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CNA

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# JAPBI Brief on CAMOLAND

A Clothing & Textile Industrial  
Base Wargame



Photo Credit: Golden Manufacturing Tupelo, MS; Thomas Wells, *Daily Journal*.

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# Who is CNA?

- **Overview**

- Nonprofit research and analysis organization
- 75+ years serving government
- Nearly 700 research and professional staff
- 72% of researchers hold Ph.D.s

- **A History of Service**

- **1942:** Created during World War II to bring civilian scientists to the U-boat fight. Pioneered the field of operations research for the Navy. Embedded with sailors and Marines in every war since.
- **1993:** The [Center for Naval Analyses](#) branches off the [Institute for Public Research](#), serving non-defense agencies such as the FAA, HHS and FEMA.  
Together they make up [CNA](#).

# The problem in detail

- Time scale: 6 years total including pre- and post-contingency (2024-2028).
- Mobilization of Active, Reserve, and Guard components for a large-scale contingency operation (LSCO).
  - ~**2 million** with about 1/3 forward deployed—and requiring combat uniforms—at the peak.
- Study population has a representative sample of C&T NIINs required to support wargame contingency events: 7-layer cold weather system, Combat uniforms, Boots, Coveralls, Aircrew/flame resistant uniforms.
- Wargame scenarios:
  - Years 1-2: Wartime preparations.
  - Year 3: Small-scale contingency in the high north that requires the 7-layer extreme cold weather clothing system.
  - Years 3-6: large-scale contingency in INDOPACOM requiring both temperate and tropical weather uniforms.
  - Year 6: post-contingency.

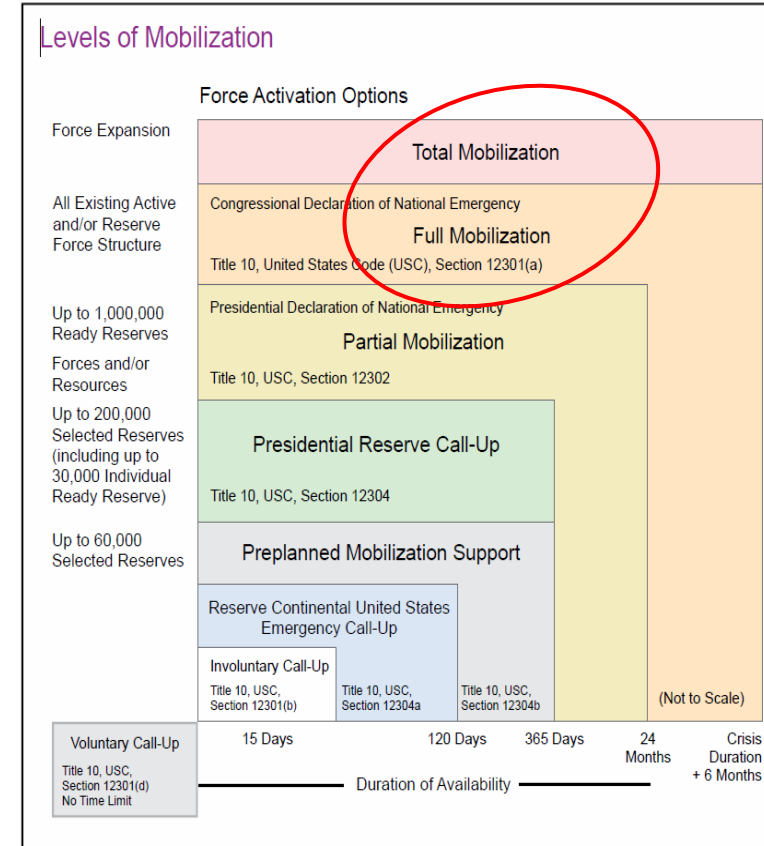
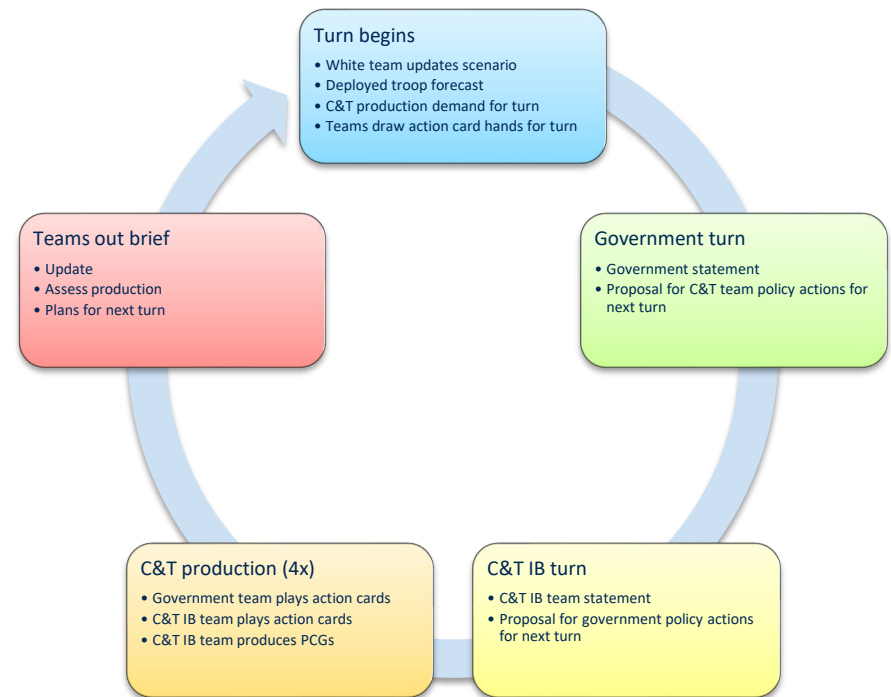


