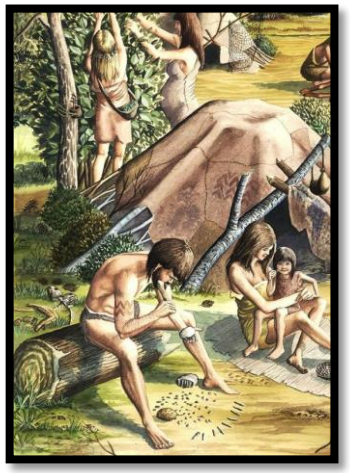
SUPPLY CHAIN DISRUPTION…ON MYTHS, MELONS, MILES, AND MACHINES

DR. MARC ANGUS SCOTT

DEPARTMENT OF SUPPLY CHAIN MANAGEMENT

WALTON COLLEGE OF BUSINESS

DISRUPTION…10,000 BC



Neolithic/
Agricultural
Revolution

Pros

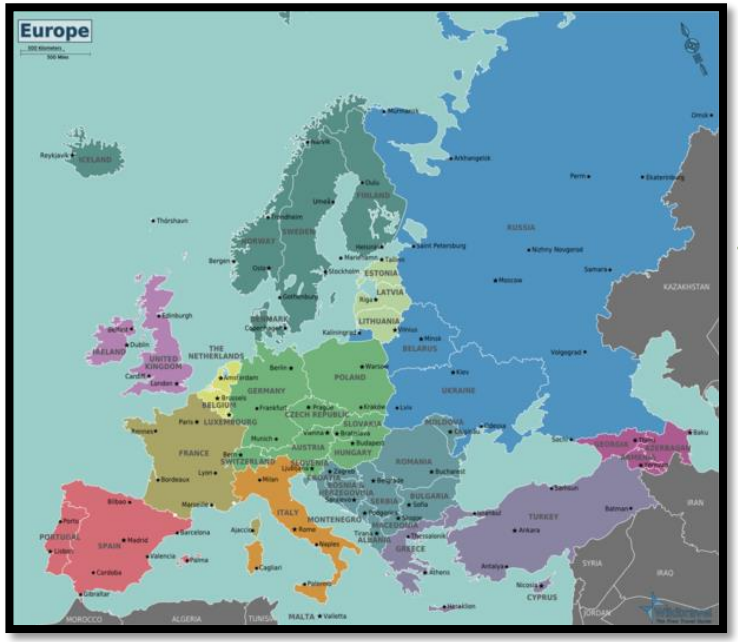
Cons

Disruptive Innovation and Society

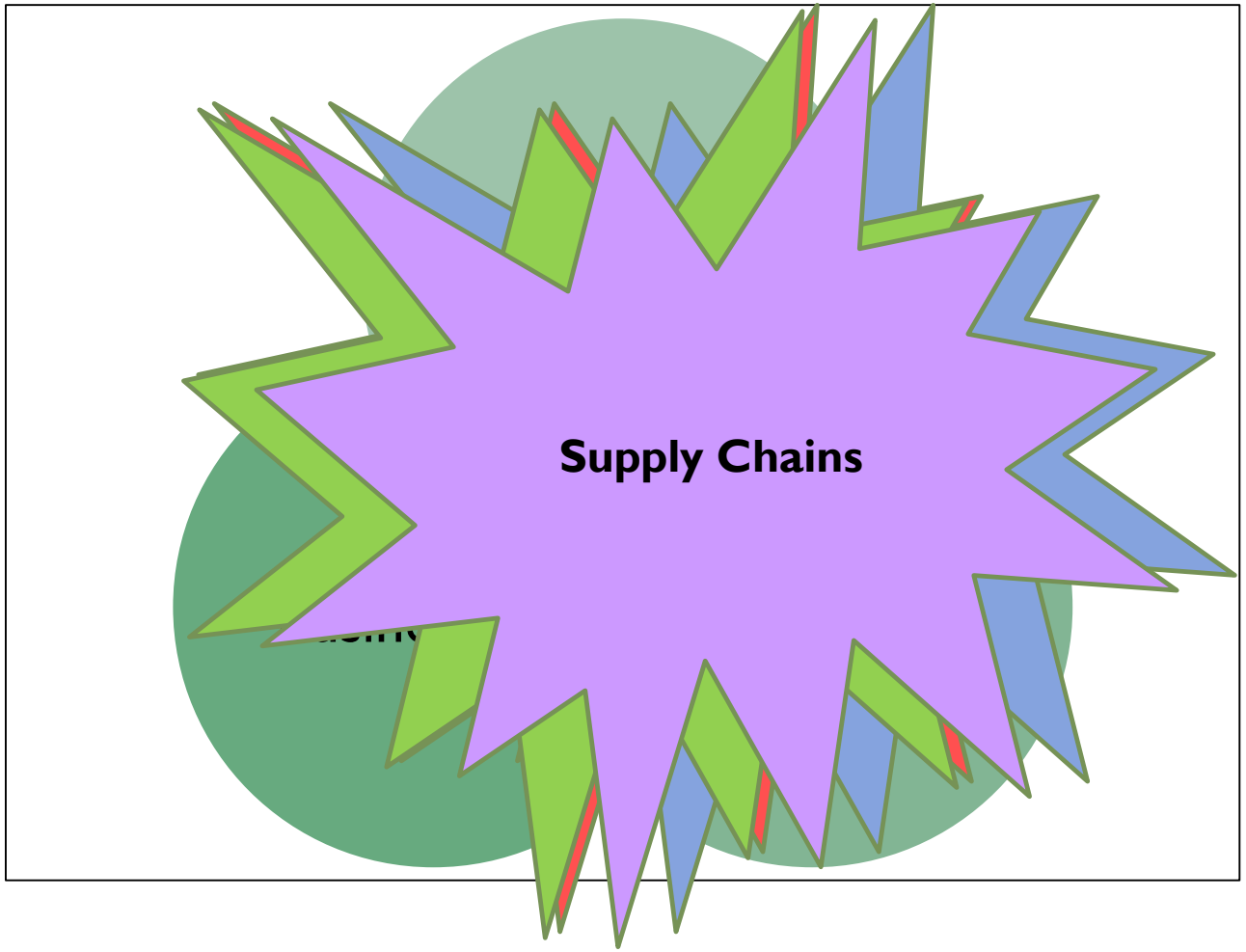
DISRUPTION…HISTORICAL LESSONS

DISRUPTION…HISTORICAL LESSONS

Gutenberg's Printing Press



DISRUPTION…HISTORICAL LESSONS



SUPPLY CHAINS …

Product Flow

- Physical Movement
- Goods and Materials

Information Flow

- Enabling Physical Flow
- Decision-Making
- Supply Chain Collaboration

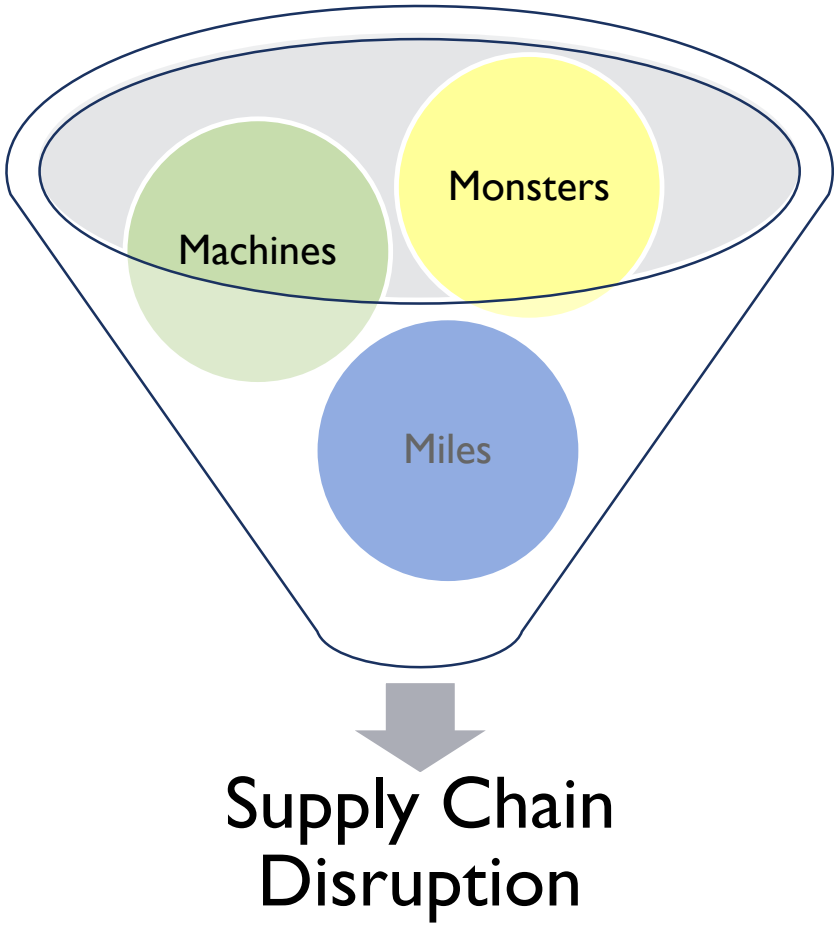
Cash Flow

- Management of Working Capital
- Cash-to-Cash Cycles

Demand Flow

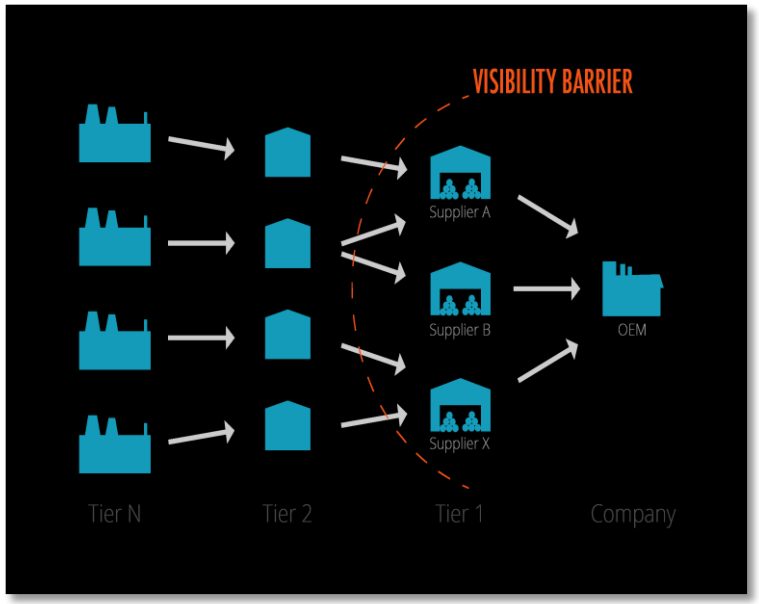
- Detect/Understand Demand Signals
- Synchronize Demand vs. Supply

