Future Freight Flows:
Potential Trends – Near and Far

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MIT Center for
Transportation & Logistics

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Freight Transportation Planning is Hard.

- Hard for shippers,
- Harder for carriers,
- **Hardest** for government planners!
  - Infrastructure planning timeframe is decades
  - Diverse and vocal constituents (NIMBY, BANANA)
  - Pallets don't vote
  - Both modal and jurisdictional silos
  - Revenue sources are decreasing dramatically
  - Removed from the system users

These challenges were recognized by AASHTO and USDOT – resulting in the Future Freight Flows project.

The Future Freight Flows Project

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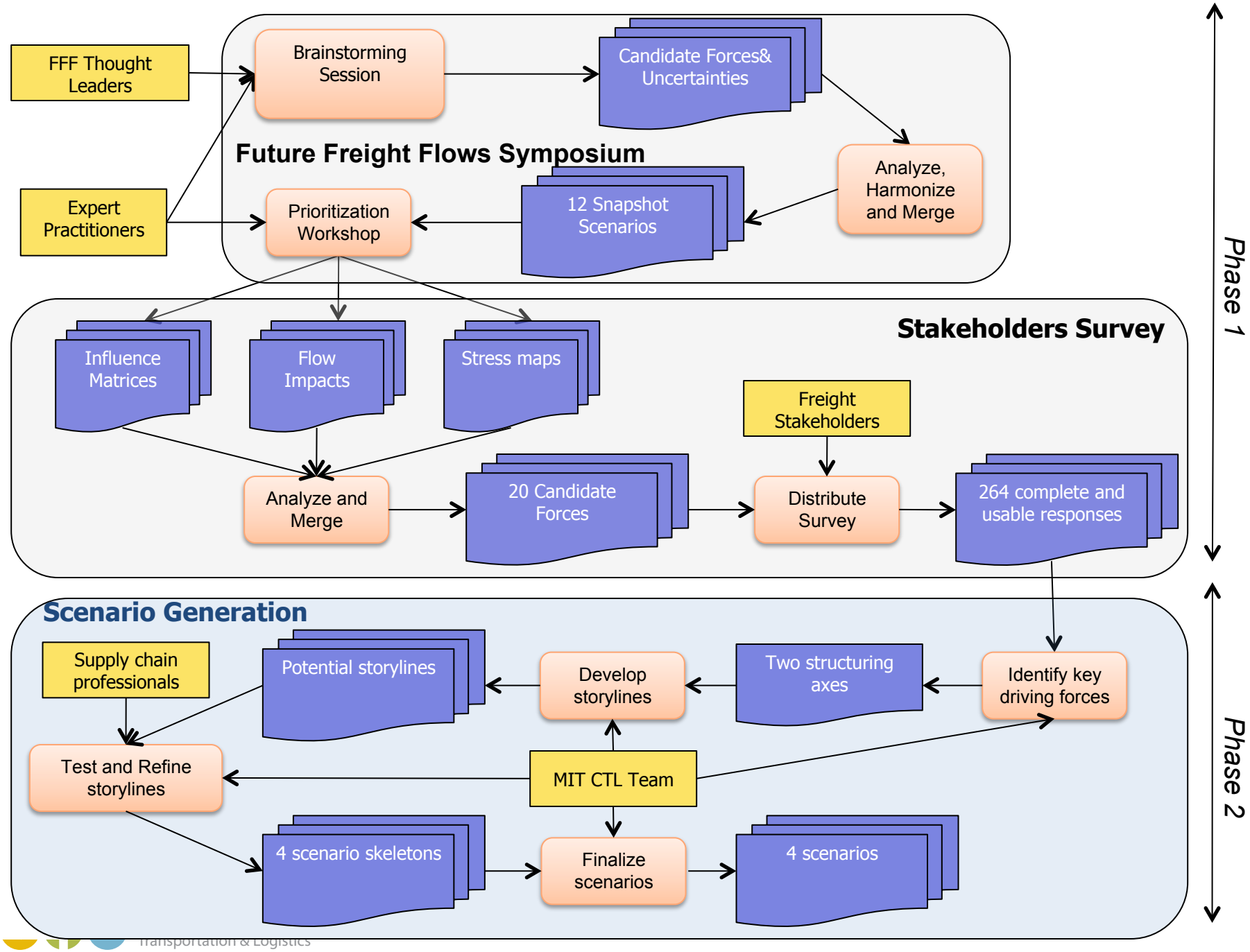
FFF Project Objectives & Deliverables

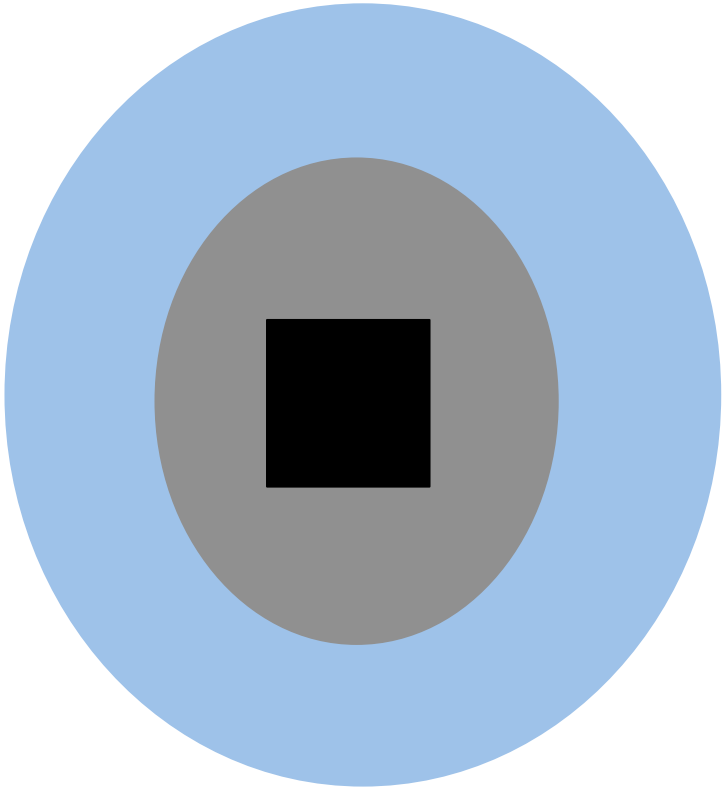
- Two Objectives:
  - "Provide decision makers [state DOTs] with a critical driving forces behind high-impact economic changes and business sourcing patterns that may effect the US freight transportation system [in the year 2030 & beyond]."
  - "Better enable informed discussions of national, multi-state, state, and regional freight policy and system investment priorities.
- Three Deliverables:
  - Analysis of Driving Forces
  - Future Scenarios
  - Toolkit for running a Future Freight Flow Workshops


So many potential futures, so little time . . .

