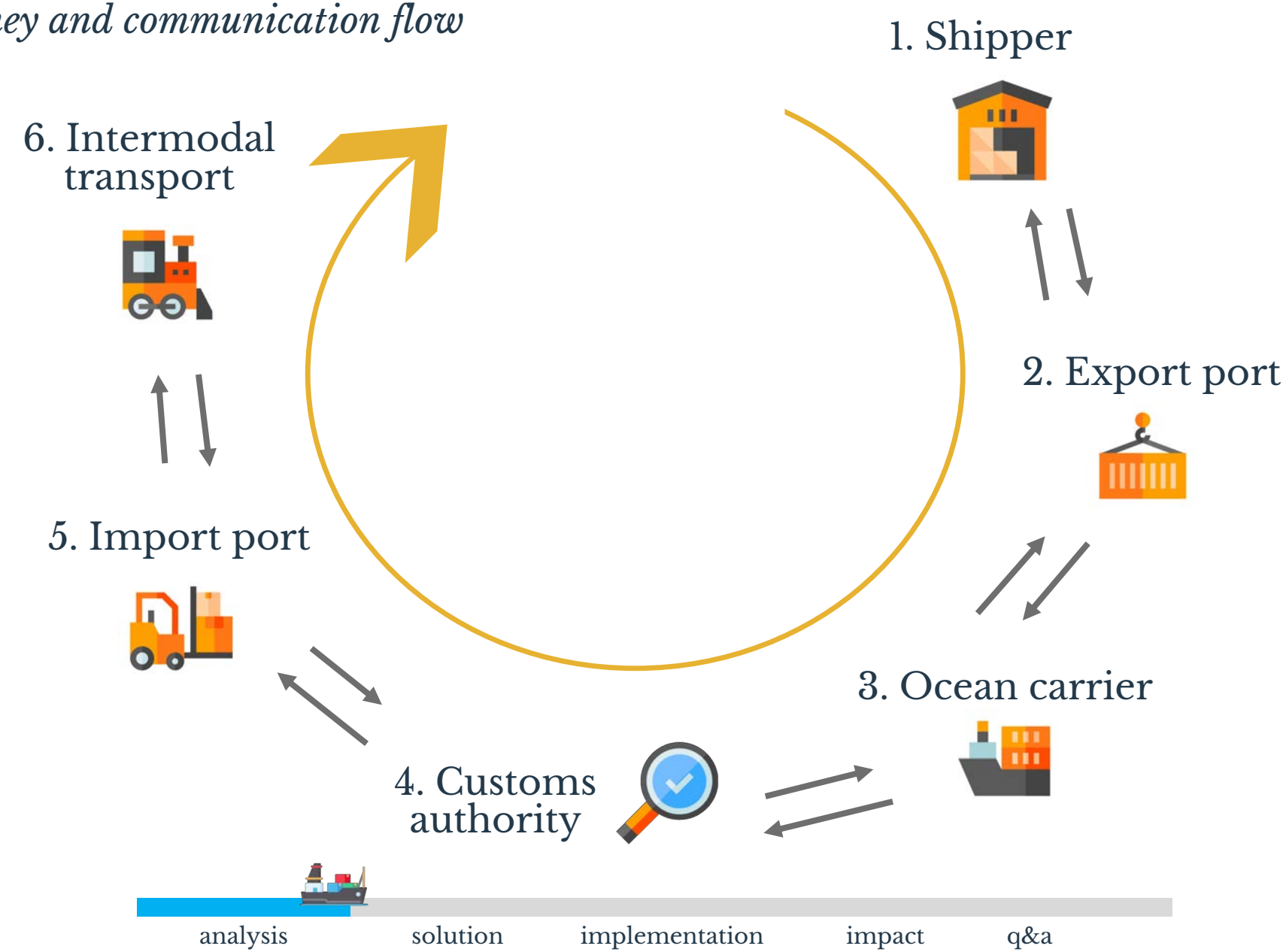
BETTING ON BLOCKCHAIN

Rose Jao | Aarthi Ganapathi

Keenan Goodman | Skye Scofield

JOURNEY OF A PRODUCT

A profile of journey and communication flow



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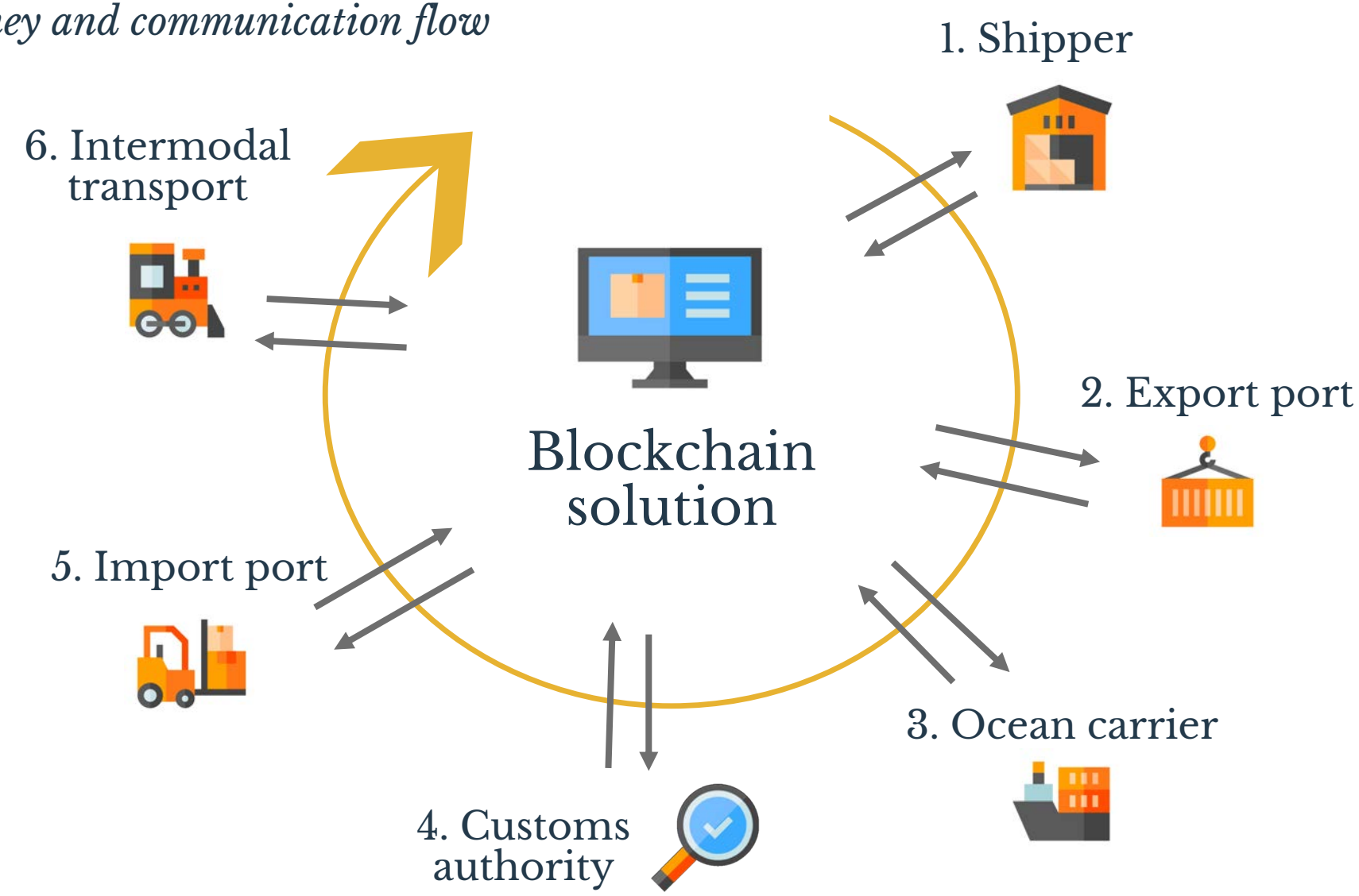