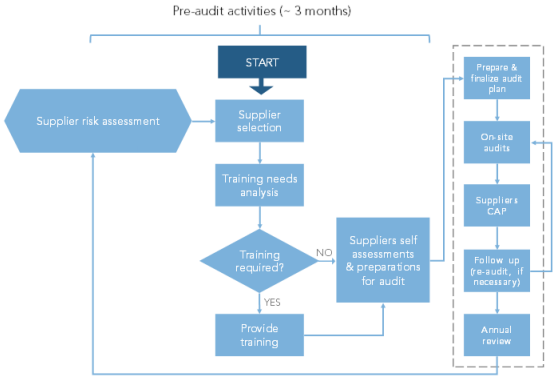
SUPPLY CHAINS DISRUPTION…OVERVIEW



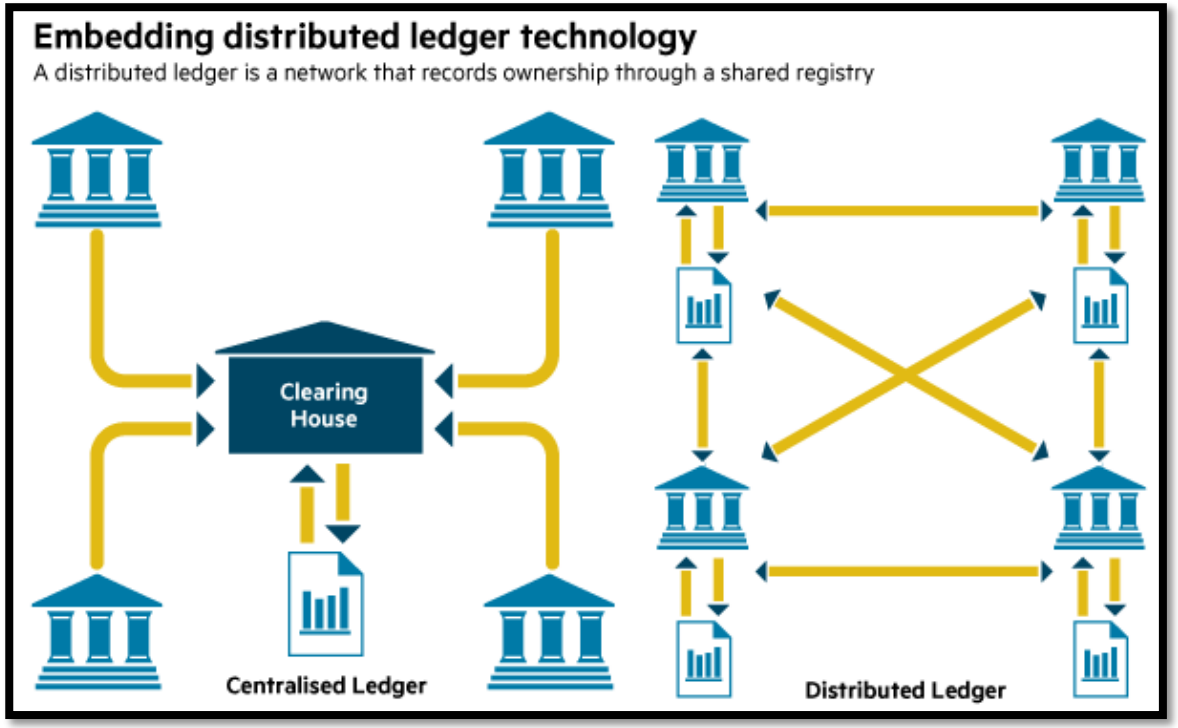
MONSTERS AND CHAINS

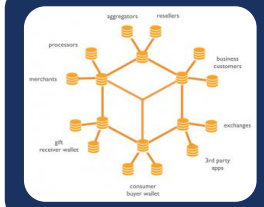
MONSTERS AND CHAINS





ENTER… BLOCKCHAIN TECHNOLOGY





Distributed Database

- All Access
- Entire History

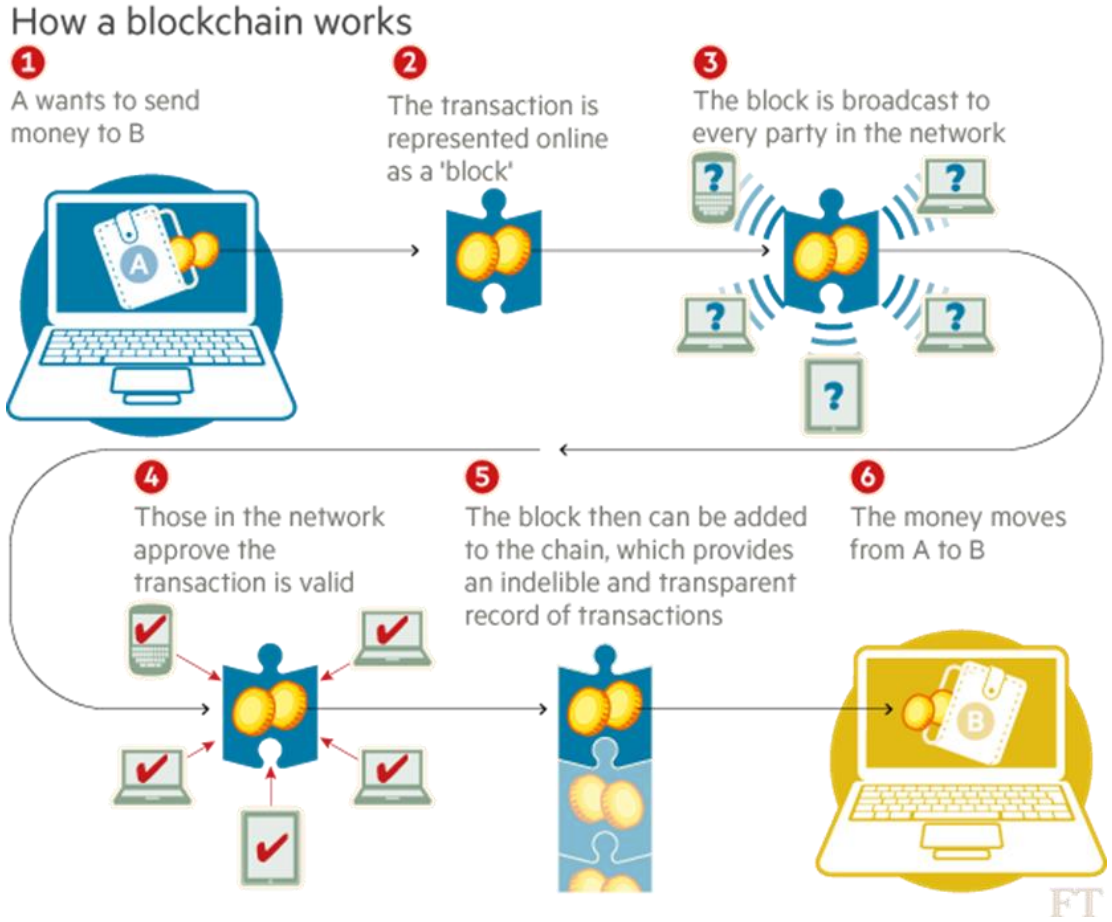
Communication and Transparency

- Transaction Records Irreversible
- Stored and Forwarded to All

Security

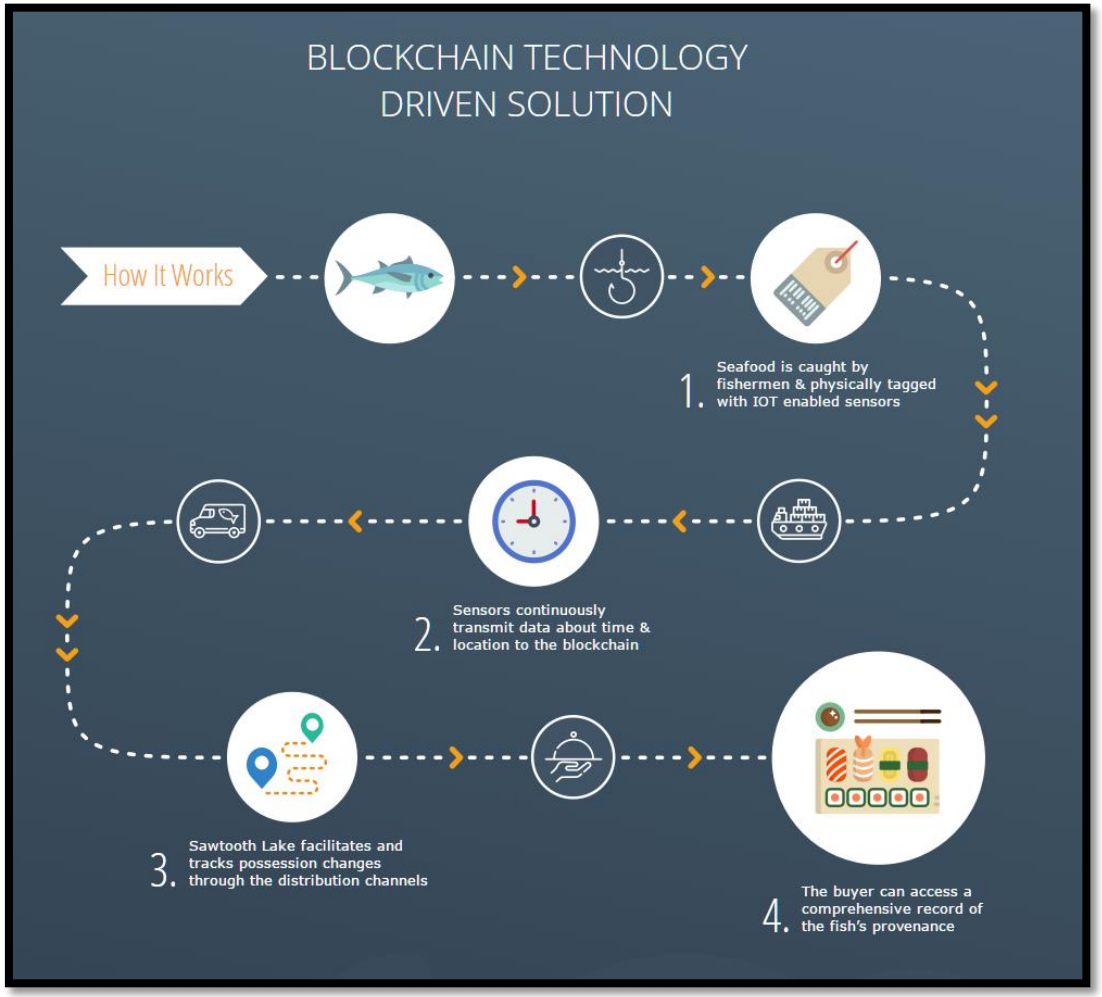
- Unique 30+ Character Addresses
- Permitted Access Only (Public/Private)

