IOWA economic development

IOWA DOT

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Leveraging Data to Optimize Commercial Supply Chain Networks

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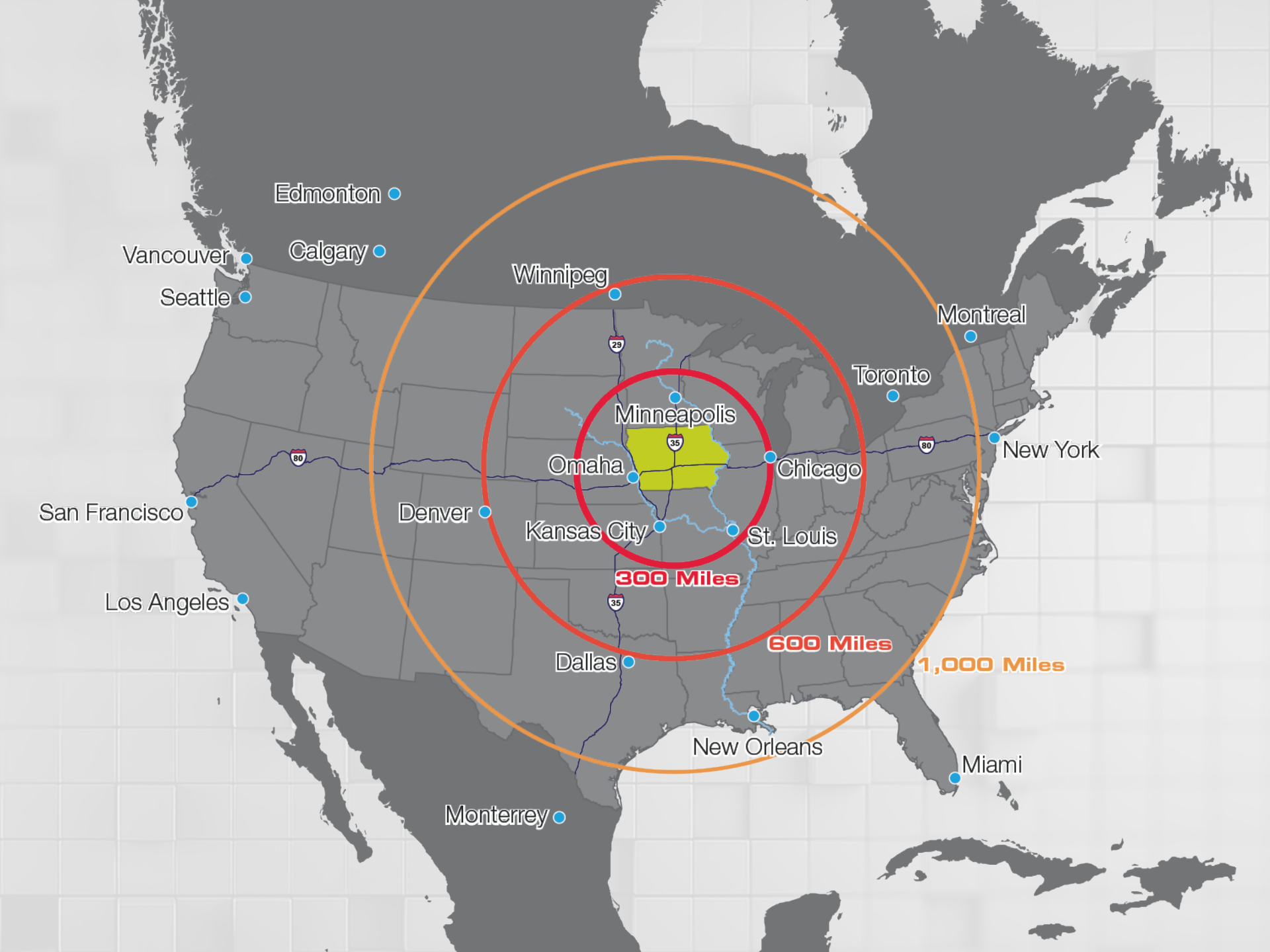
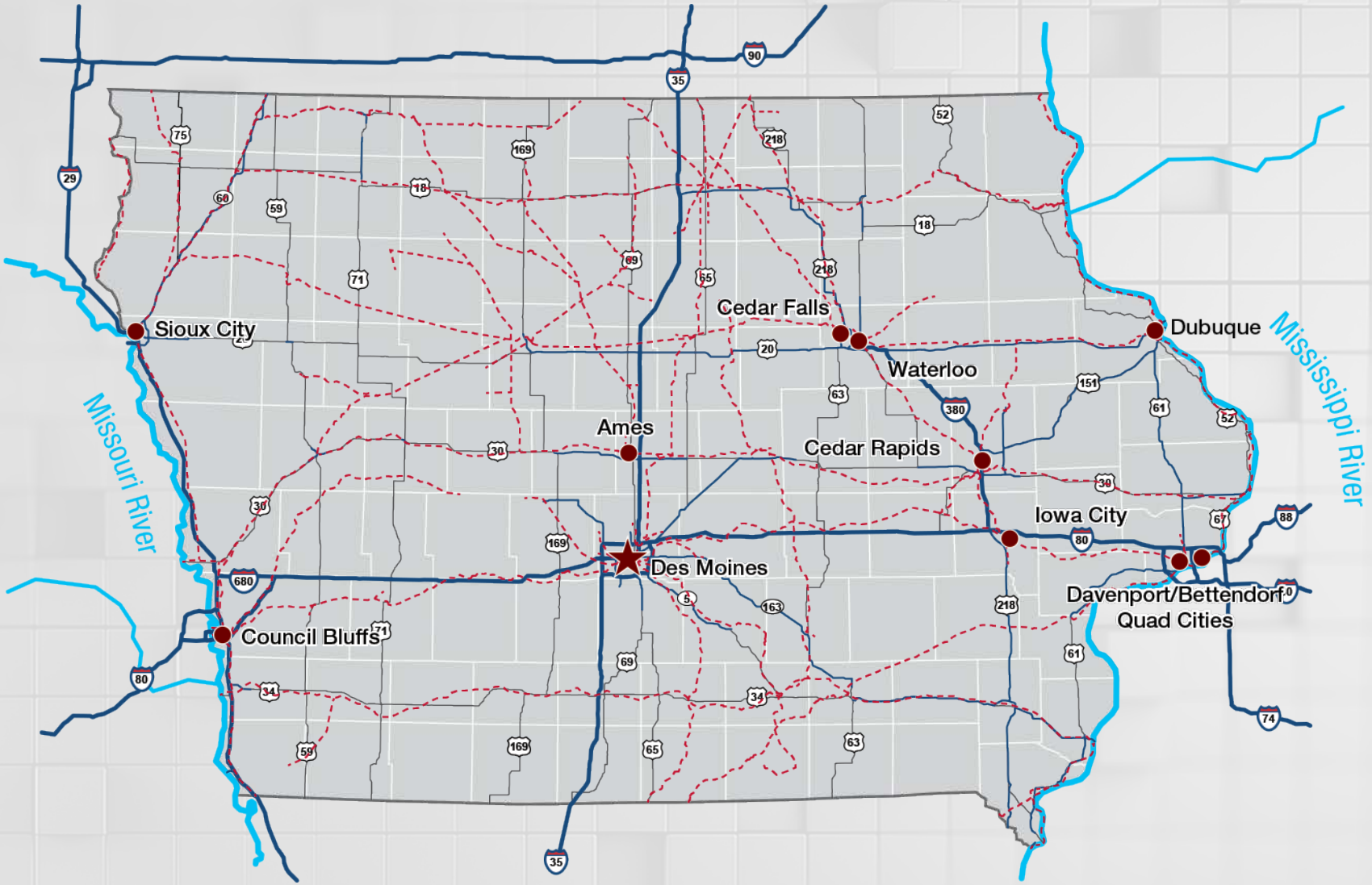
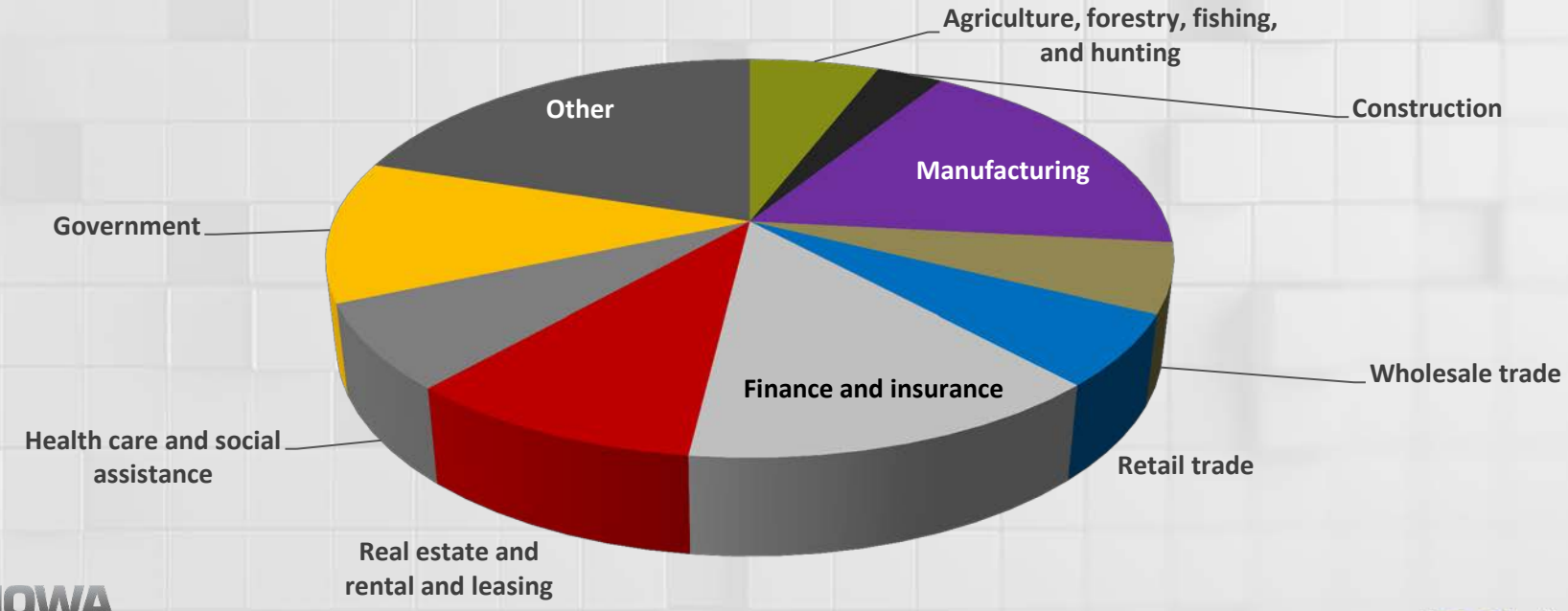

