Estimating Logistics Burdens in Support of Acquisition Decisions

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Motivation

1. Logistics is costly

2. Decisions determine supply

3. It's hard to predict, especially about a complex system…in the future

$400 gallon - Google Search - Windows Internet Explorer

http://www.google.com/search?q=%24400+gallon&sourceid=ie7&rls=com.microsoft:en-US&ie=utf8&oe=utf8

File Edit View Favorites Tools Help

Thesis Library | $400 gallon - Google Sea...

Last year

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$400 per gallon gas to drive debate over cost of war in ...
Oct 15, 2009 ... The Pentagon pays an average of **$400** to put a **gallon** of fuel into a combat vehicle or aircraft. The Pentagon pays an average of **$400** to put ...
thehill.com/.../63407-400**gallon**-gas-another-cost-of-war-in-afghanistan- - Cached - Similar

Pentagon: $400 a gallon for gas for troops - UPI.com
Oct 17, 2009 ... The U.S. Defense Department told a congressional committee paying **$400** for a **gallon** of gas is one reason the cost of the war in Afghanistan ...
www.upi.com/Top_News/...a-**gallon**.../UPI-86761255752242/ - Cached

Ron Paul: Feds spend $400/gallon on gas in Afghanistan

4 min - Jul 11, 2010 - Uploaded by RidleyReport
Sponsor: HempVideo.com - This is an unofficial illustrated version of Ron Paul's July 12 broadcast on Afghanistan. And you thought a few $69 ...
www.youtube.com/watch?v=62wSsXE7NXA

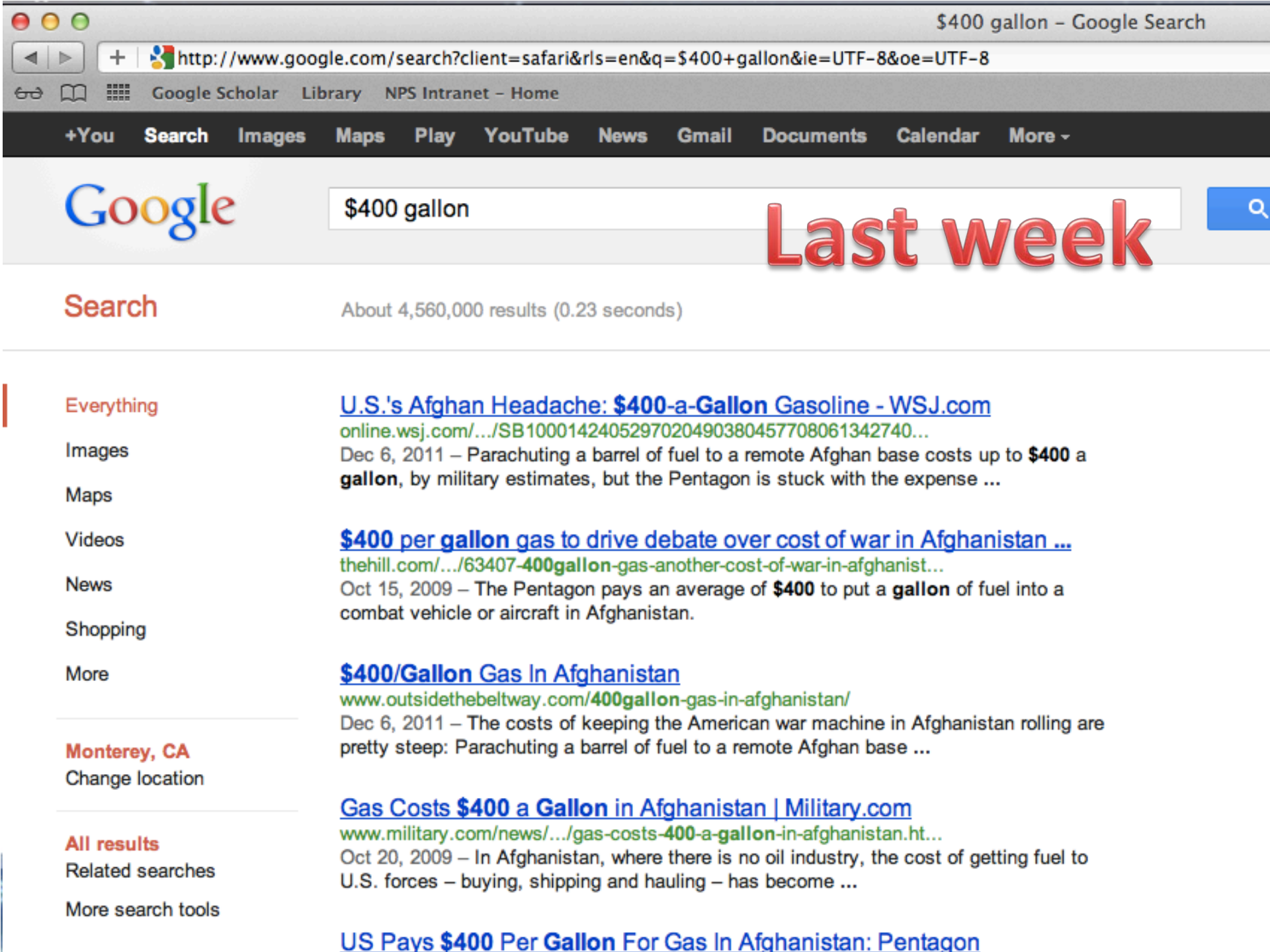
More videos for **$400 gallon** »