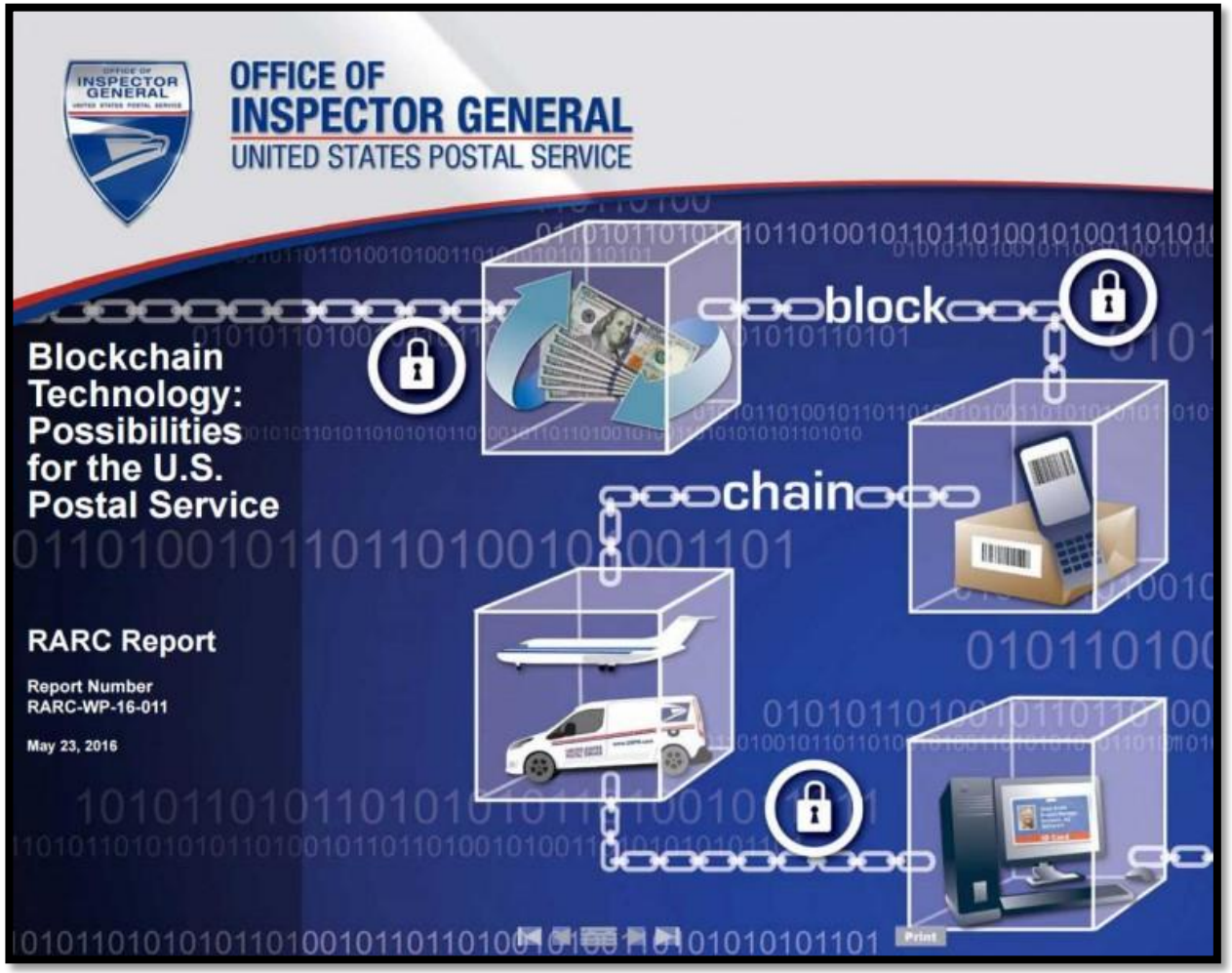
ENTER… BLOCKCHAIN TECHNOLOGY



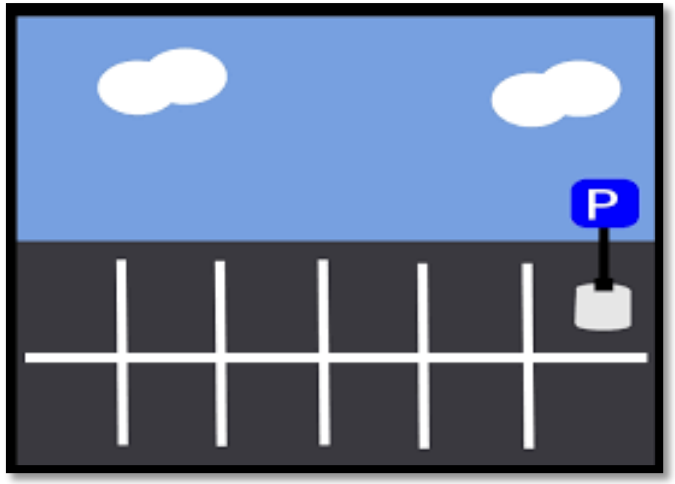
Supply Chain of Interest?

BLOCKCHAIN TECHNOLOGY…SUPPLY CHAIN APPLICATIONS

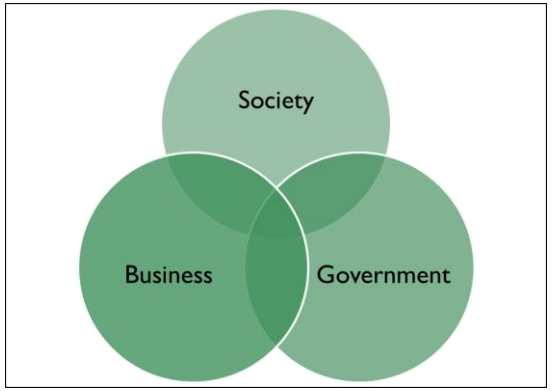


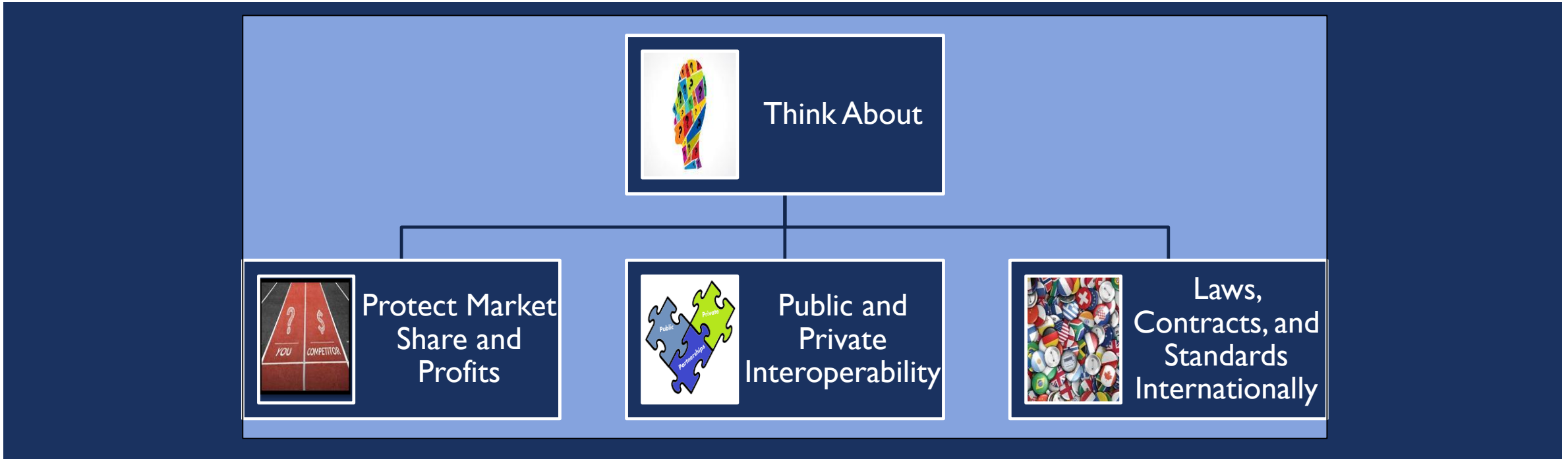


LET'S CHAT…

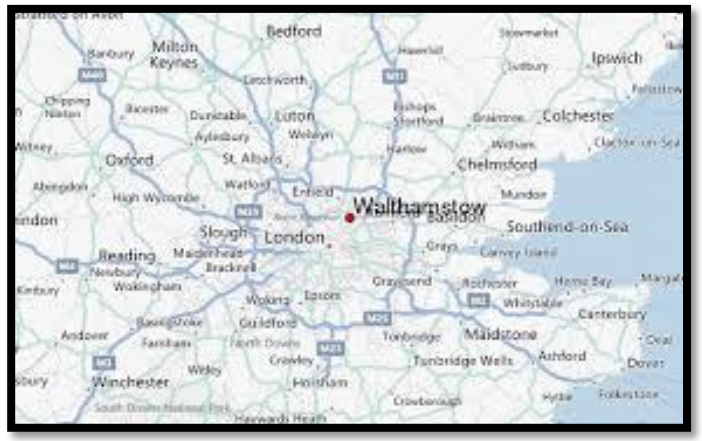


Challenges and Opportunities?