Edmonton
Vancouver
Calgary
Seattle
Winnipeg
Montreal
Toronto
Minneapolis
New York
Omaha
Chicago
San Francisco
Denver
Kansas City
St. Louis
300 Miles
Los Angeles
600 Miles
1,000 Miles
Dallas
New Orleans
Miami
Monterrey

Iowa is at the Crossroads

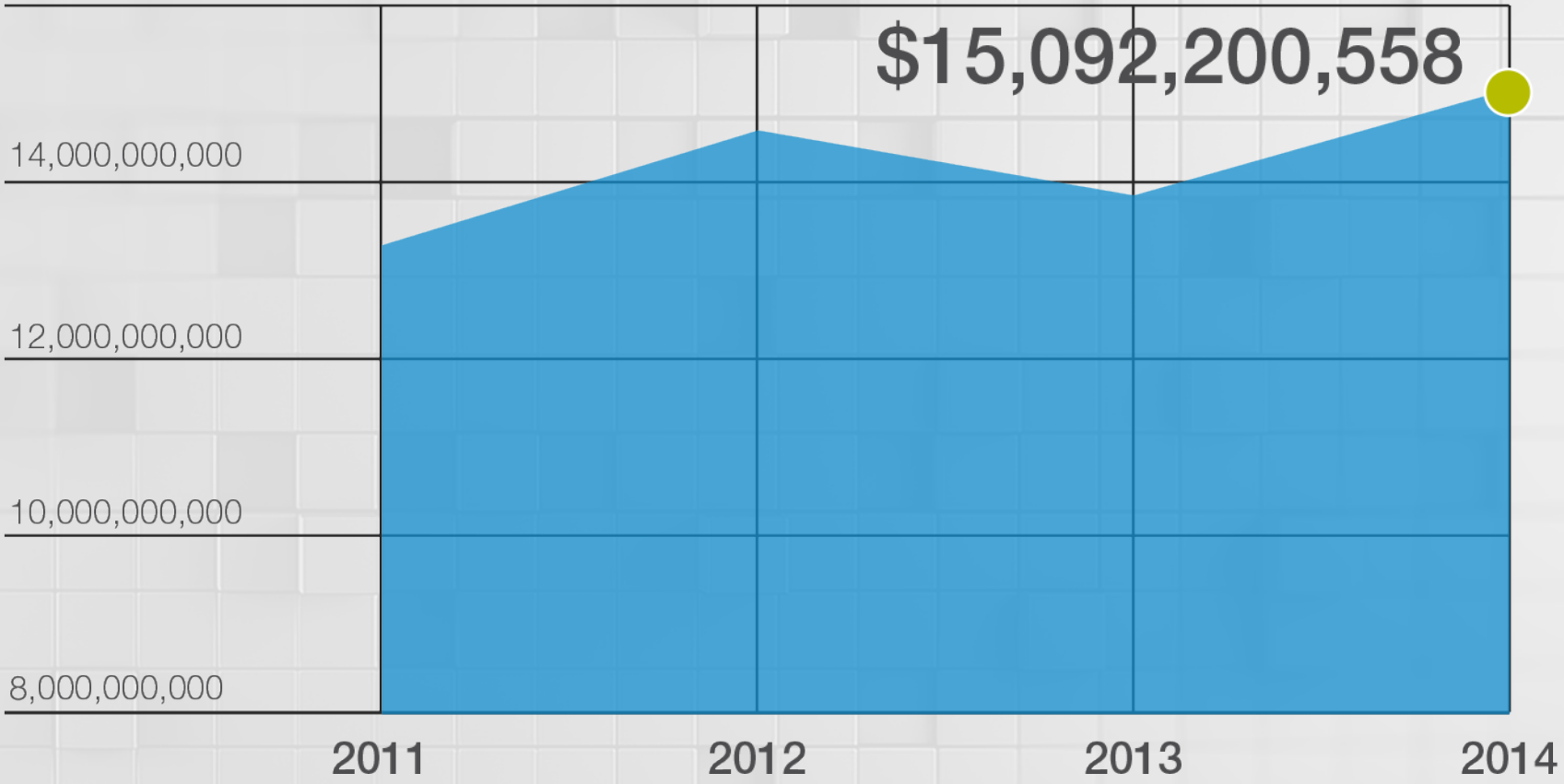


Iowa's Economy

- Iowa's GDP in 2014 was $170.6 billion
- One of only a few states currently holding a AAA rating
- Among the top 5 for "best run" states

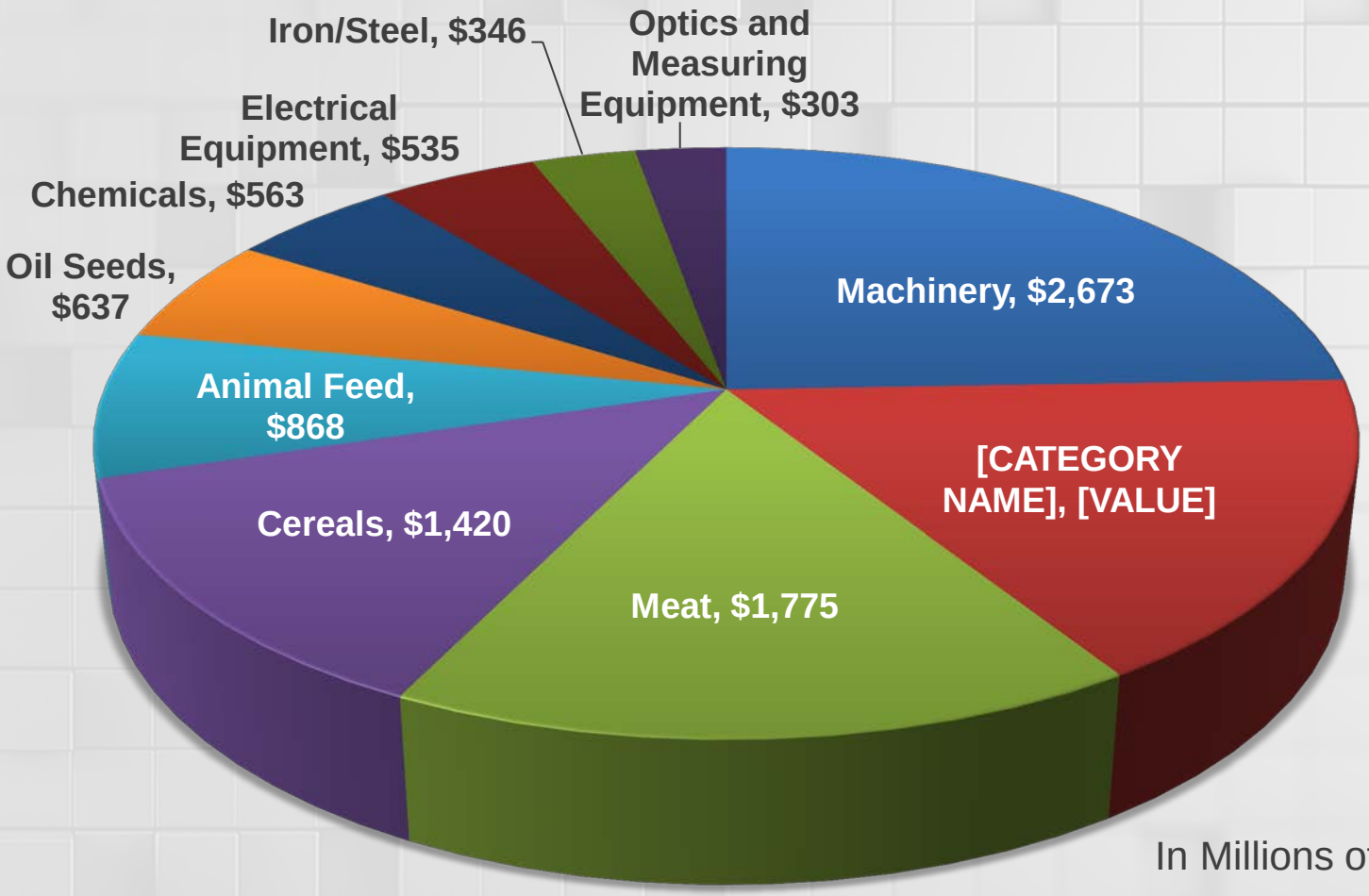


Growth of Iowa Exports



Iowa Exports

- In 2014 Iowa exported $15.1 billion in manufactured and value-added goods.



