



**Georgia
Tech**

CREATING THE NEXT

Principles of Transportation Management

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Supply Chain Consulting - NTT Data

What is Covered

- Comparison of characteristics of alternative transportation modes
- Components of Port Logistics systems
- Best practices in transportation procurement
- Application of practical transportation cost analysis techniques
- INCOTERMS purpose, types, and use
- Greenhouse gas emission generation in logistics and mitigation strategies
- New business tools in logistics enabled by emerging technologies

Course Agenda

Day 1

- Transportation Mode Review
- Key Metrics & Cost Minimization Techniques
- Transportation Accessorial Charges
- Mileage calculations, the differences and why they matter
- Understanding Federal and State weight limits
- North America Transportation Market Trends
- Transportation Procurement:

Day 2

- Transportation Cost Analysis Exercise
- TMS Fundamentals
- Incoterm Fundamentals

Course Agenda

Day 3

- Private/own fleet Management (route compliance, GPS tracking, DOT compliance, etc)
- Port Logistics
- Green House Gas Emissions in the Supply Chain
- Emerging Techniques in Logistics

Day 1



Covered in this section

Over The Road

Full Truckload

Less Than Truckload

Expedited

Small Parcel

Ocean Container

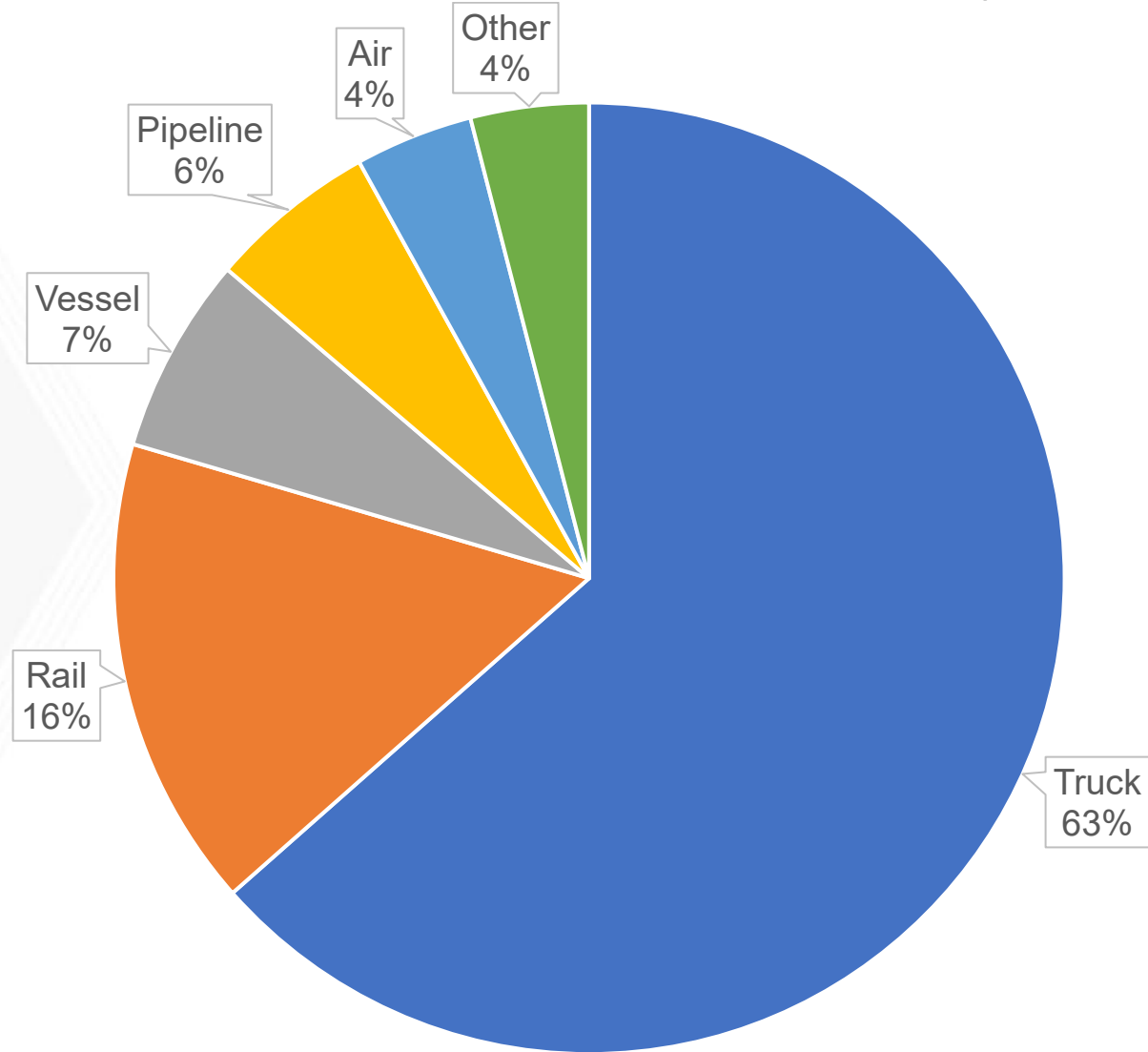
Air Freight

Rail

Last Mile



Breakdown of Transportation Modes by Goods Shipped



Over The Road (OTR)

- Divided into 3 main categories/modes*
 - Full TL (TL, FTL)
 - Including Intermodal (IM)
 - Less Than Truckload (LTL)
 - Expedited
- Each mode has a unique way of operating and pricing
- Fuel Index: Department of Energy Diesel Fuel Price
 - <http://tonto.eia.doe.gov/oog/info/wohdp/diesel.asp>

Dry Van Trailer

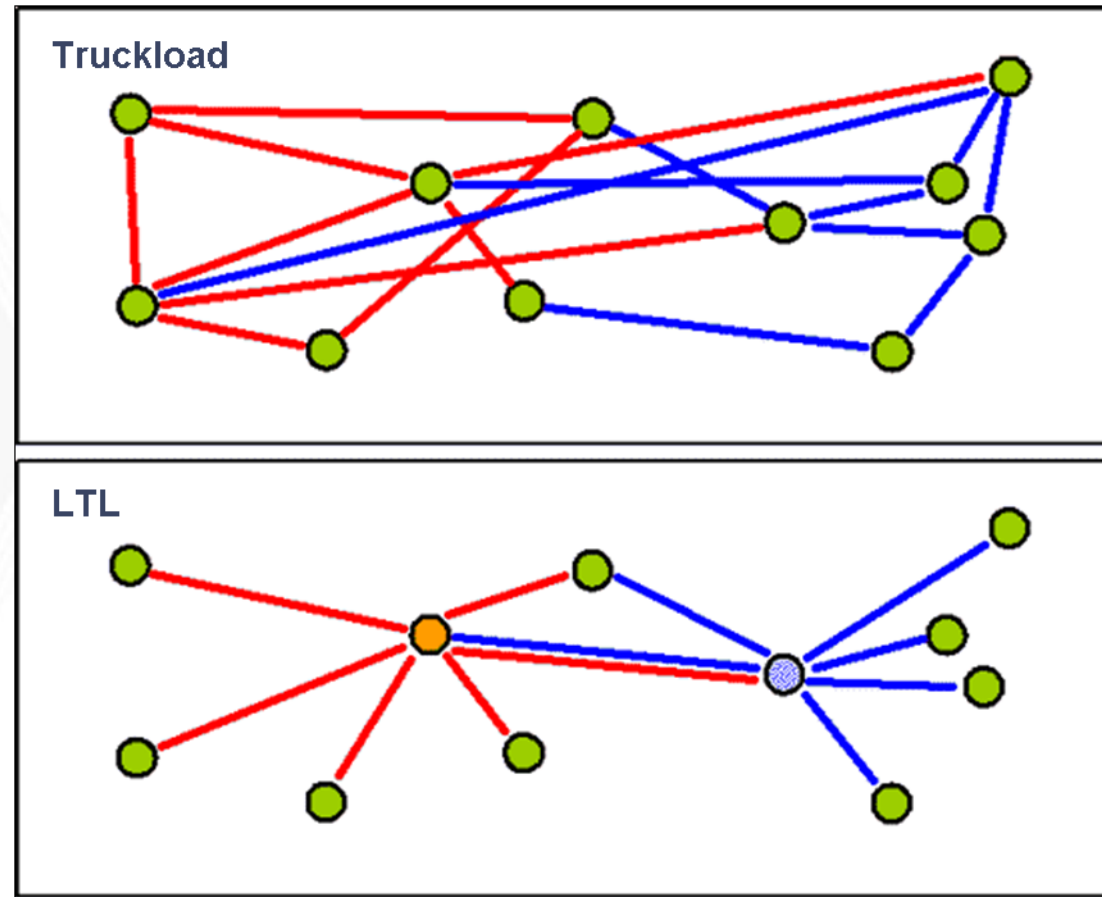


- Common Length 53' with Common Interior Width 102"
- Overall Height 13'6"
- Other configurations include 48' x 102", 45' x 96", 28' x 102" (Pup)
 - Pups can be run as doubles and triples
- Standard Payload maximum of 45,000 lbs. (sometimes rated at 44,000 lbs.)

