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Original title on 712 A/B: JITDA-ARENA an intra-theater distribution simulation

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PRESENTED IN:

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**JITDA ARENA Intra-theater Simulation**

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JITDA ARENA

Intra-theater Simulation

Steve Sommer
USTC J5/4 AS / NGIT
Steve.sommer.ctr@ustranscom.mil
Agenda

• Problem Statement
• Scope
• Model Overview
• Inputs
• Processing Logic
• Outputs
Joint Intra-Theater Distribution Assessment (JITDA): Conduct theater distribution assessments to determine required joint distribution capabilities to point of effect (e.g. across “last tactical mile”) with attention paid to the distribution of non-routine sustainment.

Modeling: Need a simulation to model the flow of sustainment through the distribution network.

- Challenges:
  - Non-routine sustainment is unpredictable, which lends itself to stochastic generation
  - Dynamic mode and route selection
Model Scope

CONUS

Overseas Depots

En-Routes

Theater Distribution Center

Forward Stock CSSB / BSB

End User FSC / Units

Modeled by JITDA-ARENA
Model Overview

• Built using ARENA simulation package
  – ARENA is a general purpose, commercial off the shelf (COTS), discrete event simulation package

• Demand driven
  – A “pull” model
  – Demand pulse starts the resupply process

• Pallet based
Demand event starts process

Available @ FWD Stock

YES

NO

TDC

Routing

Intermediate Location

X

FWD Stock

Routing

Intermediate Location

X

Units

Demand

Supply
Model Inputs

- Network Definition
  - Distances
  - Link and Node information
    - Attributes
    - Capacities
- Platform information
- Demand information
  - Size and frequency
- Supply hierarchy
- Mode selection priorities
Model Inputs

- Network Definition
  - Distances
  - Link and Node information
    - Attributes
    - Capacities
- Platform information
- Demand information
  - Size and frequency
- Supply hierarchy
- Mode selection priorities
Processing Logic
Route Selection Algorithm

Potential routes are determined prior to entering this algorithm

EDT = Earliest delivery time
Cross docking essentially eliminates the inventory-holding function of a warehouse while still allowing it to serve its consolidation and shipping functions. The idea is to transfer incoming shipments directly to outgoing trailers without storing them in between. Goods arriving from the vendor already have a customer assigned, so workers need only to move the shipment from the inbound trailer to an outbound trailer bound for the appropriate destination.
For emergency, load finalization includes batching the emergency pallet with other pallets that happen to be already there waiting.

Incoming pallet

Yes

Load finalization process

Small FW appropriate

Yes

Assign appropriate asset

No

Aggregation process

Medium FW appropriate

Pallets wait until load is full or a pallet within the load will bust its TDD

Load fits on small FW?

Yes

Small FW “most” available

No

Blue section for airdrop or air land only
Model Outputs

• System Response Time
  – Time from demand pulse to delivery
  – Available for origin-destination pairs, by priority, by destination, by legs of a transload, etc.

• Asset Utilization
  – Number of assets being used at any one time
  – Amount of space used within each asset

• Delivery by Asset Type
System Response Time

Overall System Response Time

System Response Time (Hrs.)

Number of Asset A

Notional
Asset Utilization

Asset Utilization

Notional

Number of Asset A

Sim Time
Questions
Backup
### Sample Output

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<tr>
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<th>2-1 A</th>
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**Time in hours**

- **Origin v. Destination**
- **Hub**
### Origin v. Destination

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Numbers Represent Number of Pallets