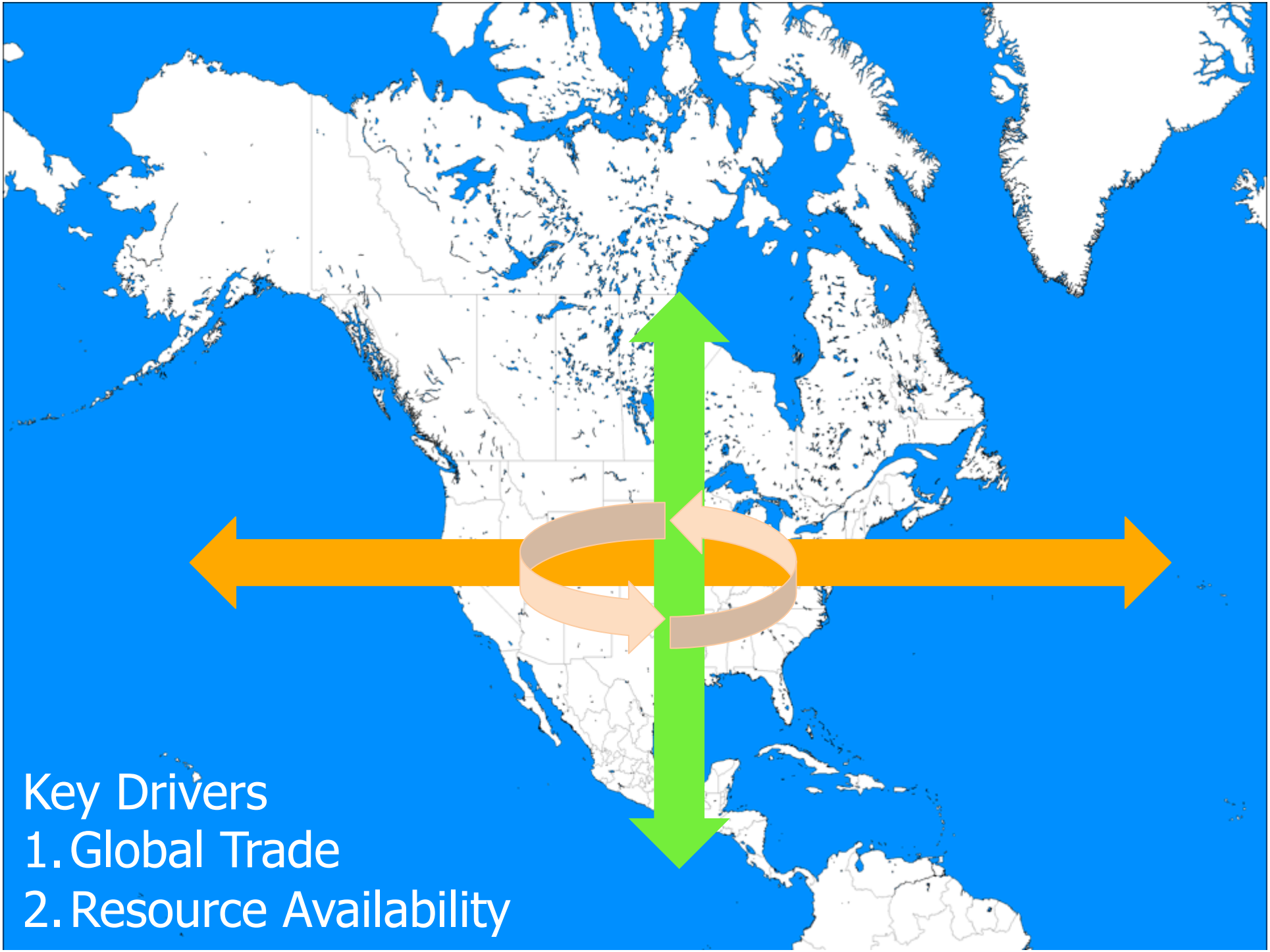

FFF Thought Leaders
Brainstorming Session
Candidate Forces& Uncertainties
Future Freight Flows Symposium
Expert Practitioners
Prioritization Workshop
12 Snapshot Scenarios
Analyze, Harmonize and Merge
Phase 1
Stakeholders Survey
Influence Matrices
Flow Impacts
Stress maps
Freight Stakeholders
Analyze and Merge
20 Candidate Forces
Distribute Survey
264 complete and usable responses
Scenario Generation
Supply chain professionals
Potential storylines
Develop storylines
Two structuring axes
Identify key driving forces
Test and Refine storylines
MIT CTL Team
4 scenario skeletons
Finalize scenarios
4 scenarios
Phase 2