Gas Costs $400 a Gallon in Afghanistan
Gas Costs **$400** a **Gallon** in Afghanistan. October 20, 2009. Military.com|by Bryant Jordan. The logic about how the war in Iraq would pay for itself from oil ...
www.military.com/.../gas-costs-400-a-**gallon**-in-afghanistan.html - Cached - Similar

US Pays $400 Per Gallon For Gas In Afghanistan: Pentagon
Oct 16, 2009 ... The Pentagon pays an average of **$400** to put a **gallon** of fuel into a combat vehicle or aircraft in Afghanistan. The statistic is likely to ...
www.huffingtonpost.com/.../us-pays-400-per-**gallon**-fo_n_324294.html - Cached - Similar

The DOD Energy Blog: Mythbusters and the $400 gallon of fuel ...
Nov 7, 2010 ... Mythbusters and the **$400 gallon** of fuel: Under Secretary of the Army Westphal and Vice Chief of Staff GEN Chiarelli headed for Afghanistan. ...
dodenergy.blogspot.com/.../mythbusters-and-400-**gallon**-of-fuel.html - Cached

Ron Paul: Feds spend $400/gallon on gas in Afghanistan Alex Jones ...
Jul 12, 2010 ... Ron Paul: Feds spend **$400/gallon** on gas in Afghanistan - The Alex Jones


$400 gallon - Google Search
http://www.google.com/search?client=safari&rls=en&q=$400+gallon&ie=UTF-8&oe=UTF-8
Google Scholar
Library
NPS Intranet - Home
+You
Search
Images
Maps
Play
YouTube
News
Gmail
Documents
Calendar
More
Google
$400 gallon
Last week
Search
About 4,560,000 results (0.23 seconds)
Everything
Images
Maps
Videos
News
Shopping
More
Monterey, CA
Change location
All results
Related searches
More search tools
U.S.'s Afghan Headache: $400-a-Gallon Gasoline - WSJ.com
online.wsj.com/.../SB10001424052970204903804577080613427 40...
Dec 6, 2011 – Parachuting a barrel of fuel to a remote Afghan base costs up to $400 a gallon, by military estimates, but the Pentagon is stuck with the expense ...
$400 per gallon gas to drive debate over cost of war in Afghanistan ...
thehill.com/.../63407-400gallon-gas-another-cost-of-war-in-afghanist...
Oct 15, 2009 – The Pentagon pays an average of $400 to put a gallon of fuel into a combat vehicle or aircraft in Afghanistan.
$400/Gallon Gas In Afghanistan
www.outsidethebeltway.com/400gallon-gas-in-afghanistan/
Dec 6, 2011 – The costs of keeping the American war machine in Afghanistan rolling are pretty steep: Parachuting a barrel of fuel to a remote Afghan base ...
Gas Costs $400 a Gallon in Afghanistan | Military.com
www.military.com/news/.../gas-costs-400-a-gallon-in-afghanistan.ht...
Oct 20, 2009 – In Afghanistan, where there is no oil industry, the cost of getting fuel to U.S. forces – buying, shipping and hauling – has become ...
US Pays $400 Per Gallon For Gas In Afghanistan: Pentagon

Fully Burdened Cost of Fuel

Our research goal

- Estimate resource* burden of supply

  no measure of capability reduction, but correlated!
- Over DoD enterprise-wide system boundaries

