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Statewide Freight Transportation Network Optimization Strategy Overview

September 21, 2016

consulting & technology

Freight Network Optimization Model (FOM)

- ***Vision**: To effectively identify & prioritize investment opportunities for an optimized freight transportation network to lower transportation costs & promote business growth.*
- State DOT can optimize statewide freight transportation network to reduce transportation costs
  - Traditional approaches focus more on capacity planning
  - Traditional methods don't quantify cost saving opportunities in a multimodal network
- FOM and Travel Demand Modeling are complementary tools for State DOT planning

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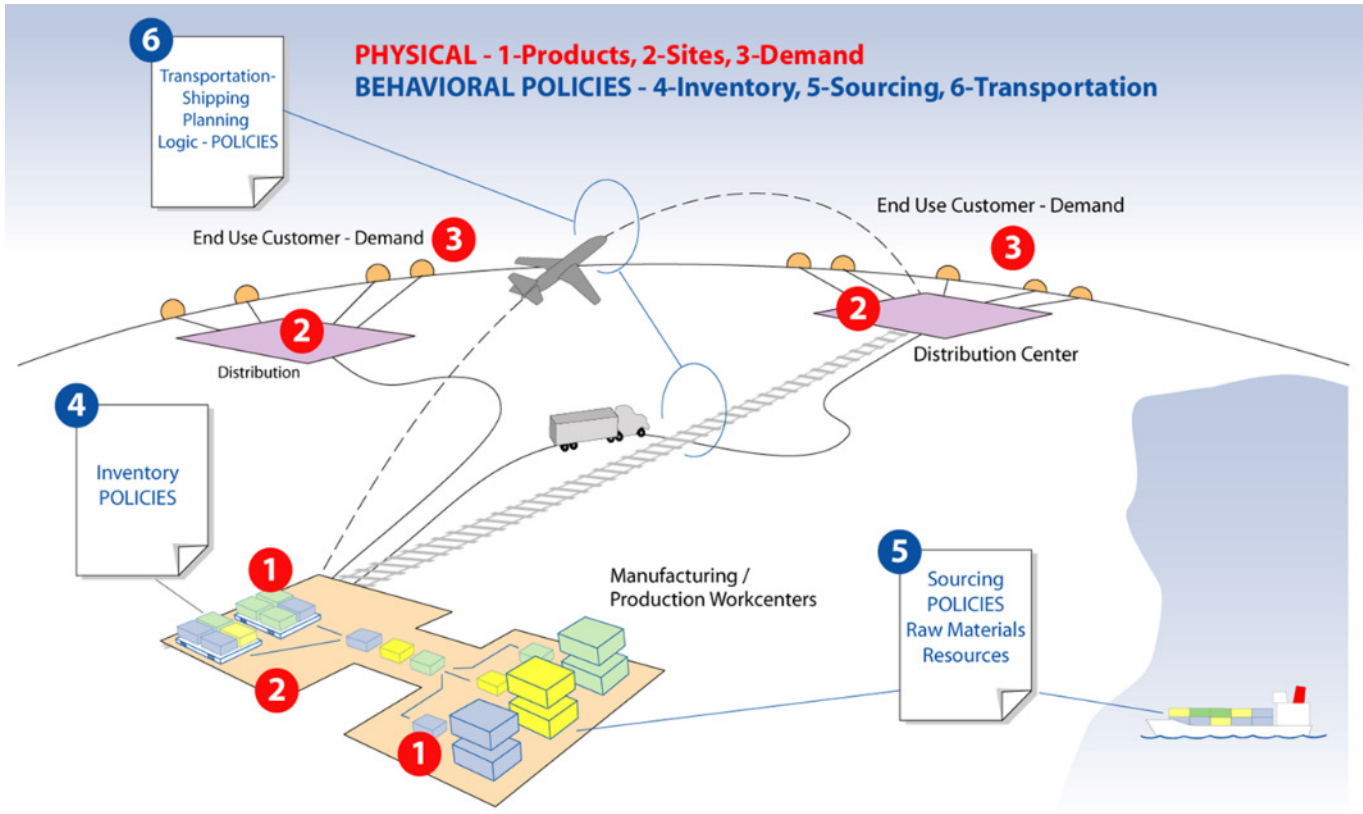
Supply Chain Network and Optimization



