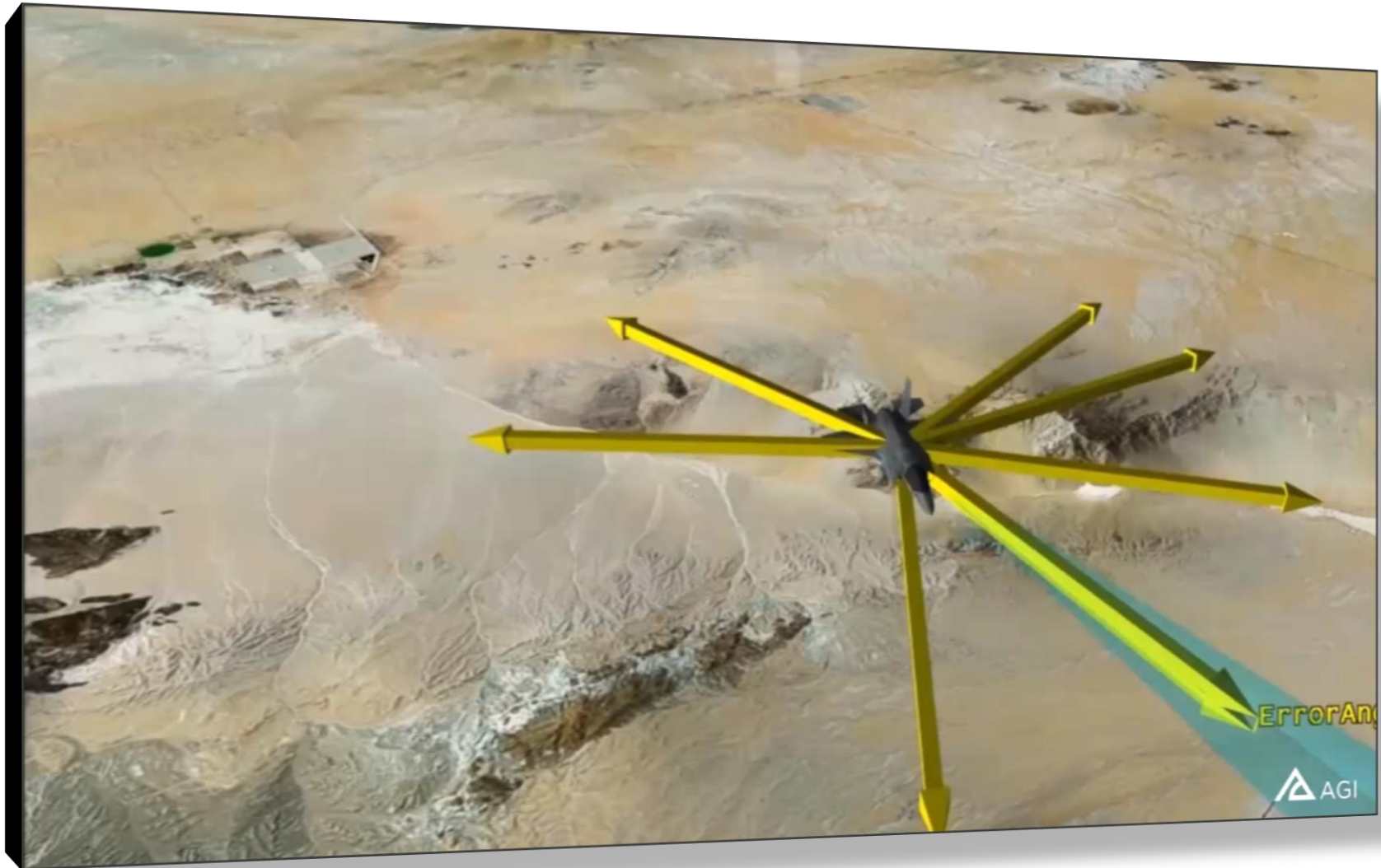


# Concept development example: A2AD

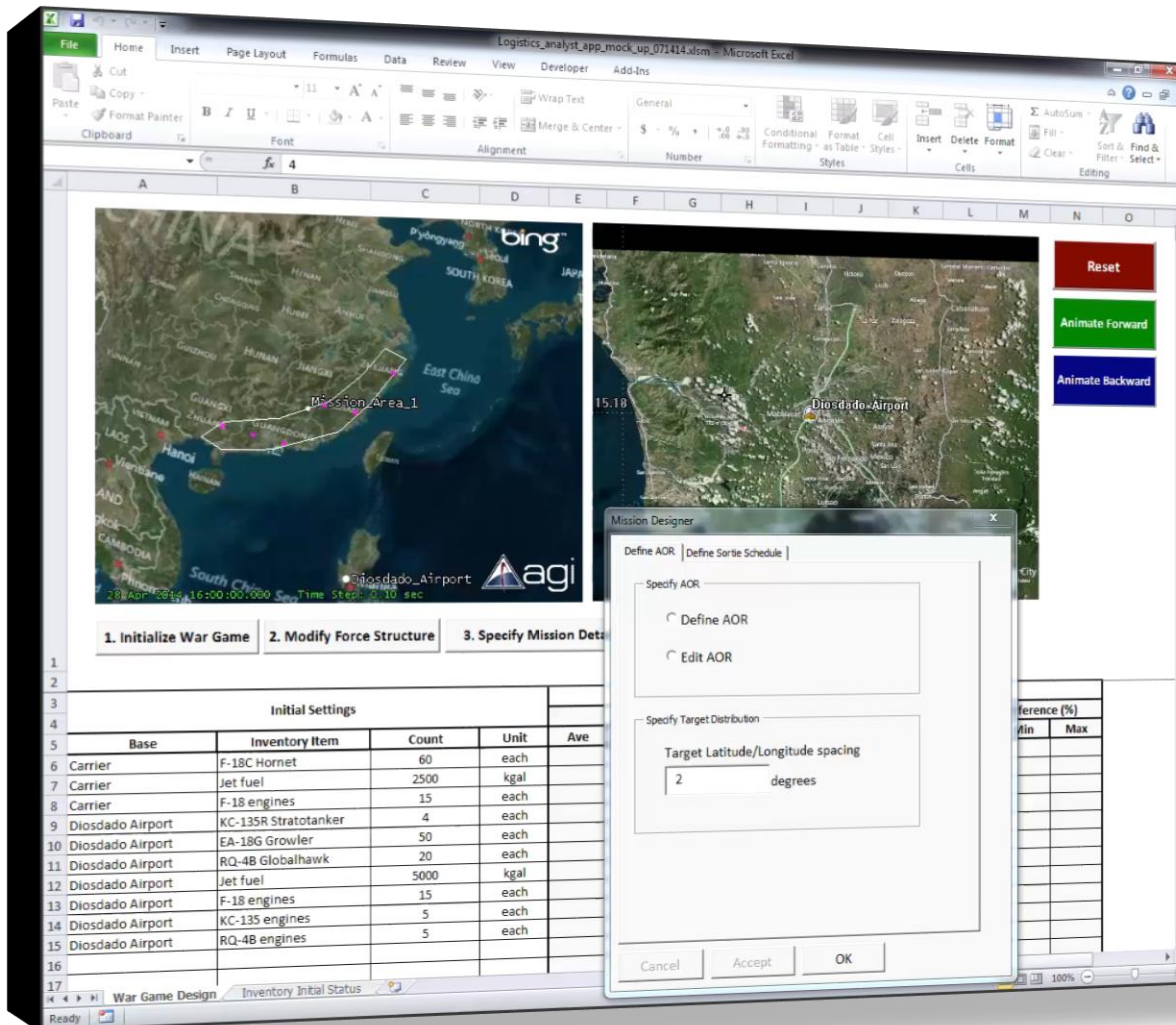




# Test example: air system DT&E



# Training example: logistics war game