Pricing Methodology Full Truckload (TL, FTL)

- Flat Pricing – One set dollar figure for a move (DV, FB)
 - Short haul - low mileage lanes where a truck may get multiple loads (turns)
 - Repeatable set lanes of any distance where the mileage does not vary
- Rate Per Mile (RPM) – (DV, FB)
 - On short hauls, minimum charge usually applies
 - Longer hauls where the destination location may change mileage
 - Runs when multiple enroute stops may occur
- Rate per Hundred Weight (CWT) – (FB)
 - Primarily used for steel industry and cable industry
 - Incentive to carrier to haul more weight on a trailer

LTL Hub & Spoke vs. TL Direct



Less Than Truckload (LTL) Tariff

- Main factors affecting cost:
 - Distance (Fixed value for a lane)
 - Weight (Variable based on shipment)
 - Class (Variable based on shipment)
 - Density (determined by weight and dimensions calculation)
 - Susceptibility to Damage
 - Value
 - Loadability (Stowage) and Handling Characteristics
- Classification of freight is governed by the National Motor Freight Classification tariff (NMFC)
- Pricing from a carrier is represented as a **% discount** from a specified tariff

LTL Density Calculation to Determine Class Exercise

Expedited - Equipment

Cargo Van



Capacity: 2,000Lbs.
Door Opening: 48"w x 48"h

12' Straight Truck



Capacity: 5,000Lbs.
Door Opening: 84"w x 84"h

18' Straight Truck



Capacity: 10,000Lbs.
Door Openings: 96"w x 92"h

24' Straight Truck



Capacity: 12,500Lbs.
Door Openings: 96"w x 92"h, 96"w x 98"h, 102"w x 102"h

53' Tractor-trailer with Air Ride



Capacity: 43,500Lbs.
Door Opening: 102"w x 102"h

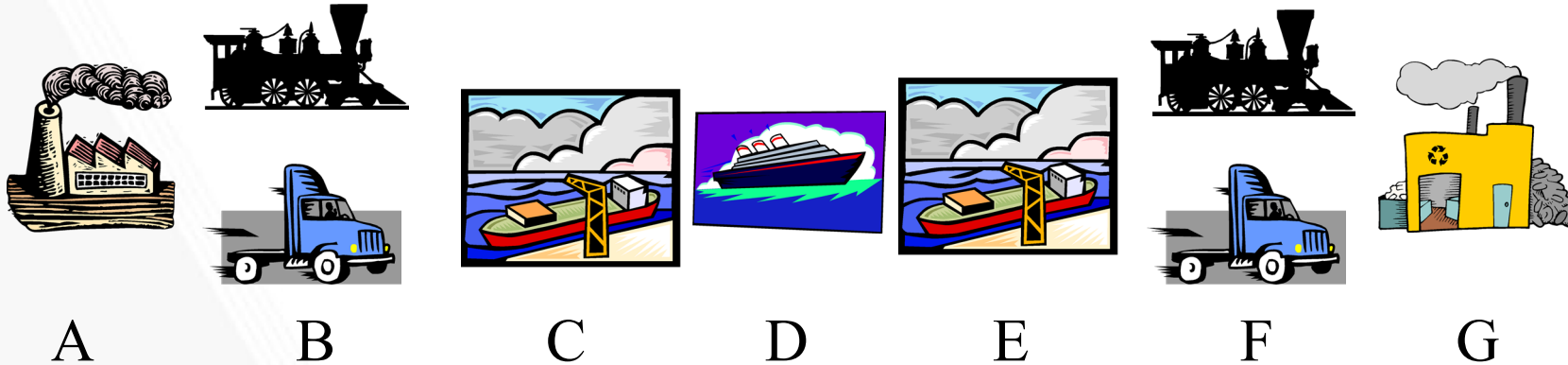
Small Package (Parcel)

- Carriers include UPS, USPS, FedEx, DHL, and regionals like LaserShip and On-Track
- Ground & Air Letters and Packages weighing Typically 5-10 lbs., less than 70 lbs. (capped at 150 lbs., with an additional surcharge)
- Pricing is zone based by service
 - Each origin has a table of destination zip codes with their associated zone
 - Each zone has a discount from a standard tariff
- Volume discount is given in tiers based on volume over previous 13 week period
- FSC is linked to DOE but not managed by standard variance
 - Not as variable as OTR modes

Ocean Container

- Economical method for shipping large quantities overseas
- Transit time can be 35 days or more on the water
 - Total transit time includes inland transit plus waiting time in ports
- Other considerations include:
 - Port locations
 - Congestion
 - Security
 - Costs
 - Infrastructure in & out
 - Transshipping – moving container from one vessel to another
 - Sailing frequency

Ocean Container – Transport Model



- Multiple options exist when it comes to Ocean Shipping
- Shipper A sends the shipment on to a container yard near port via Carrier B
 - Freight is “stuffed” in container for loading at port C where it is sent over water D (with or without transshipping)
 - Offloading at Port E the freight may be Transloaded into a standard 53’ trailer or sent in container via Carrier F to final location G
- Anywhere in the supply chain there is a handoff from seller to buyer of: risks (ownership), freight costs, documentation responsibility. This is determined by INCO terms and agreement.

Air Freight

- Specialized services
 - “Expedited” – i.e. UPS, DHL
 - Domestic
 - International
 - Charter
 - Military air lift
- Airlines or air cargo companies or their agents issue an air waybill (AWB), which is often a straight waybill (bill of lading).
 - The buyer is named the consignee on the waybill and he/she can claim the consignment from the carrier by simply showing proof of identity.

Rail

- Economical method for shipping large quantities across the country
- Transit time can be faster for longer haul lanes
 - Total transit time can be adversely impacted by delays at rail terminals
- Trains can be used to either transport containers or bulk cargo.
- A hopper car is a freight car that is used to transport dry bulk cargo.
 - The most common type of commodities transported in hopper cars are grains, coal, ore, sugar, and fertilizers.
- Stack trains are used to transport shipping containers (both ocean containers and intermodal containers).

Common Trains on the Rail Today

Stack
Train



Bulk
Train



Defining last mile services

Parcel



Traditional delivery of small package

Courier



Handling the bulky freight the parcel carriers don't want

White-glove*



Premium delivery service – unload and place your items in the room of your choice

LTL



Large bulky items such as patio furniture, small tractors, and basketball goals

Key Transportation Metrics & Cost Minimization Techniques

Metrics Review

Metric	Report	Owner
# of Loads	Weekly/Monthly Report	Logistics Operations
Linehaul Cost per Load	Weekly/Monthly Report	Logistics Operations
All-in Cost per Load	Weekly/Monthly Report	Logistics Operations
Pounds per load w/wood	Weekly/Monthly Report	Logistics Operations
Accessorial Charges/Load	Weekly/Monthly Report	Logistics Operations
Miles per Load	Weekly/Monthly Report	Logistics Operations
Cost per Pound	Weekly/Monthly Report	Logistics Operations
On-Time Delivery %	Carrier by Site Scorecards	Logistics Operations
On-Time Pickup %	Carrier by Site Scorecards	Logistics Operations
Routing Guide Compliance	Carrier by Site Scorecards	Logistics Procure/FAP
Loads Awaiting Invoice	Carrier by Site Scorecards	Logistics Procure/FAP
Outstanding Claims	Carrier by Site Scorecards	Logistics Procure/FAP
POD Performance	Carrier by Site Scorecards	Logistics Procure/FAP
% loaded Miles	Private Fleet Report	Logistics Operations
% Empty Miles	Private Fleet Report	Logistics Operations
Backhaul Revenue	GL	Logistics Procure/FAP

Metric	Report	Owner
FCOGS	Weekly/Monthly Report	Logistics Procure/FAP
% to Market	Weekly/Monthly Report	Logistics Procure/FAP
Tractor/Trailer Ratio	Weekly/Monthly Report	Logistics Operations
Backhaul Penetration	Weekly/Monthly Report	Logistics Operations
Spend by Carrier	Weekly/Monthly Report	Logistics Procure/FAP
% Spot to Contract	Weekly/Monthly Report	Logistics Procure/FAP

Common US Transportation Accessorial Charges

What are accessorial charges?

Key terminology

Not every freight shipment is the same... some loads require special handling...

Accessorial Charges (accessorials) – Additional charges outside the base rate or linehaul charge.

Having a list of pre-determined accessorial charges helps you better anticipate, mitigate, manage, and in some cases prevent any unnecessary charges.

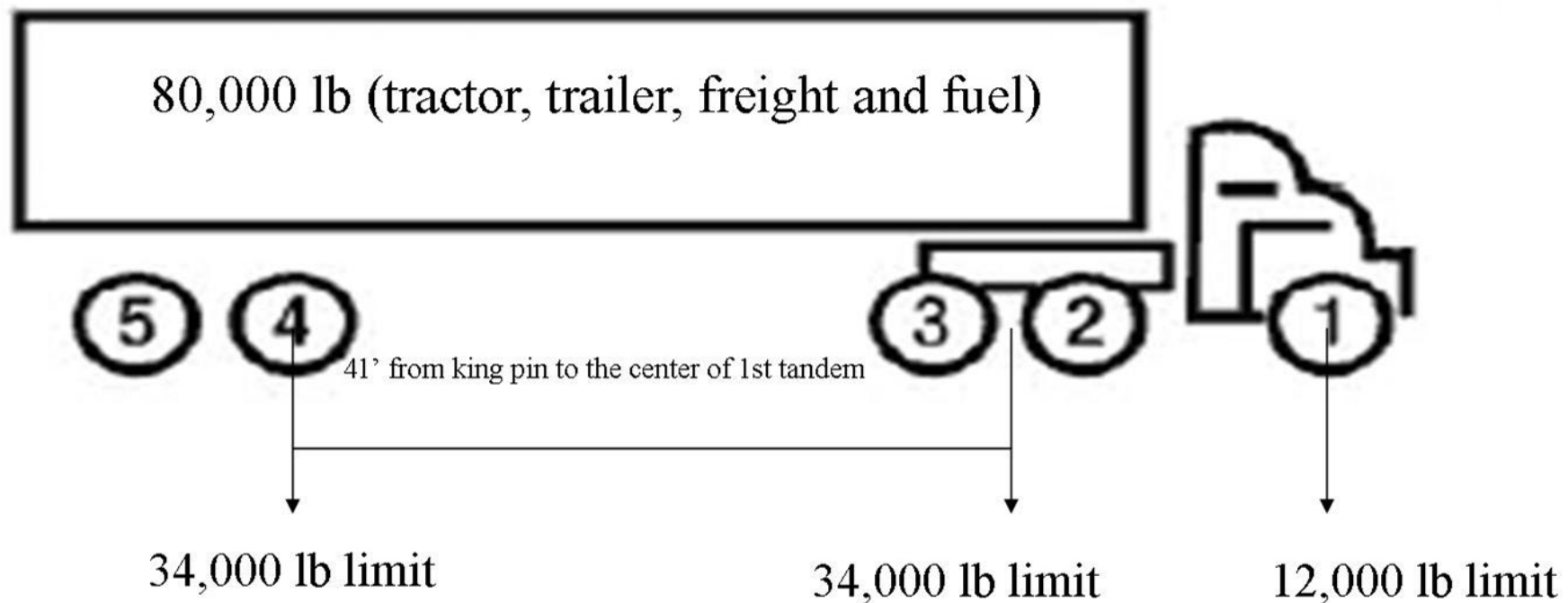
A mile does not always equal a mile in transportation

- There are three main types of mileage calculations utilized by trucking companies
 - Hub Miles
 - Practical Miles
 - Short Miles