- Up to 80% of the landed costs are locked in with the supply chain network

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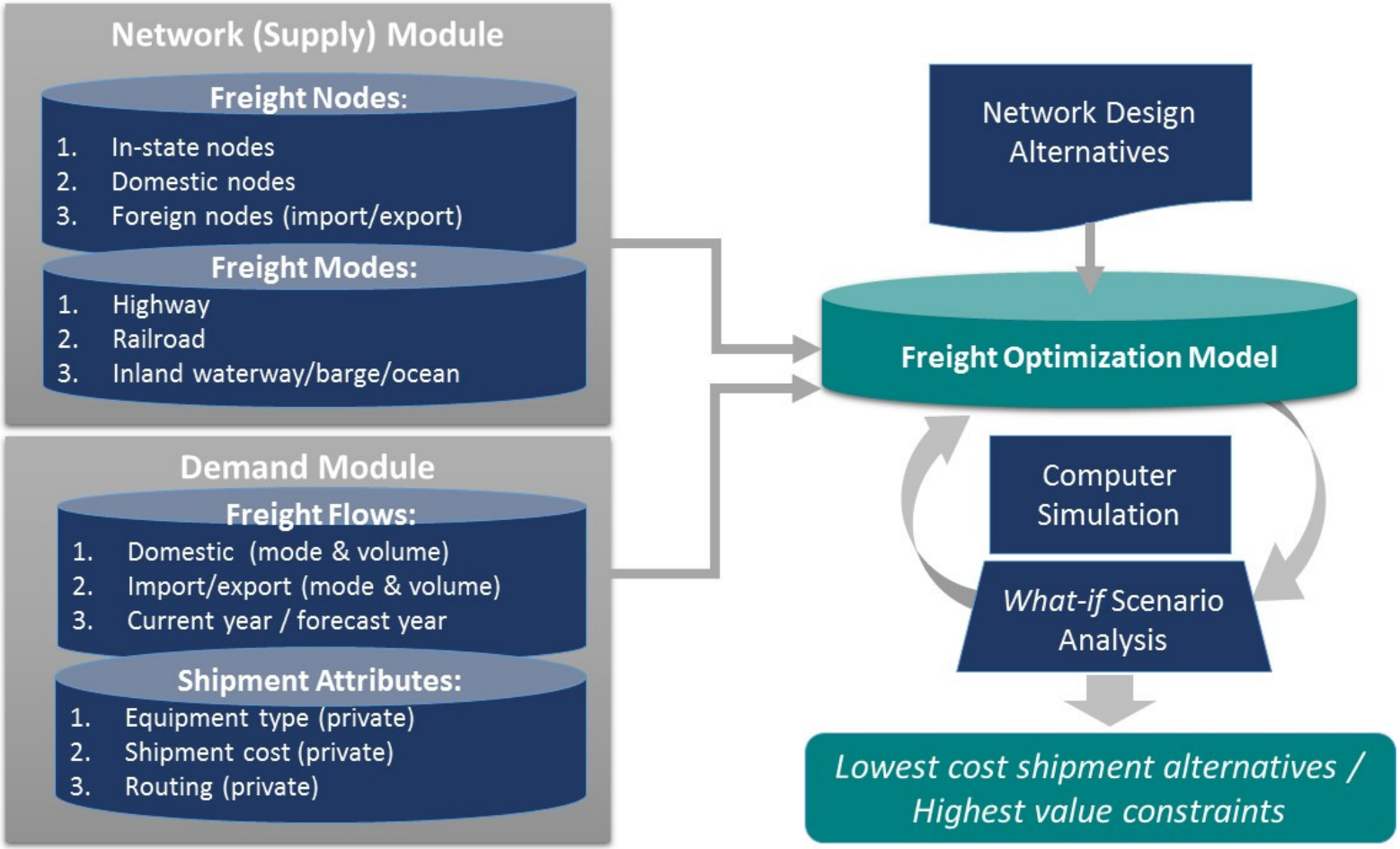
Business Architecture Overview



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Optimization Analysis

- Quantitative Analysis
  - Cost and network capacity
  - Economic viability
  - Improved network resilience
- Qualitative Analysis
  - Strategic alignment
  - Funding availability
  - Job creation and local buy-in
  - Service levels / transportation time
  - Road mile reduction
  - etc.