Strategy vs. Factors vs Forces

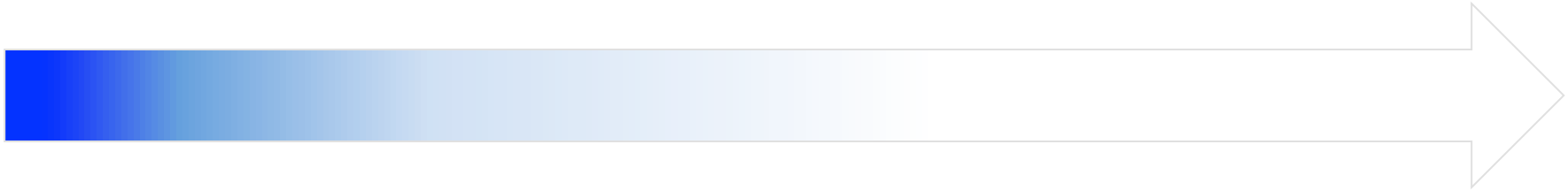
- Strategy
  - Things you control
  - Solutions & approaches
- Factors ("Inside-out")
  - You cannot control
  - You may be able to influence
  - Direct and obvious effects
- Forces ("Outside-in")
  - You cannot control
  - You cannot influence
  - Indirect, ambiguous & unknown effects



A scenario is a set of driving forces


Key Drivers
1. Global Trade
2. Resource Availability

Four Future Freight Flow Scenarios



- Digital Freight Matching
- Transportation Management Systems
- Mobile Communication
- Autonomous Trucks

Digital Freight Matching

Uber for X

Why not Uber for Freight?

The Economist

Road haulage

The appy trucker

Digital help is at hand for a fragmented and often inefficient industry

WALL STREET JOURNAL

TECH

Startups Accelerate Efforts to Reinvent Trucking Industry

Companies aim to leverage drivers' smartphones to quickly connect them with nearby companies looking to ship goods

IHS | JOC.COM

Why does venture capital love logistics startups?

Reynolds Hutchins, Associate Editor | Mar 01, 2016 7:12PM EST

Over $500M invested in these 67 start ups

"Bringing sexy back to the freight industry"

Shira Abel, *The Next Web*

The last time VCs thought freight was sexy . . .

>200 Transportation Electronic Marketplaces existed in 1999, but essentially none survived in their original form.

Name	*Year estab.*	*Origin Country*	*Market focus*
eLogistics	1999	UK	Road
Freightgate	1999	USA	Road, ocean, air
FreightMatrix	1999	USA	Road
Freightquote	1998	USA	Multimodal
Internet Truckstop	1995	USA	Road
NTE	1995	USA	Road
Nistevo	1997	USA	Road, rail, ocean
Roadrunner	1998	UK	Road
Teleroute	1988 (1999)	Belgium	Road
Timocom	1997	Germany	Road
Wtransnet	1997	Spain	Road

The last time VCs thought freight was sexy . . .