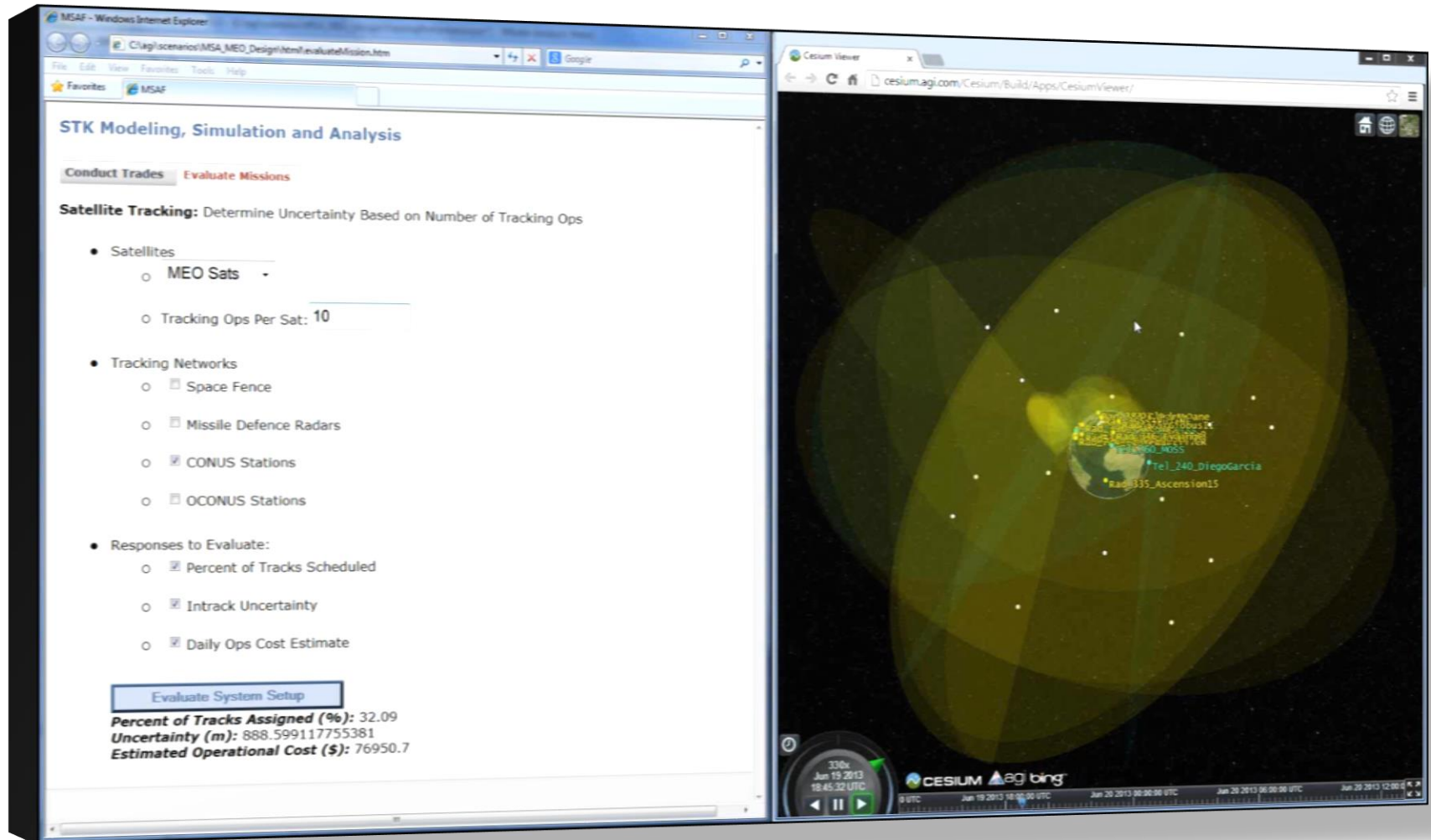


The screenshot displays a Microsoft Excel spreadsheet titled "Logistics\_analyst\_app\_mock\_up\_071414.xlsx". The interface is divided into several sections:

- Map View:** A Bing map of East Asia showing a mission area labeled "Mission Area 1" and "Diosdado Airport".
- Buttons:** "Reset", "Animate Forward", and "Animate Backward" buttons are visible on the right side of the map.
- Mission Designer Dialog:** A dialog box titled "Mission Designer" is open, showing options to "Define AOR" or "Edit AOR", and a "Specify Target Distribution" section with a "Target Latitude/Longitude spacing" of 2 degrees.
- Initial Settings Table:** A table with columns: Base, Inventory Item, Count, Unit, and Ave. The table lists various military assets and their quantities.

Base	Inventory Item	Count	Unit	Ave
Carrier	F-18C Hornet	60	each	
Carrier	Jet fuel	2500	kgal	
Carrier	F-18 engines	15	each	
Carrier	KC-135R Stratotanker	4	each	
Diosdado Airport	EA-18G Growler	50	each	
Diosdado Airport	RQ-4B Globalhawk	20	each	
Diosdado Airport	Jet fuel	5000	kgal	
Diosdado Airport	F-18 engines	15	each	
Diosdado Airport	KC-135 engines	5	each	
Diosdado Airport	RQ-4B engines	5	each	

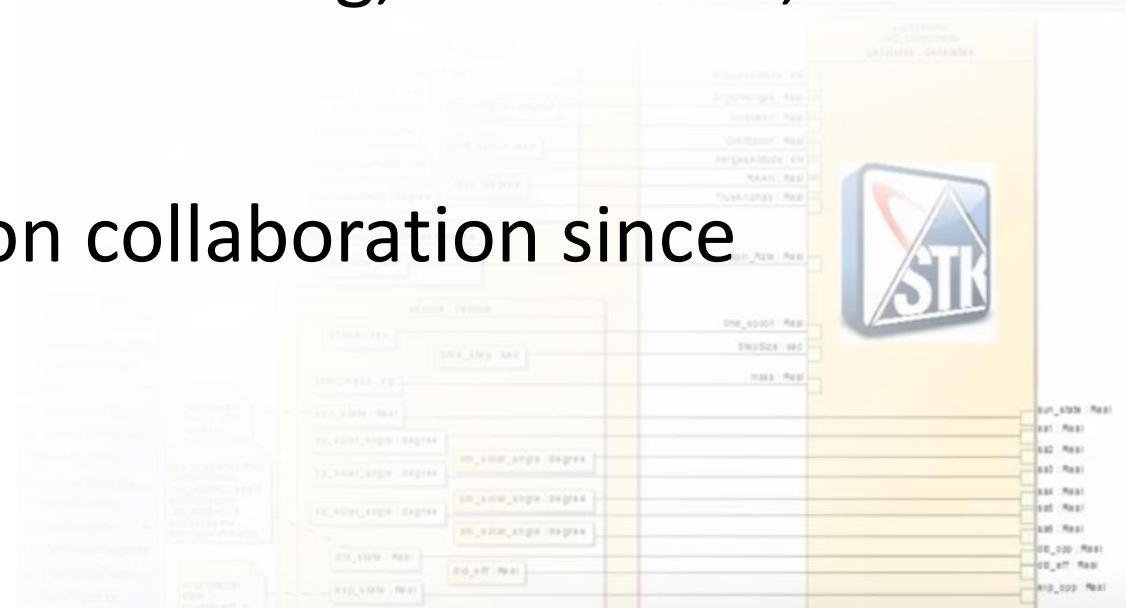
# Operations example: task planning





# AGI background

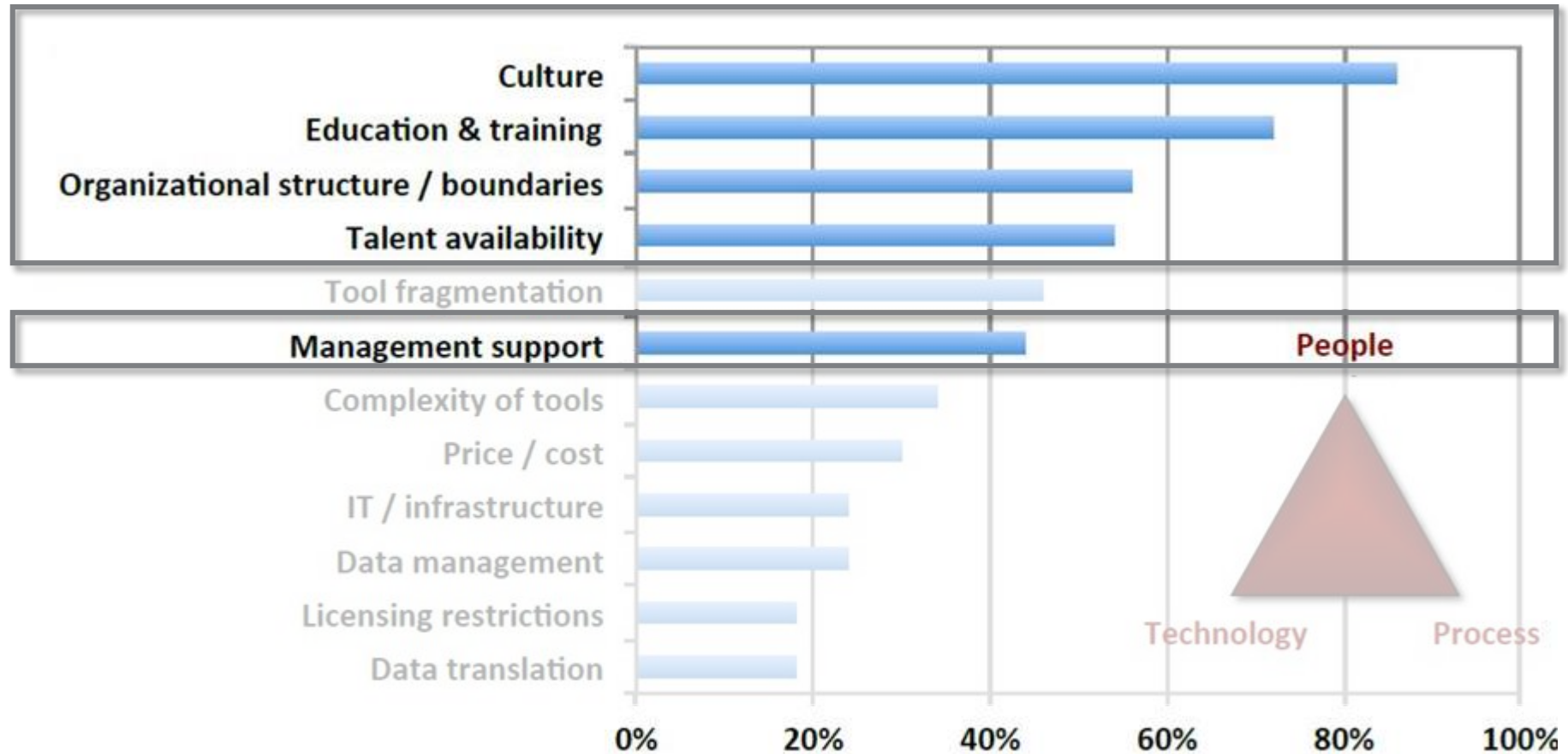
- Commercial software product company
- Founded 1989
- Aerospace mission modeling, simulation, and analysis
- Phoenix Integration collaboration since 2003



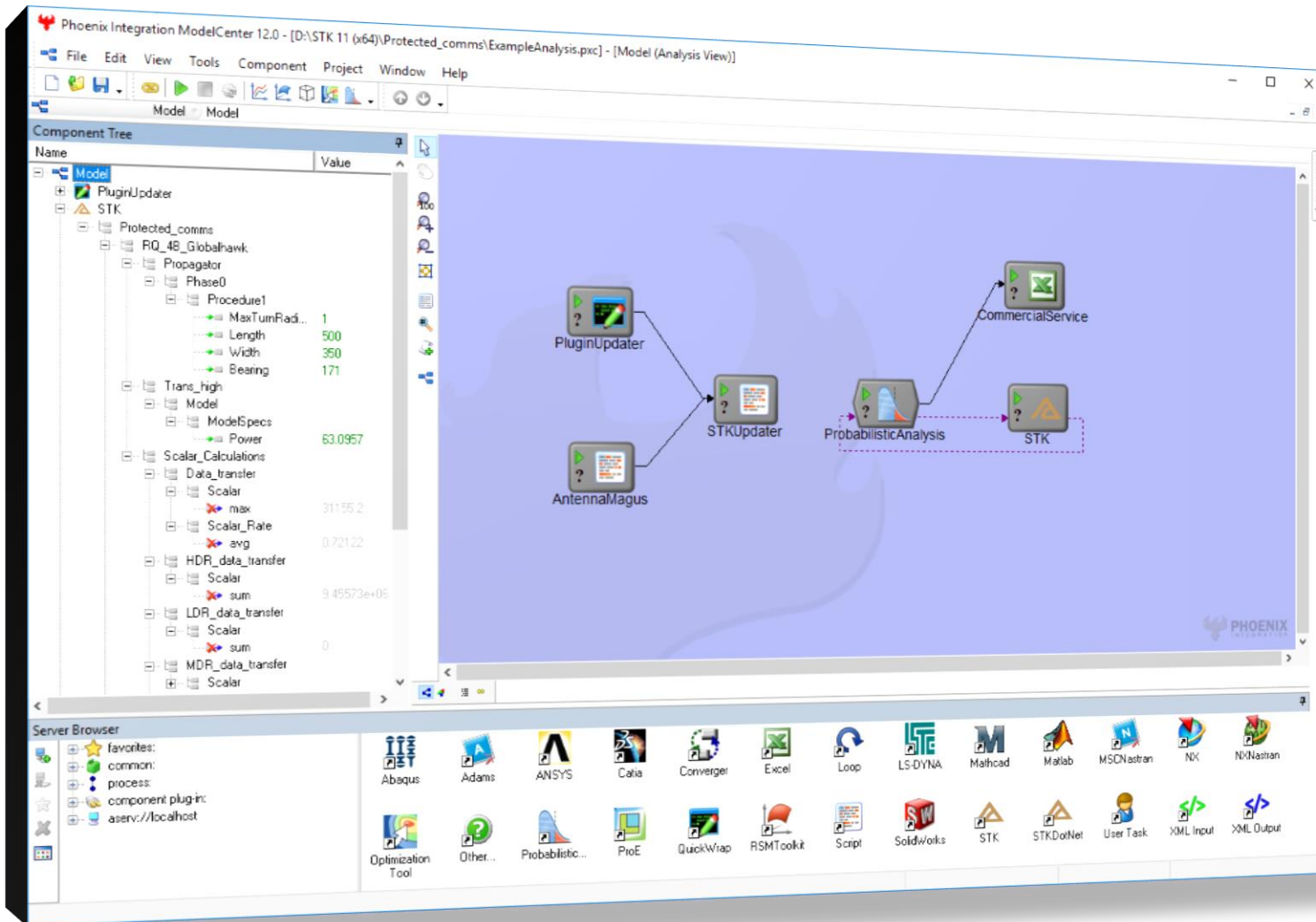
# Lifecycle Enterprise Engineering Mandates