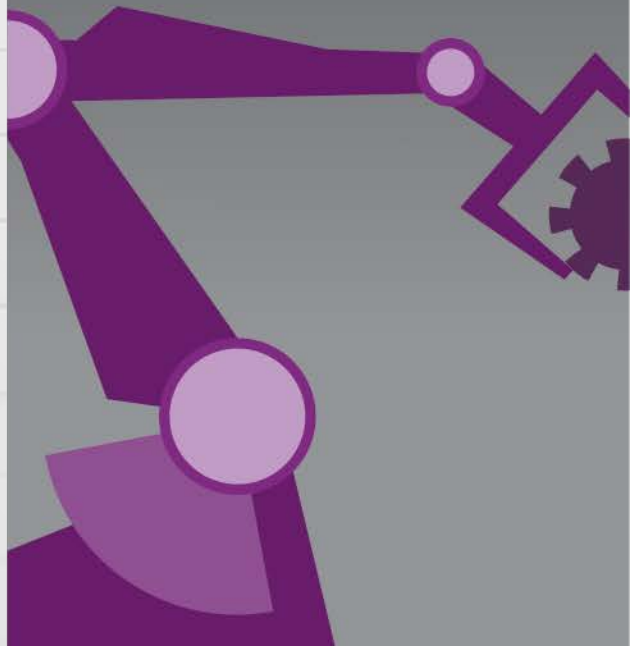
In Millions of USD (2014)

Iowa's Key Industries

FINANCIAL SERVICES

BIOSCIENCES

ADVANCED MANUFACTURING



Biofuels

IOWA HAS THE CAPACITY TO PRODUCE MORE THAN

315 MILLION

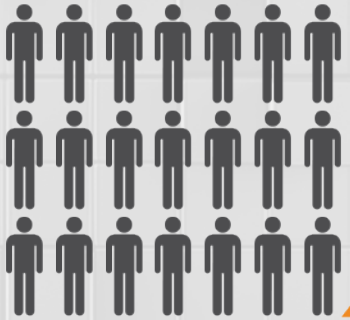
GALLONS OF

BIODIESEL

IOWA ACCOUNTS FOR OVER

27%

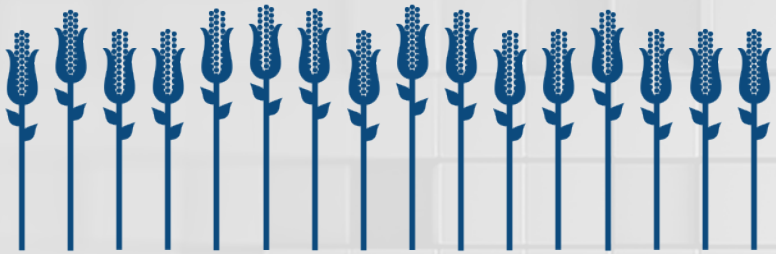
OF TOTAL U.S. ETHANOL PRODUCTION



IOWA'S BIOFUELS PRODUCTION IMPACTS OVER

47,000 JOBS

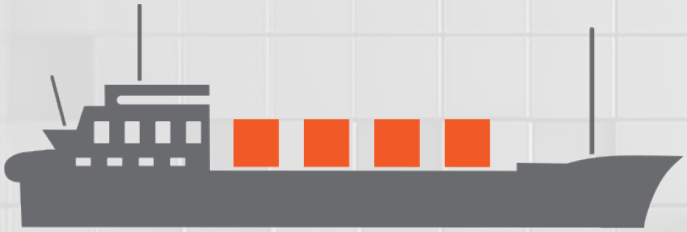
Bioscience Critical Mass



IOWA HAS THE

2nd

LARGEST SUPPLY OF AVAILABLE BIOMASS
14.4 MILLION DRY TONS PER YEAR



IN 2014, IOWA EXPORTED

$233.4 MILLION

IN PHARMACEUTICAL PRODUCTS
TO 68 COUNTRIES

NEARLY

1,250

BIOSCIENCE ENTITIES
OPERATE IN IOWA

Manufacturing is BIG in Iowa

MANUFACTURING REPRESENTS
OF IOWA'S GDP 18.3%

$31.2 BILLION
OF IOWA'S GROSS STATE PRODUCT
IS GENERATED BY MANUFACTURING

MANUFACTURING EMPLOYS
17% **OF IOWA'S TOTAL WORKFORCE**

Food Manufacturing and Processing

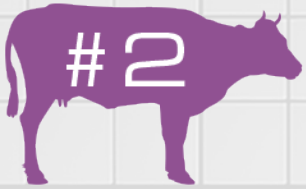
IOWA IS RANKED...

CORN PRODUCTION

PORK PRODUCTION

EGG PRODUCTION

SOYBEAN PRODUCTION

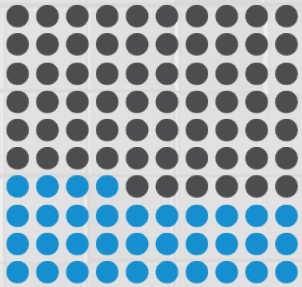


RED MEAT PRODUCTION

IOWA PRODUCES MORE THAN

$37 BILLION

IN FOOD PRODUCTS EACH YEAR



IOWA IS HOME TO

34 OF THE LARGEST 100

FOOD MANUFACTURERS AND PROCESSORS

Strategic Approach to Economic Development

- **Attraction**
  - Supply chain development
  - Cluster development
- **Retention**
  - Expansion of Existing Industry
  - Growth through innovation