MELONS AND BORDERS…



Fruit Distribution

- Growing Business (FY'15 – 18M of 180M Export Market)
- Locally Process and Package and Export to Netherlands

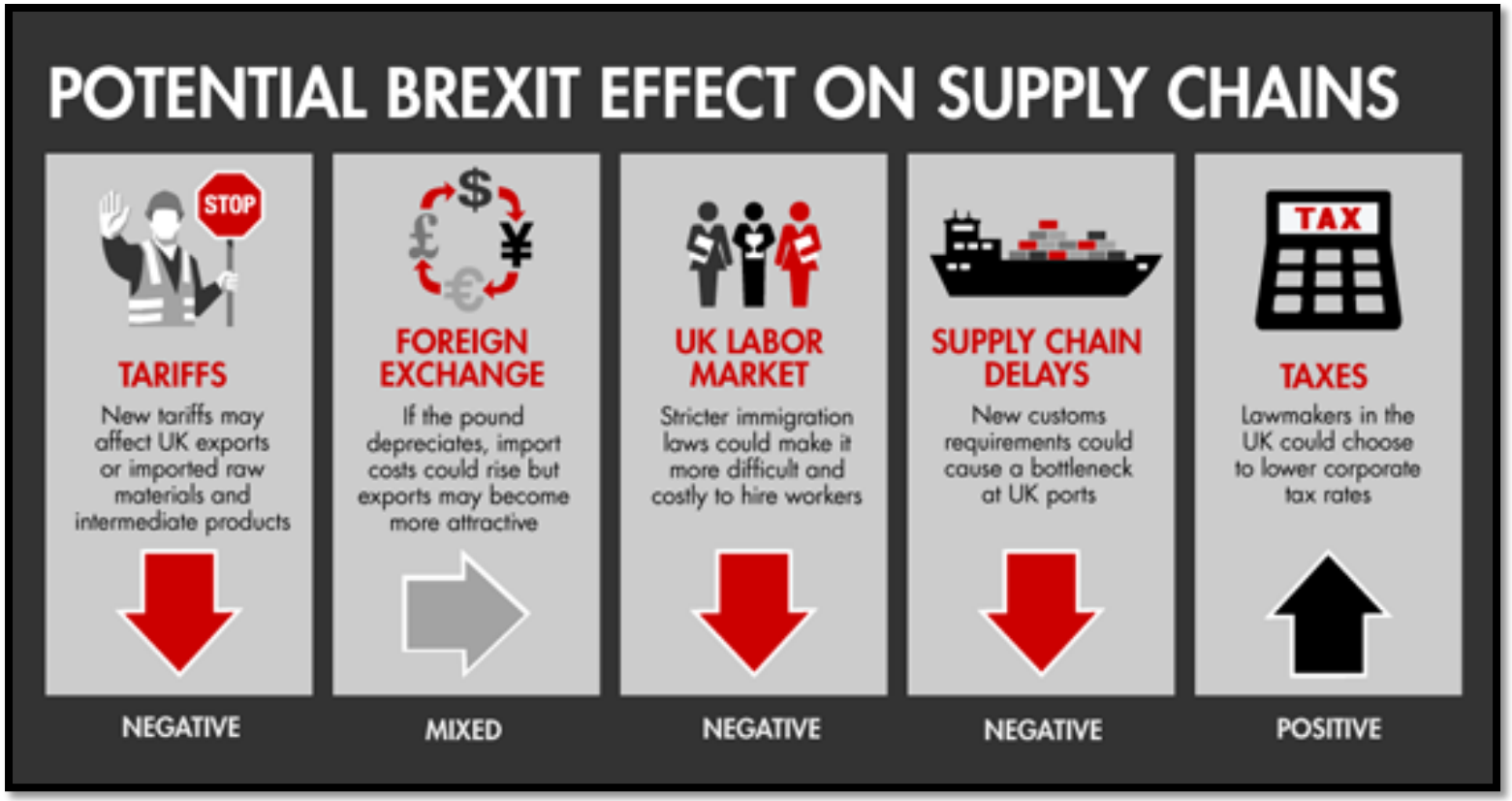
Sourcing

- Main suppliers for special types of melons in Spain and Italy
- Main supplier of cans in Luxembourg (Ardagh Group)