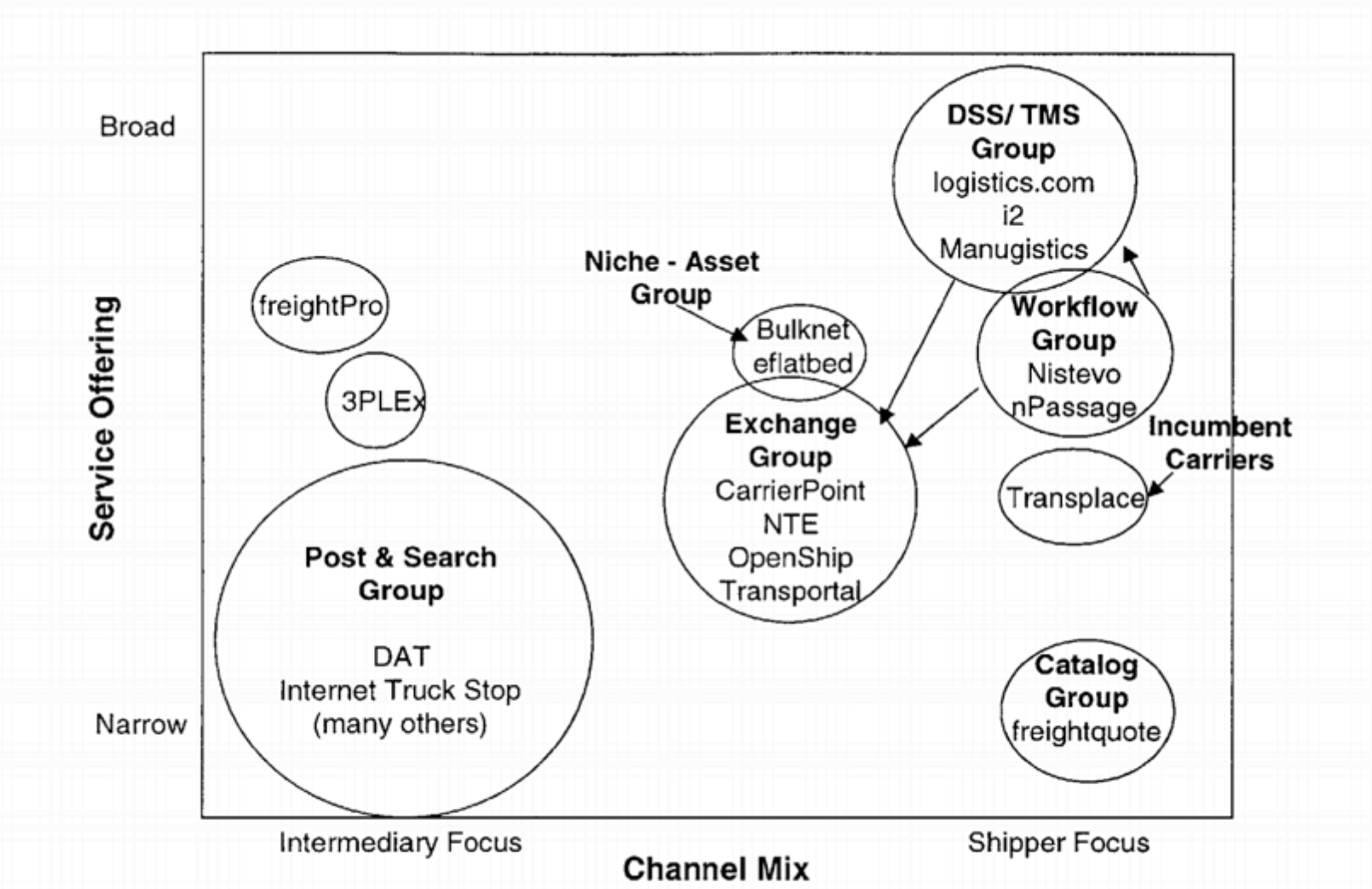
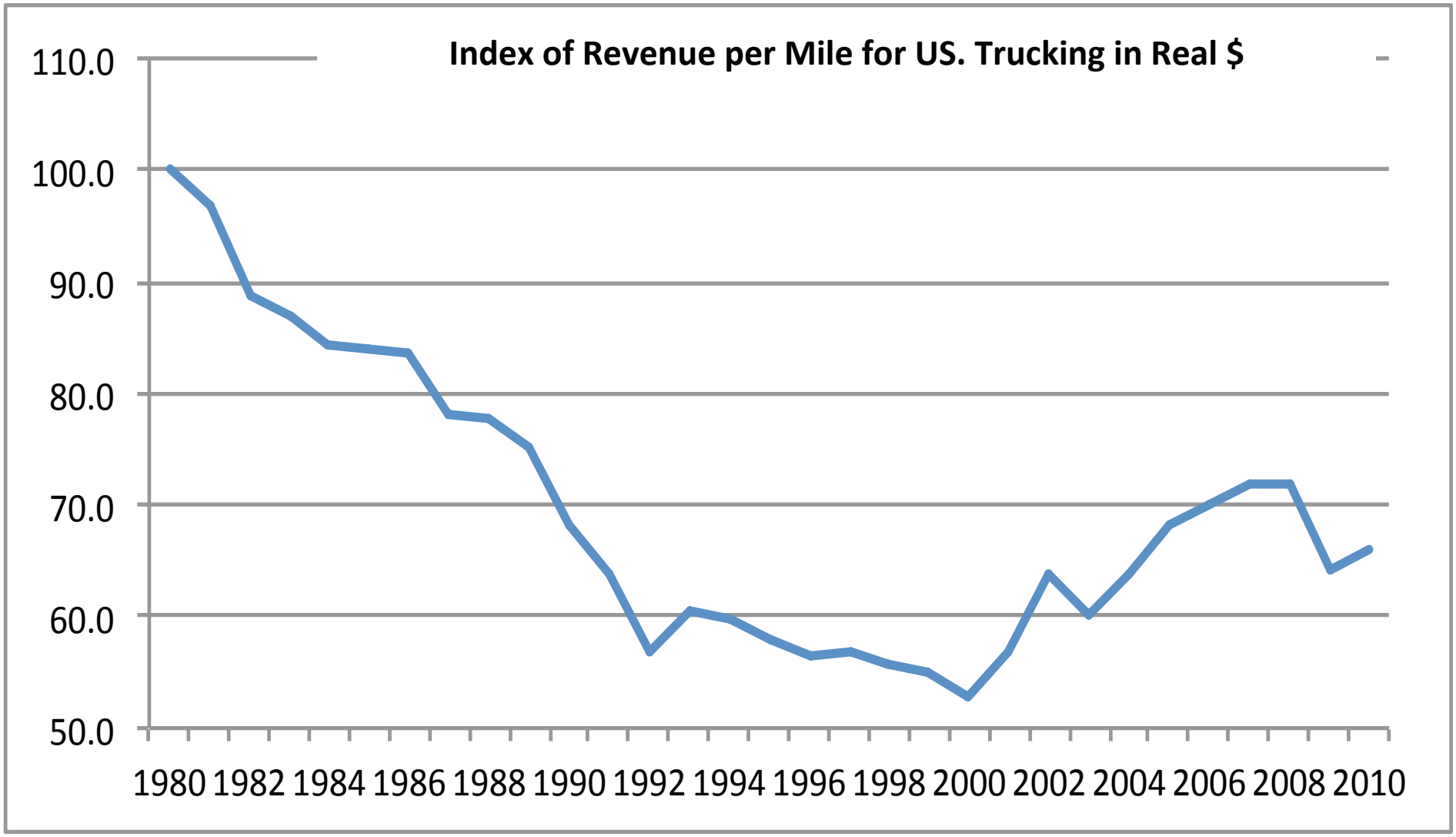


Figure 2-3 Strategy Map for Truck Transportation Marketplaces

Source: Boyle, Marc (2000) *Business-to-Business Marketplaces for Freight Transportation*