Statewide Freight Network Optimization

Project Overview

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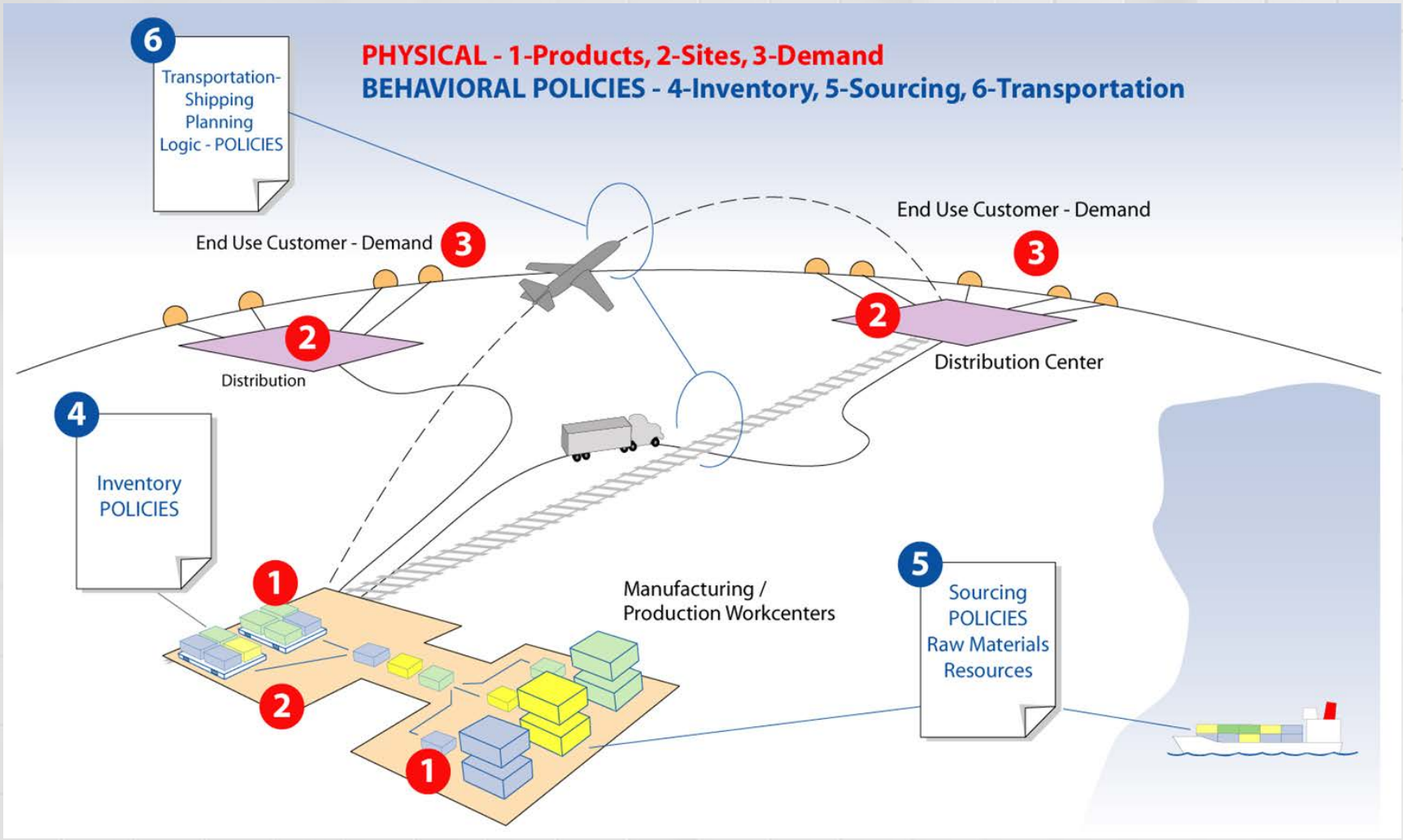
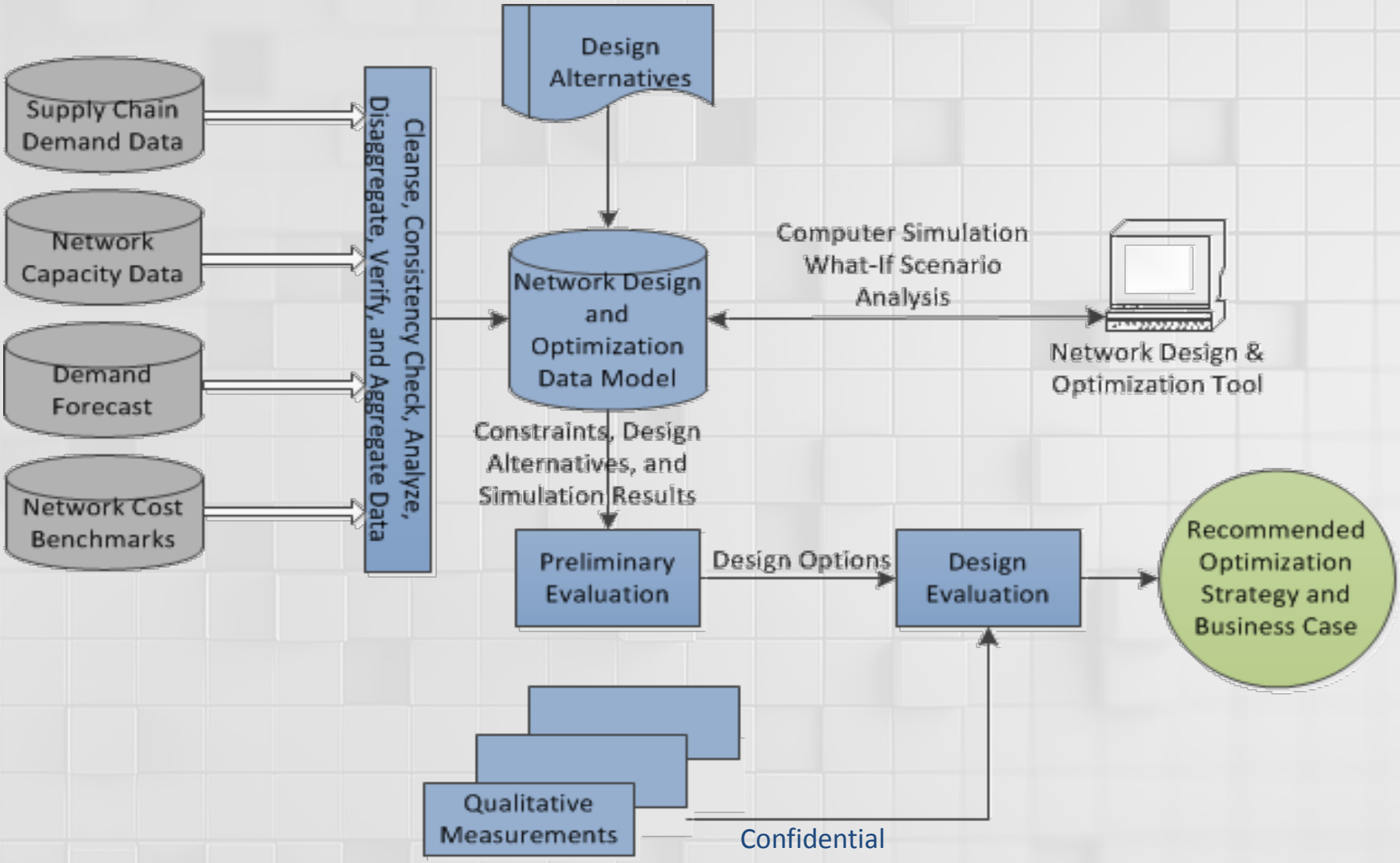
Project Background