Complementary Tools for Transportation Planning

- FOM uses network data from the Travel Demand Model TDM)
- Optimization results fed back to the TDM to analyze future traffic pattern changes

	Network Optimization	Traditional Freight Planning
Scope	Design / redesign the network (to-be)	Use the current network (as-is)
Objective	Identify highest cost (value) constraints in regional freight network	Identify bottlenecks based on stakeholder input and/or travel demand models (shortest path).
Focus	Strategic planning of critical components in supply chain network (site, capacity, inventory, mode, etc.)	Long range planning (primarily policy planning) based on highly aggregated commodity data
Tools	Network Optimization Model	Travel Demand Model
Network Detail	Defines origin-destination pairs in to-be network (lanes, modes, equipment, capacity, etc.)	Determines modal choice, major markets; makes assumptions on interchanges and routing.

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Benefits of Multi-Modal Freight Network Optimization

- Benefits to State DOT
  - Safety & Environment: reducing truck traffic
  - Mobility: improving transportation network resiliency
  - Economy & Preservation
    - Investment opportunities with high ROI
    - Identifying commercial freight road networks that are irrelevant
- Benefits to State DOT & private partners
  - Determine the highest value multi-modal infrastructure public and private investments that are measured by:
    - Lowering the cost of transportation for businesses
    - Increasing transportation responsiveness and predictability
    - Incenting business expansion
  - Provide a foundational model to help businesses optimize their supply chains

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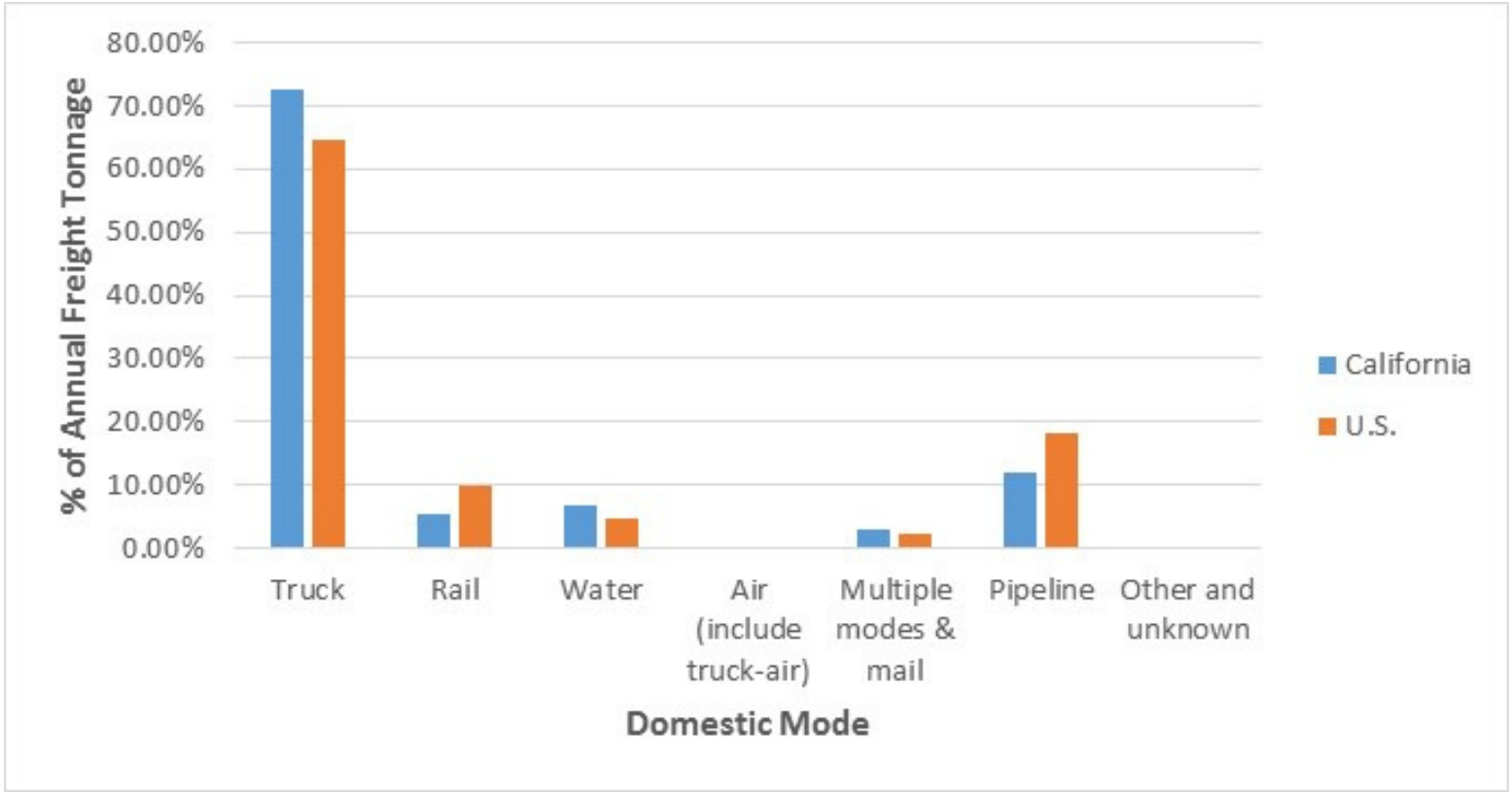
Transportation Modal Choice: CA vs. U.S.



