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2018-04

# Combat Supply Logistics Network Modeling & Simulation System

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<http://hdl.handle.net/10945/60519>

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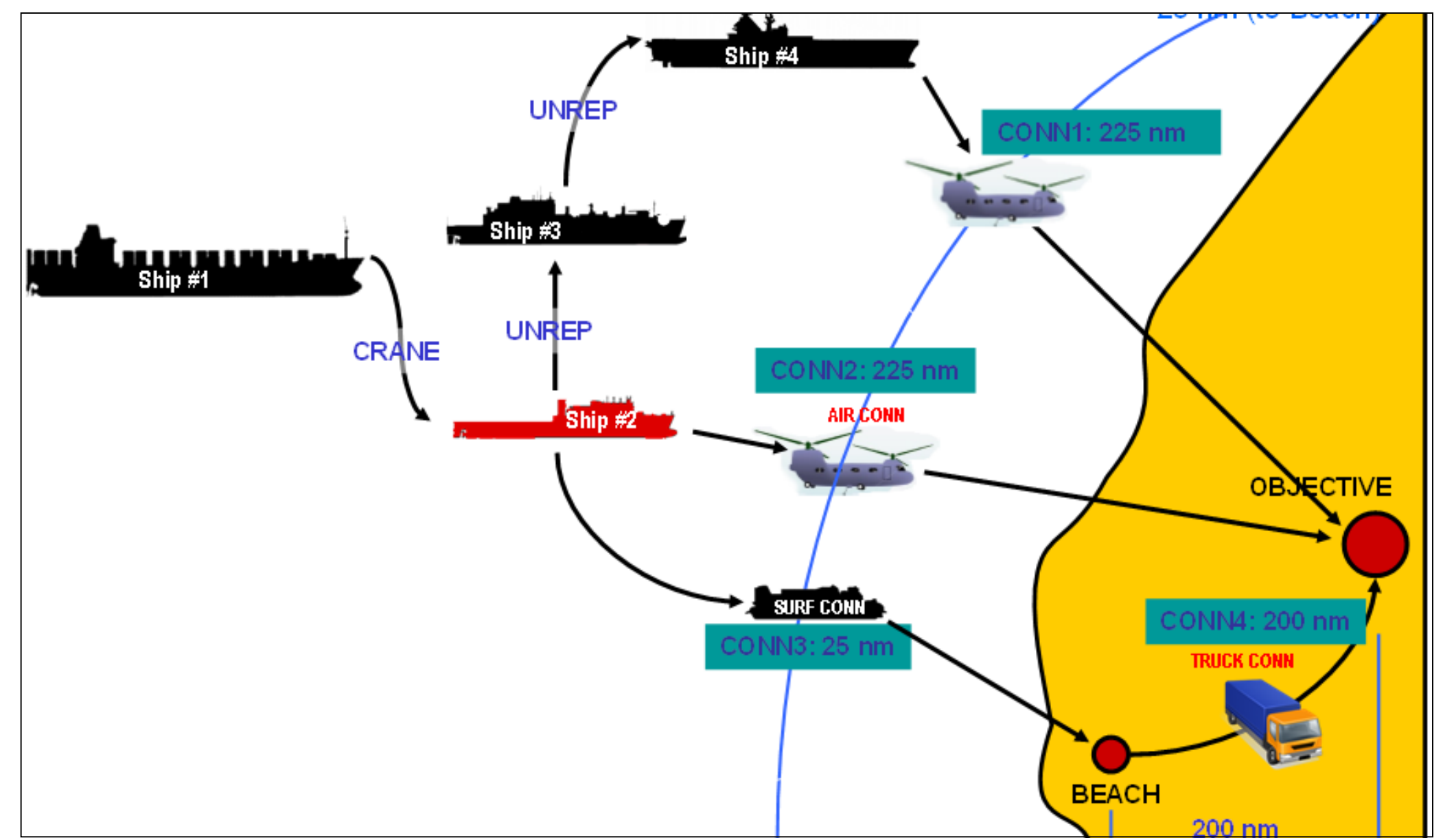
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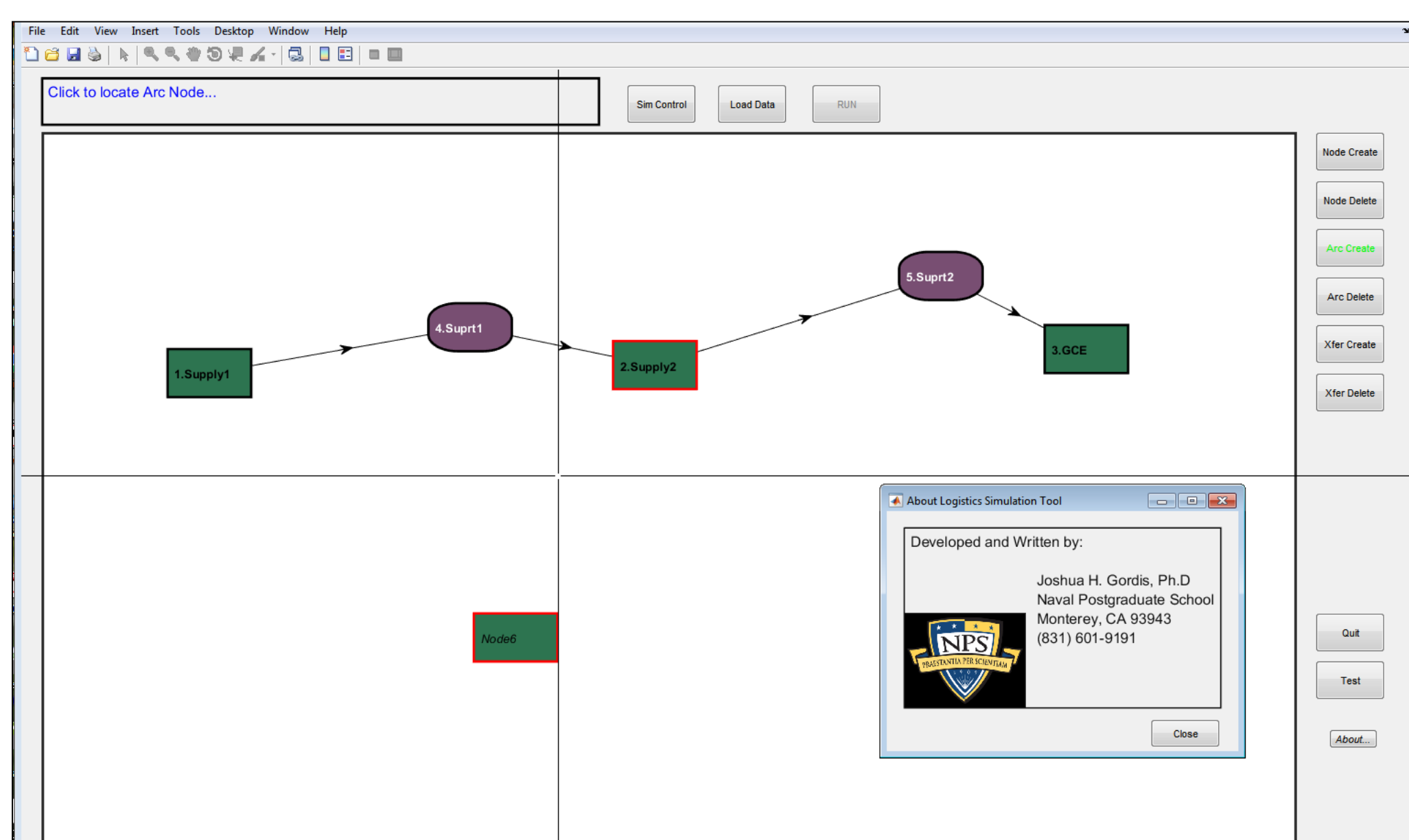
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## Simulate and Predict Performance of Supply Networks