analysis | solution | implementation | impact | q&a

GLOBAL SHIPPING

Trends in global shipping since 1997

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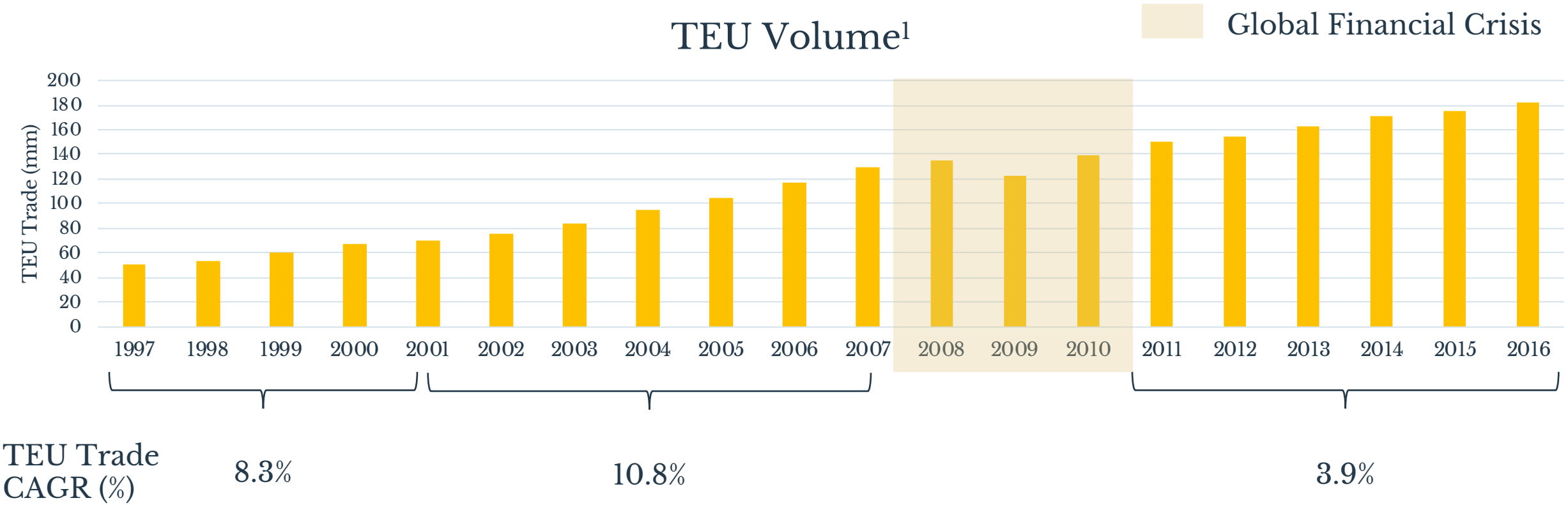

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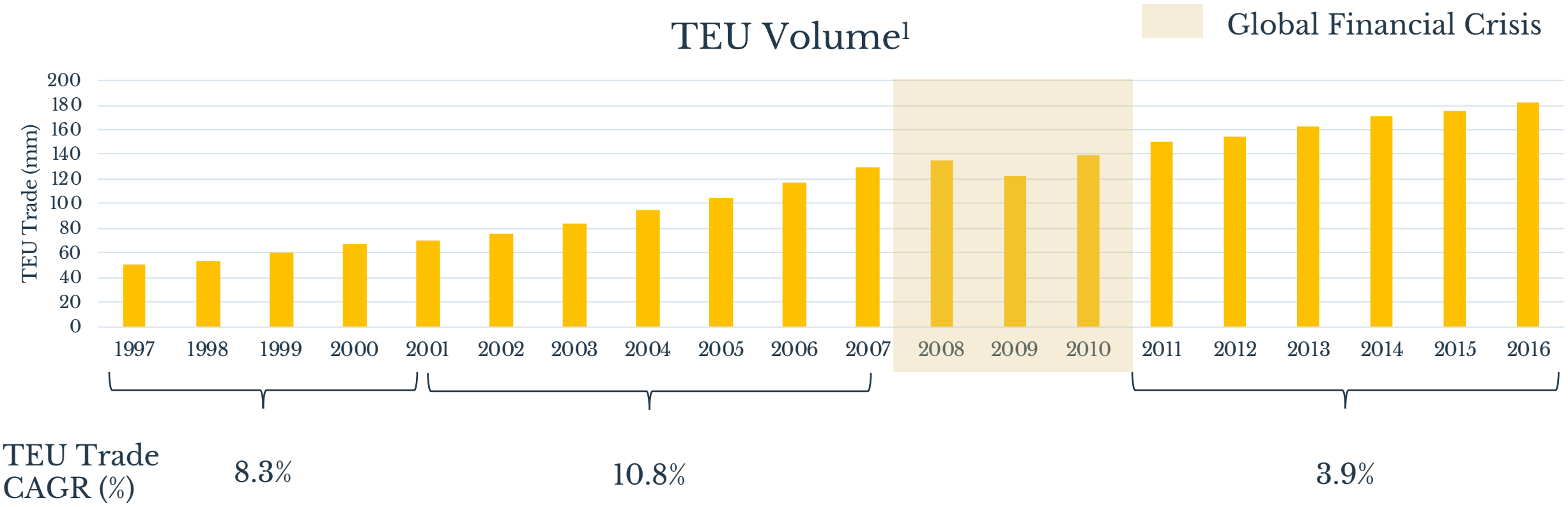

1 Significant overcapacity

analysis | solution | implementation | impact | q&a

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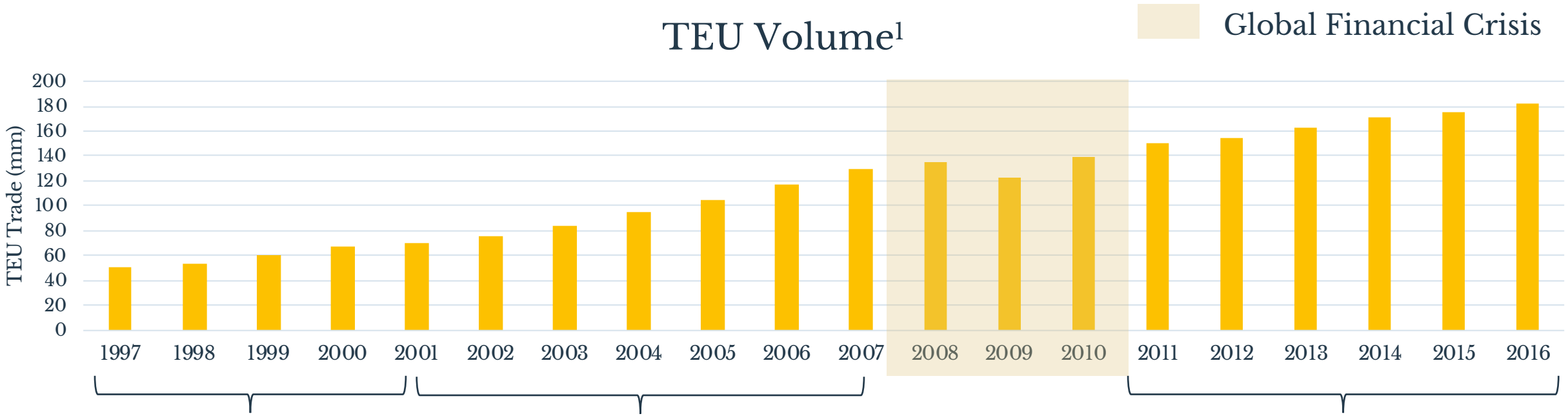