Figure I-4. Levels of Mobilization

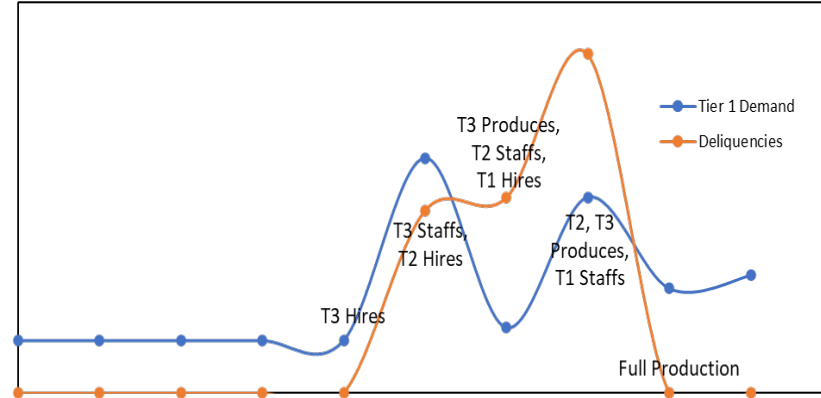
# Wargame Design

- Three parts of the game
  - Supply chain engine & DLA ACE Model
  - Policy Actions Cards
  - Industry & Government Discussions
- Centered on full DoD mobilization of Active, Reserve, and Guard components to meet demand of simultaneous small- and large-scale contingency operations.

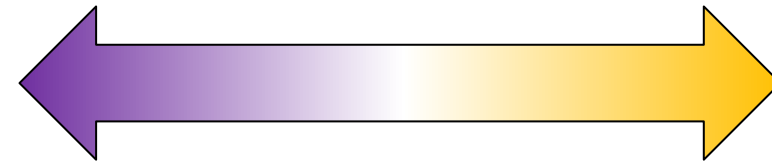


# Supply Chain Truths

- Production requires sufficient trained staff, equipment, and inventory of parts to produce goods.
  - Supply chain throughput is limited by whichever factor is slowest (1 missing component can stall the supply chain).
  - Bottlenecks move through the system starting at raw materials.
- The C&T supply chains are lean
  - Overproduction, unused equipment, & overstaffing costs \$
- Scaling up takes more time than scaling down.
  - Training people and acquiring new equipment takes more time than lay-offs.
- Production doesn't start until a delivery order is in hand (not forecast, not contract, DO). Products will be delivered 3-6 months after DO in hand.
- Steady demand is more efficient than sporadic demand
  - Continuously running production lines will be better prepared for a surge in demand than those that producing in batches.



## Tension between Industry and Government



- *Expand Berry compliance – stabilize demand, increase market size*
- *Remove Berry compliance. Cuts government spending*
- *Must address accusations of government pork-barreling*
- *Loss of resiliency (dependencies on foreign countries) in contingency*

# Supply Chain Engine

- **Purpose:** the production phase is a very simplified surrogate of C&T IB production designed to reveal constraints, limitations, and bottlenecks.
- There are three tiers to the CAMOLAND C&T supply chain
  1. Clothing manufacturers (tier 1)
  2. Component manufacturers (tier 2)
  3. Raw material suppliers (tier 3)
- PCGs played were **CW Parka, FR Coat, and IHWCU Coat.**
- Each tier produces using simplified inputs
- Each tier feeds the subsequent tier to meet DLA demand or rectify delinquencies.
- Individual tiers manage # of lines, staffing, production capability and balancing their budget sheet.