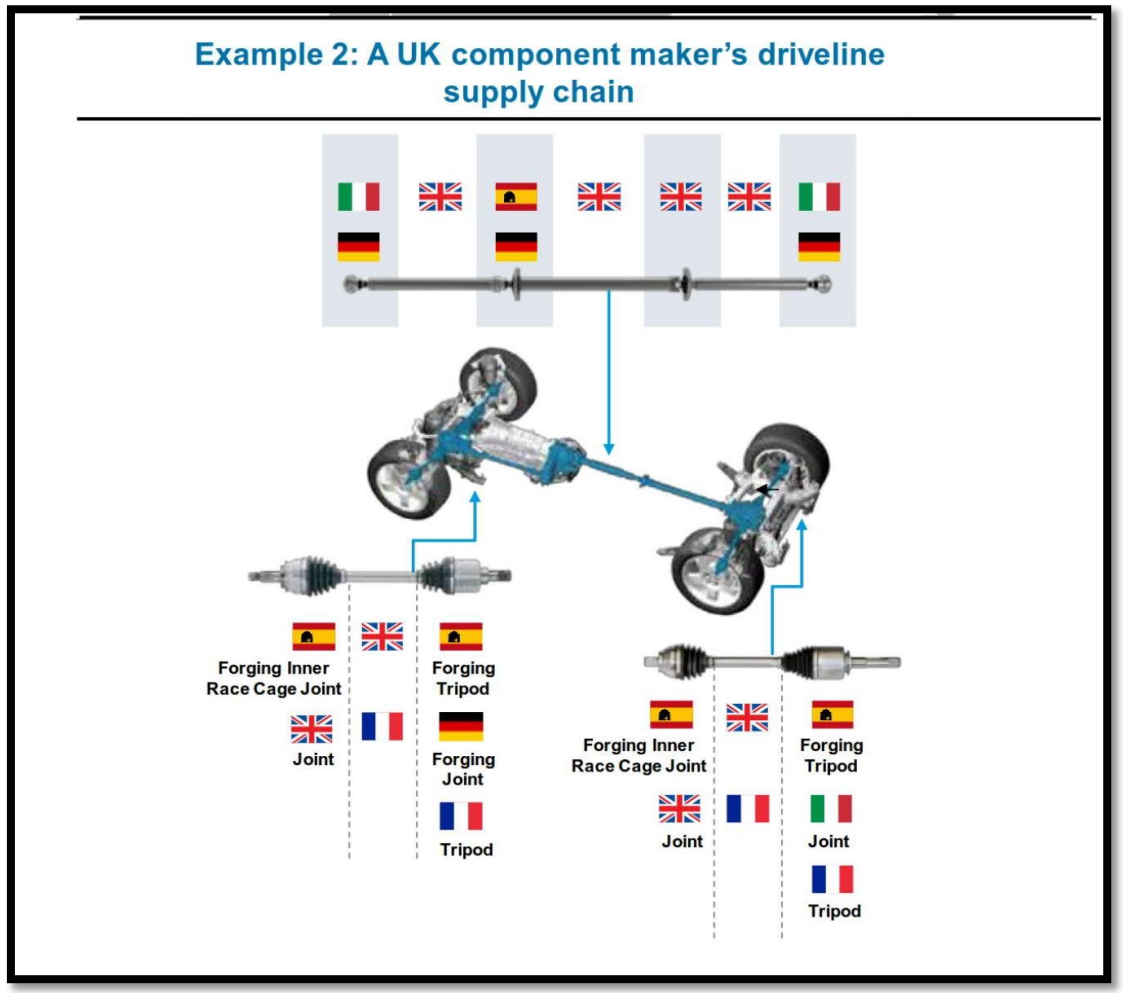
Trade Facilitation

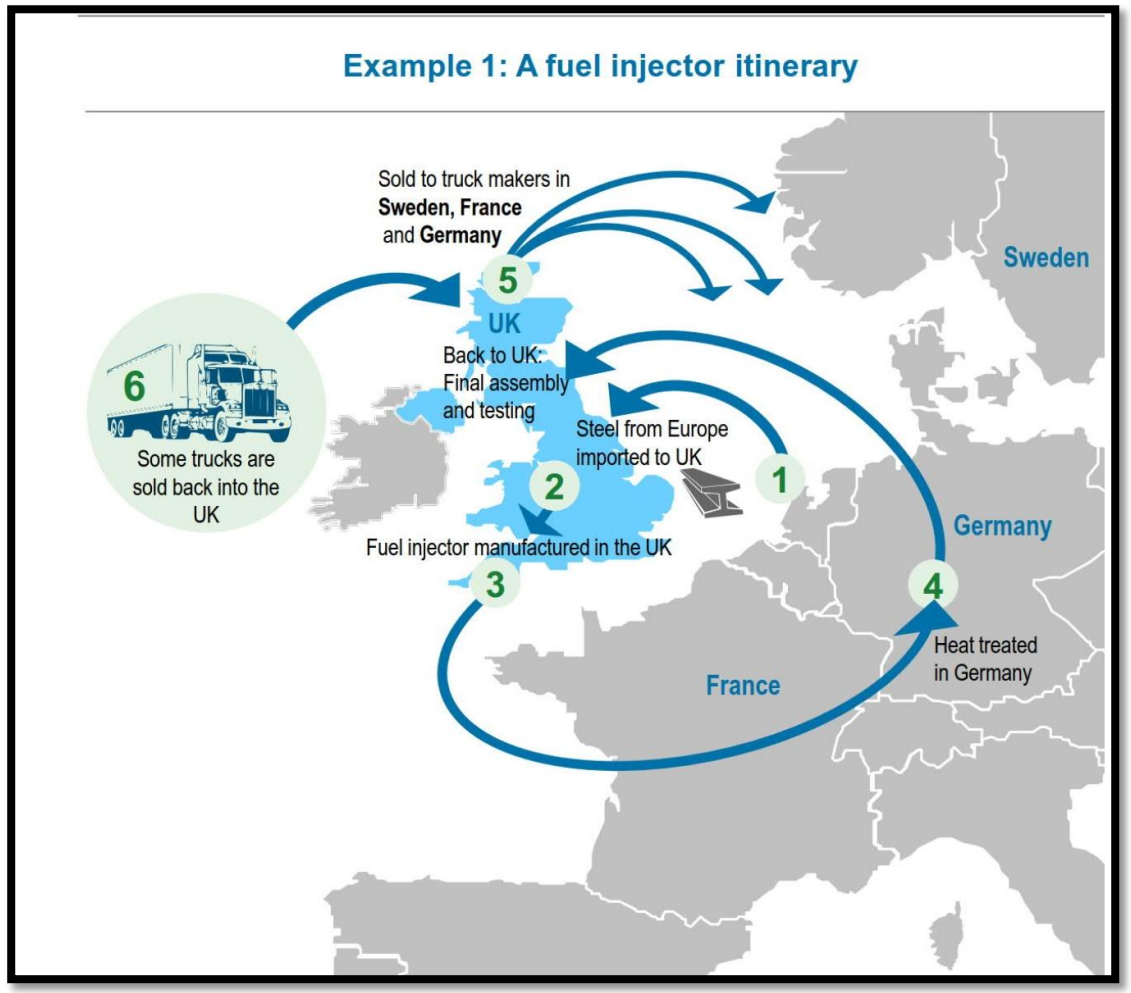
- EU member trade benefits
- Free movement of labor, goods, services, and capital

MELONS AND BORDERS…DISRUPTION

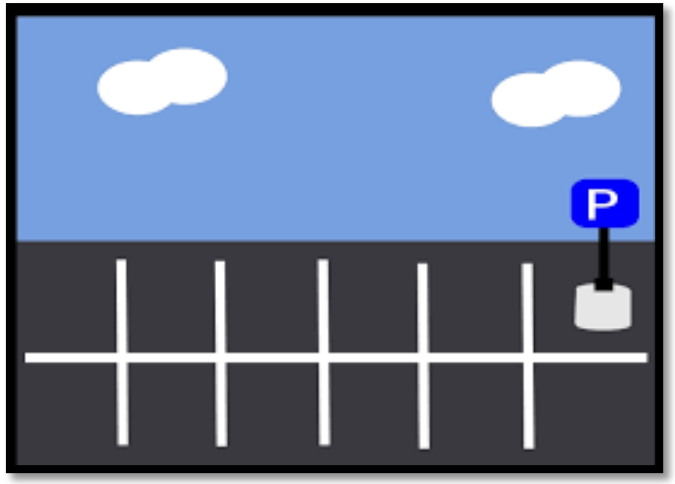


REGULATORY-BASED DISRUPTION…?

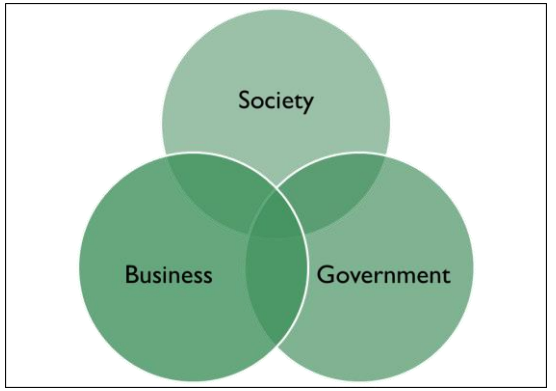


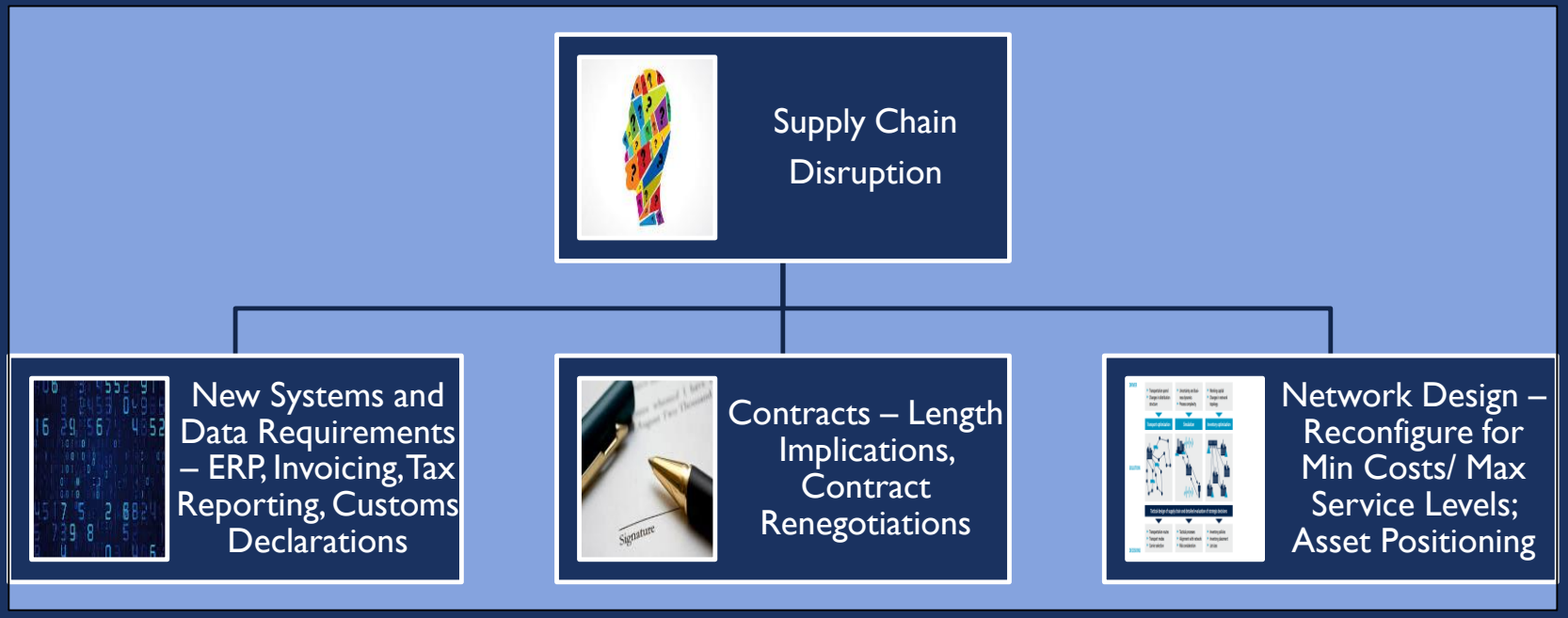


LET'S CHAT…



Challenges and Opportunities?





CONSUMERS AND DISRUPTION…

Growth of Ecommerce

- While Overall Retail Growth – 1-2%
- Ecommerce $370B market and 15% CAGR (Forrester Research)
- Currently 8% of retail sales. Projected: 14%-16% by 2022 ($1T)

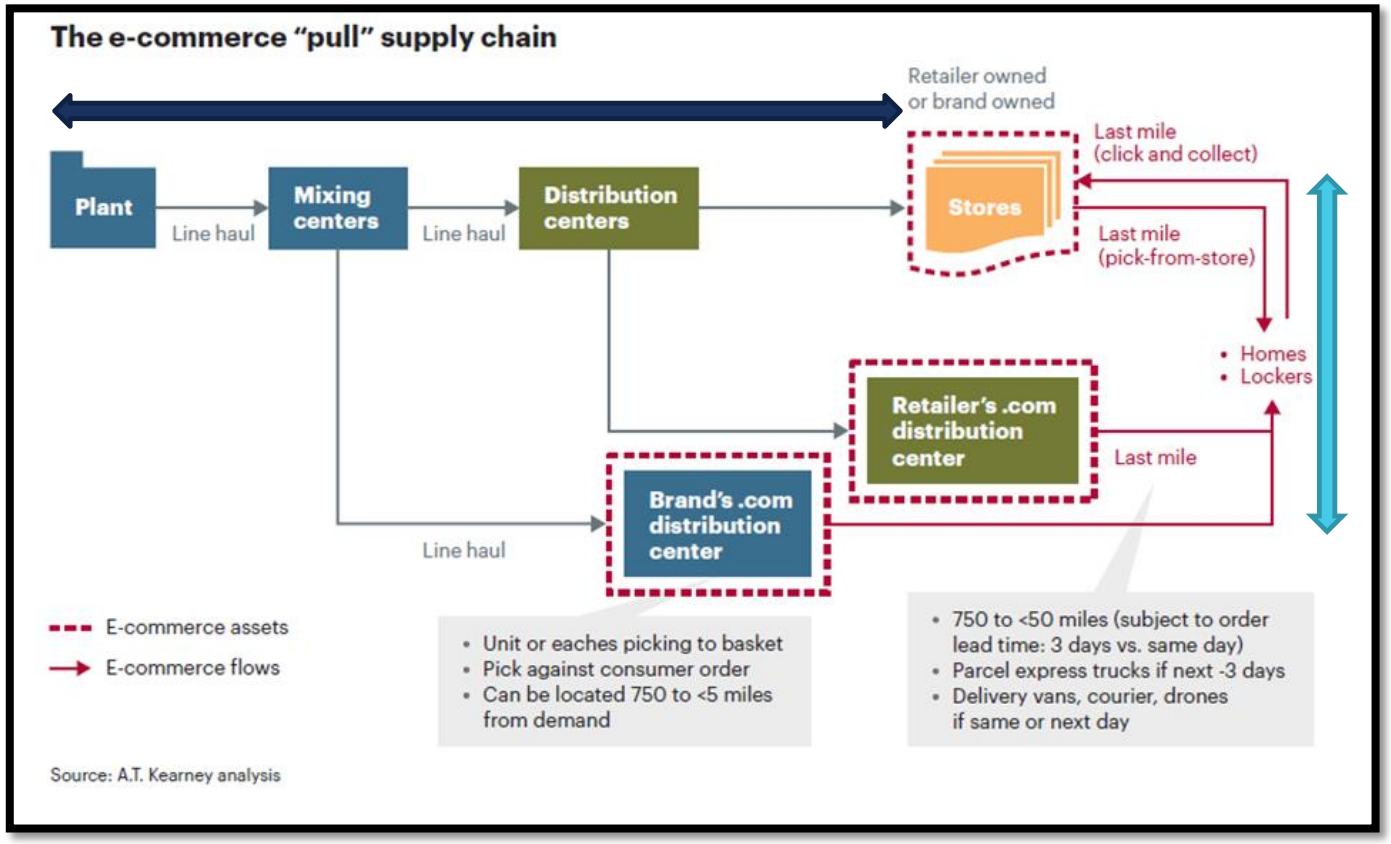
Consumer Behavior

- 88% of US Consumers: "Web Rooming". Web > Store
- 77% of Best Buy Customers: "Showrooming" Store > Web