TEU Trade CAGR (%)	8.3%	10.8%	3.9%

1. Significant overcapacity
2. Decrease in shipping prices

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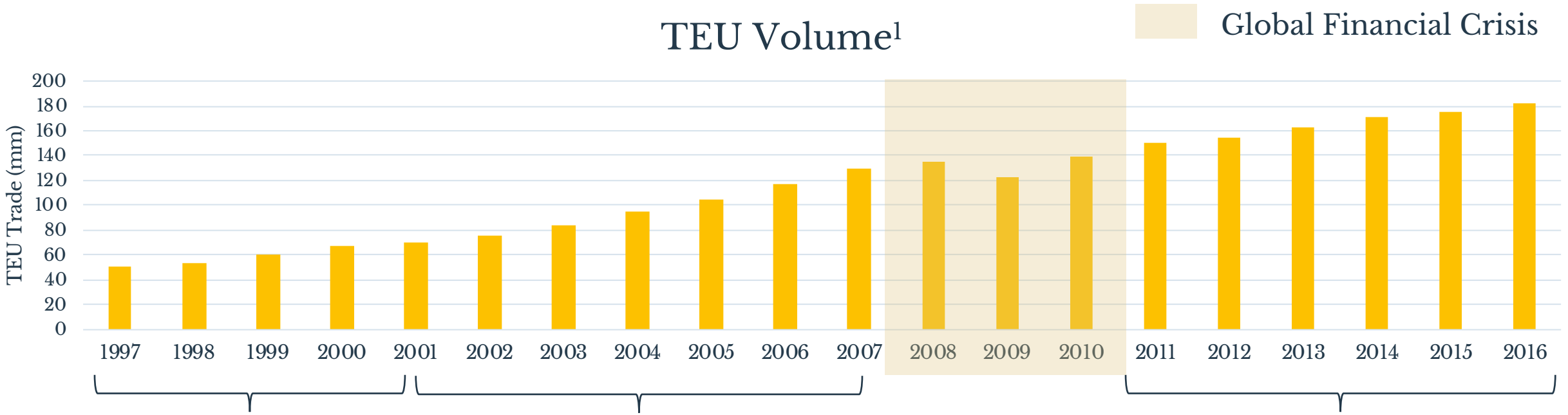

TEU Trade CAGR (%)	8.3%	10.8%	3.9%

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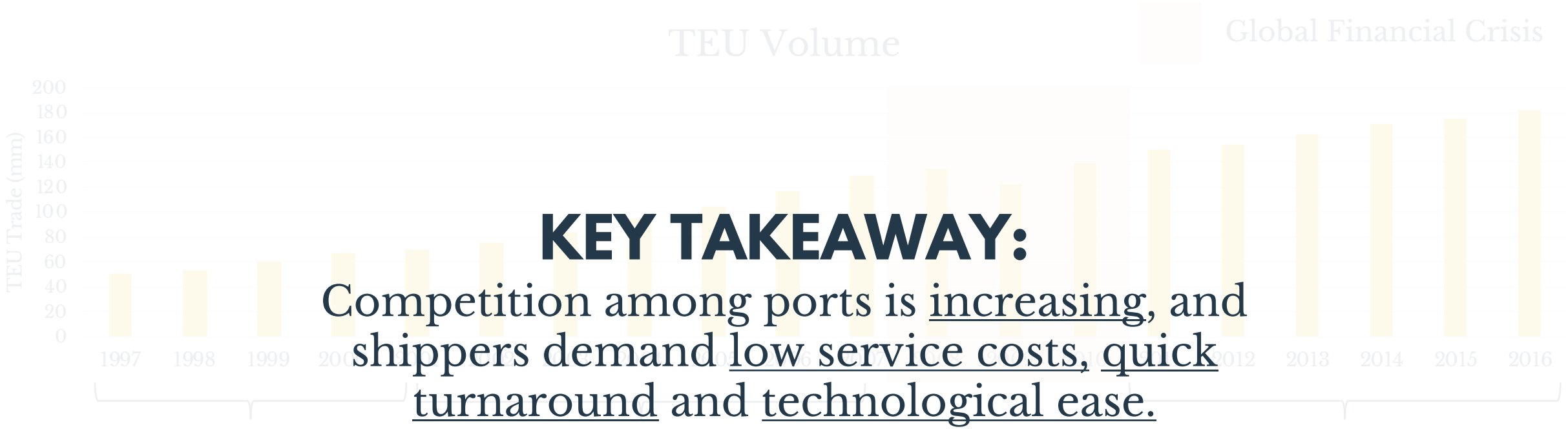

KEY TAKEAWAY:

Competition among ports is increasing, and shippers demand low service costs, quick turnaround and technological ease.

	1997–2007	2007–2012	2012–2016
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THE NORTHWEST SEAPORT ALLIANCE

What is the NWSA?

The NWSA is a **joint venture** between the **Port of Tacoma and the Port of Seattle** responsible for the **operation and development of global shipping** in the Puget Sound

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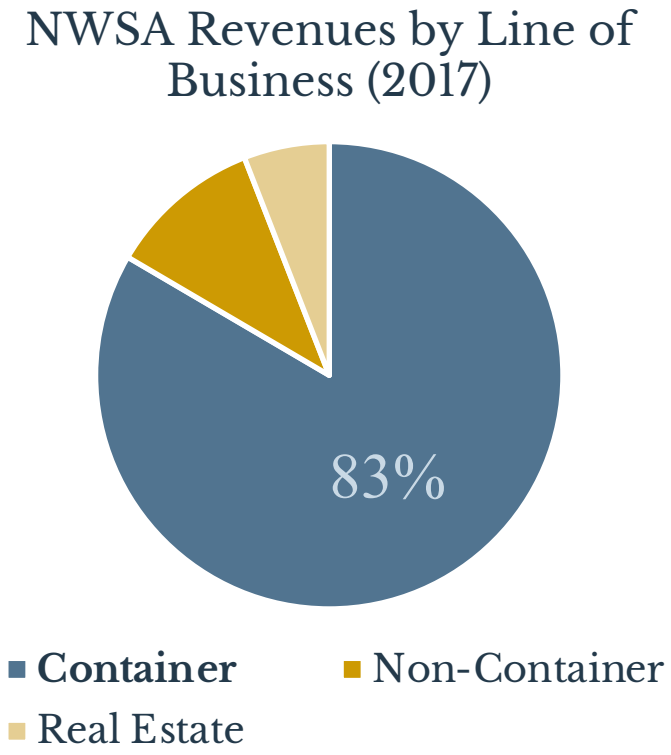