Most Recent Real Disruption? Deregulation



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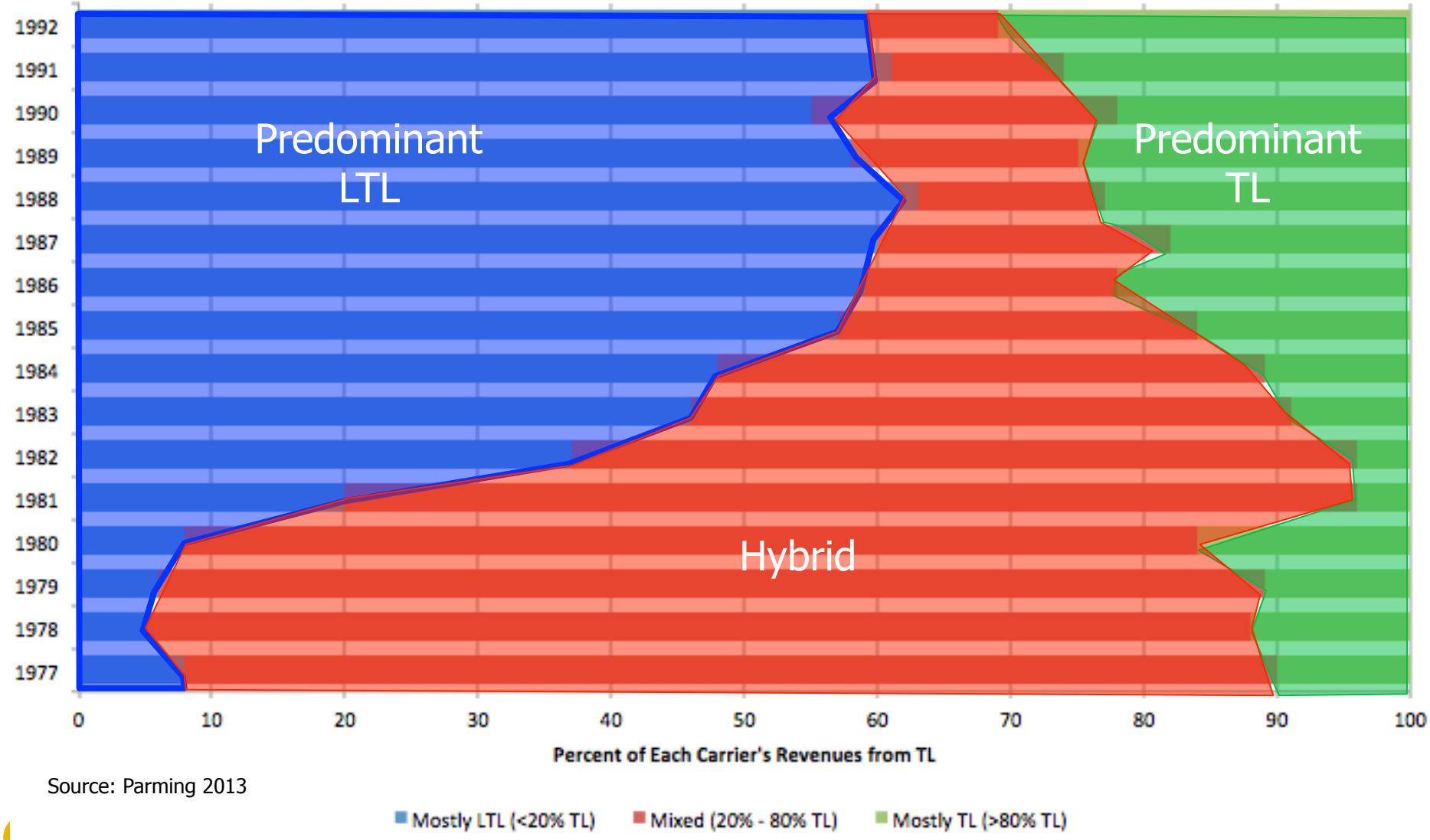
Source: AAR and ATA

Case of Rapid Change: Deregulation

Bifurcation of US Trucking Market



Source: Parming 2013

Does the Uber model fit?

- What do we do when we uber?
  1. Contact a single source through an App
  2. "Real time" visibility of nearby vehicles
  3. Matched to one of multiple underlying providers
  4. Payment handled off line, estimated in advance
  5. Pricing varies based on surging

Is Uber just Freight Brokerage for Passengers?

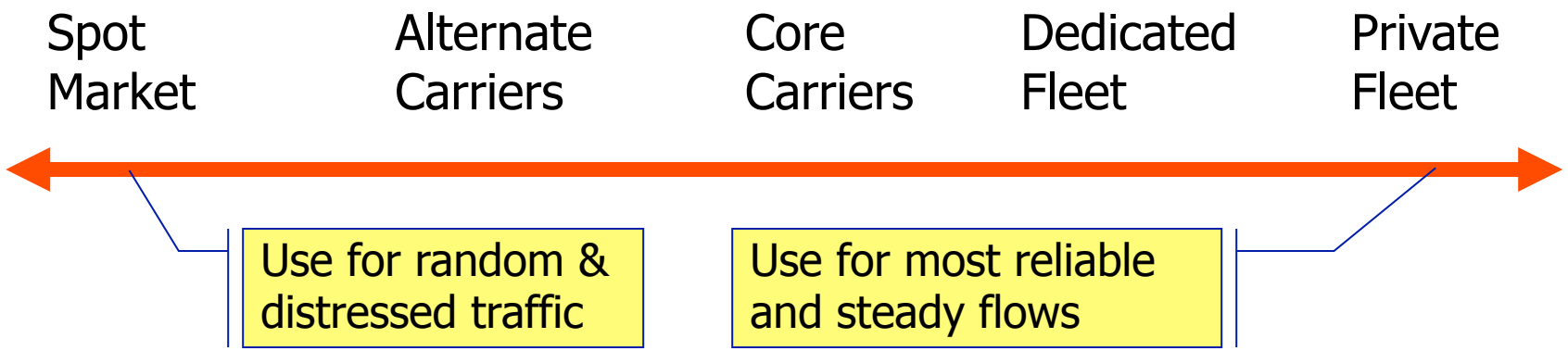
How do the Markets Compare?

	PAX	FRGT
Competitive Market	Local Monopolies (taxis)	Highly Competitive

Partially adapted from Satish Jindal (2016)

Transportation Portfolio Continuum

- Different network segments require different relationships
- Segmentation of network and carriers by needs
- Continuum from one-off transactions to ownership
  - Ownership of Assets versus Control of Assets
  - Responsibility for utilization
  - On-going commitment / responsibilities
  - Shared Risk/Reward – Flexible contracts