How Consumers Shop

- Consumers Pulling Customized Baskets to Desired Locations
- Created Structural Changes in Supply Chains
- Product Flow, Asset Location, Delivery Modes, Tech/Analytics

CONSUMER-BASED SUPPLY CHAIN DISRUPTION…



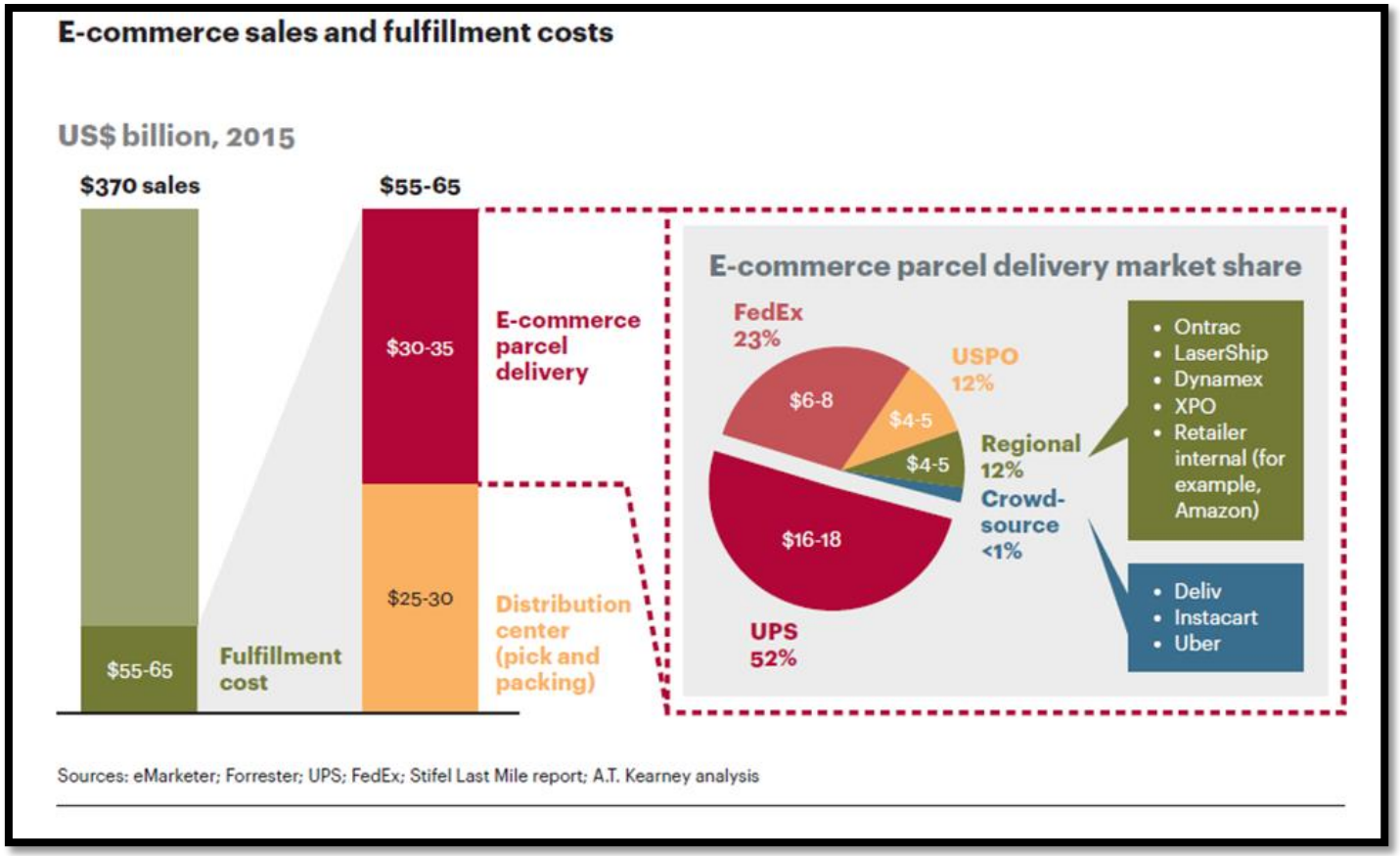
Investment in E-Commerce Assets

- Walmart – 6 Centers: Free 2-Day Shipping
- Amazon $13B: 50 Facilities

Getting Closer…

- Focus on forward-deploying wider-mix assortments of SKUs to fulfillment centers

CONSUMER-BASED SUPPLY CHAIN DISRUPTION…



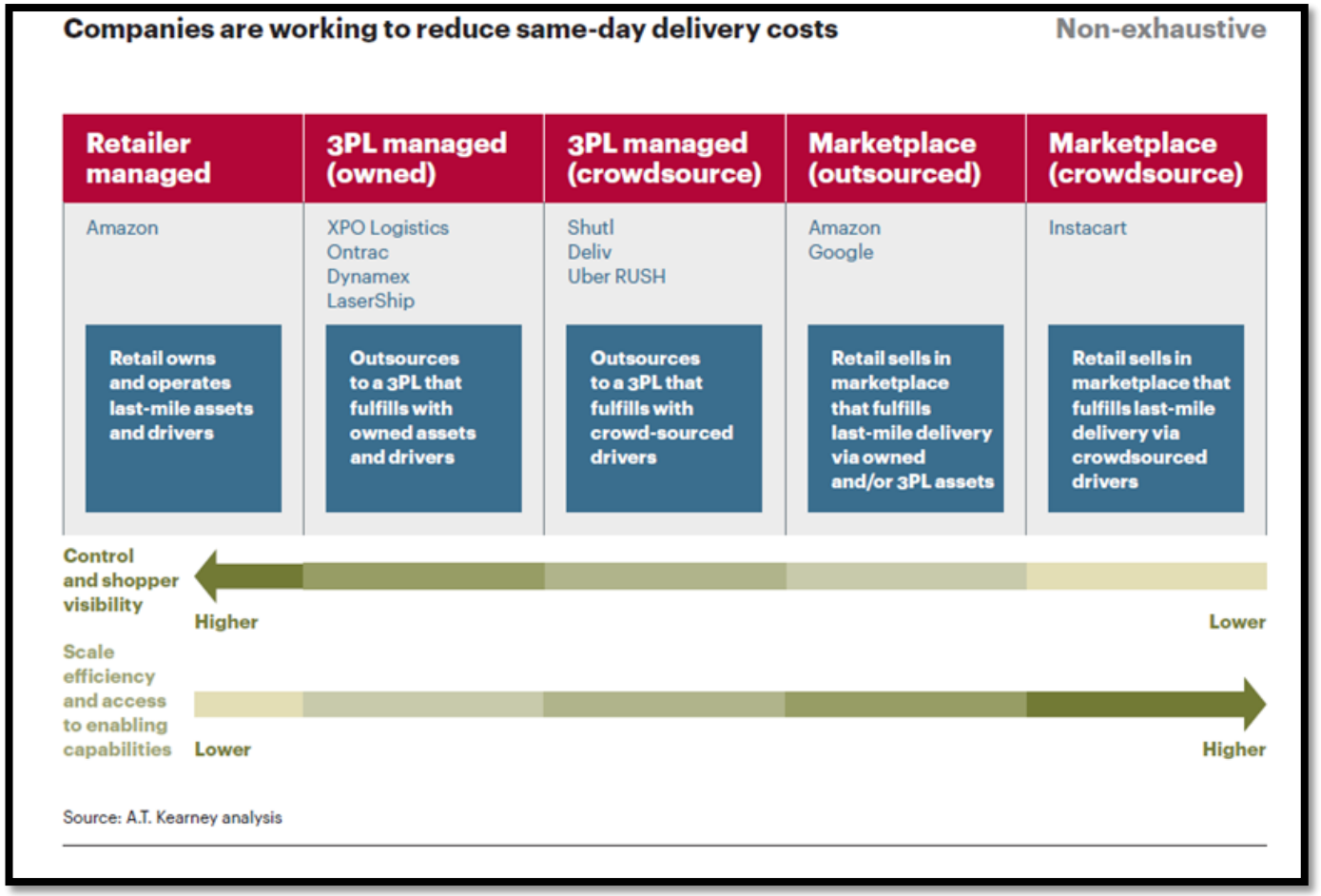
Last-Mile Delivery…

- Big Three – UPS, FedEx, USPO
- UPS - 50% of domestic parcel deliveries: ecommerce orders
- Free returns offerings: Reverse Logistics

E-Commerce Distribution Business

- $55-$65B in Spend by Shippers
- Represents 15%-18% of Sales
- Higher supply chain costs that traditional channels (4%-9%)

…THERE IS PREFERENCE FOR "SAME-DAY"