- **Lifecycle** – Integrate mission with engineering and connect models across entire lifecycle
- **Process Evolution** – Solve problems today; adapt to tomorrow's processes
- **Stakeholders** – Support all engineering disciplines, mission areas, and user personas
- **Fidelity Spectrum** – Account for graphical models through high-fidelity, physics-based models
- **Integration** – Avoid need for tool-to-tool, project-by-project integrations
- **Orchestration** – Execute simulations composed from models of models

# Process Evolution

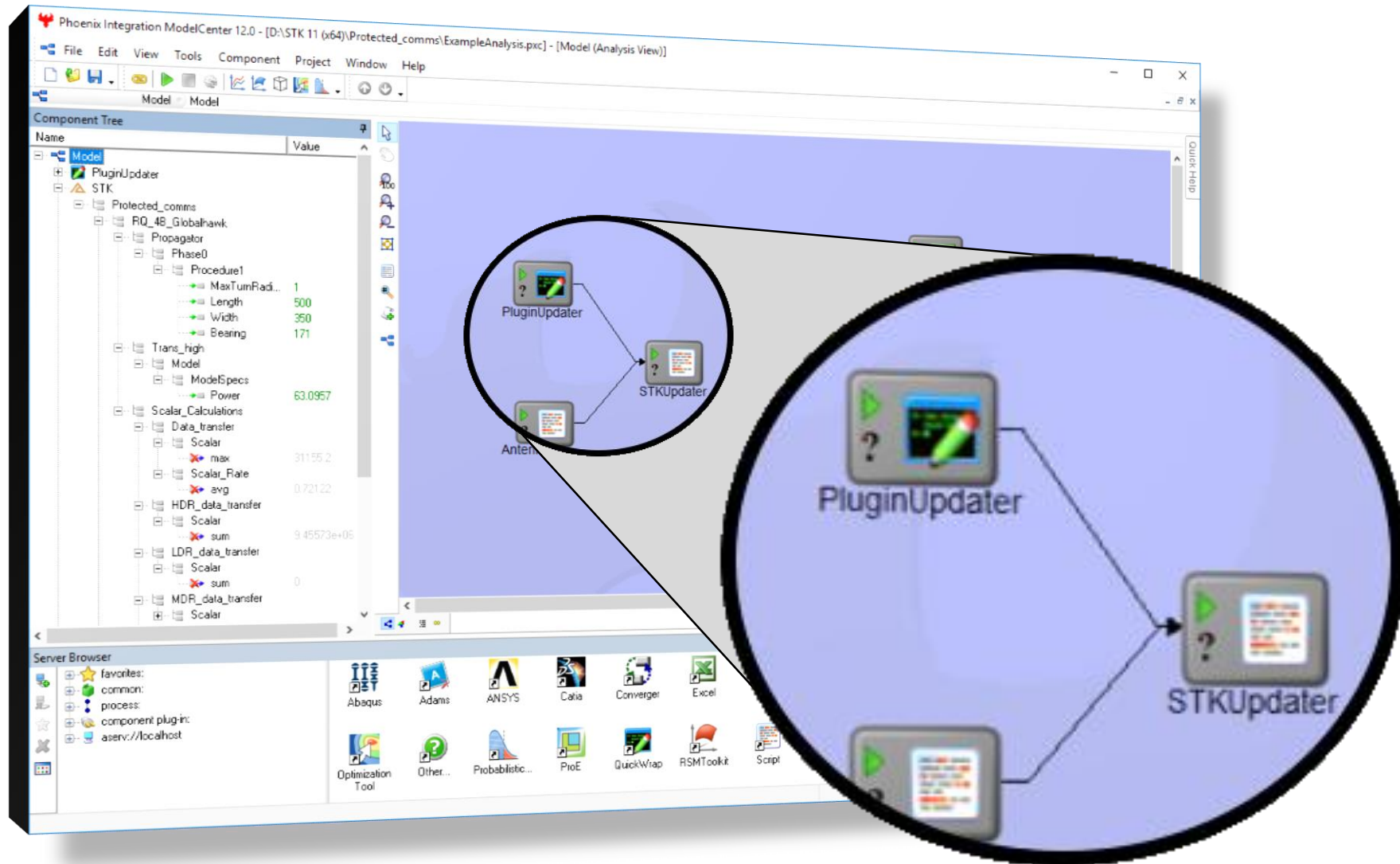


# Concept development example: A2AD

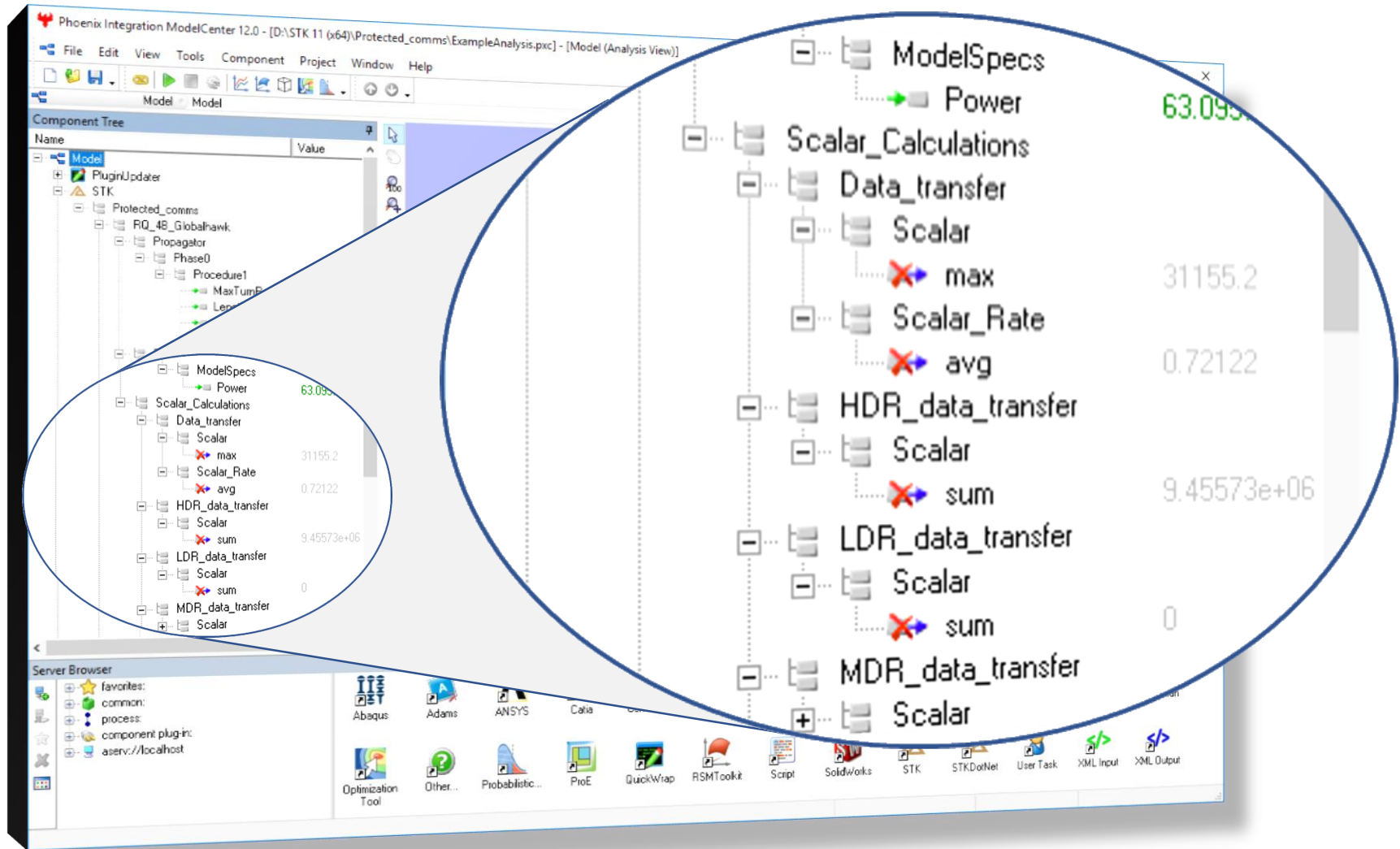




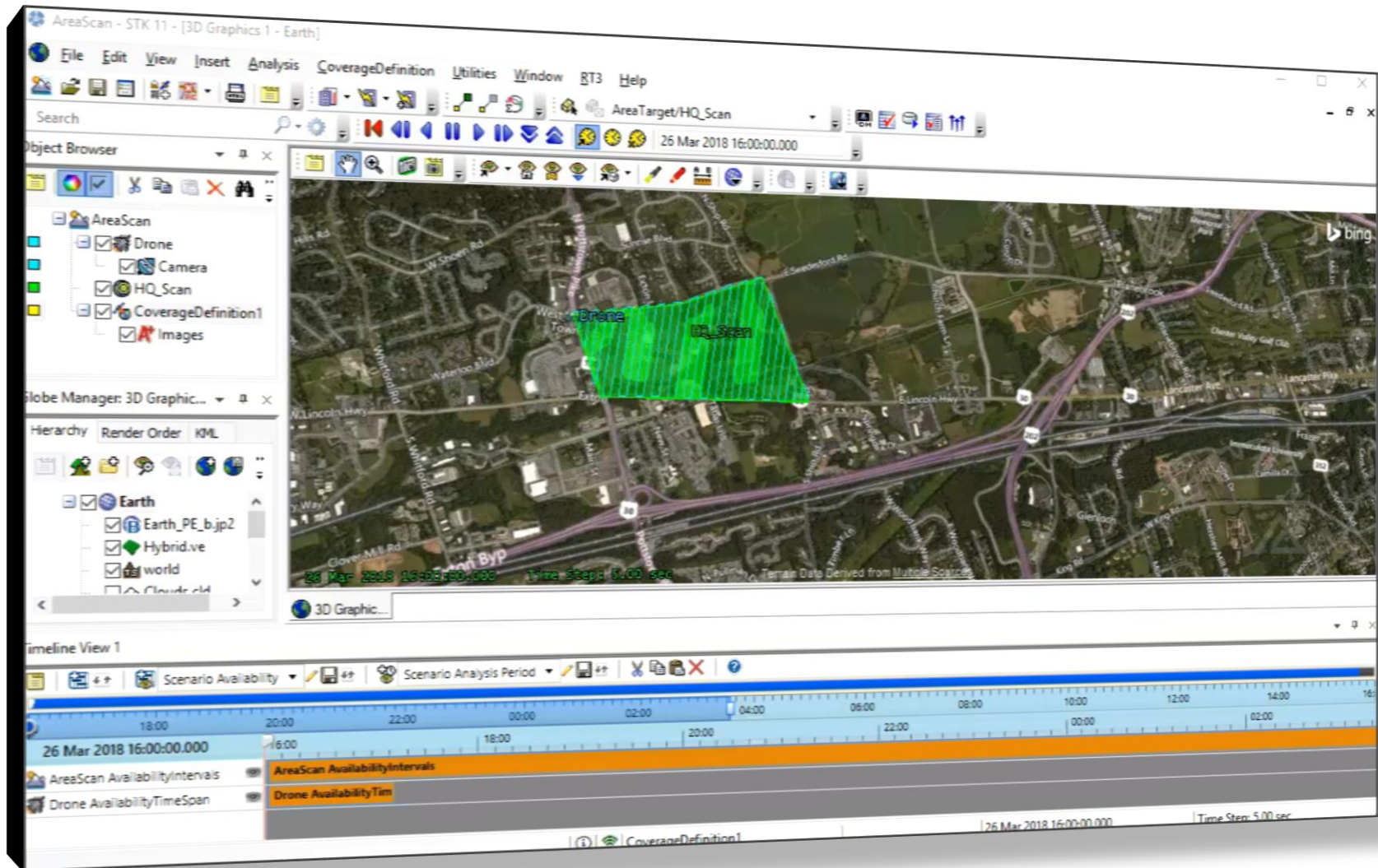