This is in order of greatest to least accuracy

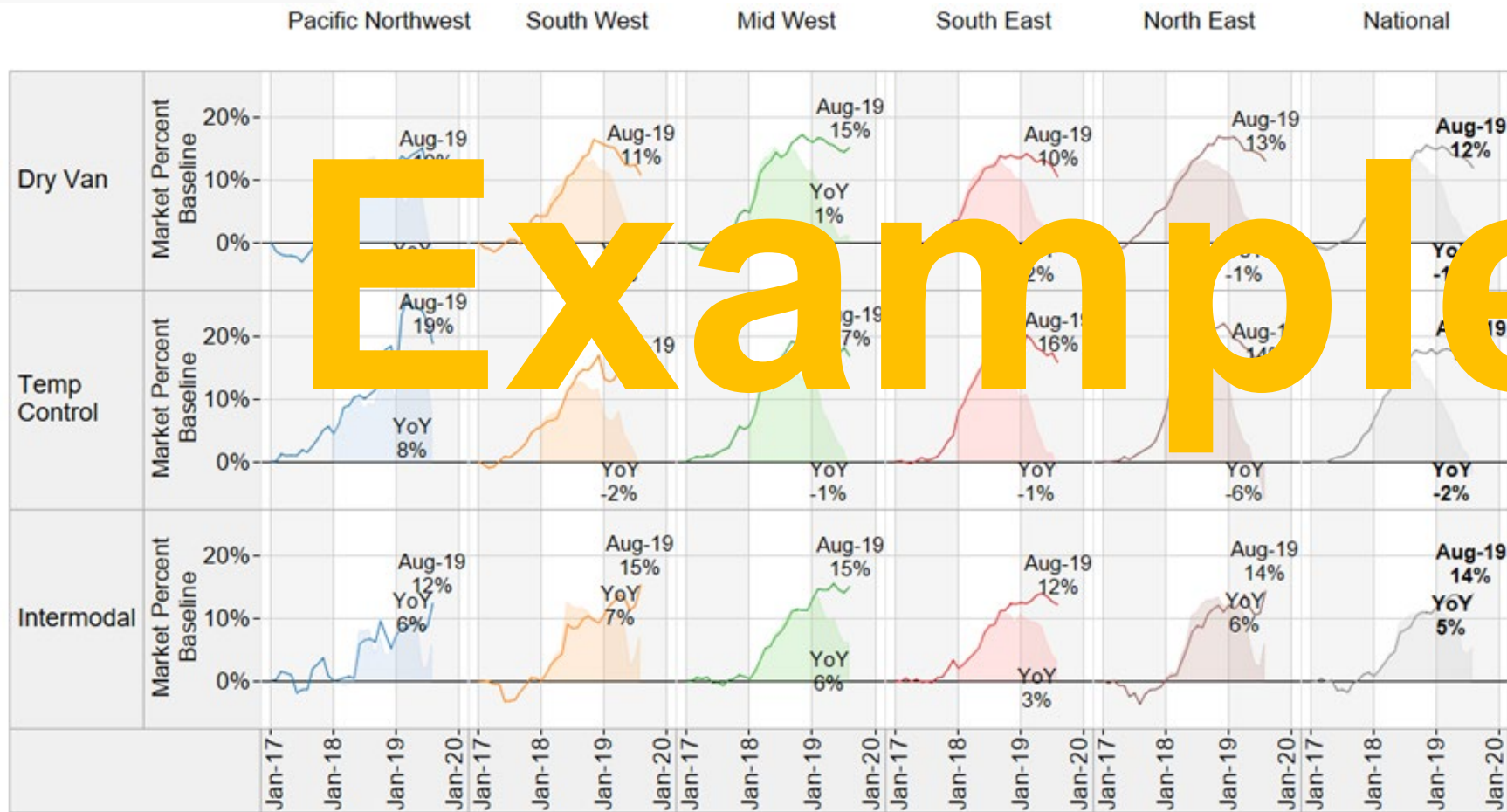
Weight distribution graphic

- Steer axle: 12,000 pounds or 6,000 pounds per tire
- Drive axle tandems: 34,000 pounds or 4,250 pounds per tire
- Trailer tandems: 34,000 pounds or 4,250 pounds per tire.



North America Transportation TL and IM Market Trends

Contract rate change indexed to January 2017



Example

- Contract truckload market is post-peak
- Expect Y-o-Y comps to continue to drop
- Economic stall and huge inflow of drivers and equipment will exacerbate drop in rates
- Long term market inflation average is 2-3% per year.
- 10% rise two years in a row is not sustainable

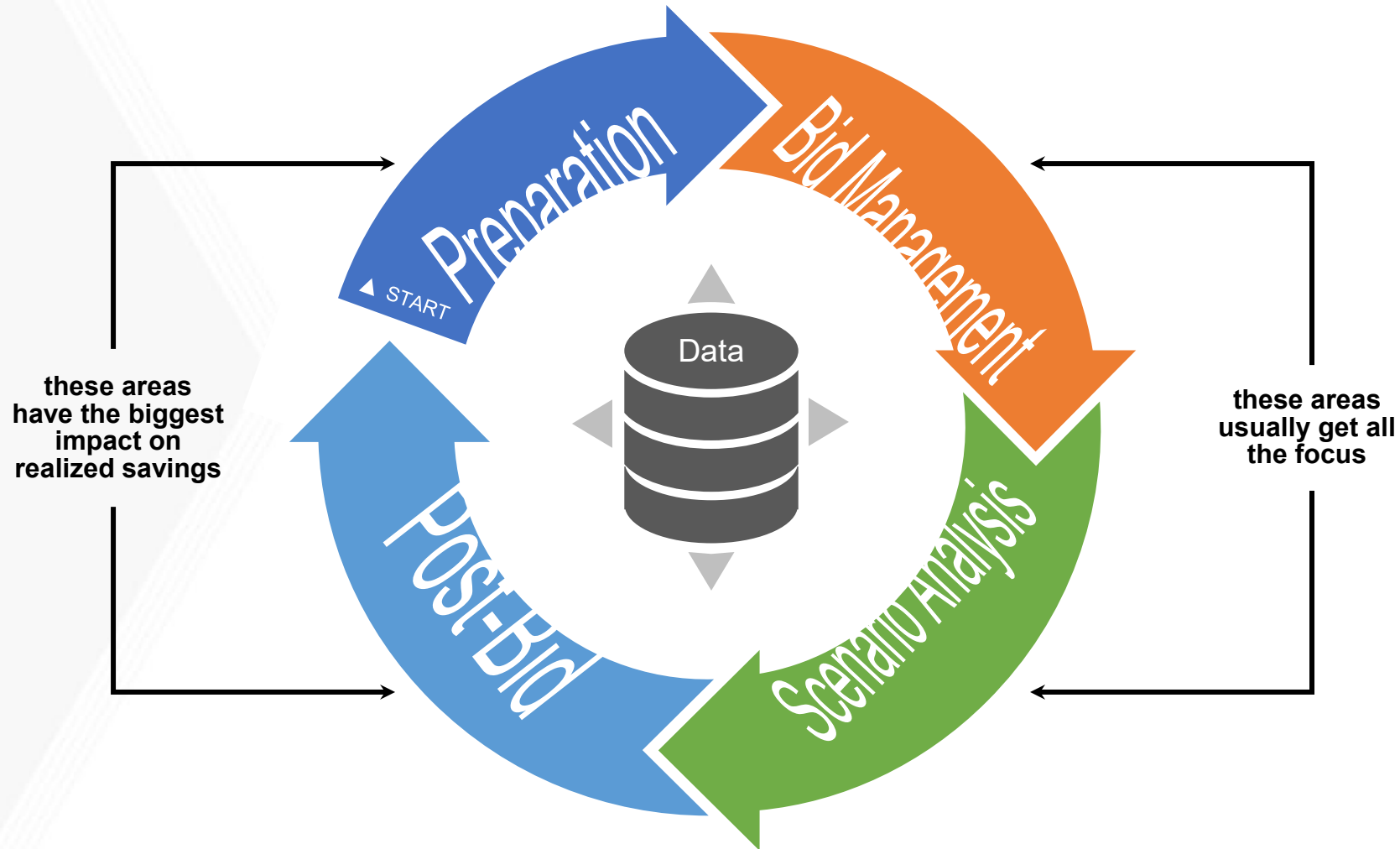
Transportation Procurement

Key Transportation Procurement Terms

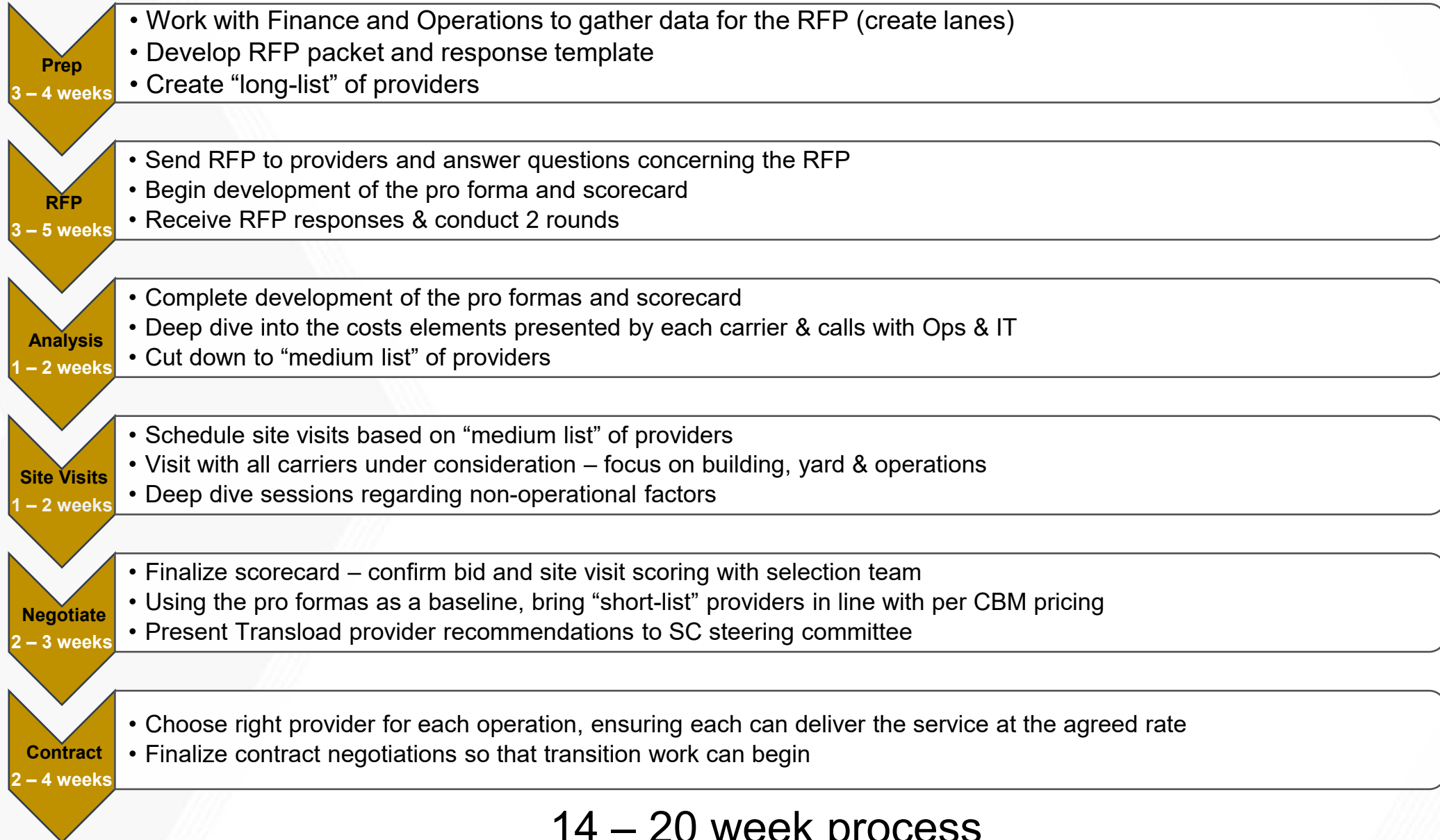
Key terminology

- RFP – Request for Pricing
- RFI – Request for Information
- MSA – Master Service Agreement
- Addendum - an item of additional material, added at the end of a Contract (usually the detailed list of rates agreed to with a carrier)
- Accessorial Charges (accessorials) – Additional charges outside the base rate or linehaul charge.