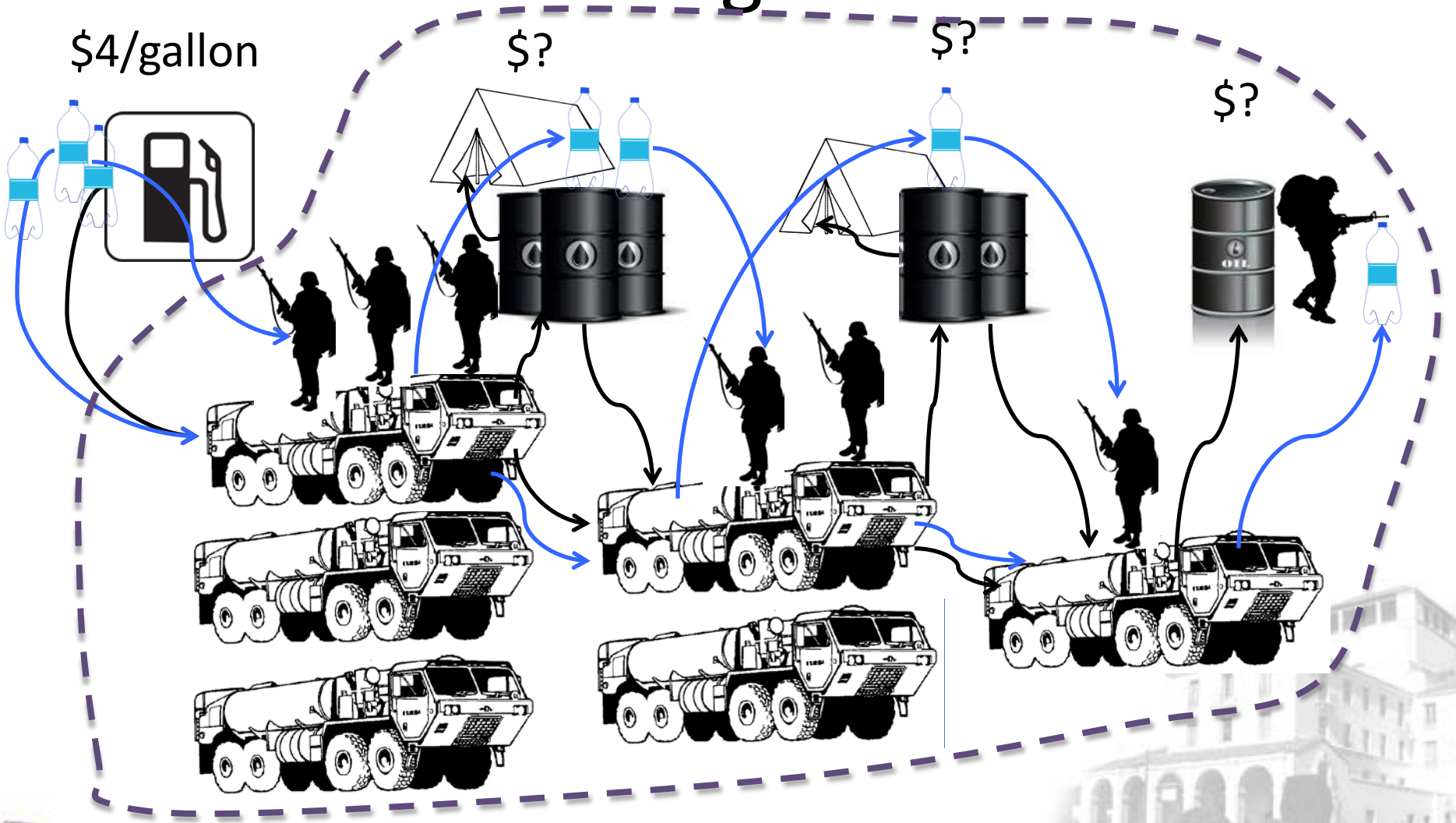
  expand beyond service-level boundaries
- Based on broad planning scenarios