# Concept development example: A2AD



# Concept development example: A2AD

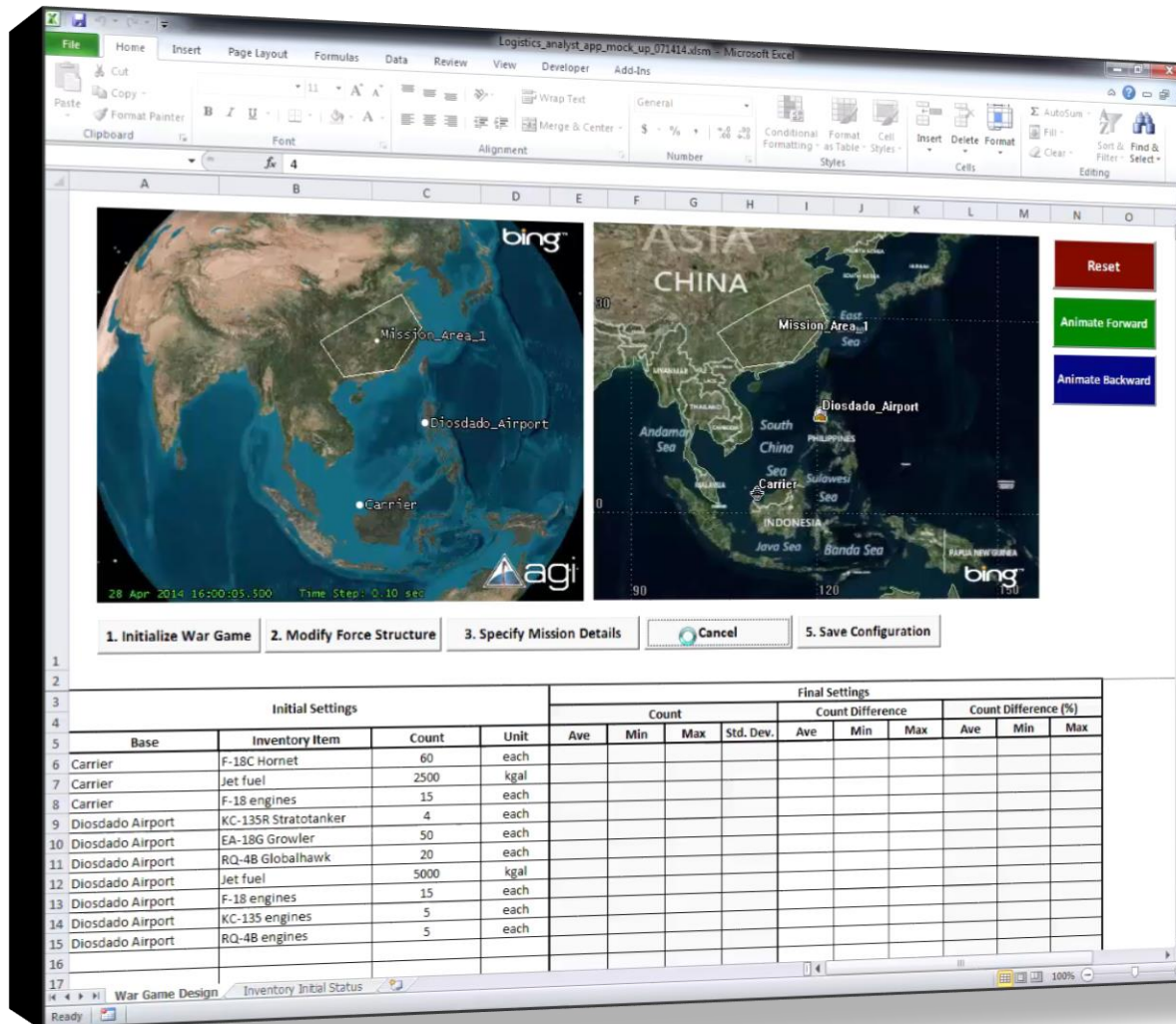


# Test example: air system DT&E





# Training example: logistics war game



The screenshot shows a Microsoft Excel spreadsheet titled "Logistics\_analyst\_app\_mock\_up\_071414.xlsx". The spreadsheet is divided into two main sections: a map view and a data table.