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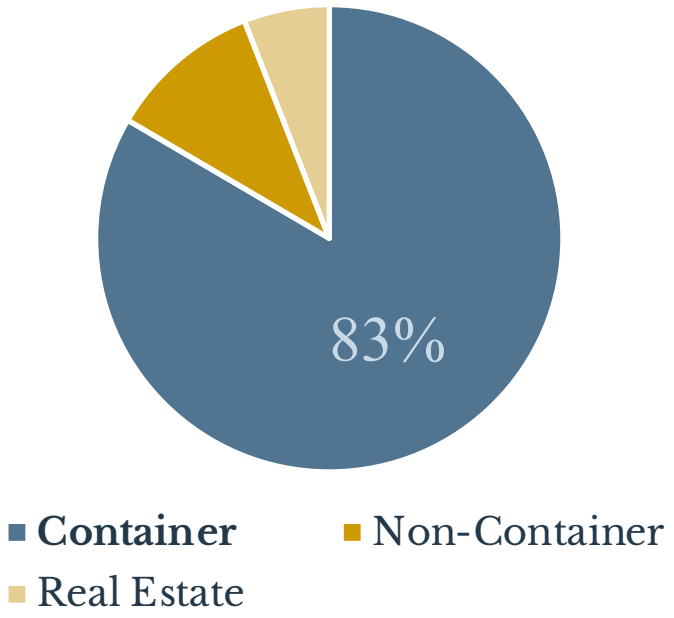
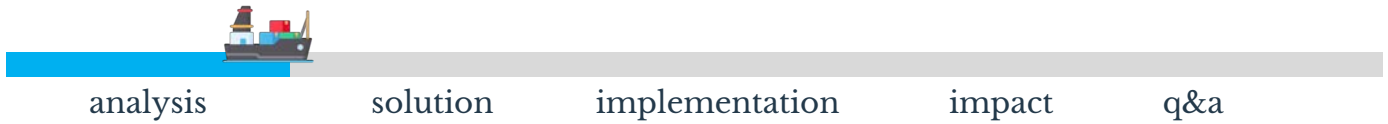
NWSA Revenues by Line of Business (2017)



NWSA'S OUTLOOK

- The NWSA has **significant excess capacity** for container operations
- Dynamic changes are underway to transform the NWSA into a **best-in-class container port**
- Comparable trucking wait times to other US ports
- Key focus needs to be on **increasing utilization over time**



REACHING THE GOAL

NWSA's plan to hit 6mm TEUs

Year	TEUs Shipped	Jobs	Utilization
2017	3.7mm	36,000	~47%
2025	**6.0mm**	**+14,600**	**70%**

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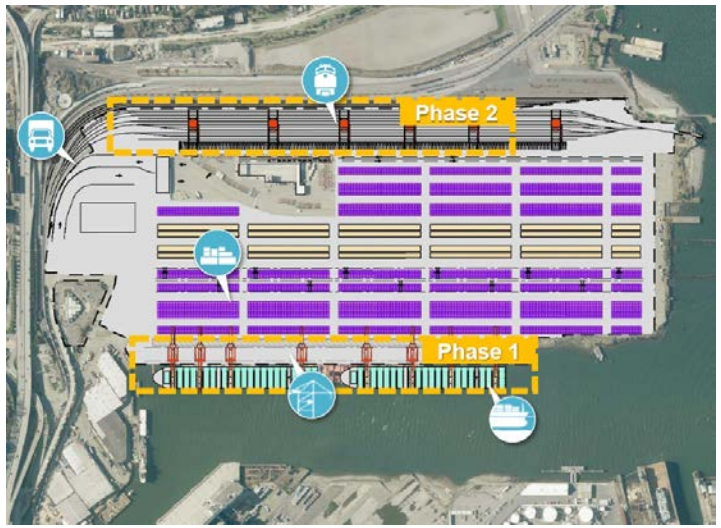
1. Expand ultra-large ship facilities
2. Reduce overall acreage devoted to containers
3. Improve utilization dramatically

Strategic Terminal Configuration

GCPT (Tacoma)

T5 (Seattle)



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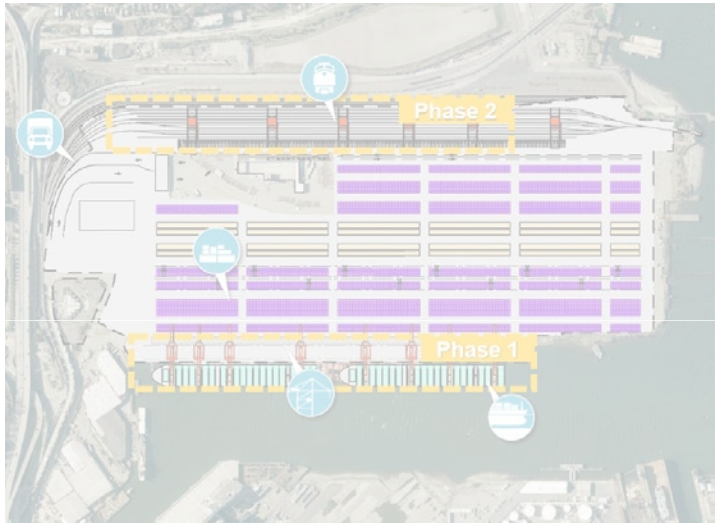

WHAT IS BLOCKCHAIN

Explaining distributed ledger technology

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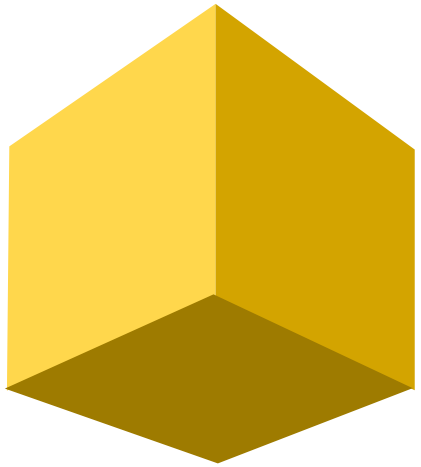

SINGLE SOURCE OF TRUTH

- All parties have access to identical and accurate information
- All transactions are verified by every party

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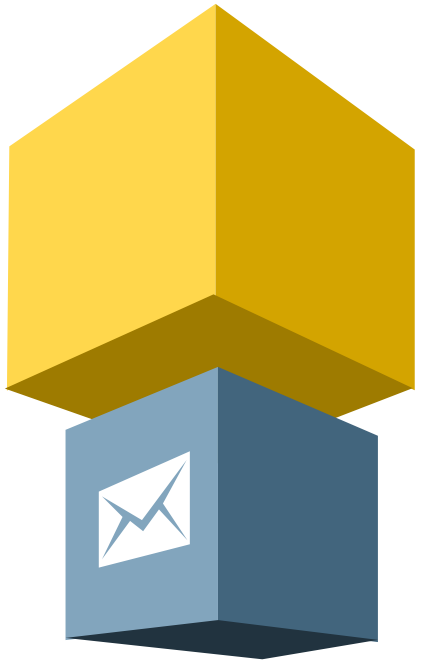

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SMART CONTRACTS

- Software that enables
  - Automatic transfer of ownership
  - Immediate billing/payment

analysis solution implementation impact q&a

BENEFITS OF BLOCKCHAIN

How will blockchain impact the NWSA?