  Level of detail suitable to 5+ year horizons

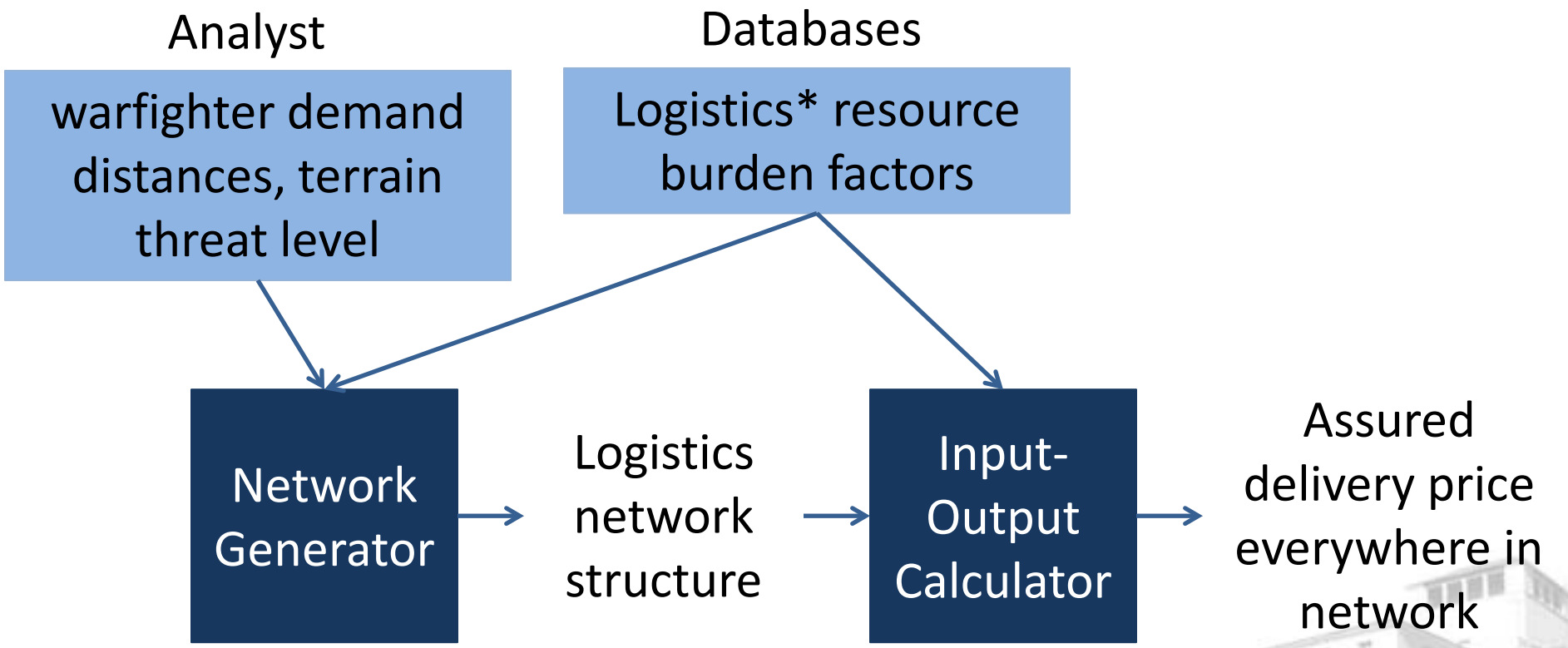
Features of our approach

- Automatically generates network structure
- Captures burdens excluded by other FBCF/E estimates
  - Supply to sustain personnel employed in logistics
  - Higher-order effects of sustainment of logistics assets
- Especially valuable for
  - Organic (self-sustaining) logistics networks
  - Long lines of communication
  - High-threat (high-cost) regions