- ***Vision: To effectively identify and prioritize investment opportunities for an optimized freight transportation network to lower transportation costs and promote business growth in Iowa.***
- **Iowa DOT optimizes statewide freight transportation network to reduce transportation costs for Iowa businesses**
- **This project uses a demand-based supply chain network design and optimization approach to Iowa DOT planning**

Supply Chain Network and Optimization



Conceptual Architecture Overview



Collected Supply Chain Data

- **Statewide Demand Data**
  - FAF3.4 freight flow data disaggregated to county level
  - Modes included: Truck, Rail, Water, and multimodal
  - 43 commodities
  - Domestic, import, and export
- **Transportation Network Capacity Data**
  - Primary roads, rail, and inland waterway systems
  - Existing logistics sites such as intermodal, transload, barge terminals, etc.
- **Transportation Cost Benchmark Data**
  - Full Truckload (FTL), Less-Than-Truckload (LTL), Intermodal, Rail, Barge, and Ocean container
- **Socio-economic datasets**
  - Available development sites with infrastructure support in Iowa
  - Population and employment data by county

Optimization Analysis

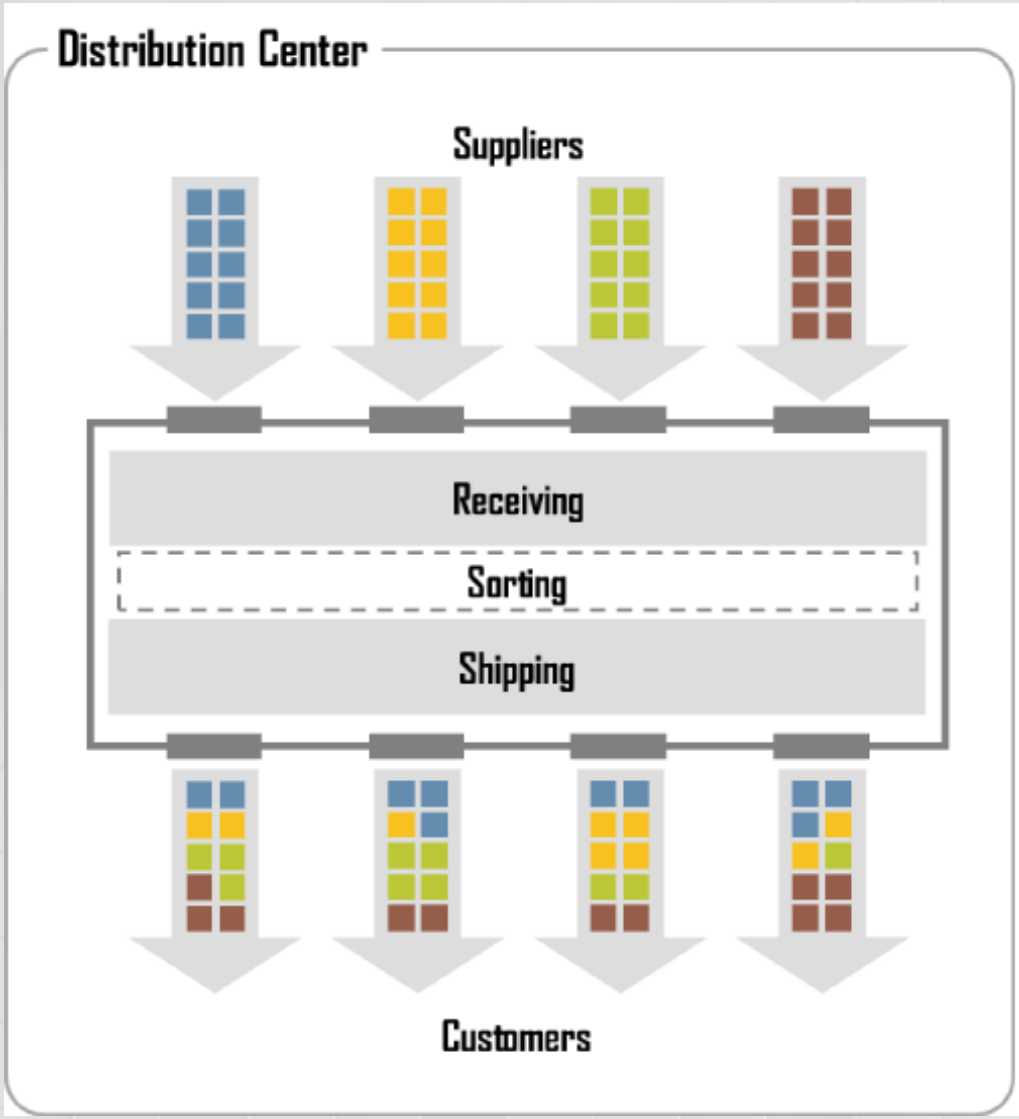
- **Quantitative Analysis**
  - Cost, capacity, etc.
  - Economic viability / return on investment
- **Qualitative Analysis**
  - Strategic alignment
  - Network resiliency
  - Tax incentive / funding availability
  - Service levels / transportation time
  - Project implementation risks