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[1]The Asian Journal of Shipping and Logistics, 2017
[2]The Journal of Commerce, 2018

Administrative Automation

- Smart contracts eliminate paperwork such as Bill of Ladings (BOLs)
- Electronic paperwork decreases customs and processing delays[2]

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- Time and cost are two important factors determining customer behavior[1]

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INCREASE UTILIZATION & TRUCK TURN RATE

S

- **Secure digital solution** for exchanging digital documents
- **Reduces delays** caused by errors, delays, and other statutory requirements
- **Increases visibility** to the supply chain

W

- Strongly associated with Maersk (unattractive to competitors)
- **Permissioned blockchain** (not public), meaning it is entirely controlled by one entity
- Storage limits from huge volumes of data in this sector

O

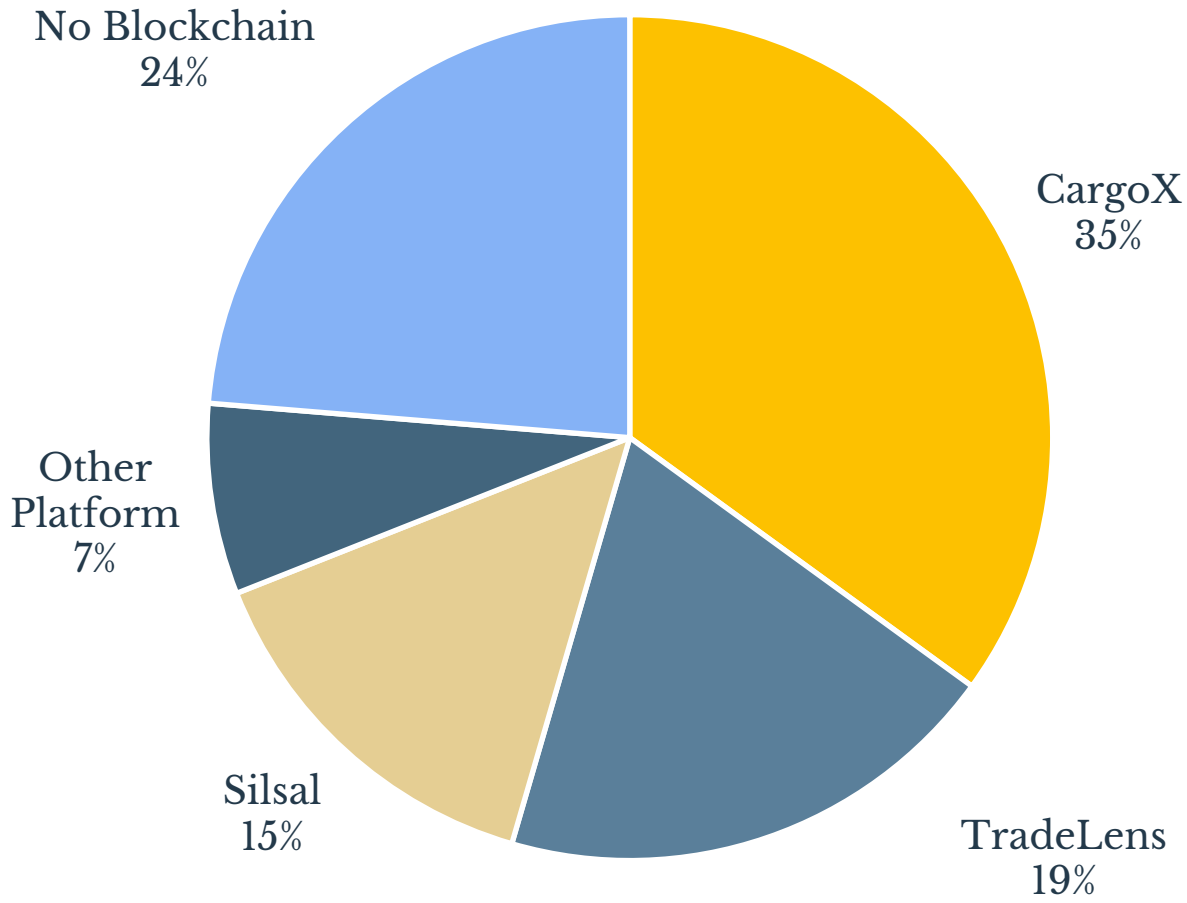
- Creates the foundation for ongoing improvement and innovation through open, non-proprietary APIs
- Blockchain integration with other emerging technologies (AI, IoT, autonomous vessels, etc.)

T

- Governance around practices and conflict resolution from country to country
- **Need more container carriers** to join for an industry-wide solution

BLOCKCHAIN SHIPPING SOLUTIONS

A fragmented market with battling players



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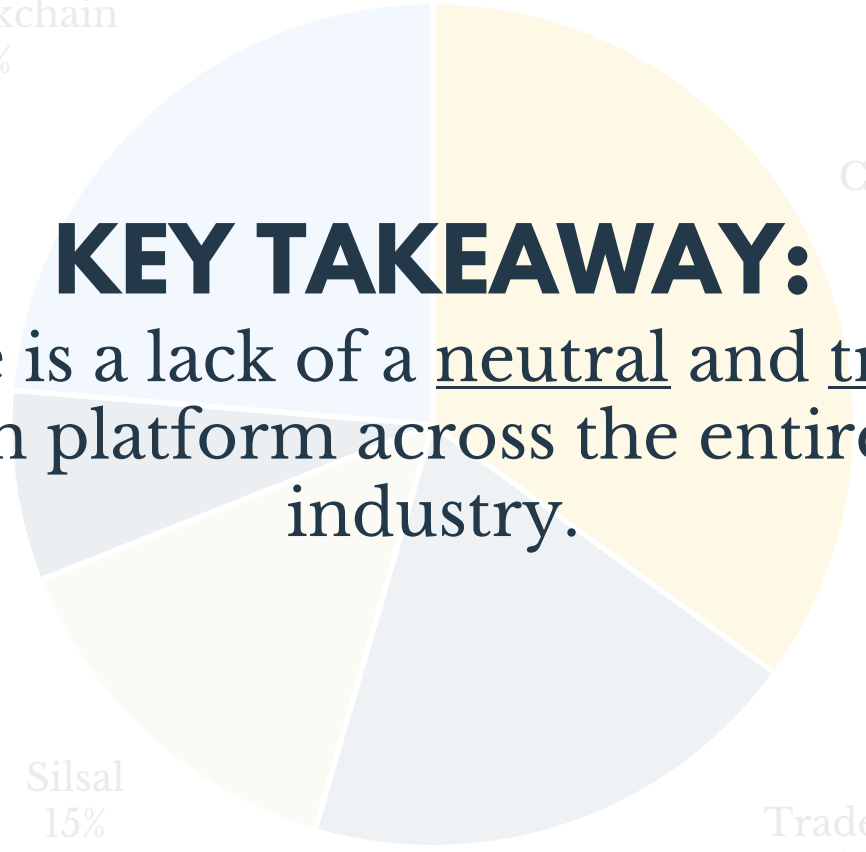

KEY TAKEAWAY:

There is a lack of a neutral and trusted blockchain platform across the entire shipping industry.

CHARTING A COURSE

Choosing the right technology investment for NWSA

CRITERIA	TradeLens (Exclusively)	CargoX (Exclusively)	Proprietary Blockchain	Train Employees on All Options	Develop Intermediary Interface
Cost to Develop					
Ease of Implementation					
Independence/ Flexibility					
Customer Reach					
Operational Feasibility					

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analysis solution implementation impact q&a

DIRECTLY USING BLOCKCHAINS

How does this solution work in practice?

Third Party Blockchains

TRADE LENS

CargoX

Nexledger

NWSA Employee System

- Stores all shipment information
- Distributes information to all
- Receives updates directly from employees

- Employees use separate system for each blockchain
- Employees queries information directly
- No layer of error checking

DIRECTLY USING BLOCKCHAINS

How does this solution work in practice?

Third Party Blockchains

TRADE LENS

CargoX

Nexledger

NWSA Employee System

Pain Points

- Employees use separate system for each blockchain
- No layer of error checking
- No “single view” of all operations

USING AN INTERMEDIARY API

How does this solution work in practice?