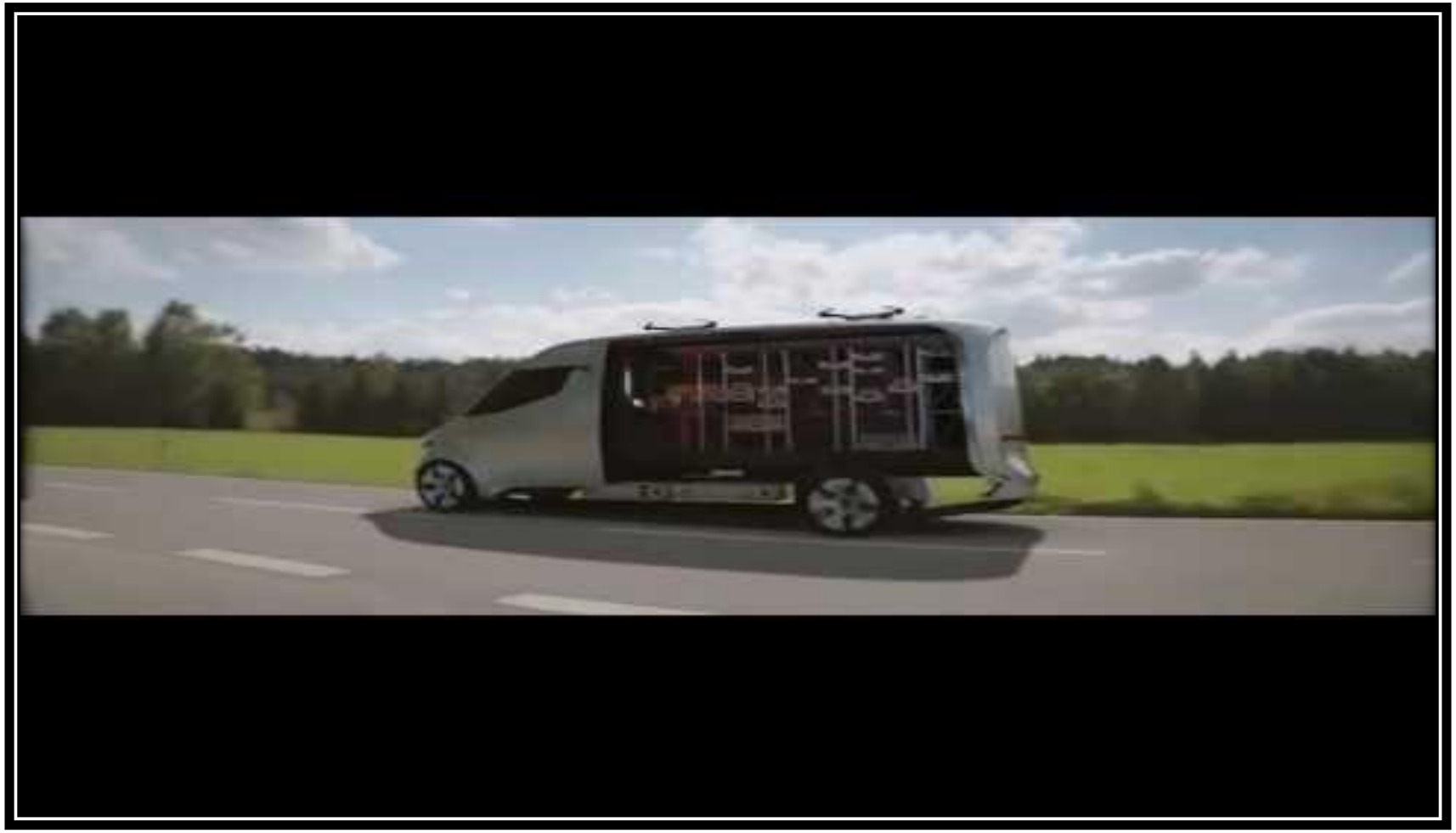
Expectation-Driven…

- Faster delivery of online orders (1-2days)
- Millennials (60%) – Same Day
- Category Specific – Food, Consumables, Luxury Items

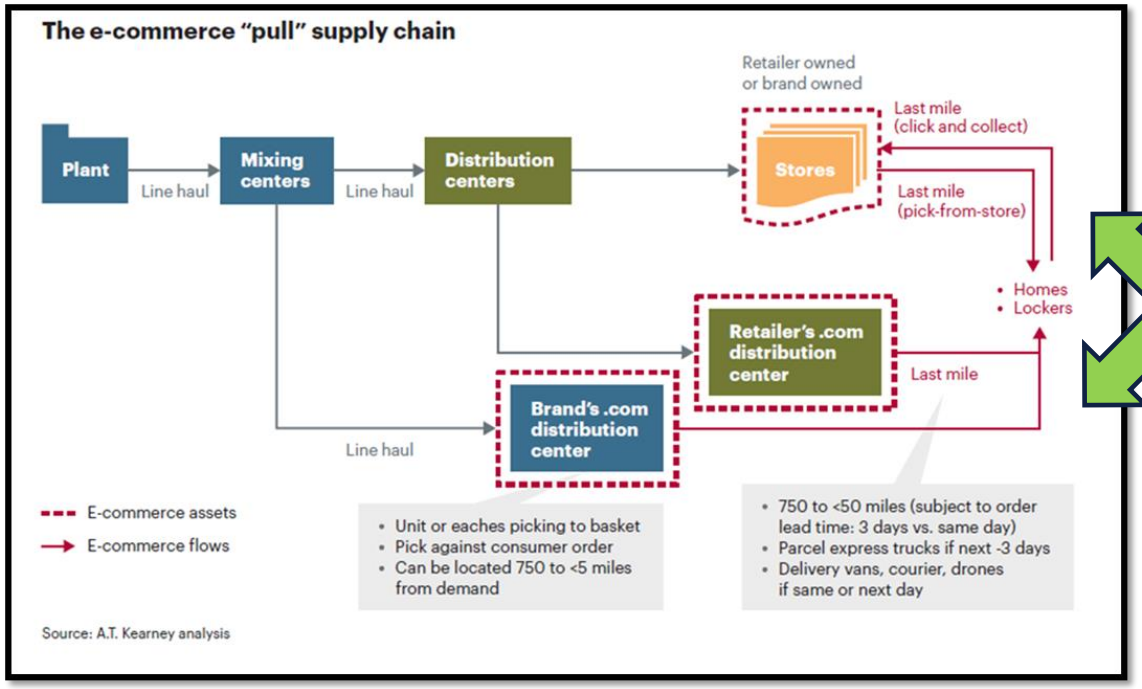
Same Day Economics

- Direct function of demand density (spatial distribution)
- 0.2-2miles/stop: $5 per stop
- 5-20 miles/stop: $20-$30 per stop
- Same-day preference driving volumes from national to local carriers
- Increased investment and M&A activity e.g. UPS investment in Deliv.

MACHINES AND MILES…



MACHINES AND MILES…THE "LAST-MILE"



"The portion of transit from the final delivery center to the customer's door"

Identified as a key differentiator in ecommerce competition

MACHINES AND MILES…BUSINESS MODEL DISRUPTION

Contemporary Model

- Delivery by van
- Traditional parcel service provider

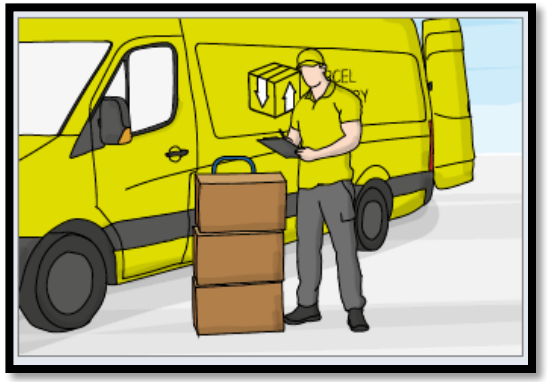
Crowdsourcing Model

- Driver subscribed to a network chooses to complete a delivery order
- Consumer choice facilitated

Bike Couriers

- Couriers employed by parcel carriers
- Pervasive in document and food delivery

MACHINES AND MILES…



Semiautonomous Ground Vehicles

- Delivery Person + "Smart" Vehicle Driving
- Driver uses time to complete tasks –"efficiency"

Autonomous Ground Vehicle (Lockers)

- Delivery of parcels without human intervention
- Ability to park and become temporary storage

Droids

- Small autonomous vehicle – delivery to door step
- Utilizes Sidewalks – Suburban and Campuses

Drones

- Two types – "Copters" or " Planes"
- Most Direct Route at "Higher Speeds"

MMMS, MYTHS, AND MILESTONES…

Delivery Options vs. Expectations

- 70% - Choose the cheapest home delivery option
- 23% - Choose same day delivery
- 5% – Guaranteed delivery in specified time-windows (2hrs)
- 2% - Instant delivery

Willingness-To-Pay (WTP)

- 20%-25%: $3USD Premium for Same-Day
- Only 2%: >$3USD for Instant Delivery
- Demand there…who bares the cost?

Willingness-To-Pay (WTP)

- US – 30%: Home Delivery Important
- US – 50%: Would pay Extra for Home Delivery
- US – 15%: Willing to pay > $1:00

Delivery Economics

- Wages and Autonomous Use - Direct
- +40% Cost Saving for wages $21.45 per hour
- 40% Cost Saving ~ +15%-20% Profit Margin
- Cost Saving hold only if wages > $10.73 per hour