Schematic of logistics network



Schematic of Approach



*Logistics includes protecting logistics network

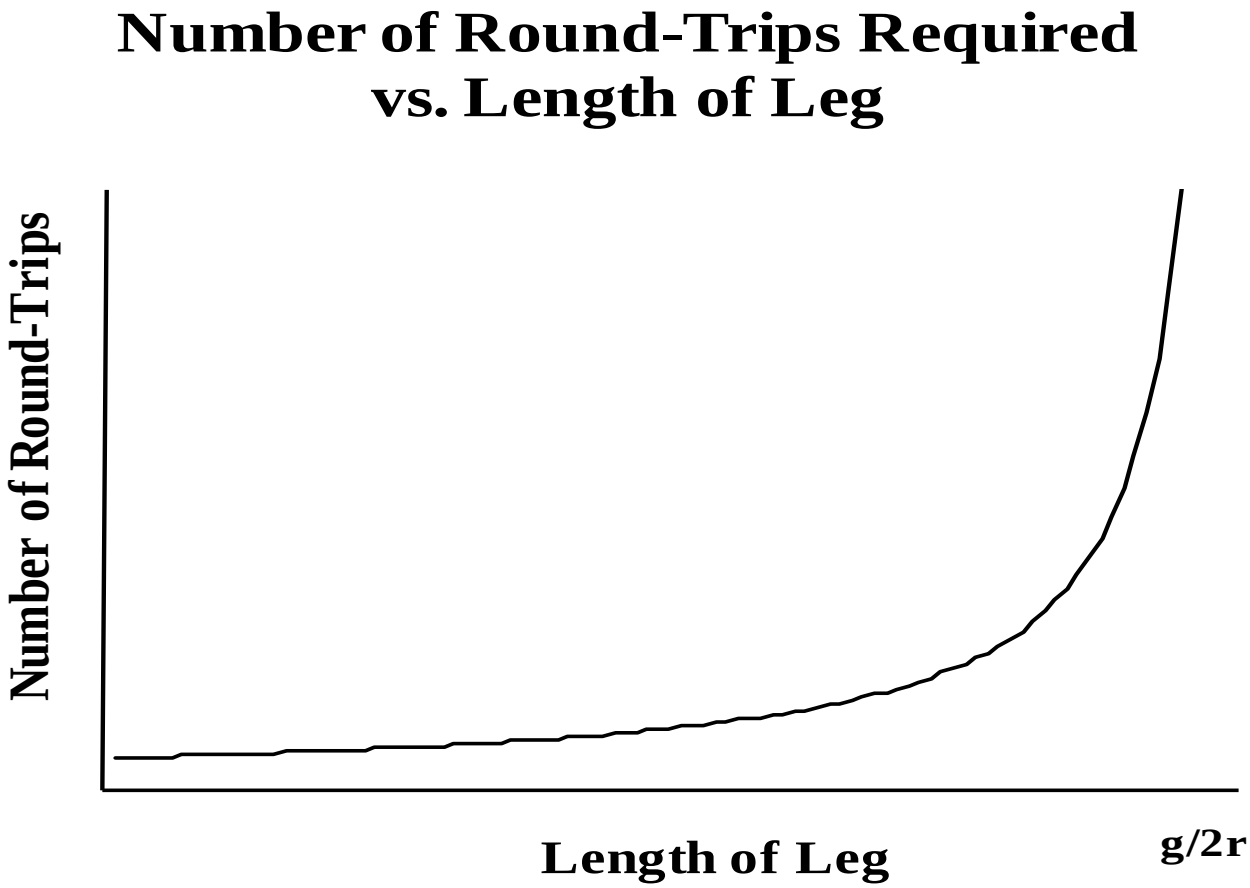
Network Generator: Method

Optimization:

- Select number and location of depots
- To minimize total transportation* cost

*May be extended to include other logistics costs

Logistics costs depend on depot placement



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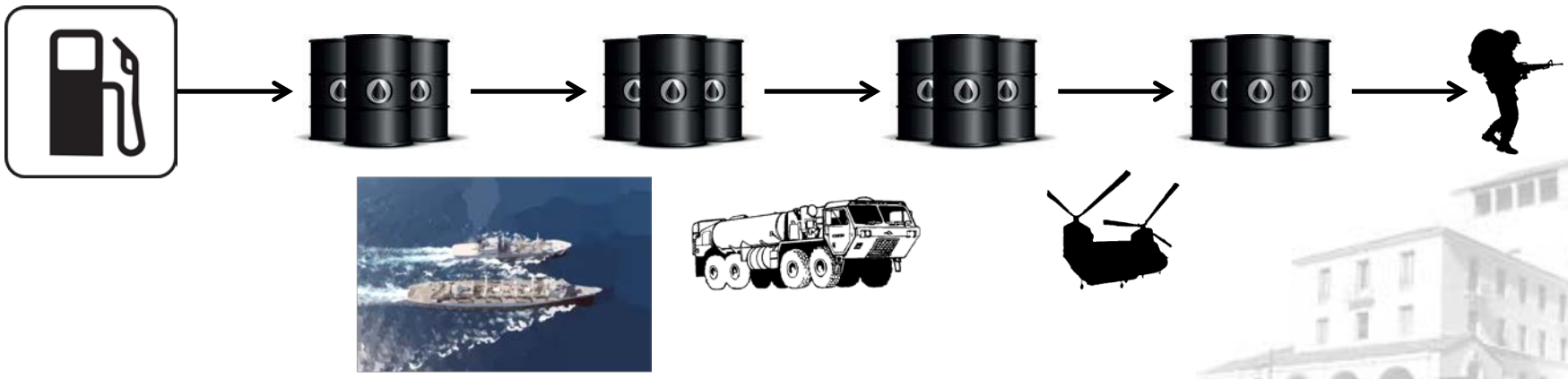
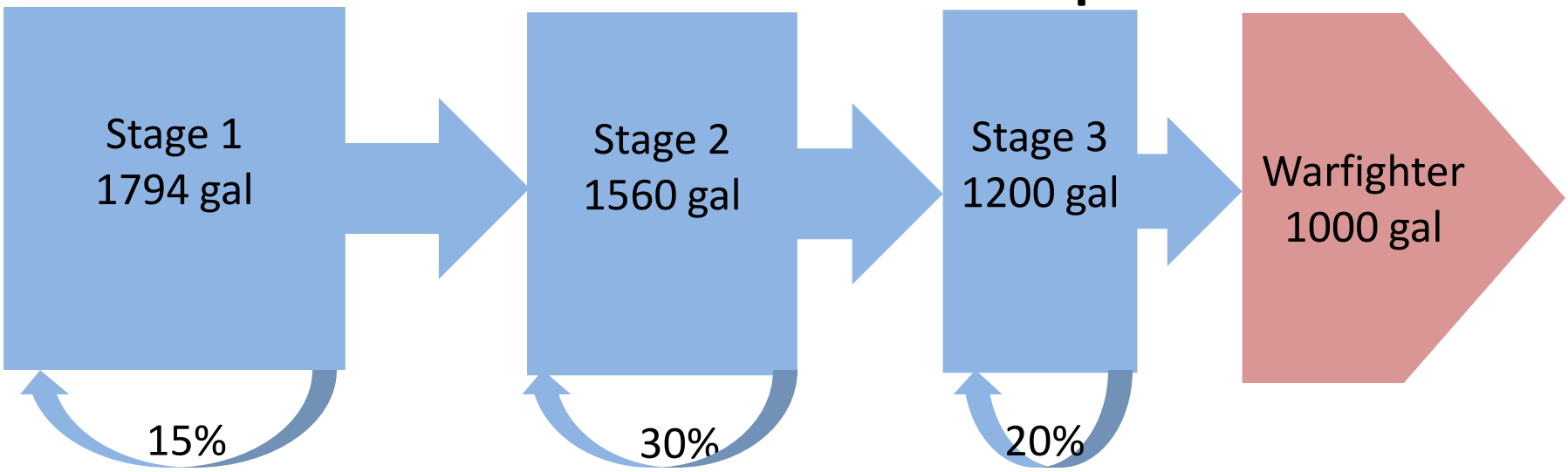


The Multiplier Effect
Linear Network Example



234 gal
= 0.15×1560 gal
= 0.15×1000 gal
+ 0.15×0.2×1000 gal
+ 0.15×0.3×1000 gal
+ 0.15×0.3×0.2×1000 gal

360 gal
= 0.3×1200 gal
= 0.3×1000 gal
+ 0.3×0.2×1000 gal

200 gal
= 0.2×1000 gal

Input Output Analysis

- Model requires parameters
  - Warfighter resource demands
  - Resource requirements for each stage/activity in the logistics networks
  - Resource prices when acquired by enterprise
- Model assumes (among other things)

  Proportional consumption of multiple inputs
- Model estimates:
  - FBCS, ADP everywhere in the network
  - Resource requirements (by type) everywhere in network

a_{ij} = the number of units of output from component i required to produce each unit of output from component j.

x_i = the amount of fuel delivered component i

The total fuel requirement for the organization is $\sum_{j=1}^{n} x_j a_{Xj}$. The input-coefficient matrix is shown below.