Third Party Blockchains

- Stores all shipment information
- Distributes information to all
- Receives updates directly from NWSA

NWSA Databases

- Employees use standardized system
- Allows for centralized reporting and error checking
- Allows for “single view” of operations

NWSA Employee System

- Employees use standardized entry system for all blockchains
- Employees can query necessary information

IMPLEMENTATION

Building an Application Program Interface (API)

Task

Key Needs

Partners

IMPLEMENTATION

Building an Application Program Interface (API)

1

Task

CREATE AN INTERFACE

Key Needs

- Compatible with several different blockchain systems
- Supports extremely large number of database calls
- Operates single employee view

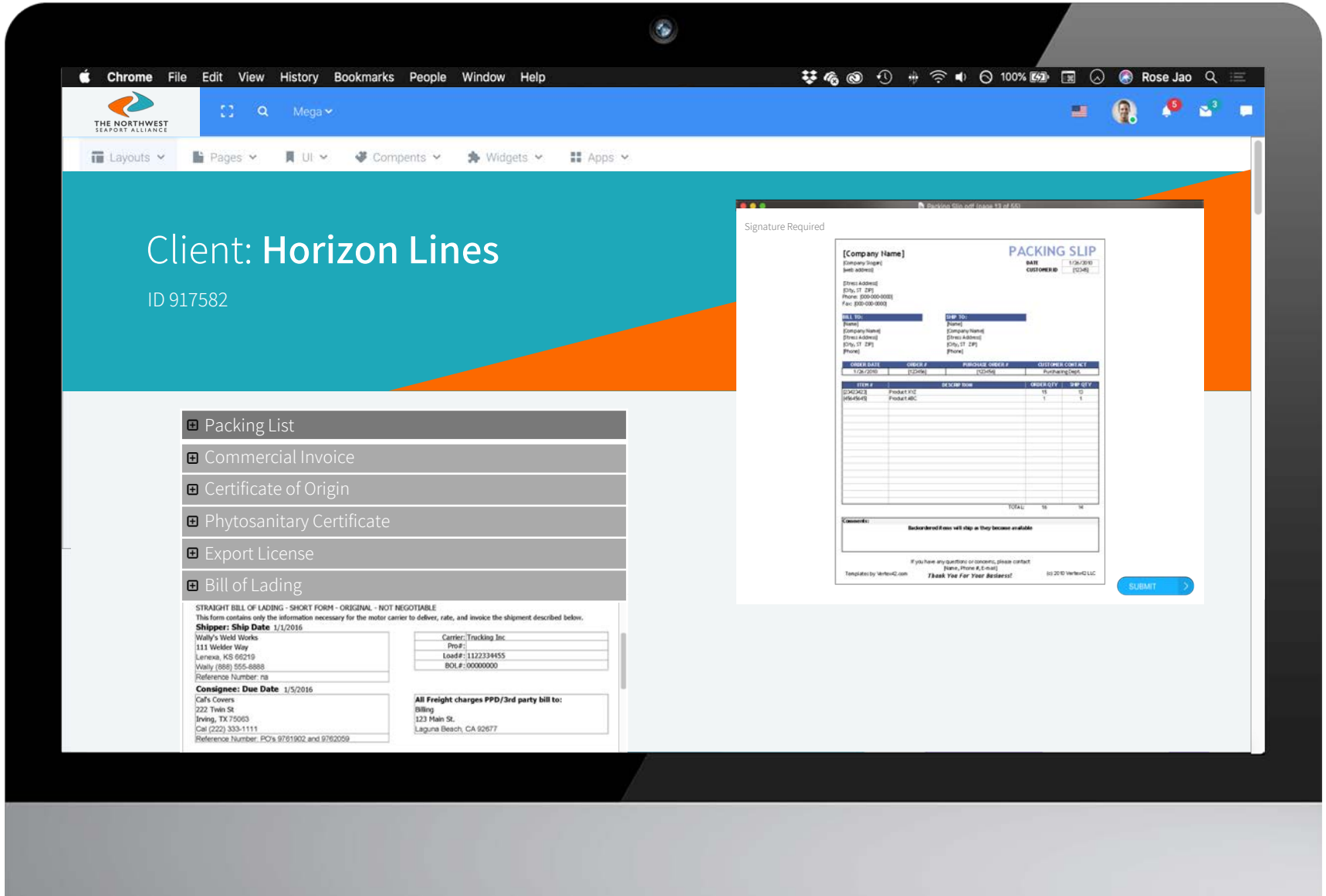
Utilize an API

Partners

apigee

SAMPLE API INTERFACE

Made specifically for NWSA



What is an API?

A software system that takes employee requests for data, communicates with the blockchain platform to retrieve that data, and returns the results back to the employee.

IMPLEMENTATION

Building an Application Program Interface (API)

	1	2
Task	**CREATE AN INTERFACE**	**CHOOSE A DEVELOPMENT PLAN**
Key Needs	• Compatible with several different blockchain systems • Supports extremely large number of database calls • Operates single employee view	• Fast time-to-production • Ensures system upholds industry standards • Requires minimal expertise and infrastructure
	Utilize an API	**Choose a Consultant**
Partners	apigee	accenture

IMPLEMENTATION

Building an Application Program Interface (API)

	1	2	3
Task	**CREATE AN INTERFACE**	**CHOOSE A DEVELOPMENT PLAN**	**INTEGRATE WITH PARTNERS**
Key Needs	• Compatible with several different blockchain systems • Supports extremely large number of database calls • Operates single employee view	• Fast time-to-production • Ensures system upholds industry standards • Requires minimal expertise and infrastructure	• Join Tradelens, CargoX, and other major blockchain service providers' networks • Equip freight forwarders and ground transportation with tools to use API
	Utilize an API	**Choose a Consultant**	**How to get started?**
Partners	apigee	accenture	TRADE LENS, CargoX

TIMELINE

NWSA action plan for the next five years

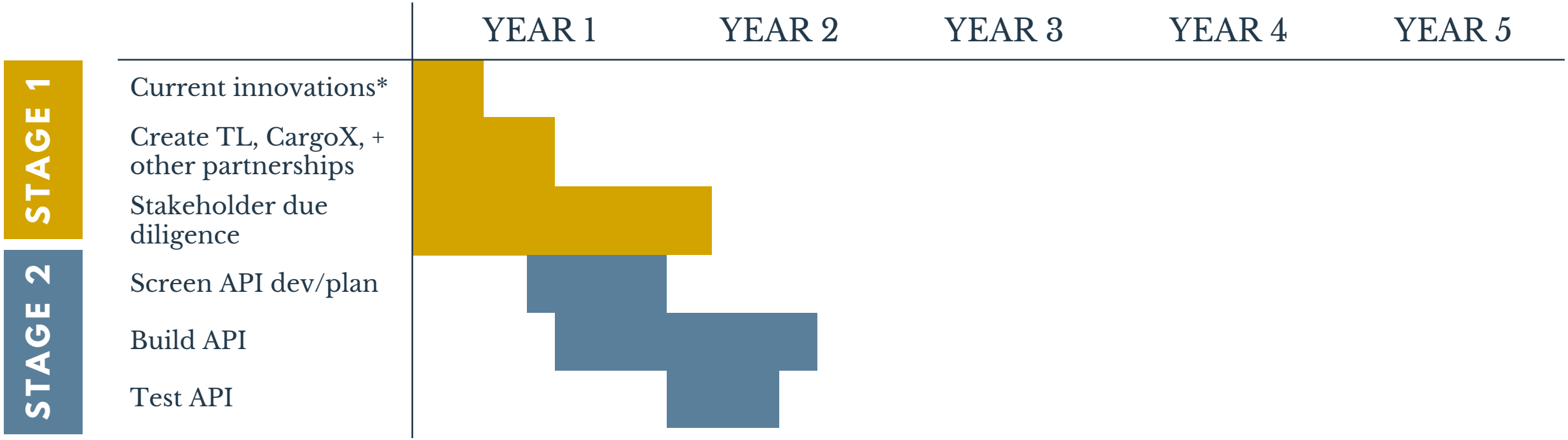
STAGE 1

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Current innovations*					
Create TL, CargoX, + other partnerships					
Stakeholder due diligence					