- Predict network throughput and time required to deliver cargo to objective
- Ensure adequate delivery rate of mission-critical supplies (e.g. Fuel, water, ammo, food, etc.)
- Predict energy use by network
- Provide chokepoint/bottleneck analysis



Land, sea, and air elements can be represented



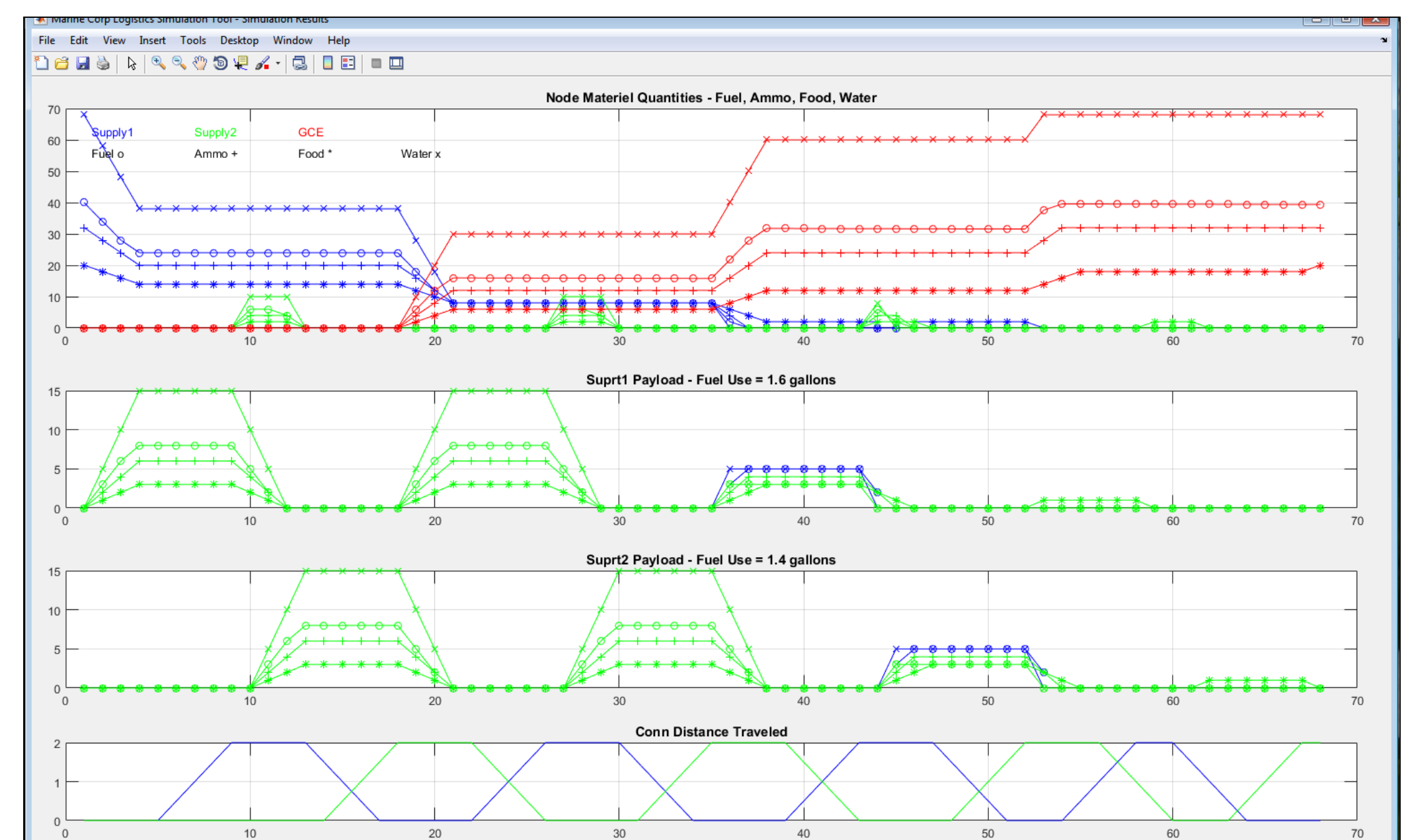
Graphical user interface for network definition

## Modeling of Supply Networks

- Insight into behavior of supply networks during logistics planning.
- User-friendly interface for defining network nodes
- Ships and land bases can be modeled
- Connectors are modeled (sets of air, land, or sea vehicles) - Number, payload, distance, speed
- Connector behavior modeled:
  - Deployment criteria, Transfer rates

## Time-Domain Network Performance

- The time-domain performance of the supply network is simulated
- Supplies-on-hand versus time calculated (Connector loads versus time calculated)
- Connector position versus time calculated



Network performance simulated

| Manifest | Type  | Unit    | Units   | True or False | Fuel Measure | Transfers: |
|----------|-------|---------|---------|---------------|--------------|------------|
| Item 1   | Fuel  | gallon  | Select. | TRUE          | gallons      | Select.    |
| Item 2   | Ammo  | TEU     | TEU     | FALSE         | pounds       | Unit/hour  |
| Item 3   | Food  | pallet  | pallet  |               |              |            |
| Item 4   | Water | gallon  | ton     |               |              |            |
| Item 5   | n/a   | Select. | sq. ft. |               |              |            |
| Item 6   | n/a   | Select. |         |               |              |            |

| Node   | Label | Type   | Initial | Capacity | Minimum | Unit |
|--------|-------|--------|---------|----------|---------|------|
| Item 1 | Fuel  | gallon | 0       | 0        | gallon  |      |
| Item 2 | Ammo  | TEU    | 0       | 6        | 0       |      |
| Item 3 | Food  | pallet | 0       | 3        | 0       |      |
| Item 4 | Water | gallon | 0       | 15       | 0       |      |
| Item 5 | n/a   | n/a    | 0       | 0        | n/a     |      |
| Item 6 | n/a   | n/a    | 0       | 0        | n/a     |      |

## Excel-Based User Input

- Define network cargo manifest
- Define node properties
  - Capacities, payloads, transfer rates, speed, distance, cargo consumption rates, fuel consumption,