Data Source: FAF 4.1 2014, Federal Highway Administration

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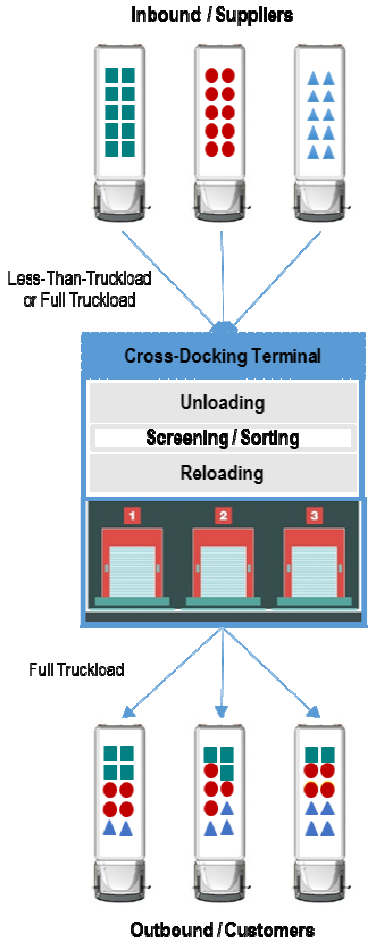
Iowa Case Study
Cross Dock

- Truck freight arrives via LTL or FTL
- Freight is unloaded and sorted based on destination
- Outbound trucks are loaded with freight going to the same area
- LTL freight is consolidated to long-haul FTL
- Can offer packaging / palletizing services



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Cross-Dock Opportunity Analysis

- Identified four regions based on freight density
- Central Iowa – S has the highest cost saving, but Central Iowa – A and Eastern Iowa are more viable options because of existing access to interstate highways
- Selected Eastern Iowa as the primary site candidate with the concept to co-locate cross-dock and intermodal facilities in a logistics park

Location	Total Annual Saving Opportunity
Central Iowa – A	$867 Million
Central Iowa – S	$870 Million
Eastern Iowa	$852 Million
Western Iowa	$670 Million

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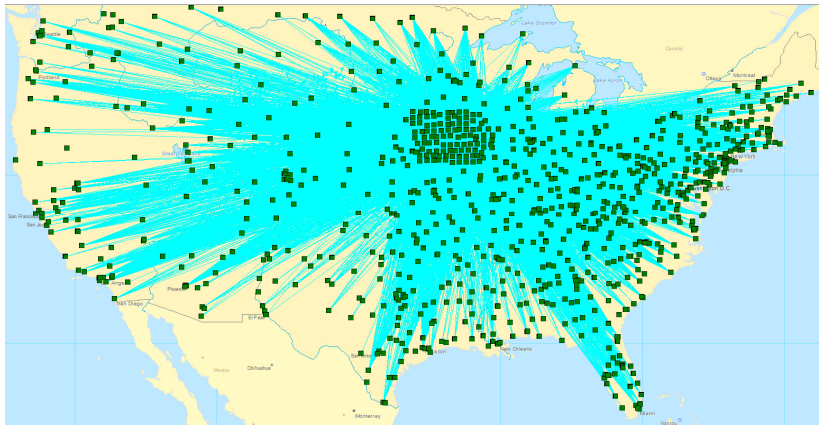
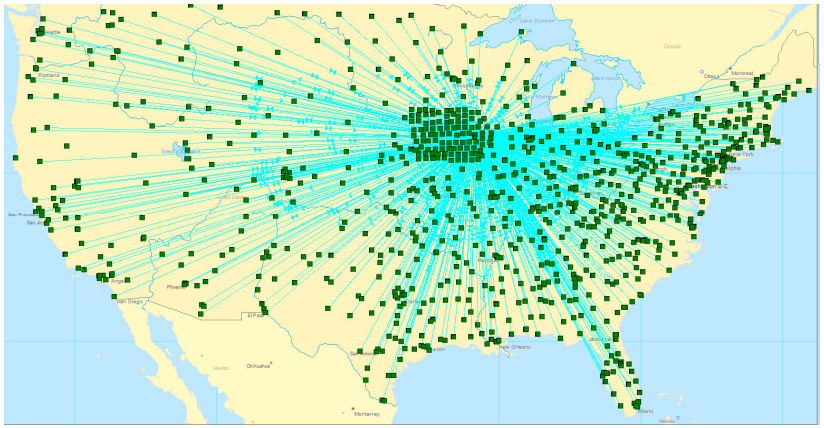
Cross-Dock Network Impact