**RFID implementation, utilization initiative*

TIMELINE

NWSA action plan for the next five years



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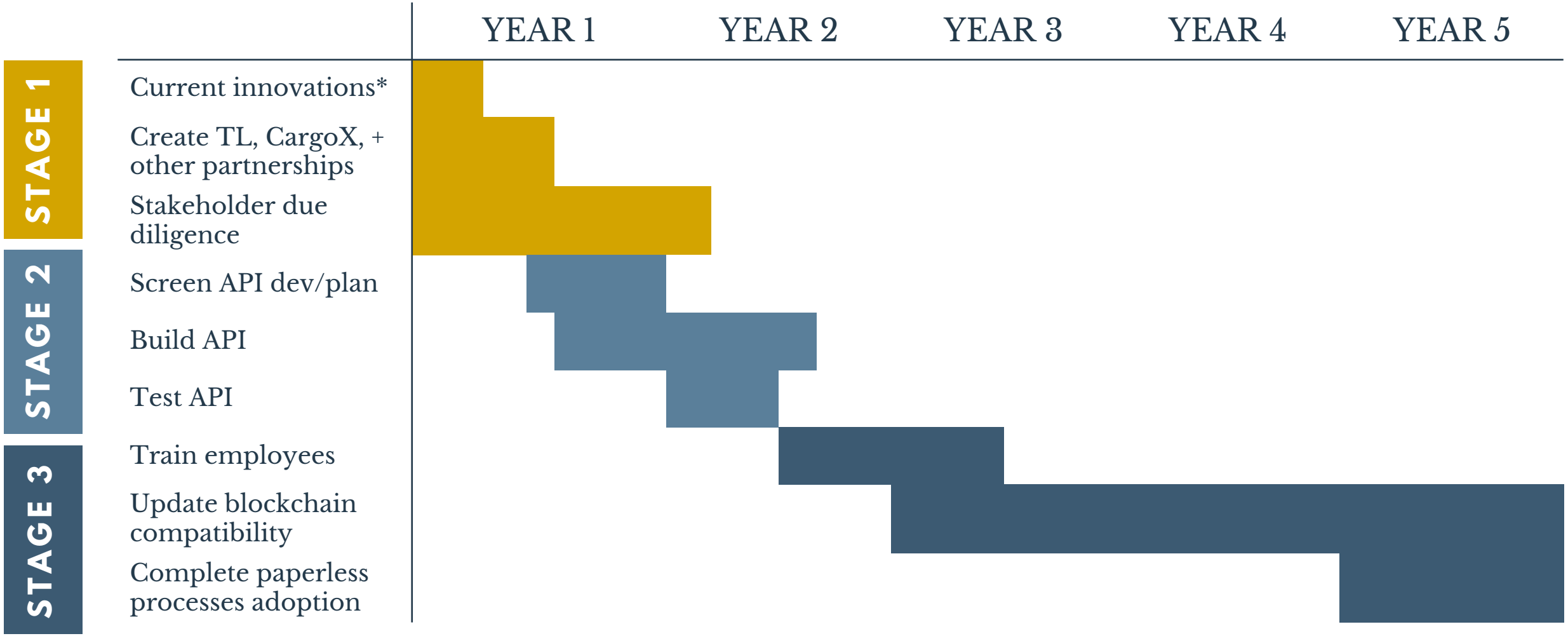

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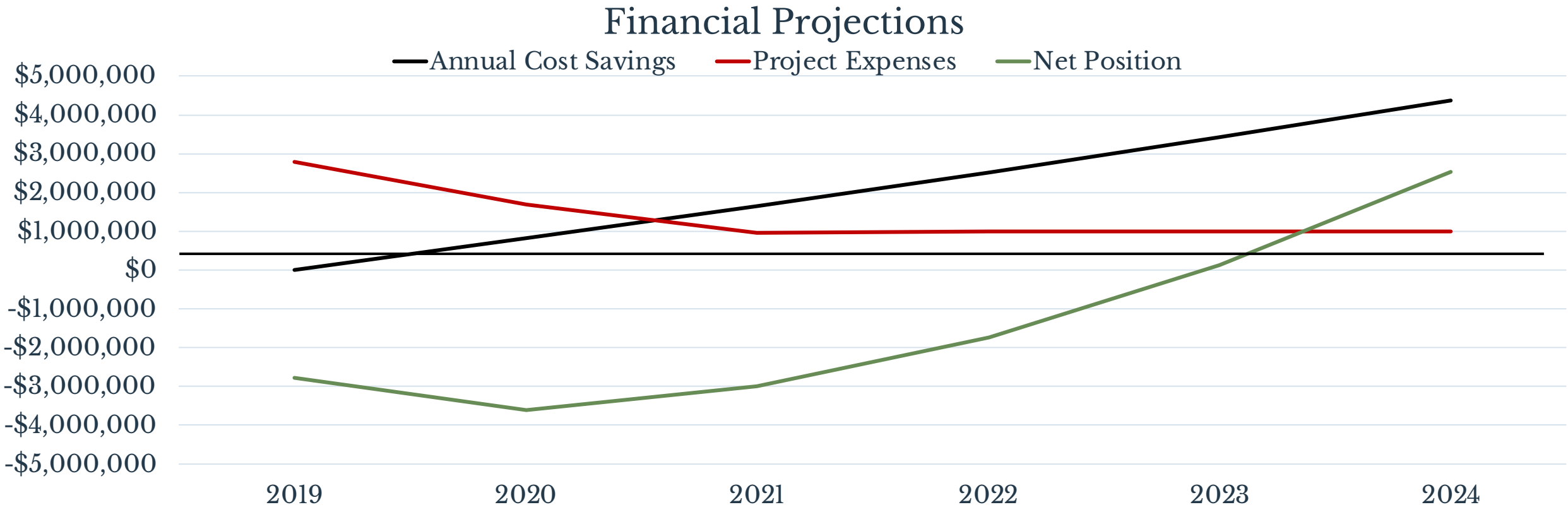
IMPACT

How will our plan affect the bottom line?