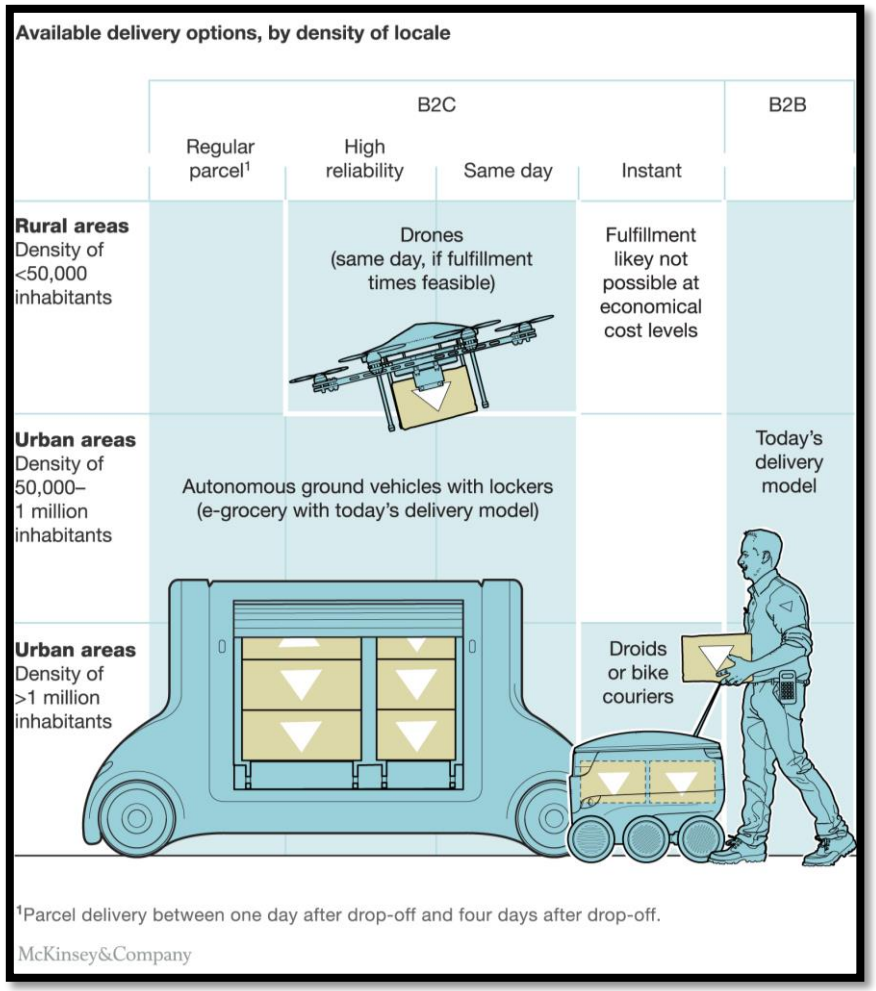
Drone Operation Challenges

- Currently carry up to ~ 11 pounds
- Products bought? (+5% items ~ 33-66 pounds)
- Require 2M squared landing area
- Small parcel + Landing Space = Rural Service Areas/ Emg. Ops

Instant Delivery?

- Economically viable up to 6 miles
- Beyond 6 miles i) cost high ii) WTP too low
- Crowdsourcing vs. Bike Couriers (Speed? Cost? Access to Drivers?)

MACHINES AND MILES…PROJECTED FEASIBLE SOLUTIONS



Rural Areas (< 50,000 people)

- Regular Parcels – Traditional Delivery
- High Reliability/Same Day – **Drones**
- Instant – Fulfillment infeasible (economics)

Urban Areas (50,000 - 1M)

- Regular Parcels – **AGVs with Lockers**
- High Reliability/Same Day – **AGVs with Lockers**
- Instant – Fulfillment undetermined (economics) (**Opportunity**)

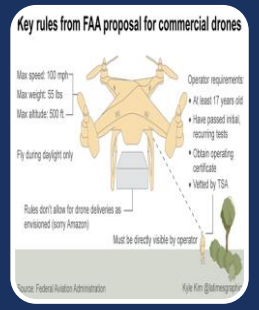
Urban Areas (> 1M)

- Regular Parcels – **AGVs with Lockers**
- High Reliability/Same Day – **AGVs with Lockers**
- Instant – **Droids** or **Bike Couriers**

MMMS, MYTHS, AND MILESTONES…

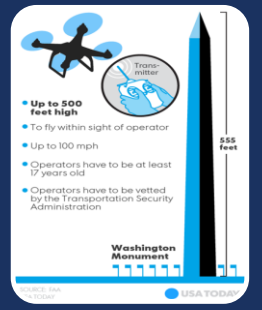
Table 1 – Evolution of delivery drones

TIME FRAME	MILESTONE
2005 – present	**Experimental delivery drones**. Companies such as Amazon, Google, UPS, DHL, and others have tested drone delivery for years, some since 2005.
2014 – present	**Commercial delivery drone pilots**. DHL launched its first commercial drone delivery for the German island of Juist in 2014. Matternet has been running drone deliveries in Switzerland, Haiti, and the Dominican Republic. Flirtey ran the first legal drone delivery for bottled water, food, and a first-aid kit in the United States on July 17, 2015. Amazon received FAA approval for research and development for drone delivery in 2015.
2018	**Widely permitted commercial delivery drones**. The FAA estimates that as many as 7,500 commercial drones may obtain drone permits from the FAA by 2018, provided that necessary regulations are in place.



Drone Regulations

- FAA – Currently cannot fly over people
- FAA – Require an on-ground observer
- FAA – Cannot fly over 500 feet
- FAA – Commercial use only with Section 333 exemption (case by case)

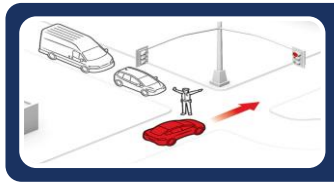


Drone Regulations and Economics

- FAA – Commercial Regs. (2017 Finalization)
- ARK Invest 2015 – Cost/Delivery: 88c
- Robot Economics 2014 – Cost/Delivery: $9.75 -$17.44
- Difference? Assumptions in human resource-operations regulation: i) ARK Invest – 1:12 and ii) Robot Economics – 1:1

TRANSPORTATION DISRUPTION AND YOU

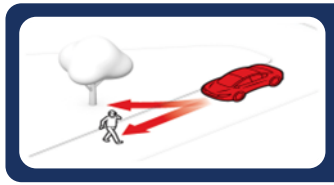
"Promising results with rain but snow is a hard one" - MIT Roboticist



"Rule-based programming and unusual situations" – Duke Robotics Lab

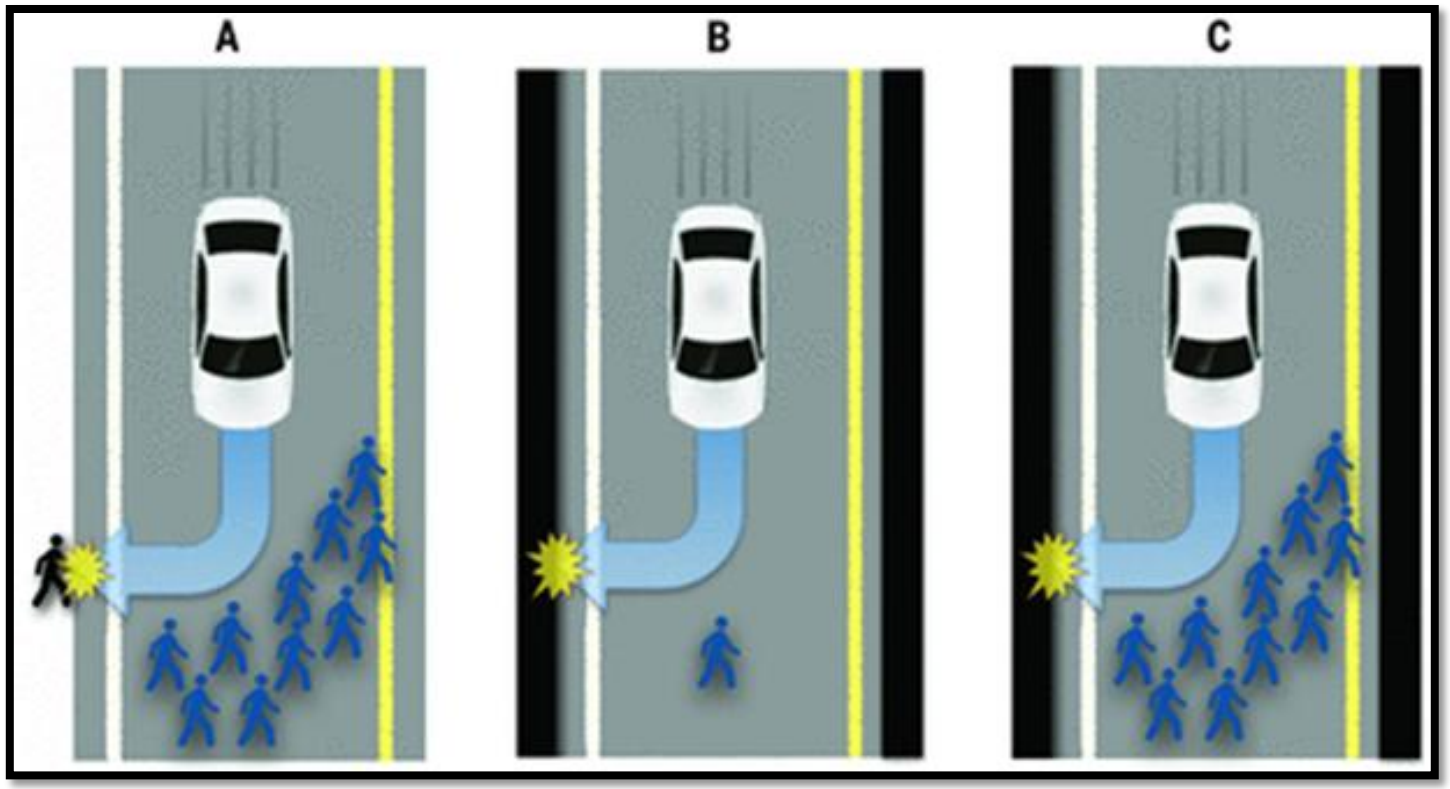
Semiautonomous Cognitive Load "Driving or not Driving"? – Utrecht University

Cybersecurity and Hacking " Challenges in Keeping Track" – Dartmouth Computer Science



"People want cars that prioritize the passenger" – MIT Cognitive Science

WHAT WOULD YOU DO?



Algorithms – Embedded Moral Principles Guiding Decisions

- A: Several pedestrians vs. one passerby
- B: One pedestrian vs. own passenger
- C: Several pedestrians vs. own passenger

1
- 76% - 1 passenger opposed to 10 pedestrians
- 67% - program to minimize casualties

2
- 23% - Save one pedestrian vs passenger
- As pedestrians increased there was a switch…
- Less so with family member in the vehicle

3
- Do suppliers provide algorithms with varied moral principles?
- Does the government enforce regulation that facilitates best global outcome?

INNOVATIVE DISRUPTION - PROGRESSING

"By seizing the opportunities that disruption presents and leveraging hard times into greater success through outworking/out innovating/outthinking and outworking everyone around you, this just might be the richest time of your life so far".

Robin S. Sharma