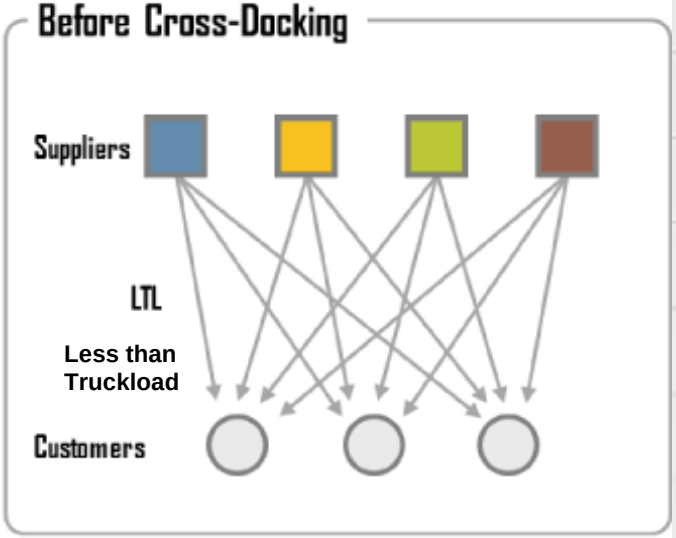
Examples of Analysis Results

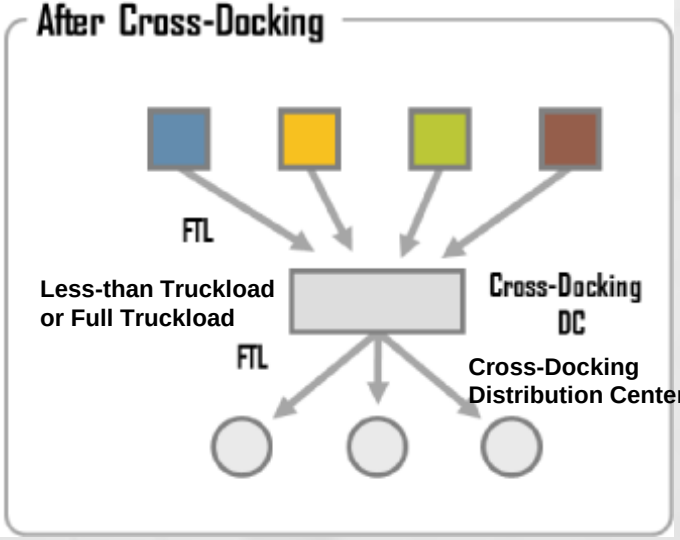
- Cross-dock facilities to consolidate freight shipments and reduce transportation costs
- Intermodal facility to leverage railroad transportation and reduce transportation costs and truck miles

Project Case Study:
Cross-dock

Cross Dock Overview







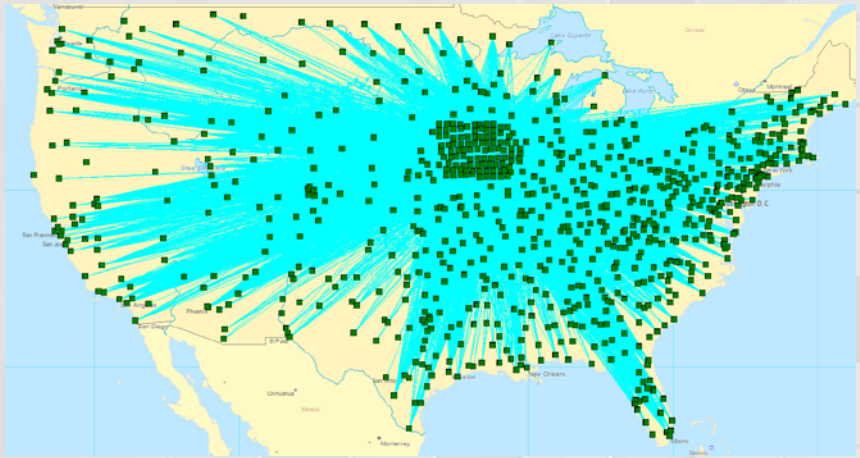
Case Study 1 - Cross-Docking Analysis

- Evaluated total cost saving opportunities in four regions
- Region 1 has the highest cost saving, but Regions 2 & 3 are more viable options because of existing access to interstate highways
- Selected Region 2 as the primary site candidate with the concept to co-locate cross-dock and intermodal facilities in a logistics park

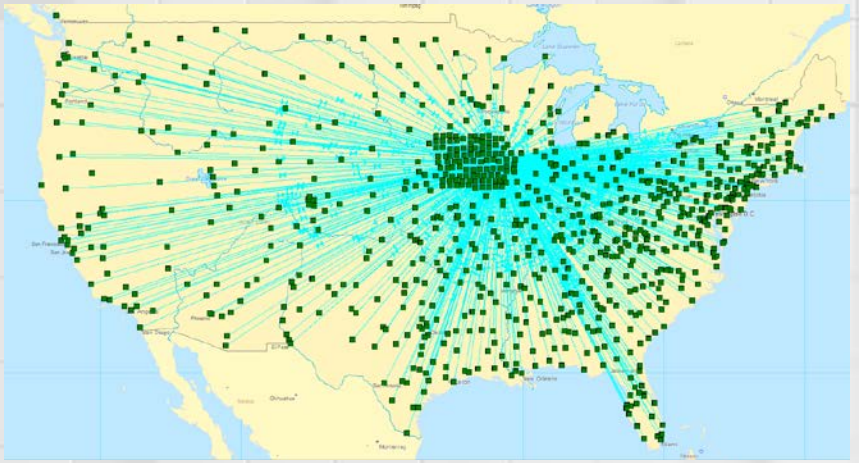
Location	Total Annual Saving Opportunity
Region 1	$909 Million
Region 2	$883 Million
Region 3	$908 Million
Region 4	$713 Million

Impact on Freight Transportation

- Current State



- Future State

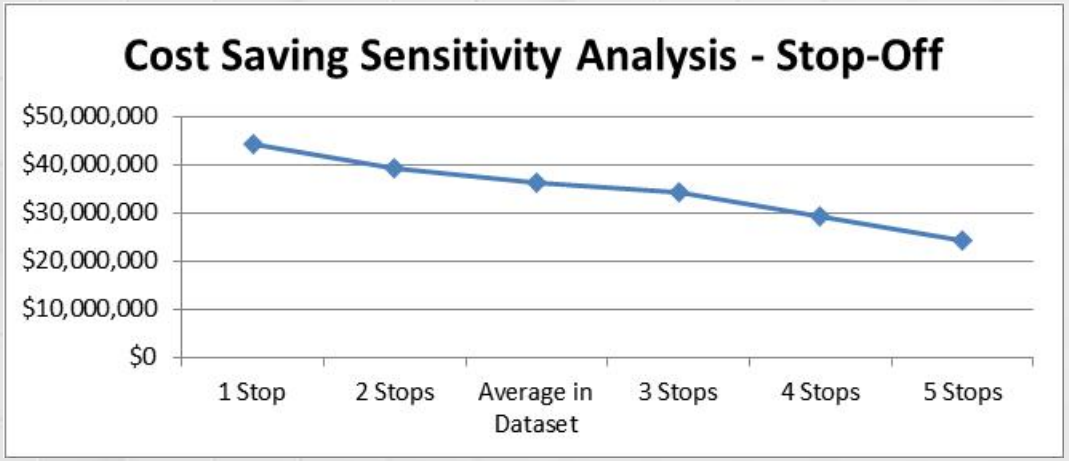


- Benefits:
  - Leverage freight consolidation to reduce transportation costs
  - Reduce long distance truck traffic and improve sustainability