Current State



Future State



- Benefits:
  - Leverage freight consolidation to reduce transportation costs
  - Reduce long distance truck traffic and improve environmental sustainability

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Iowa Case Study
Intermodal Facility

The total market opportunity for high volume traffic lanes:

Item	Opportunity
Total Number of Outbound Container	377,000
Est. Number of Inbound Containers	139,000
Est. Container Shortage	238,000
Est. Annual Loaded Containers	**516,000**

Item	Opportunity
Annual Gross Transportation Saving	$340 Million
Empty Container Reposition Cost	($143 Million)
Annual Net Savings	**$197 Million**

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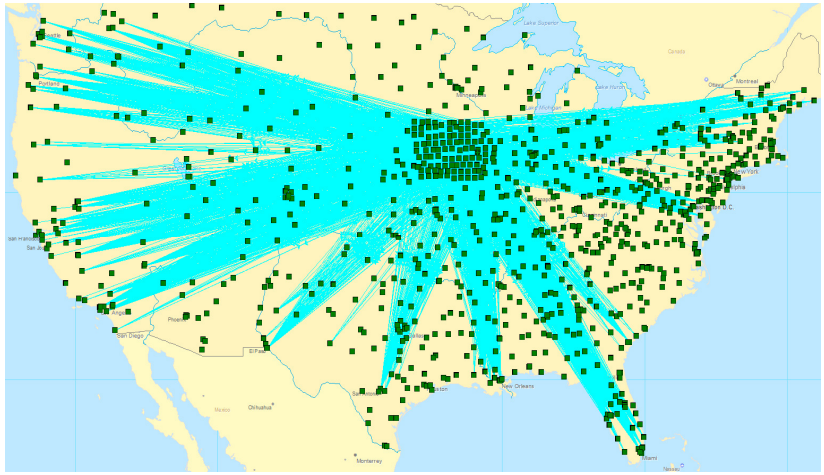
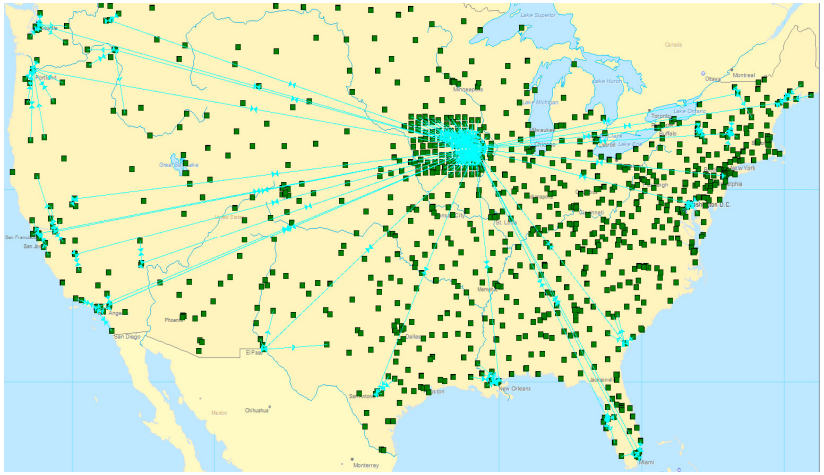
Case Study 2
IM Facility Network Impact

Current State



Future State



- Benefits:
  - Leverage rail network to reduce transportation costs
  - Reduce truck traffic and improve environmental sustainability