Proposed value to better matching

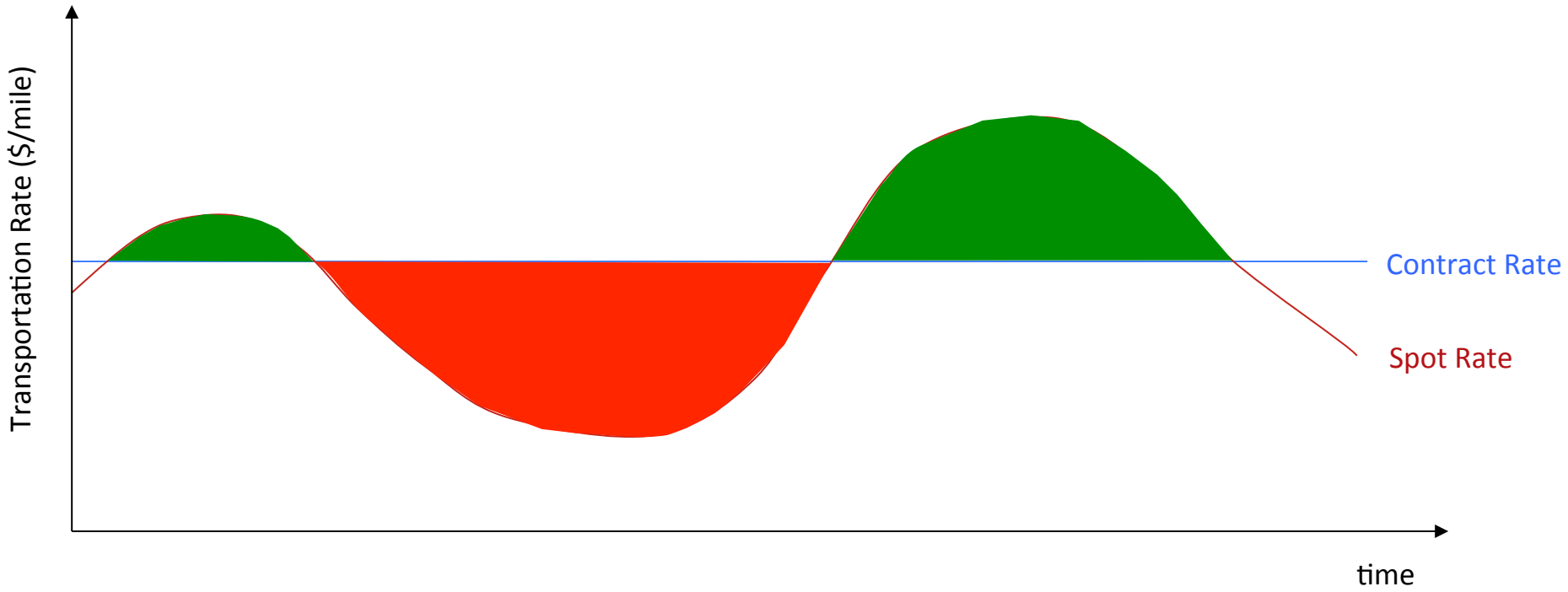
- Improved vehicle utilization
  - Estimates in US 10%-30% empty miles
  - Differs by length of haul & carrier size

- Reduced transactional inefficiencies (friction)
  - Streamline matching, payment, notification, visibility, etc.
  - Does visibility of nearby trucks add value to a shipper?

My Take-Aways on "Uber for Freight"

- Most start ups in this space hate the name!
- Some start ups do have have improved functionality . . .
  - Evolutionary more than revolutionary,
  - Serving to increase customer expectations, but
  - Worthwhile functionality is being incorporated within TMS or brokers.
- Demise of brokers has been greatly exaggerated (again)
  - Middleman's role is growing, not being diminished
  - Promised "two party" transactions are really "three party"
  - Potential consolidation in brokerage space – strong economies of scale
- Area for fit: Local real-time, on-demand delivery

Begs a bigger question . . .



If spot market was totally liquid and reliable, would it lead to the end of annual contracts?

TMS Trends

Gartner's Magic Quadrant for TMS

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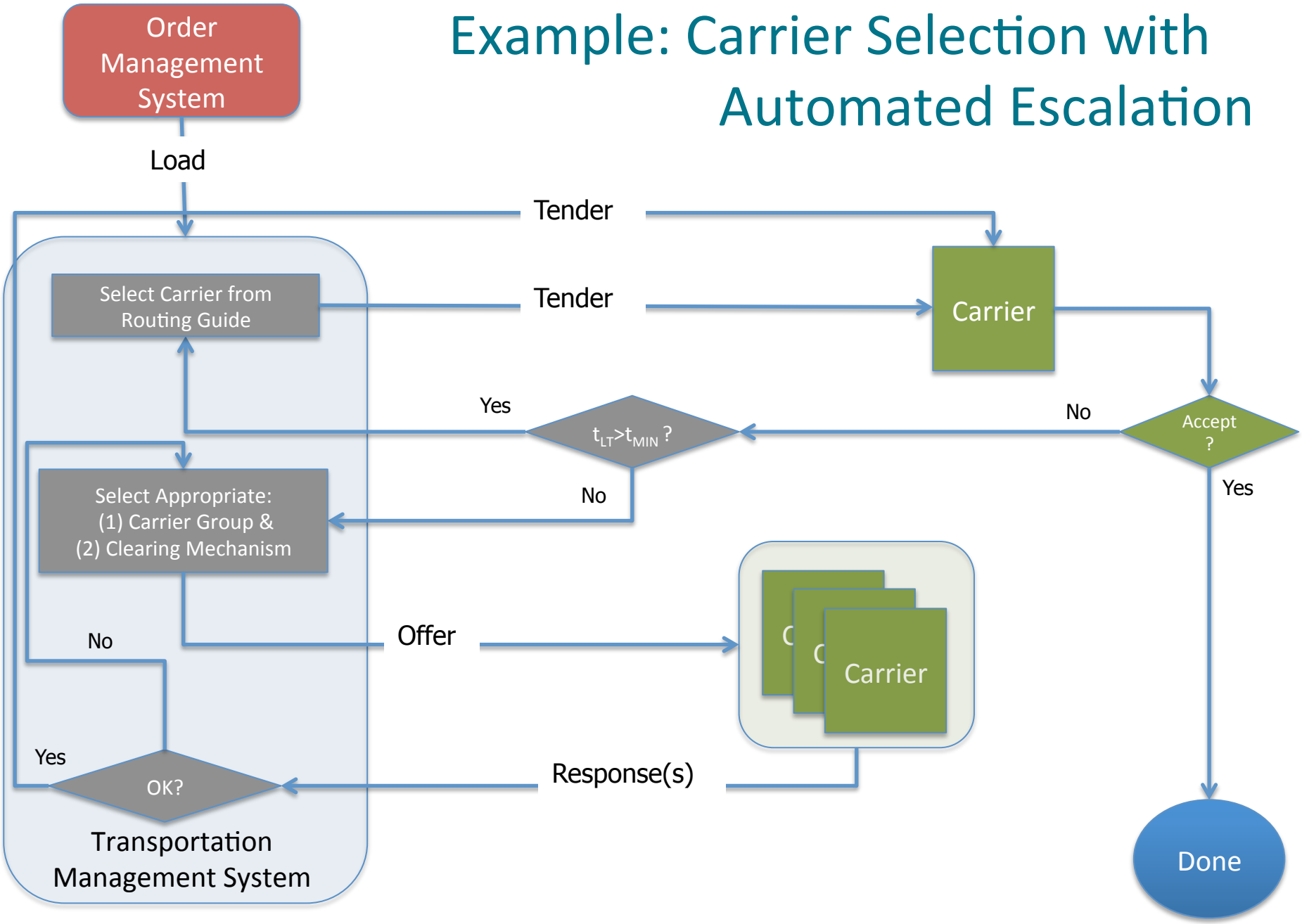
Latest TMS Trends