Investment Analysis – A Cross Dock in Region 2

- **Assumption**
  - Build a 150-door, 600 trailer parking, 120,000 sq. ft. cross dock facility on 15 acres
  - 200 truck pickups daily, 52,000 truck pickups yearly (5 days a week, 52 weeks a year)
  - Capture 5.30% of overall market opportunity
  - Cross-docking fee ($450/truck) covers all operational expenses and profit margin
- **Initial Investment: $21 million**
- **Annual Net Saving Opportunities: $24.4 MM to $44.3 MM; Average $36.2 MM**

Item	Cost
Construction Cost	$ 5 million
Doors	$1 million
15 acres of land	$5 million
Sortation and support systems	$10 million



Project Case Study:
Intermodal Facility

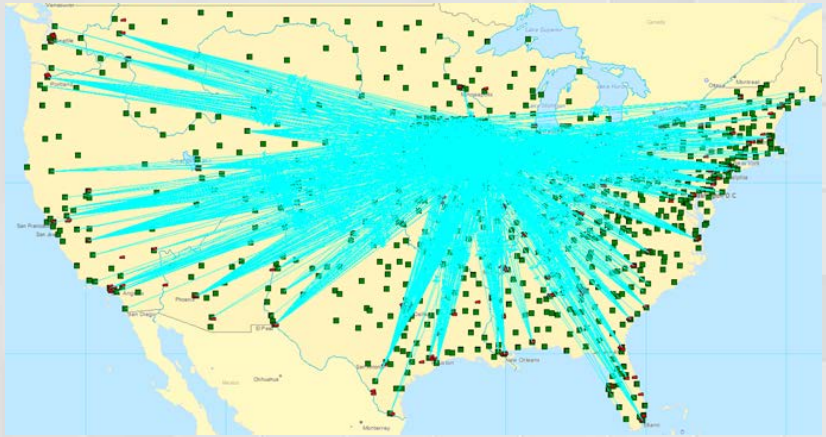
Opportunity Size – Focusing on High Volume Origin-Destination Pairs

The total market opportunity for just the high volume origin-destination pairs: $289 million net annual savings

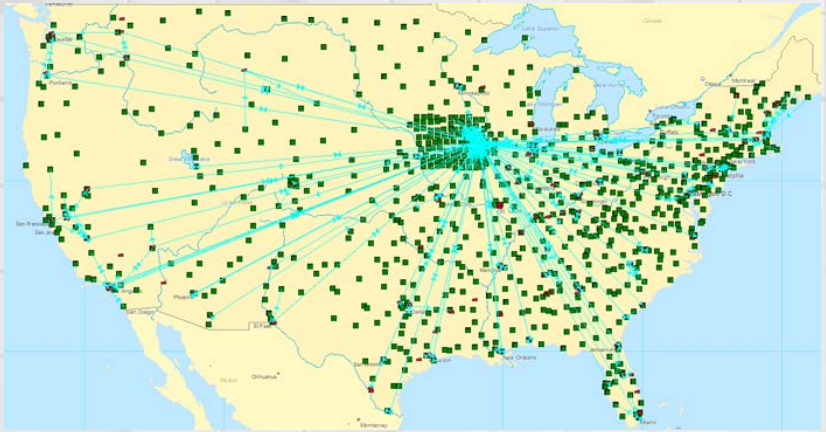
Item	Opportunity
Annual Gross Transportation Saving	$412 Million
Empty Container Reposition Cost	($123 Million)
Total Outbound Container Number	247,000
Total Inbound Container Number	42,000
Total Container Shortage	205,000
Annual Net Saving	$289 Million
Annual Lift Number	494,000

Example 2 – a New Intermodal Facility

- Current State



- Future State



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

Investment Analysis – a New Intermodal Facility

- **Conservative case vs. Base case**

	Annual Lift No.	Annual Net Cost Saving	Facility Size	Initial Investment
Conservative Case	32,000	$23 million	16 to 20 acres	< $15 million
Base Case	56,000	$40 million	30 to 35 acres	$15 million

Approach to Commercial Supply Chain
Network Optimization

Project Benefits

- **Expected Results – Identify options to reduce supply chain costs**
  - 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
- **Project is funded by Iowa DOT**
- **Project may take up to ~6 months, depending on the complexities of companies' supply chains and data availability**
  - Number of sites
  - Number of products
  - Availability of electronic data

Approach to Effective Network Design & Optimization

- **Use demand-based network optimization methodology, statewide freight network optimization data and results**
- **Merge public and private data for effective commercial supply chain network design & optimization**
  - Quetica will sign NDA to protect client's confidentiality
  - Augment our data model with companies' supply chain data in:
    - Product category
    - Demand (location of customers, product, and volume)
    - Supplier (location of suppliers and volume)
    - Private transportation network capacity
    - Facility construction and operation cost
- **Leverage proven techniques, tools, and computer algorithms used in commercial supply chain network optimization for global Fortune 500 companies**

What we Learned and Next Steps

- ***Traditional Approach focuses on Capacity Planning***
- ***Traditional methods do not quantify cost saving opportunities in a multimodal network***
- ***Commodity Flow is more valuable than Volume of Vehicles***
- ***All Vehicles are NOT equal in Value!***
- **Calculated Baseline Transportation Cost/Iowa Gross State Product (21%) and Optimized Transportation Cost/Iowa Gross State Product (14%)**
- **Implementing results to reduce overall cost of freight transportation by leveraging better modal-investments which reduces capital and maintenance costs of transportation infrastructure.**
- **Ongoing supply chain analysis for 10+ businesses – results expected in early 2016**
- **Developing business case for a full-service Logistics Park in eastern-part of Iowa.**
- **Broadening application of tool for use in areas of air quality, agriculture production and movement.**
- **Data Refresh and improving architecture structure for data mining**

QUESTIONS?

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