The map view displays a satellite image of the Pacific Ocean, showing the Philippines, Indonesia, and the surrounding seas. A mission area is highlighted, and a carrier is positioned near the Philippines. The map is labeled with "Mission Area 1", "Diosdado Airport", and "Carrier". The map is sourced from Bing.

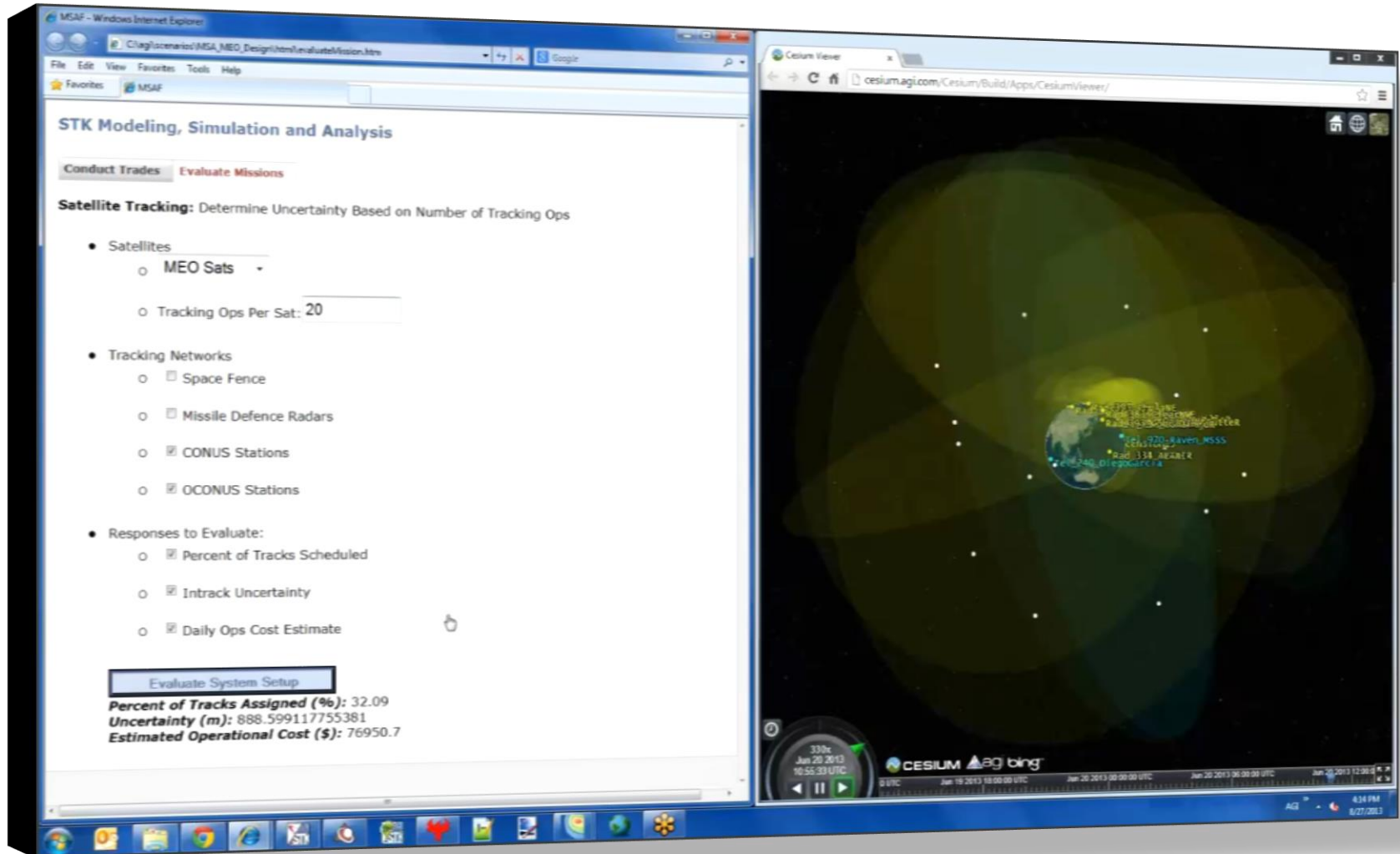
The data table is divided into two sections: "Initial Settings" and "Final Settings". The "Initial Settings" section contains columns for Base, Inventory Item, Count, and Unit. The "Final Settings" section contains columns for Count (Ave, Min, Max, Std. Dev.), Count Difference (Ave, Min, Max), and Count Difference (%) (Ave, Min, Max).

Initial Settings				Final Settings									
Base	Inventory Item	Count	Unit	Count				Count Difference			Count Difference (%)		
				Ave	Min	Max	Std. Dev.	Ave	Min	Max	Ave	Min	Max
Carrier	F-18C Hornet	60	each										
Carrier	Jet fuel	2500	kgal										
Carrier	F-18 engines	15	each										
Diosdado Airport	KC-135R Stratotanker	4	each										
Diosdado Airport	EA-18G Growler	50	each										
Diosdado Airport	RQ-4B Globalhawk	20	each										
Diosdado Airport	Jet fuel	5000	kgal										
Diosdado Airport	F-18 engines	15	each										
Diosdado Airport	KC-135 engines	5	each										
Diosdado Airport	RQ-4B engines	5	each										

The spreadsheet also includes a navigation bar at the bottom with buttons for "1. Initialize War Game", "2. Modify Force Structure", "3. Specify Mission Details", "Cancel", and "5. Save Configuration".



# Operations example: task planning



# Summary

- Integrate mission and engineering across lifecycle
- Important tool attributes include:
  - Open APIs, open data, and interoperability
  - Multiple levels of fidelity
  - Orchestration of models of models
- Learn by doing
  - Solve today's problems
  - Evolve tomorrow's solutions
- ModelCenter is a key component