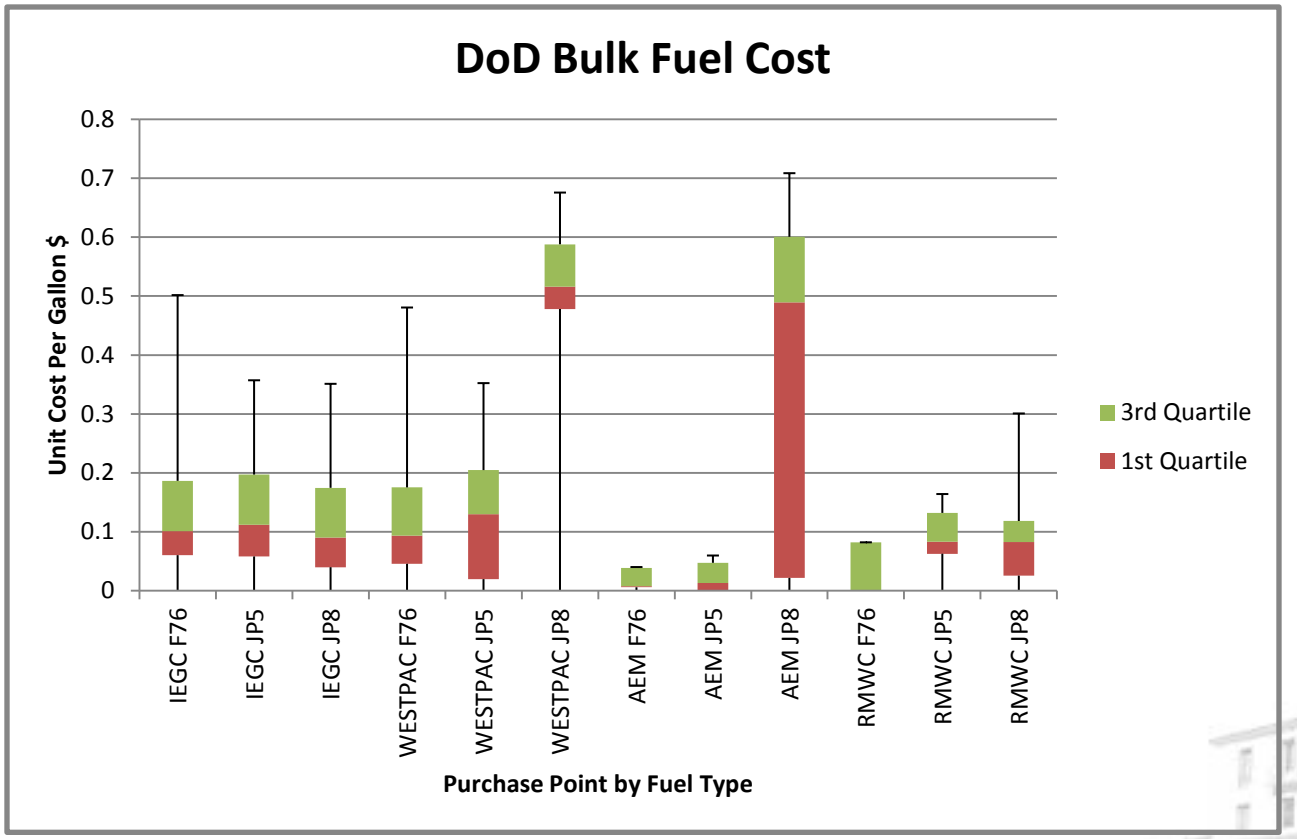
Table 1: General input-coefficient matrix

			destination			
			component			
			1	2	3	n
source	component	1	a_{11}	a_{11}	…	a_{1n}
		2	a_{21}	a_{22}	…	a_{2n}
		…	…	…	…	…
		n	a_{n1}	a_{n2}	…	a_{nn}
		external	a_{X1}	a_{X2}	…	a_{Xn}

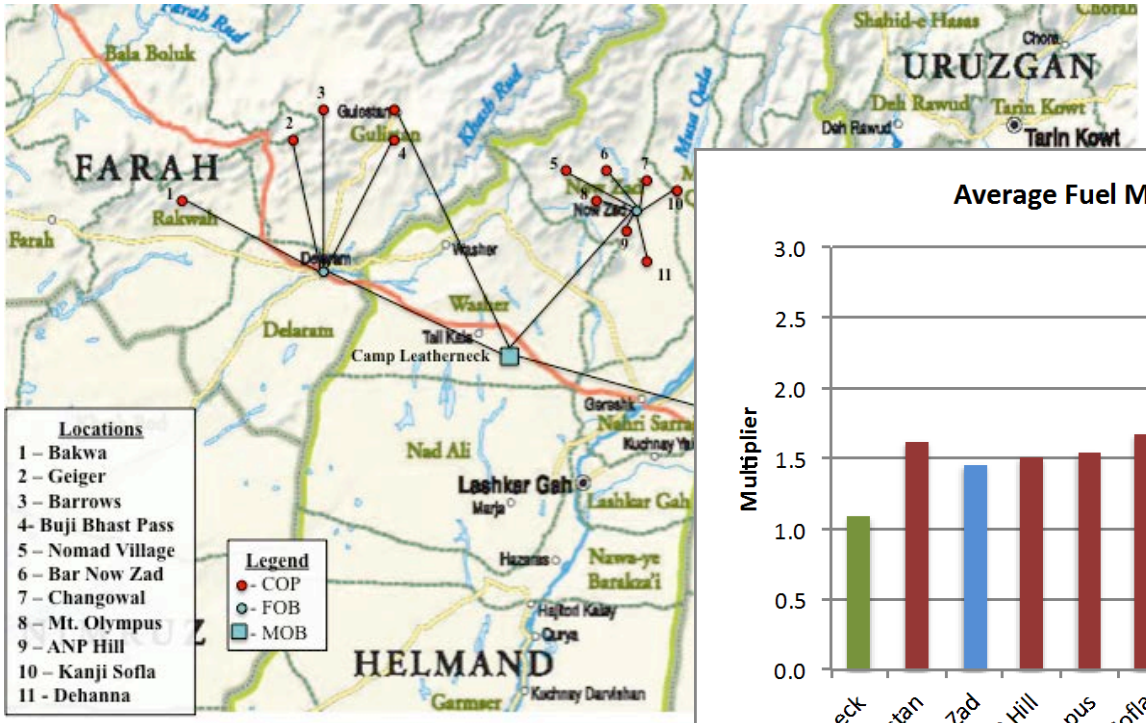
The values of a_{ij} and x_i satisfy the n equalities:

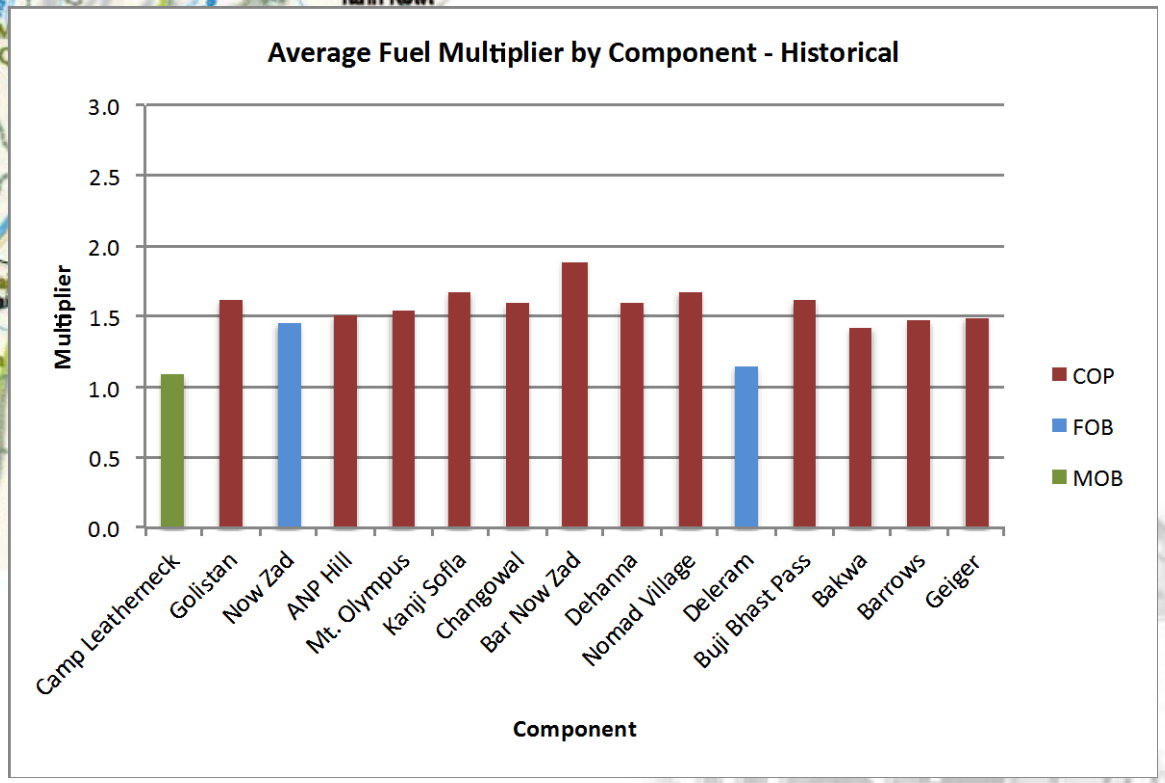
$$x_i = \sum_{j=1}^{n} a_{ij} x_j, \forall i = 1, \ldots, n,$$

Last Year's Results
Bulk fuel delivery cost vs. location



Last Year's Results
Logistics fuel requirements important





Questions?

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Additional References

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