Lifecycle of transportation sourcing event



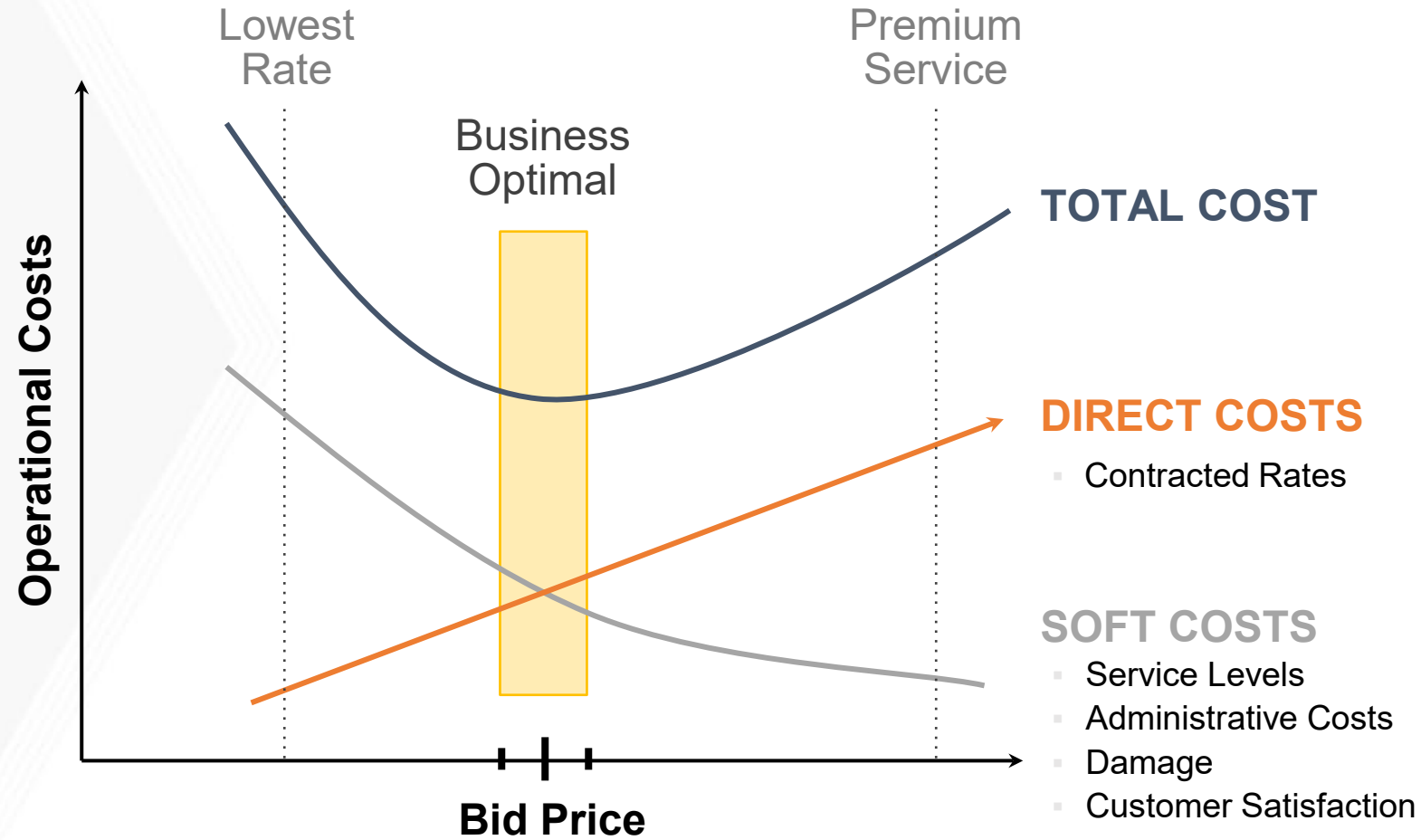
RFP Timeline



14 – 20 week process

Scenario Analysis

OBJECTIVE



Long term procurement management

- **Organize**
 - Signed Copies of all carrier contracts
 - Understand the status of each carrier contract and categorize by expiration and spend
 - Determine which contracts need to immediate attention
- **Standardize**
 - Standard RFP template, including questions to operations and finance/accounting
 - Standard carrier contract
 - Standard carrier filing system
 - Standard reporting and communications
- **Execute**
 - Develop RFP plan for the year and set cadence
 - Develop strategy for each RFP so that we can meet the savings goal
- **Deliver**
 - Ensure every facility is operating under a valid contract
 - Meet the savings goals set by management & service levels required by customers

Mock RFP

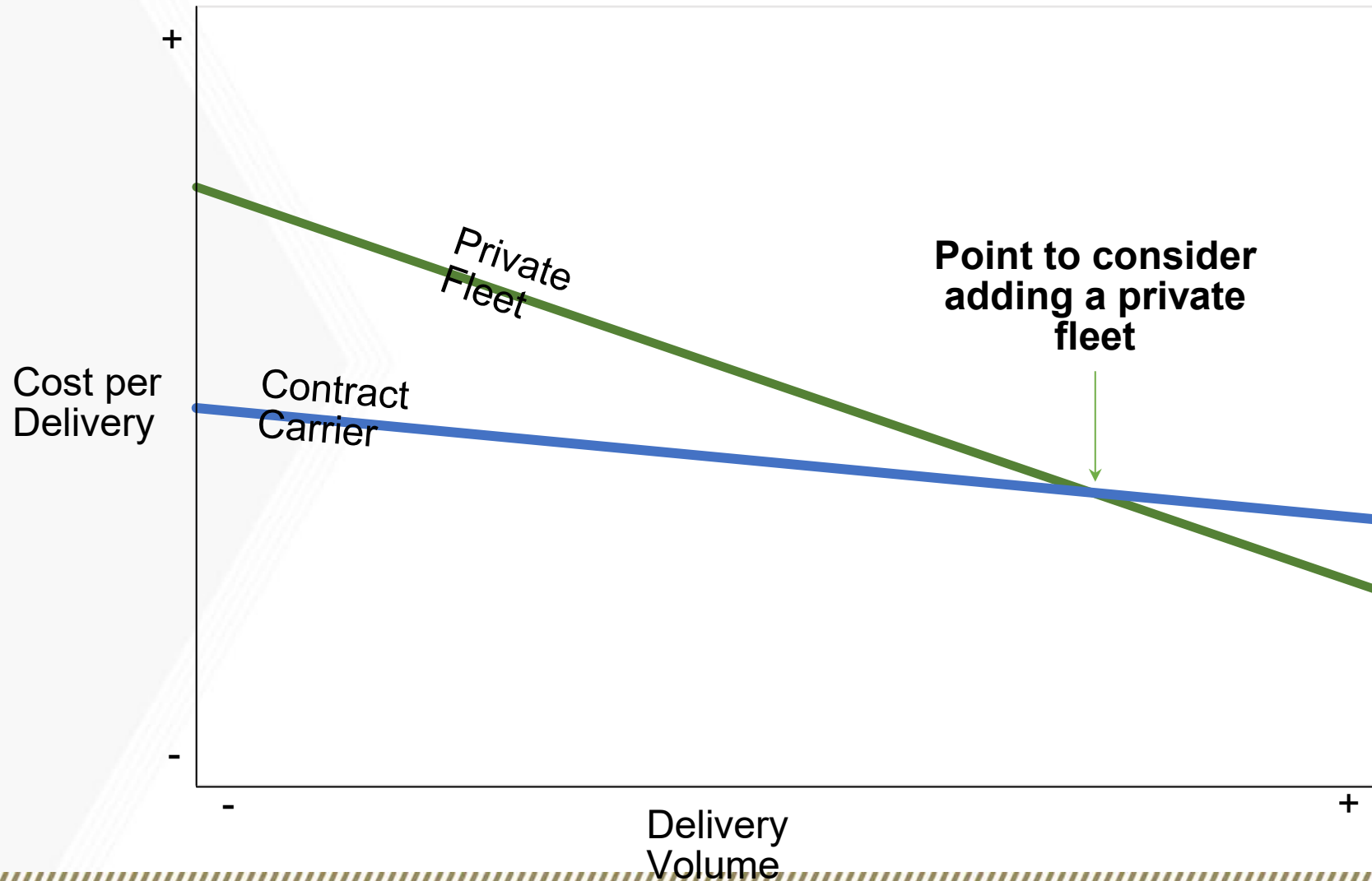
- Capture business requirements
- Create a bid form
- Input responses from the carriers
- Analyze the results