## C1 - Tier 1 – Uniforms - C1

**Per Quarter (3 months):**

- **Place Orders**
  - Use order cards and fill out request and pass to higher tier (do not resubmit delinquent orders)
- **Use Production Line to Produce**
  - Check line is set up to produce item (token at top of line)
  - Match color of inputs to token (black is wild)
  - Use required inventory items and update. Fill in corresponding number of produced goods as delivered on supply card and on line. If overproducing, update inventory.
  - Update delinquencies (cumulative)
  - Receive \$1 per product delivered to requestor. Lose \$1 per excess staff or produced items held in inventory.
- **Receive Deliveries:**
  - Pass order cards back to originator.
  - Copy delivered column to inventory card. Erase request column, erase production mark on lines.
- **Adjust production lines (All steps optional – must do in order)**
  - **Scale Up:** Increase staff on line(s) by number in training station.
  - **Pivot:** Decrease staff on line to increase another line.
  - **Layoff:** Reduce staff on line (no penalty).
  - **Hire:** List new staff in training station (train 1 quarter before moving to line).
  - **Expand:** Start new line or switch token of line with zero staff (cannot staff this turn).
- **Turn End:** Update data collection sheet.

**Production Rules:**  
Colors must match!

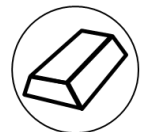
**Training Station (TQ)**

#	Line 1	Line 2	Line 3	Line 4	Line 5
	Staff	Produ	Staff	Produ	Staff
	+40	0	+40	0	+40
	+20	0	+20	0	+20
	+10	0	+10	0	+10
	9	0	9	0	9
	8	0	8	0	8
	7	0	7	0	7
	6	0	6	0	6
	5	0	5	0	5
	4	0	4	0	4
	3	0	3	0	3
	2	0	2	0	2
	1	0	1	0	1

For staff over 9 mark circle and sum with below

**Production Lines:**  
*Must have at least as many staff as production desired*

## T3 – Raw Materials



## T2 - Components



## T1 - Uniforms



# Industry & Government Discussions

- Provided a venue for IB partners and government participants to discuss supply chain challenges in greater detail than the supply chain engine allowed:
  - Pain and friction points between DLA & Industry
  - Issues specific to IB areas
  - Potential government and IB solutions to identified challenges
- Sessions split by areas
  - Uniforms (non-profit)
  - Uniforms (for-profit)
  - Uniform components
  - Cold weather uniforms
  - Boots



# Supply Chain Engine In Action

- **Game Summary:**

- 5 turns. Players actively worked through 3. years of a 7 year scenario.
  - Competition (baseline)
  - CW contingency (1 year)
  - LSCO ramp up w/ CW Rampdown
  - LSCO steady state
  - LSCO ramp down
- Game simplified to explore 3 PCGs:  
**Demand Spike: Game orders increased 5-7x from baseline with large oscillations** due to troop rotations/wear and tear.

Game and Model vs Demand

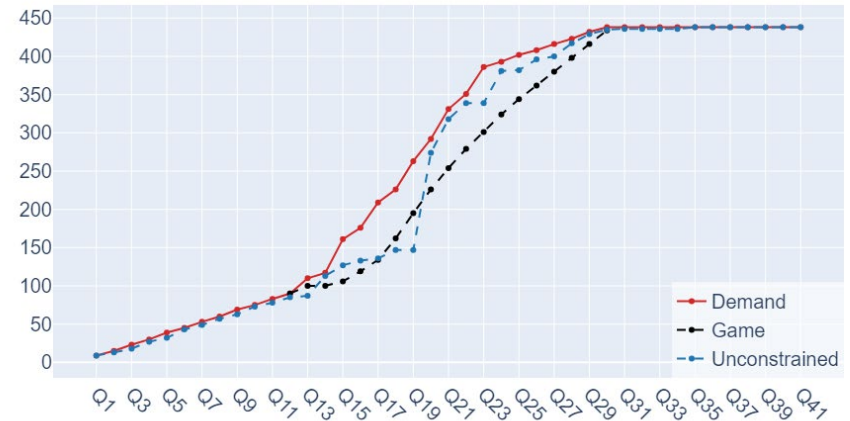


Figure Credit: DLA ACE

- **Simplified production does not mean simplified decisions.**

- Wargames are tools to understand player decisions and identify challenges for follow-on study.
- While we made simplifying assumptions for game purposes, we ensured the mechanics required industry experts to make difficult/complex decisions.
- **Adding more realism will only aggravate challenges observed within the wargame.**



# CAMOLAND Initial Insights

## 1. Everything is a bottleneck, but some bottlenecks are worse than others.

- The demand spike resulted in all Tiers having insufficient equipment/staff and materials
- Players indicated policy solutions to reduce bottlenecks were specific to each company's situation.
- **Implication:** DLA should consider identifying those companies able to ramp up most quickly in a supply chain.

## 2. Government needs visibility where/when multiple items competing for same component or material and must have process to prioritize items.