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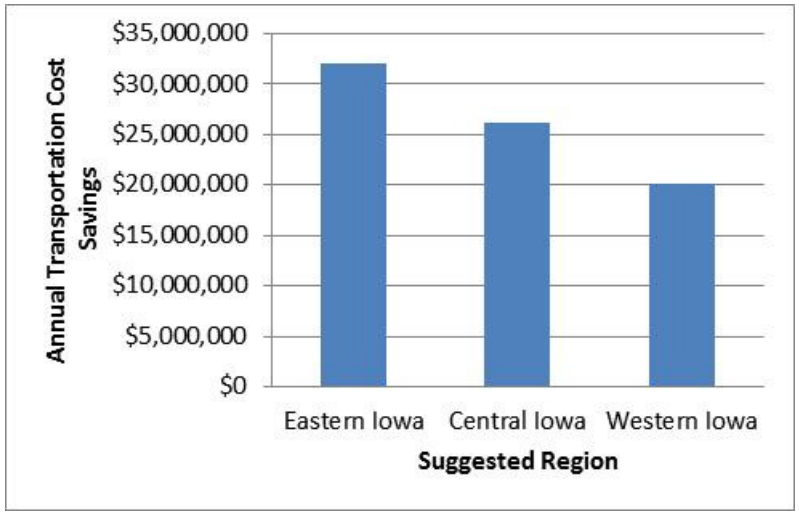
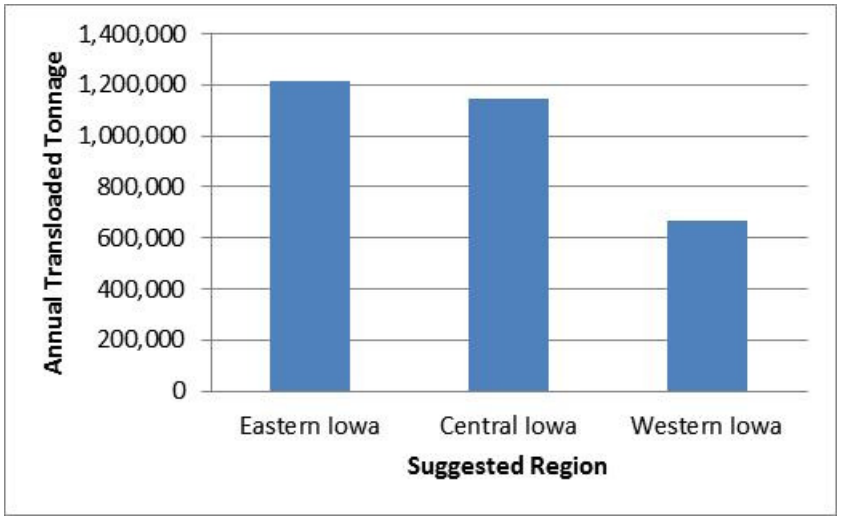
Iowa Case Study
Transload Facility

- Transload facilities allow shippers to transfer freight between two modes and leverage lower cost shipment options
- In the statewide model, three locations are identified as candidates for transload facilities to provide largest cost saving opportunities





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Iowa Case Study

A Logistics Park Business Case

Commercial Benefits

Facility	Base Case Est. Annual Savings	Base Case Est. Annual Loads
Cross-Dock	$34.2 Million	52,000
Intermodal	$15.5 Million	68,500
Transload	$3.2 Million	6,900
Combined LP	**$52.9 Million**	**127,400**

Public Benefits

Items	Annual Savings/Reduction
Crash Cost Savings in 2021	$31.3 Million
Carbon Reduction Savings in 2021 (3% Discount Rate)	$81.6 Million
Reduction of Long-Haul Truck Freight in 2021	170,000 Trucks
Truck Mile Reduction in 2021	150 Million Miles

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Application to Commercial Supply Chains
Leveraging Big Data for Optimization & Benchmarking

- Assists commercial companies to design & optimize their supply chains
  - Baseline Optimization
    - Identify opportunities in current network to reduce transportation costs
    - Make specific recommendations to improve the supply chains
  - Greenfield Scenario Analysis
    - Identify locations of new facilities in the supply chains
    - Assess cost savings and build business case for investment
- Many companies challenged to collect relevant data and lack expertise
- Quetica's unique approach merges public data from its state multi-modal network optimizations with a company's supply chain data
  - Product category
  - Demand (location of customers, product, and volume)
  - Supplier (location of suppliers and volume)
  - Private transportation network capacity
  - Facility construction and operation cost
- More effective commercial supply chain network design & optimization
  - Leverages techniques, tools & computer algorithms proven with Fortune 500
  - More robust dataset overcomes internal data limitations

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Questions

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