Day 2



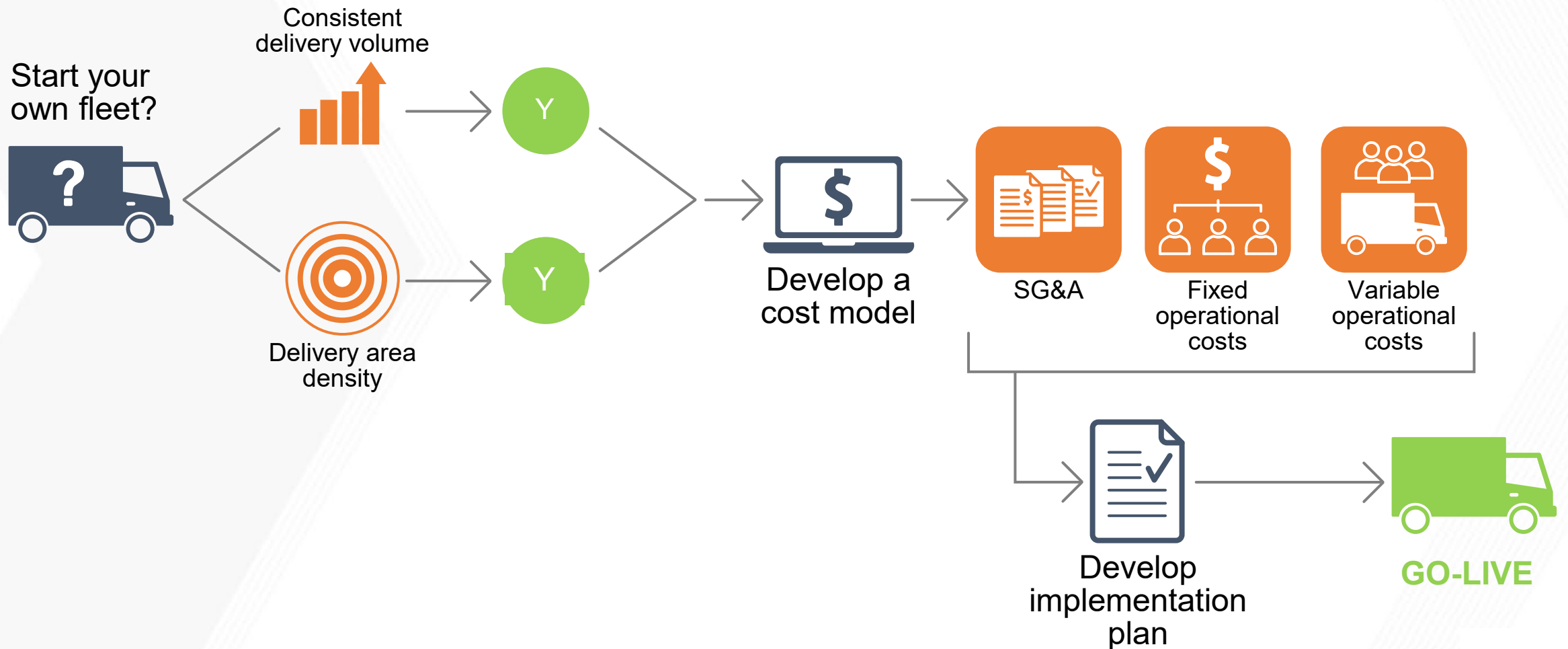
Transportation Cost Analysis

Private fleet vs. Contract fleet



Private fleet vs. Contract fleet

When should I bring my delivery operation in house



Transportation Cost Exercise

- Dedicated Fleet Estimate
- Capture Assets Required
- Estimate SG&A
- Estimate Fixed Costs
- Estimate Variable Costs

Transportation Cost Exercise

TMS Fundamentals

What is a TMS?

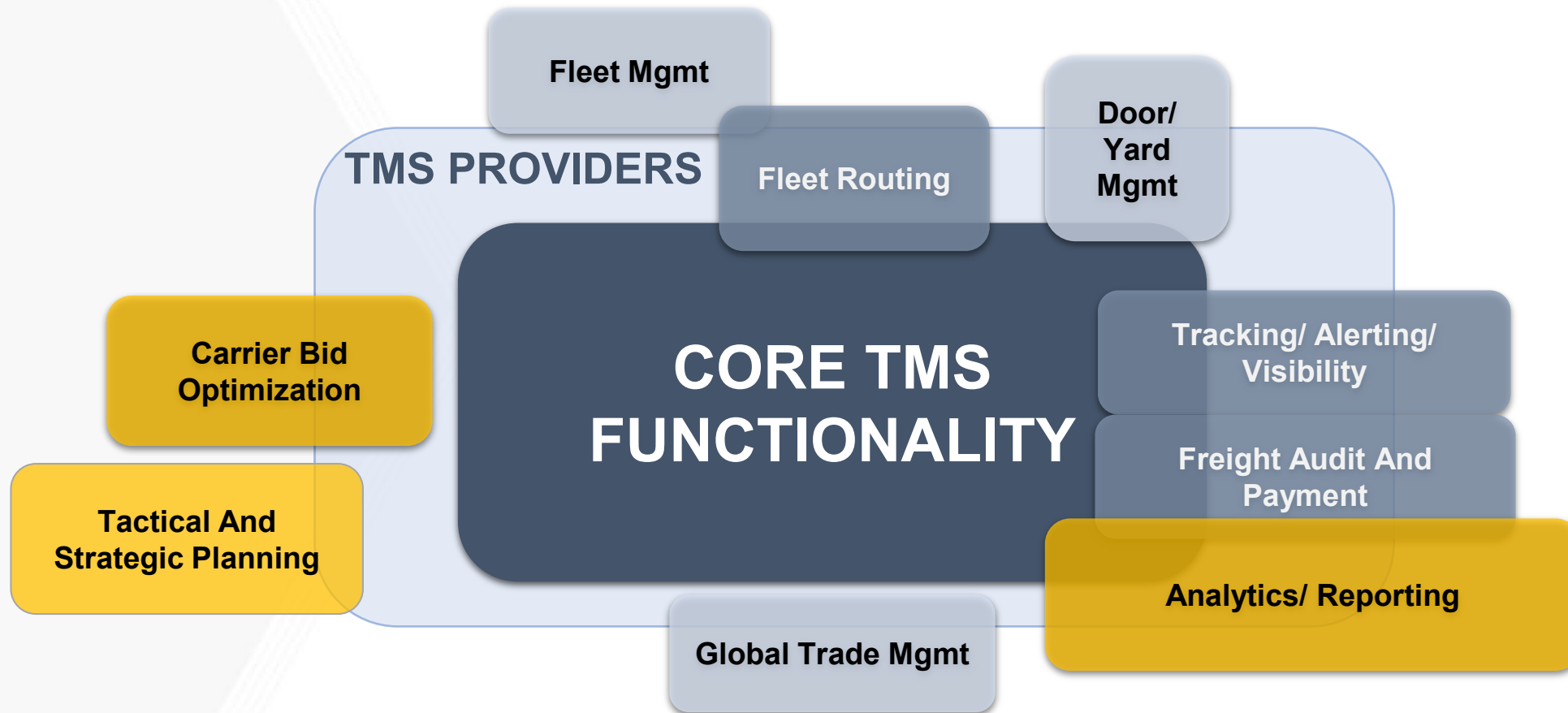
Definition varies

- TMS=Transportation Management System
- No one true definition of TMS today
- Systems that call themselves TMS:
 - Fleet routing
 - Parcel rating
 - Carrier selection
 - Rate quoting
 - Carrier tendering
 - Global trade management



What's in a TMS?

Functionality



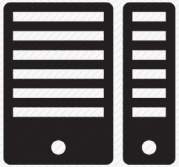
TMS Today



TMS Platform

Evolution

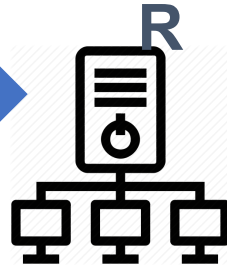
MAINFRAME



- AS400
- On-site
- Expensive
- Clunky

1980's-1990's

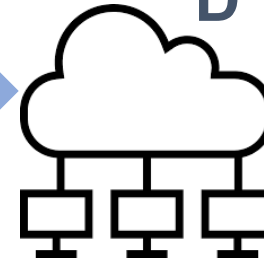
CLIENT/SERVE



- Citrix or browser
- On-site
- Cost as a barrier
- More user friendly

1990's-Today

CLOUD



- Browser
- Hosted
- SaaS
- Highly Configurable
- Cost not a barrier

2000's-Today

TMS & MSP Vendors

TMS Vendors – Gartner Magic Quadrant



- Other notable vendors
 - BestTransport
 - Kuebix
 - Cloud Logistics
 - Descartes
 - Infor
 - McLeod
 - ProcessWeaver
 - TMW

TMS vs Managed Service Provider (MSP)

TMS

- Providing a platform
- May help with initial configuration, but client is responsible for ongoing configuration
- Responsible for own reporting
- Own staff operates the system
- Control own supply chain destiny

MSP

- Provide the platform
- Configure and maintain the system
- Develop reporting
- Provide operating staffing
- May or may not procure carriers
- Partnership is a must

TMS Vendors

Trans MSP

TRANSPLACE

TMC | A DIVISION OF
C.H. ROBINSON

BLU  JAY

3PL

 **Ryder**

FedEx

XPO
Logistics

 **ups**

 **PENSKE**

Odyssey

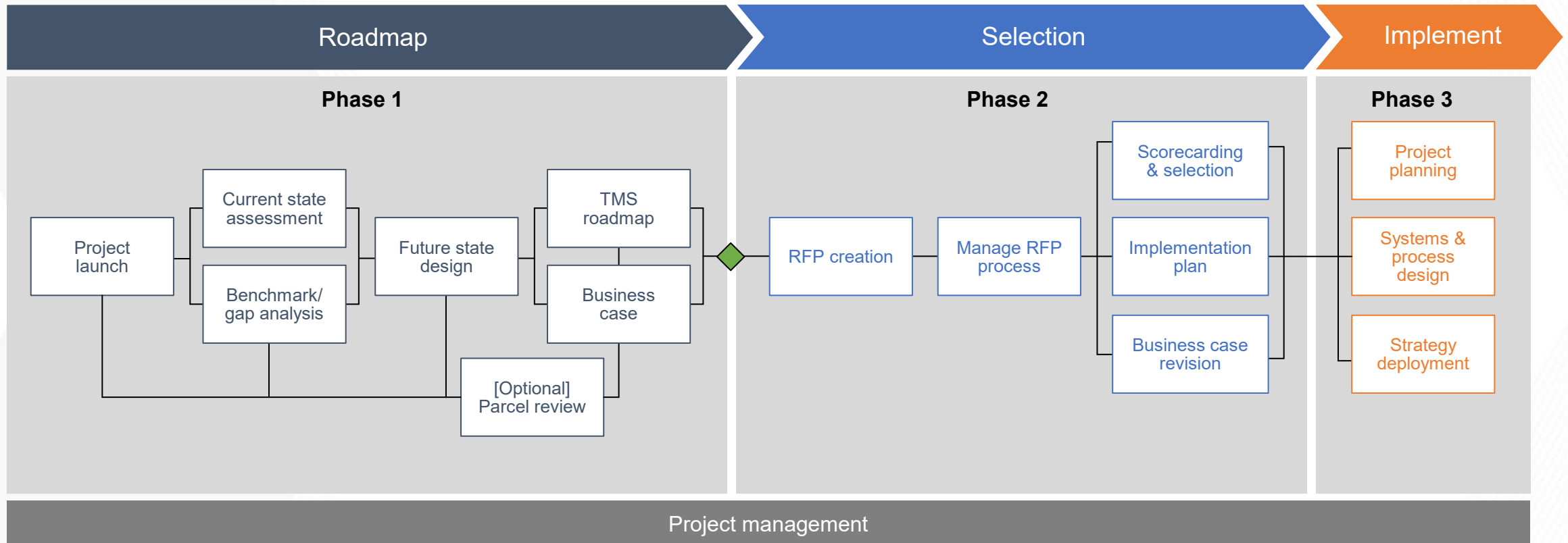
 **DHL**

 **Lineage**

TMS Selection Process

Process & System Transformation

Phased project approach



- ◆ **Go / No-Go** gate verifies
 - Current Infrastructure fit
 - Compelling Business Case
 - Insource - Outsource

Incoterms Fundamentals

What does INCOTERM stand for ?