- Convergence of Systems
  - Bridging Functions
    - Connecting to WMS, OMS, IMS, etc.
    - Fitting in end-to-end solutions
    - Growth of Supply Chain Platforms
  - Connecting gap between planning & execution
    - Integrating real-time status into execution
    - Feeding execution results back into planning
    - Procurement triggering (market vs. schedule based)
- Evolution of Deployment
  - Finally flipped from self-hosted to remote hosted
  - Long evolution: ASP to SaaS to Cloud
  - Different flavors of remote hosting
  - Faster upgrades and roll out of improvements

My Take Aways for TMSs

- The decision for the shipper has not changed,
  - Standard processes versus Competitive advantage
  - ERP off-the-shelf versus Best of Breed
- The speed of implementation is still a problem,
  - Getting faster (for vanilla install)
  - Connecting carriers is still the time sink
  - No standardization of format or data
- Most have Digital Freight Matching anyway!
  - Private marketplaces
  - Dynamic and adaptive carrier selection

Example: Carrier Selection with Automated Escalation



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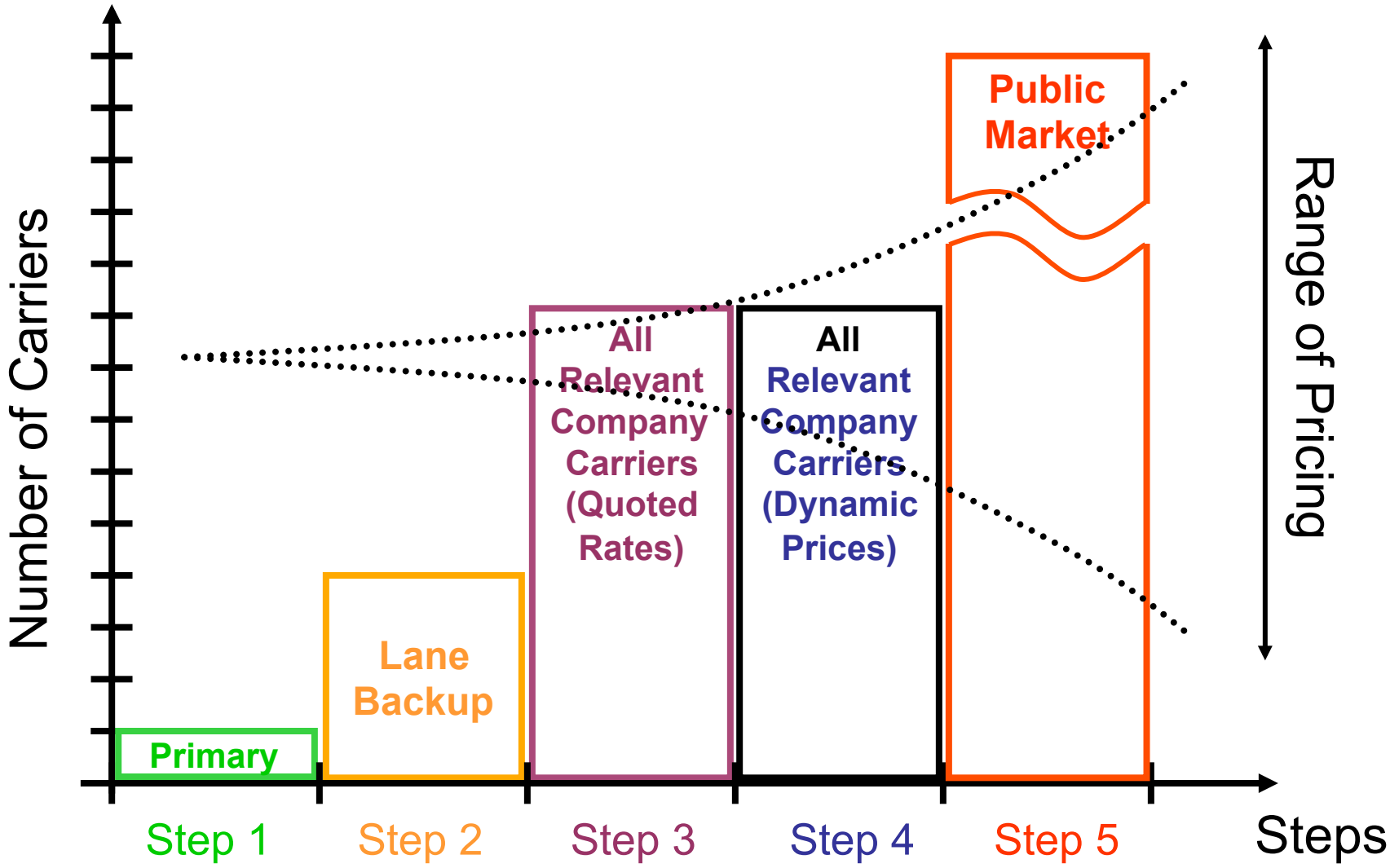
Automated Escalation Process



Mobile Communications

Mobile Communications

- Providing real-time access to drivers
  - For shippers, carriers, brokers . . .
  - GPS based positioning - tracking
  - Visibility versus exception management
- Connectivity to the driver . . .