- When the LSCO was ramping up and the CW scenario was ramping down, the CW supply chain was directly competing with the uniform supply chain for bolts of cloth.
- **DLA communication** with tier 3 suppliers may increase the agility of the IB.

## 3. The C&T DIB cannot ramp up at the flip of a switch

- The cold weather scenario was ramping down by the time the supply chain was able to ramp up.
- **Implication:** Short duration shocks to the supply chain can only be mitigated by stock on hand.
- Stockpile of component parts, whether GFM or VMI reduces delinquencies but delays between policy decisions and game effects resulted in miscalculations in stockpiling components.
- **Implication:** Government must not only have a policy, but a plan for phasing policy and targeting policy where and when it is needed.

# CAMOLAND Initial Insights (cont.)

## 4. Different companies make different prioritization decisions that may prevent current capacity from being used in demand spike.

- When demand spiked, 1 T2 co. chose “first-in, first out” leaving 1 company with excess and another without a required component.
- The company with excess still lacked staff, while the company lacking material had unused staff/equipment that round.

Game and Model vs Demand

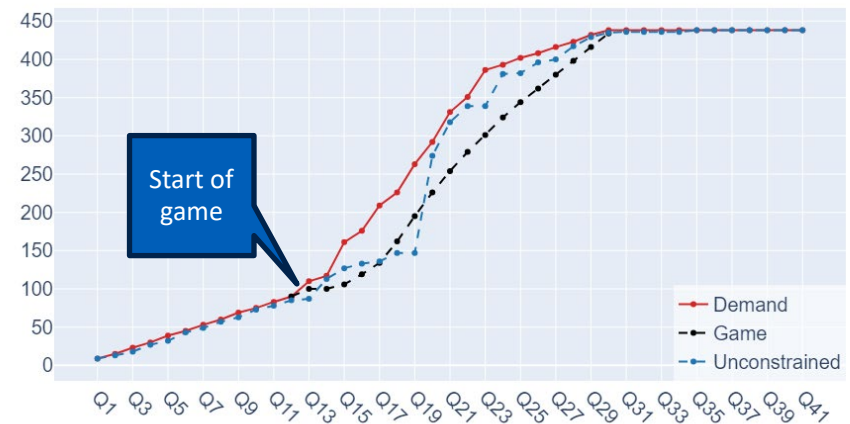


Figure Credit: DLA ACE

## 5. Players prioritized staff stability over “chasing” the demand (following oscillations closely).

- Players chose to accept delinquencies during a high quarter, to “even out” a subsequent relatively low quarter.

## 6. DLA’s cumulative delinquencies did not decrease until after LSCO ramp down.

- The DIB eventually ramped up to meet the new “steady state” demand.
- Participants were reluctant to ramp up sufficiently to “catch-up” with the backlog – again prioritizing staff stability and citing concerns of miscalculating a ramp-down.

## 7. Outstanding delinquencies during ramp down created the opportunity for a natural “soft-landing” for the industry, though companies ramping down at different rates may complicate this process.

# CAMOLAND Initial Insights (cont.)

- 8. Inability of for-profit IB vendors to offer a competitive wage in their respective markets due to government contract terms compromises their long-term viability**
  - Other businesses competing for the same labor market segment can offer higher wages (i.e., fast food, retail etc.).
  - C&T workers on commercial production lines at IB vendors make higher wages than their counterparts producing uniforms for DOD due to higher profit margins allowed in commercial contracts.
- 9. Strong community mentality within the C&T IB**
  - **Vendors band** together to **ensure competitors remain viable** during times of **lower demand—by sub-contracting to one another to limit operating losses.**
- 10. Defense Production Act Title III** of particular interest to both government and industry participants with historical cases of use during COVID 19.
- 11. DLA communication with all IB tiers improves vendor health and agility**
  - Each tier experiences different chokepoints and **problems are not persistent across all tiers.**
  - **Government and Tier 1 IB partners adjust contract and delivery terms to maintain vendor long-term viability.**
  - With tier 3 suppliers may increase the agility of the IB.

# CAMOLAND Initial Insights (cont.)

12. **Stockpiling** component parts, either through GFM or VMI, increases IB ability to respond to demand spikes
13. **Draw-down** at the end of a contingency results in **shrinkage of IB** because of less demand and less funds for purchases
  - Planning and strong government-IB communications can mitigate some of these effects.
14. **Time delays** result in large delinquencies early in a surge as bottle necks work their way through the supply chain
15. **Expansion of Berry Amendment** to other US Government agencies will stabilize industry demand however political barriers, such as free trade, remain
  - Homeland Procurement Reform (HOPR) Act closes loopholes in the Kissell Amendment for the Department of Homeland Security by establishing criteria for purchasing uniforms, footwear, and personal equipment from American sources.
  - More federal agencies could source their uniforms, footwear, and personal equipment from American vendors, but doing so likely requires political intervention.