- Def : The word INCOTERM is an abbreviation for **International Commercial Terms** which provide a common set of rules used for defining the responsibilities of sellers and buyers in the delivery of goods under sales contracts.
- They are widely used in international commercial transactions.

Revising the INCOTERMS

Updated every 10 years

- In order to keep up with the continuous evolution of commercial practices, types of goods and transport and international law, INCOTERMS need to be regularly updated by specialized experts.
- Some significant revisions :
- 1980 - FCA was introduced, for dealing with cases where the reception point was no longer the ship's rail, but a point on land where goods were stored in a container
- 1990 - the seller was permitted to provide the proof of delivery electronically by EDI-messages instead of paper documentation
- 2000 - export clearance and other formalities under FAS are placed on the seller (previously buyer) - in FCA, it became the seller's obligation to load the goods on the buyer's vehicle or the buyer's obligation to receive the seller's arriving vehicle unloaded
- 2010 –
- reduction from 13 to 11 terms by replacing 4 delivery terms : DEQ, DAF, DES, DDU with 2 new ones : DAT(Delivery at Terminal) and DAP(Delivery at Place)
- terms grouped in 2 categories, according to the means of transport used :
 - General all types of transport & Special sea & inland waterway

Incoterms (2 categories)

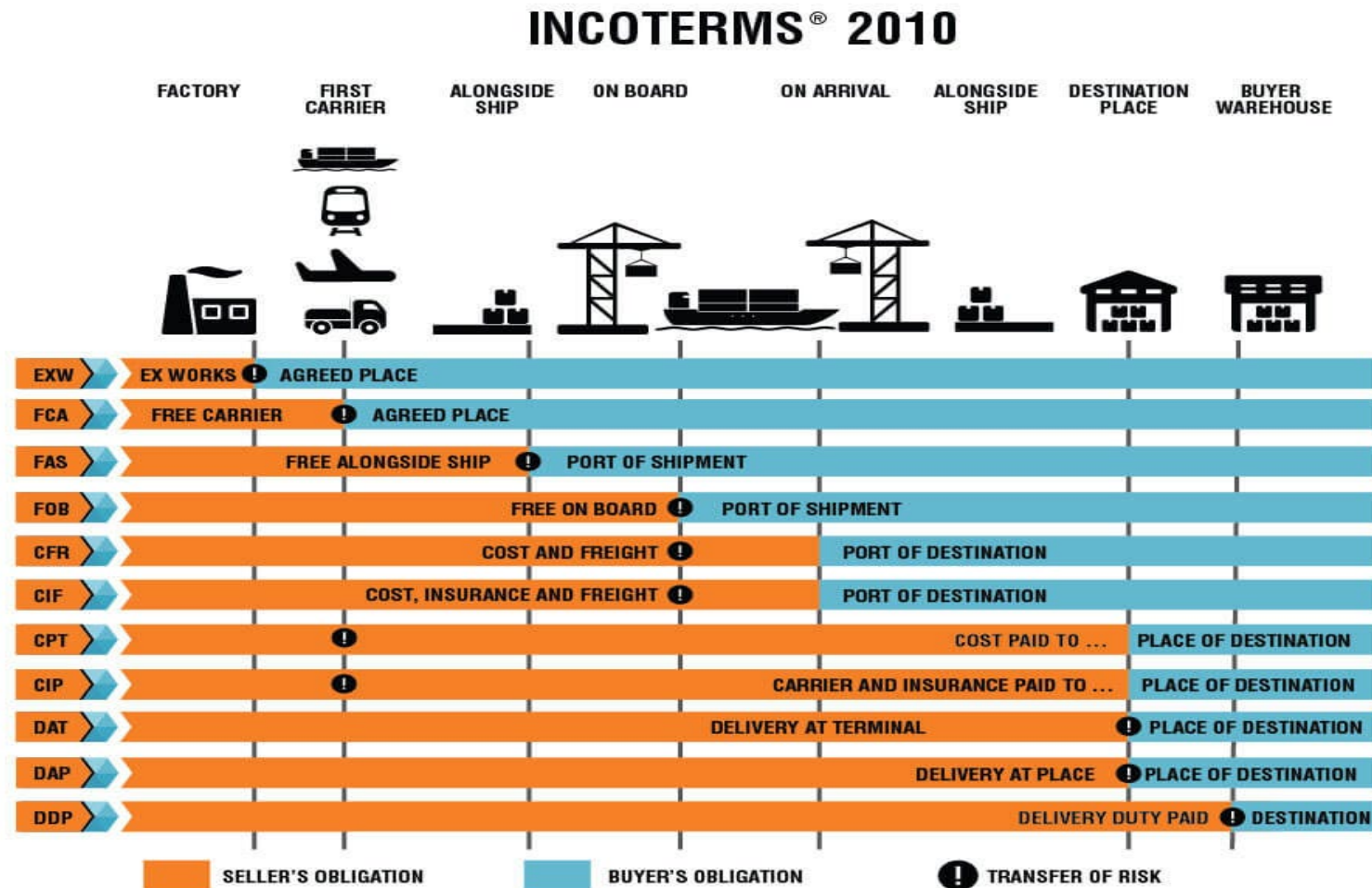
General all types of transport

EXW • FCA • CPT • CIP • DAT •
DAP • DDP

Special sea & inland waterway

FAS • FOB • CFR • CIF

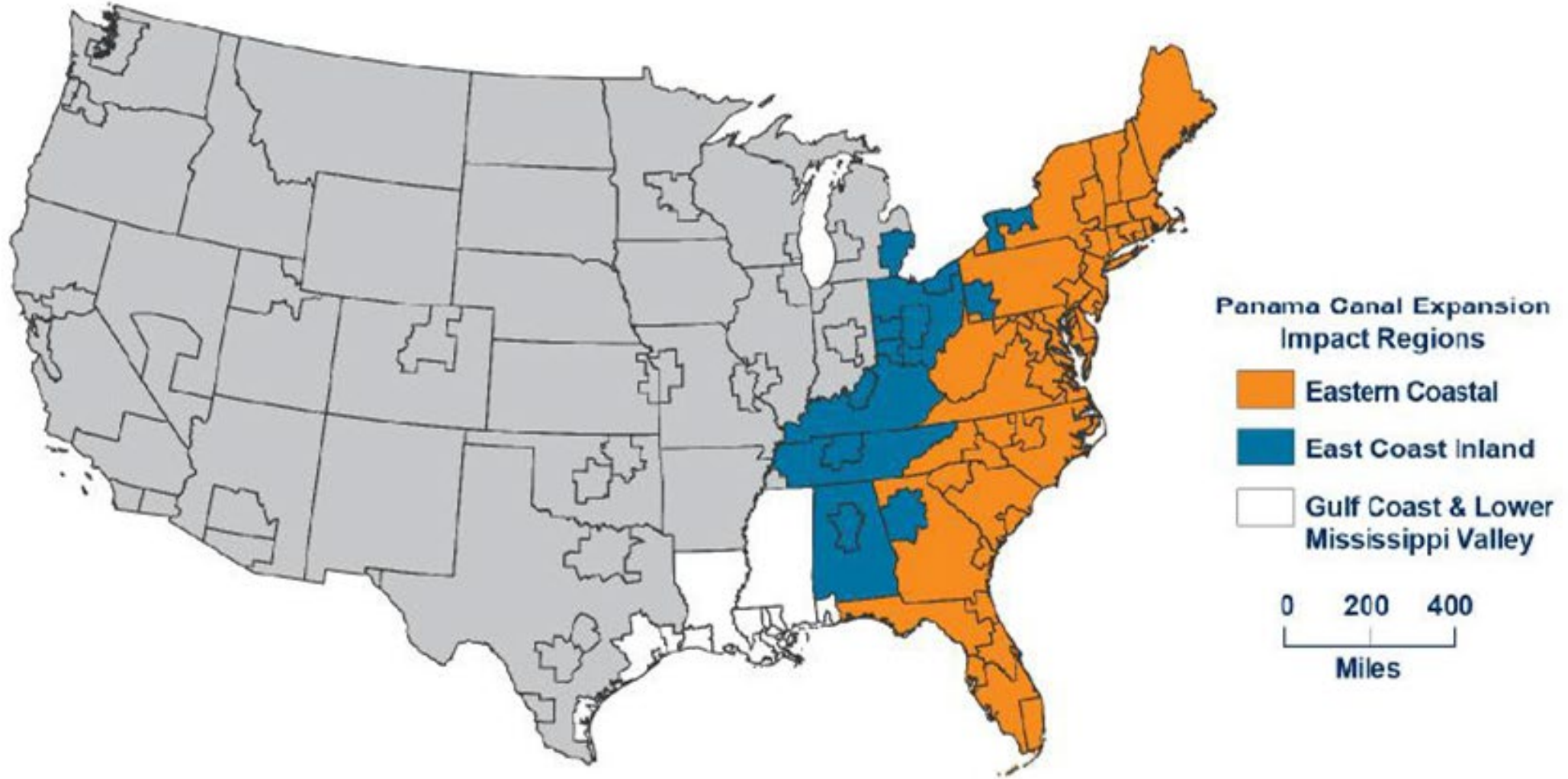
Graphic Representation of Incoterm Liability



<https://internationalcommercialterms.guru> V.2.1 by J. Montezuma under Creative Commons CC BY-SA 4.0