  . . . do shippers really **want** this information?

  . . . do carriers really want to **give** this information?

Challenges for Mobile Tracking

- How easily can real-time asset tracking . . .
  - GPS data be merged with milestone EDI data?
  - Be translated and mapped into actionable on the underlying orders and goods?
  - Be converted into better predictions?
- Impact of widespread use of Electronic Log Books?
- What happens with complete transparency to drivers?
  - Dissolution of carriers?
  - Growth of alliances?
  - Growth of freight brokerage (Uber Freight)?

Autonomous Trucks

Shift from “If” to “What, When, & Where”

- **The What** . . . like boiling a frog!
  - Not a binary decision . . .
    - No Automation (Level 0)
    - Function-Specific Automation (Level 1)
    - Combined-Function Automation (Level 2)
    - Limited Self-Driving Automation (Level 3)
    - Full Self-Driving Automation (Level 4)
  - Systems in Place
    - Collision Mitigation Systems
    - Integrated Safety Systems
    - Lane Departure Warning
    - Blind Spot Detection

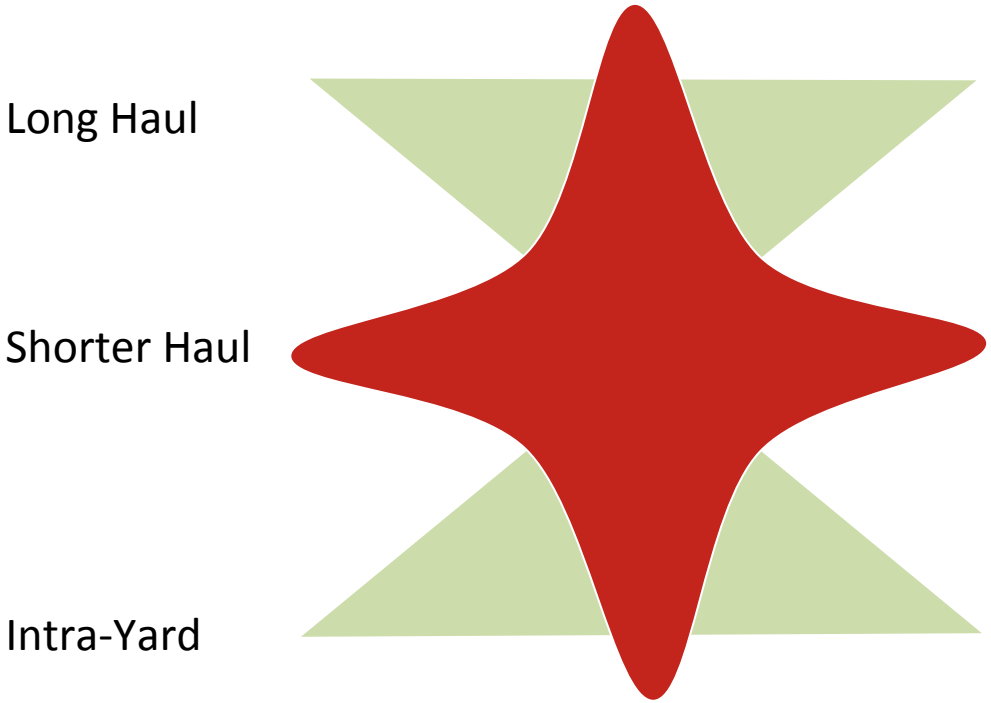
Shift from “If” to “What, When, & Where”

- **The When** . . . faster than originally thought!
  - First paid autonomous delivery occurred in Colorado in October 2016.

  - Uber Freight On-going Experiments & Trials
    - Initial window was 15 years to commercial non-pilot use
    - Releasing software updates 2-3x weekly and hardware weekly
    - Window for non-pilot commercial use shrinking to single years

From “If” to “What, When, Where, & How”

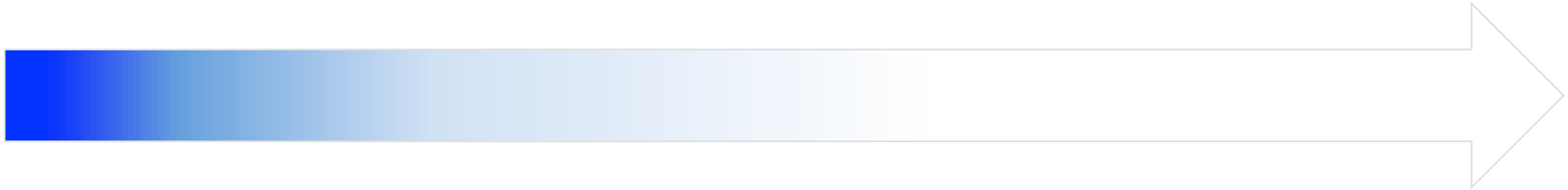
- **The Where** . . . three environments for freight
  - Long haul corridors
  - Shorter haul local moves / shuttle runs
  - Intra Facility (Yard) moves



Longer Term . . .

- Direct Changes
  - Increased single day range (~1000 miles)
  - Ubiquitousness of TL combined with low cost of IM
  - Lower fuel costs

- Indirect Impacts
  - Reduction in National DCs, increase in locals
  - Concentrated corridor traffic
  - Dissolution of TL carriers to independent driving entities



- Digital Freight Matching
- Transportation Management Systems
- Mobile Communication
- Autonomous Trucks

Questions, Comments, Suggestions?

"Wilson & Dexter – disrupting the dominant design daily"
Yankee Golden Retriever Rescued Dogs (www.ygrr.org)

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