Port Logistics

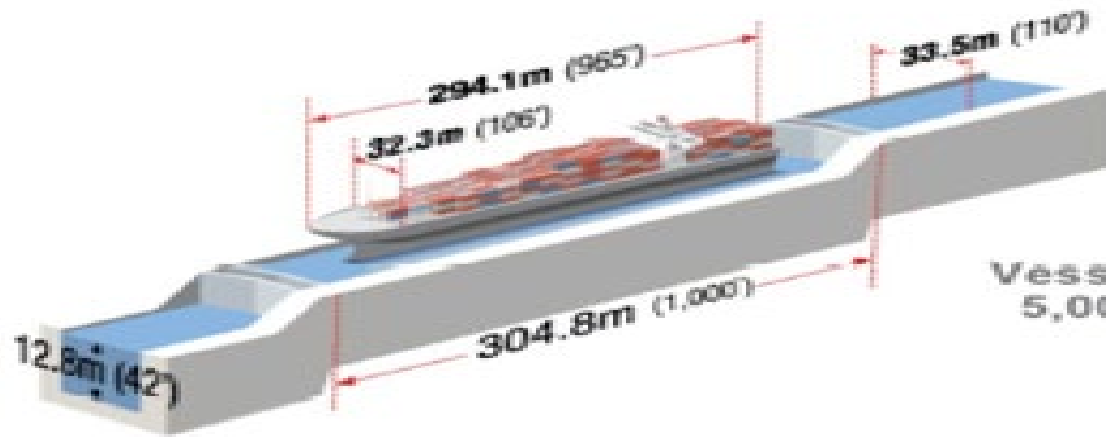
U.S. REGIONS AFFECTED BY PANAMA CANAL EXPANSION – CONTAINER TRADES



Source: Parsons Brinckerhoff, Panama Canal Expansion Study, June 2012

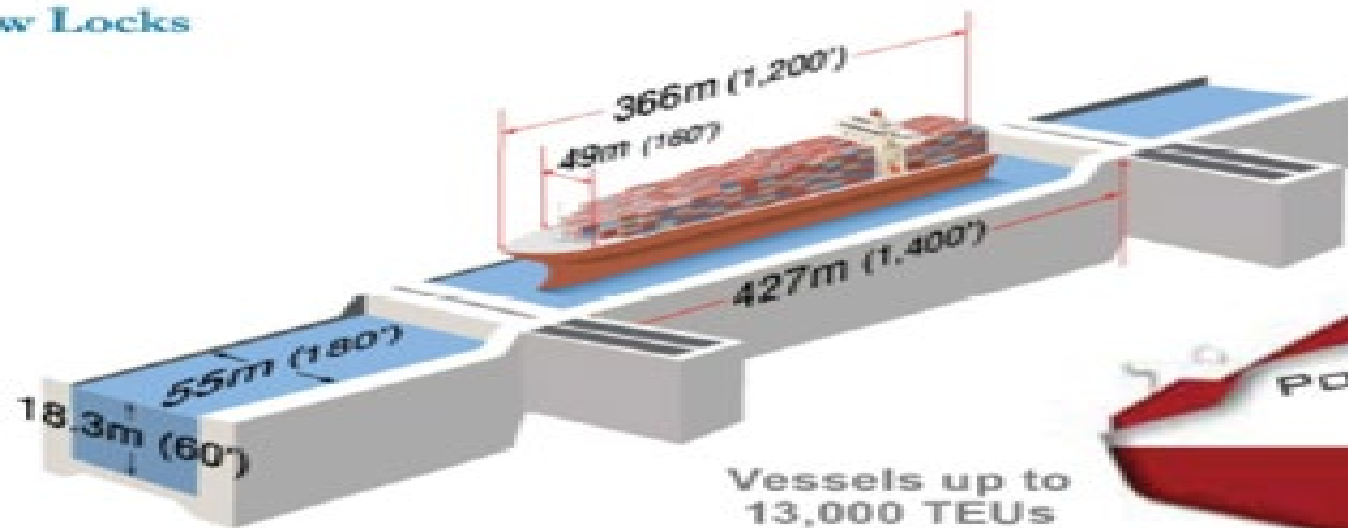
Figure 2. LOCK CONFIGURATIONS FOR EXISTING AND EXPANDED CANAL

Existing Locks



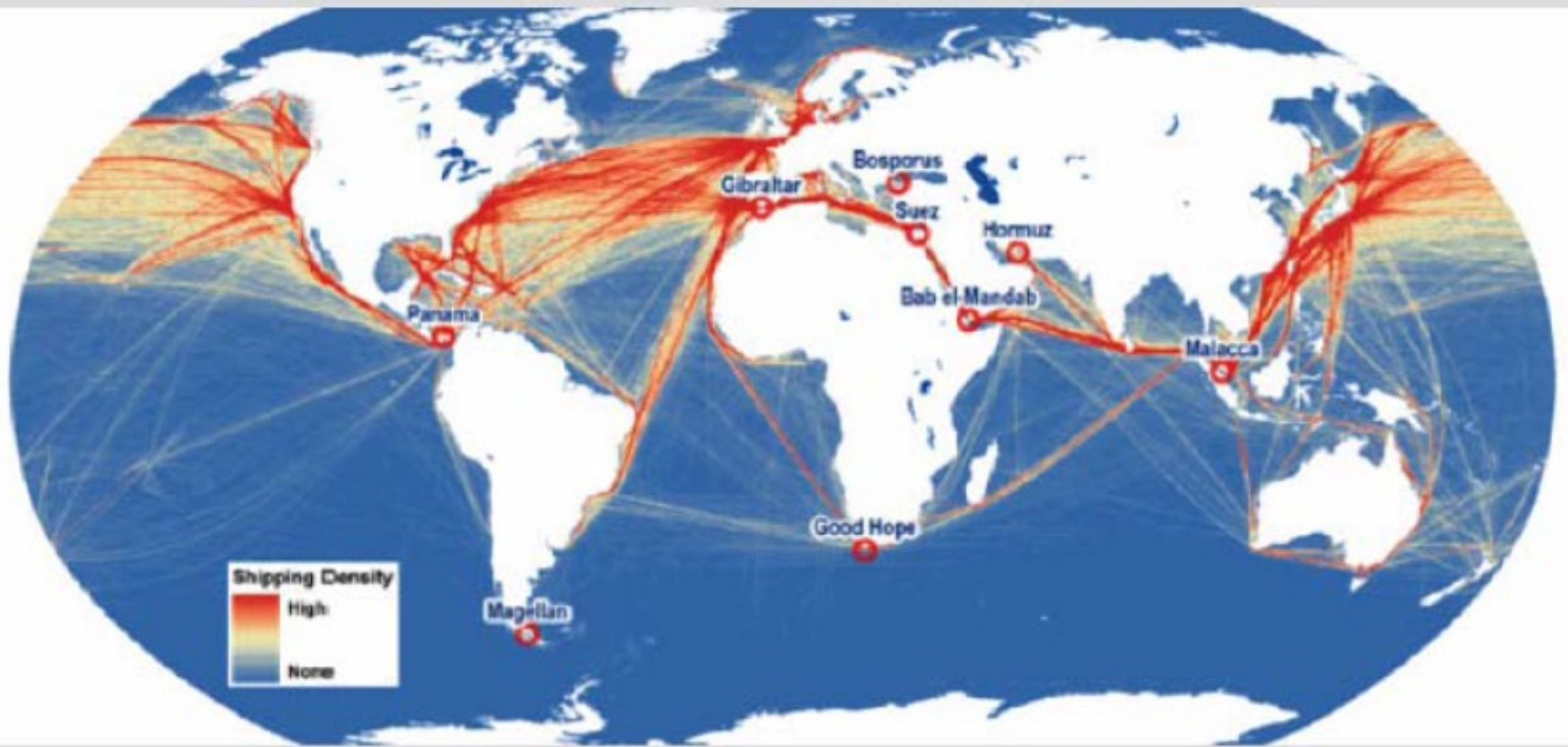
Vessels up to
5,000 TEUs

New Locks



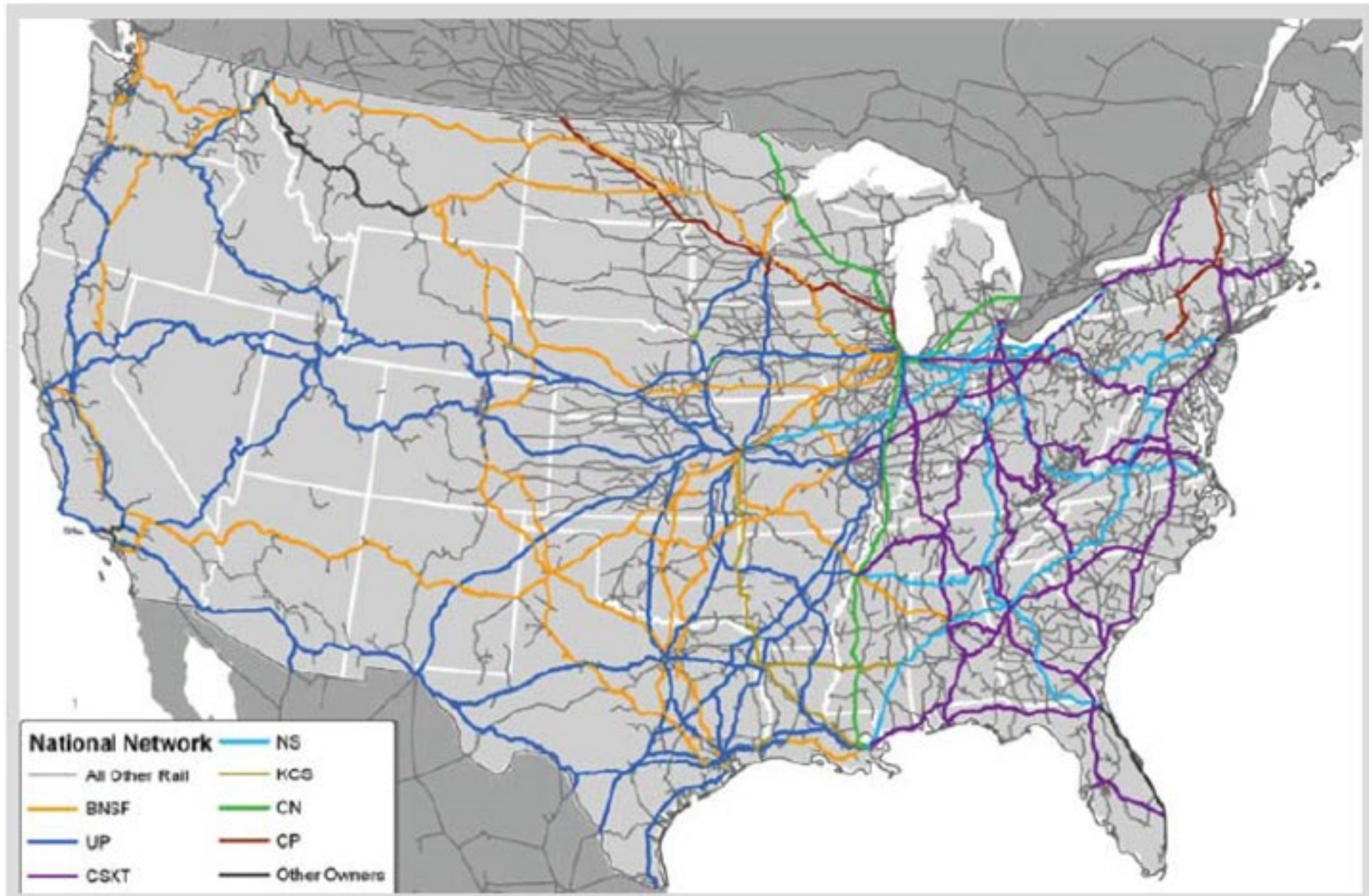
Vessels up to
13,000 TEUs

CARGO DENSITIES OF GLOBAL SHIPPING ROUTES



Source: Shipping density data adapted from National Center for Ecological Analysis and Synthesis, A Global Map of Human Impacts to Marine Ecosystems

U.S. NATIONAL RAILWAY SYSTEM MAP



Source: Association of American Railroads, May 2012

Container Ships



Roll-On/Roll-Off Ships



Break-Bulk Ships



Combination Ships



TYPES OF SHIPS

Crude Carriers



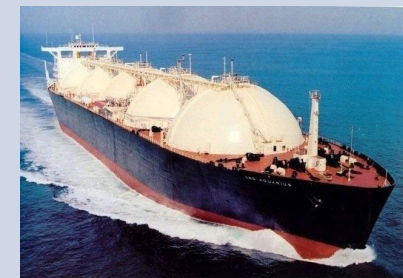
Product and Chemical Carriers



Dry-Bulk Carriers



Gas Carriers



Addressing Carbon Emissions in Logistics

Session Outcomes

Objective: Convey an understanding of the value of incorporating Green House Gas Emissions (GHG) into Supply Chain Design and discuss “How” to do this.

Key Elements:

- Impact on business and the environment
- Design activities in SCM that impact GHG
- Tools and techniques associated with Green Supply Chain Network Design

GHG Analysis in Network Design

Carbon Footprint Reporting: Measure End-to-End Emissions of Network: Each Scenario

Constraining Emissions: Incorporate Upper Limit on Carbon Emissions in Optimization

Emissions as a Cost: Apply a Cost to Carbon Emissions and Incorporate in Model

Emerging Technology in Logistics

The Amazon Effect



The marketplace platform has been fuelled by the widest range, lowest prices and best convenience and is increasingly supported by Prime membership which provides free fast Fulfilment, streamed Content (Video/Music) and Alexa services.

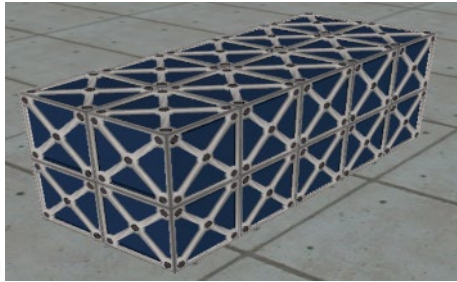
July 2017 The Financial Brand

Physical Internet Concept

- Open market goods transport, storage, realization, processing
- “Black box” modular containers: transport handling & packaging
- New generation handling, transportation and storage
- Protocols for seamless open asset sharing & consolidation
- Critical mass: vast community of users
- Service provider certification and ratings-by-users
- Continuous tracking & monitoring
- Smart, fact-based proactive, distributed decisions

Containers at All Scales

12m
6m
4.8m
3.6m
2.4m
1.2m

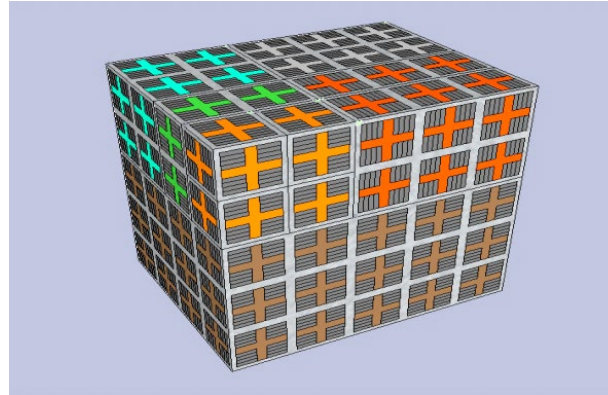


Handling Containers π-Boxes

Modular fit in transport containers

Transport Containers

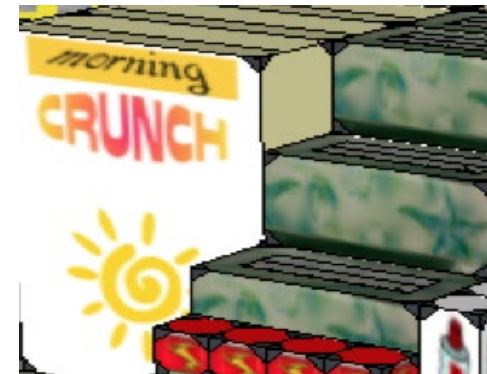
Modular fit in π -certified vehicles



1.2m
0.8m
0.6m
0.4m
0.3m
0.2m
0.1m

Packaging Containers π-Packs

Modular fit in handling containers

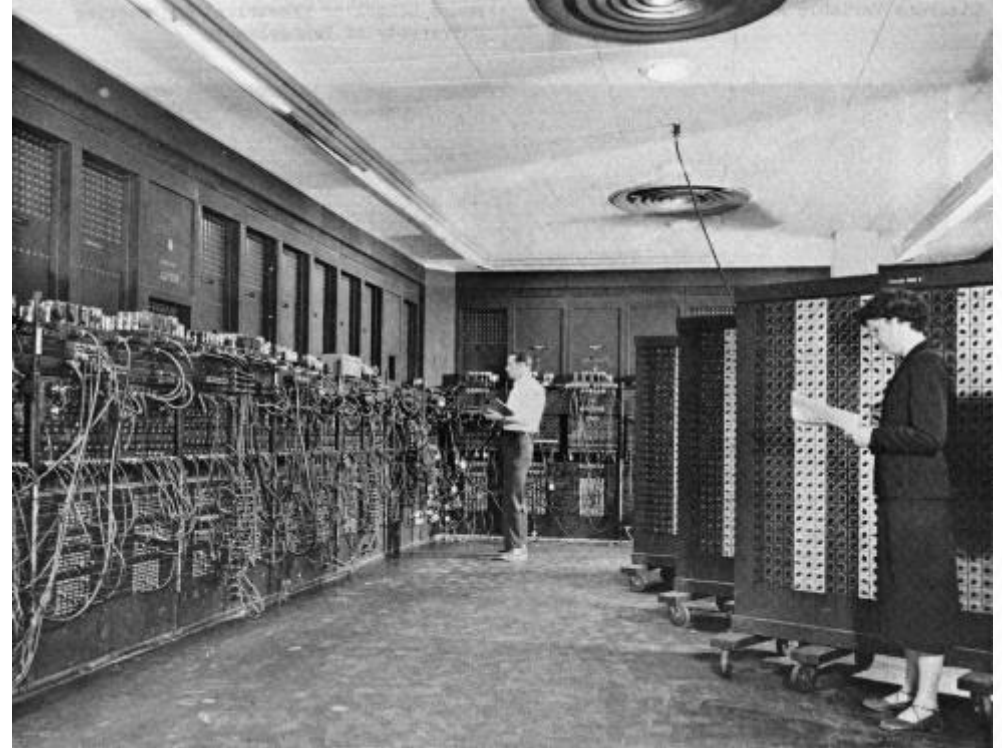


1.2m
0.6m
0.48m
0.36m
0.24m
0.12m

The History of AI

1956 to ~2000: The rise of the term AI

- 1956, top researchers gathered at Dartmouth to create machines that could replicate human intelligence and coined the term AI.
- Small breakthroughs over this time, but the tools and technology was lacking
- Little application to business
- Little funding for research (everyone associated AI with the movies)
- Y2K was top priority



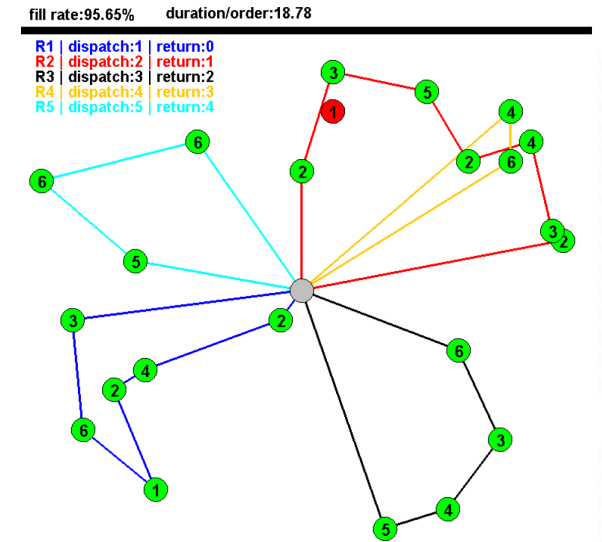
AI in the Transportation Industry

How it is used today and will be tomorrow

- **Route optimization** - Tools maximize the use of the delivery fleet, meet delivery and pickup times while adjusting real-time to traffic and weather patterns.



- **Inventory planning** - Predicting customer ordering patterns and positioning the right products at the right time closer to the customer to reduce handling and shipping time.



What you will walk away with



The Ability to Answer Strategic Questions Regarding Transportation Operations



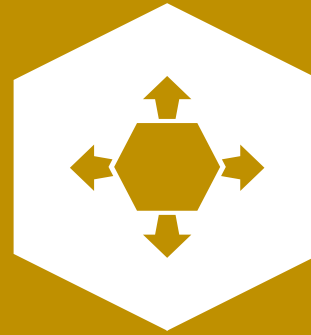
Strategy & Transformation

Are our processes and systems providing maximum benefit? Are we using the correct metrics to measure success?



Systems Selection & Implementation

Which systems are right for us, and how can we ensure it is implemented correctly?



Mode & Fleet Analysis

Can we reduce costs or improve service using another shipping strategy?



Spend Optimization

Are our contracts optimized? What is the best carrier mix to service our network? Should we conduct a transportation RFP?



Transportation

Questions?