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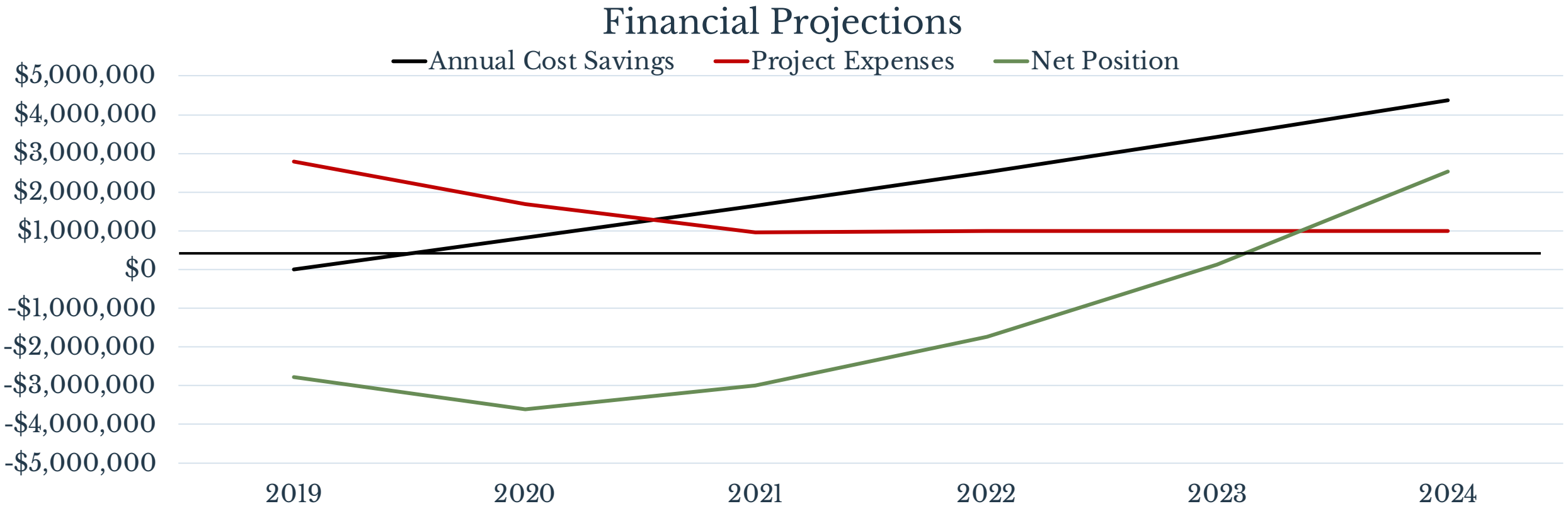

$8.4mm in Project Expenses

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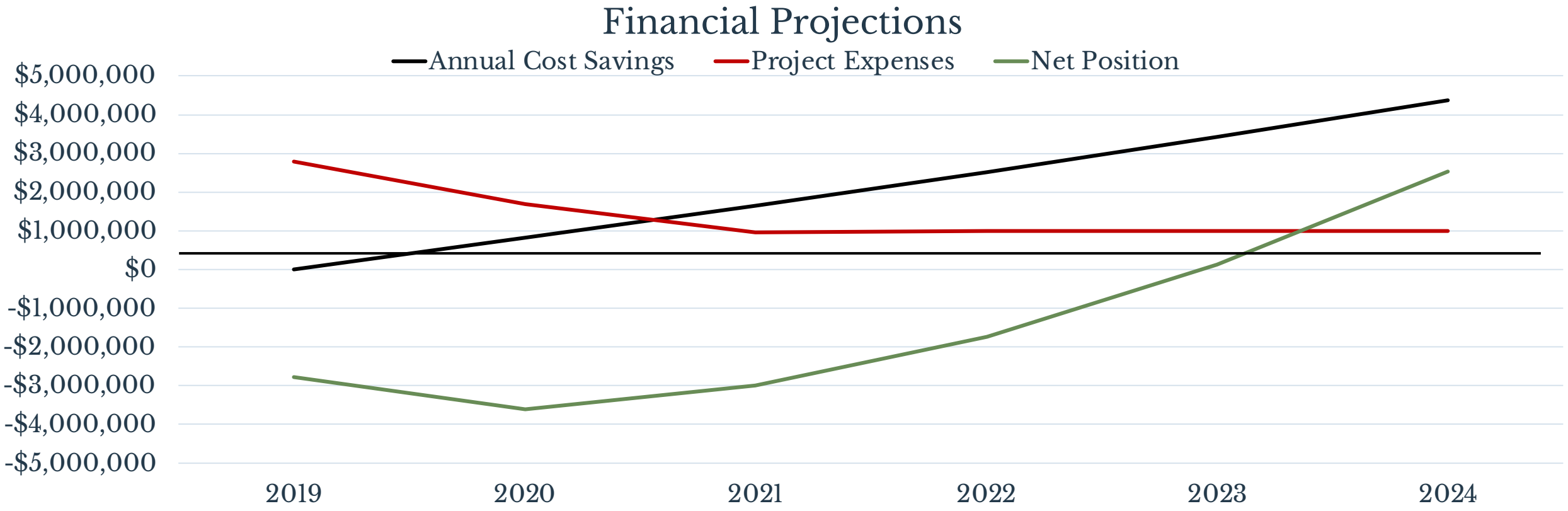

$8.4mm in Project Expenses

$12.8mm in Estimated Cost Savings

IMPACT

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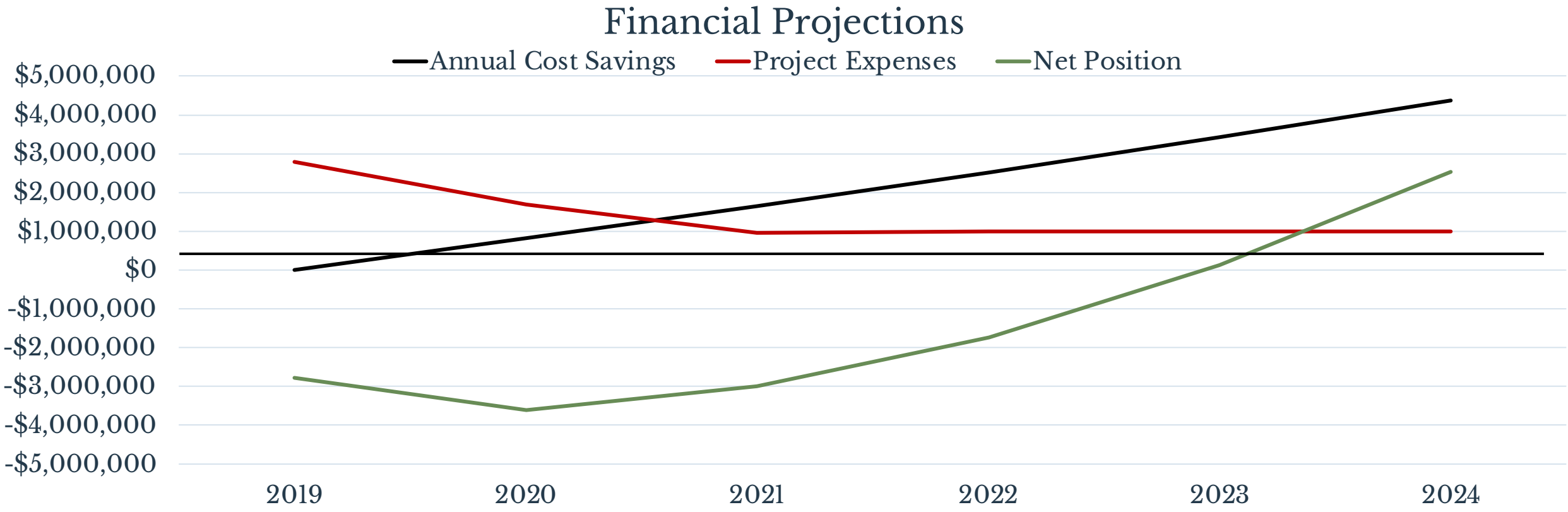

$8.4mm in Project Expenses

$12.8mm in Estimated Cost Savings

$2.5mm NPV over 5 Years

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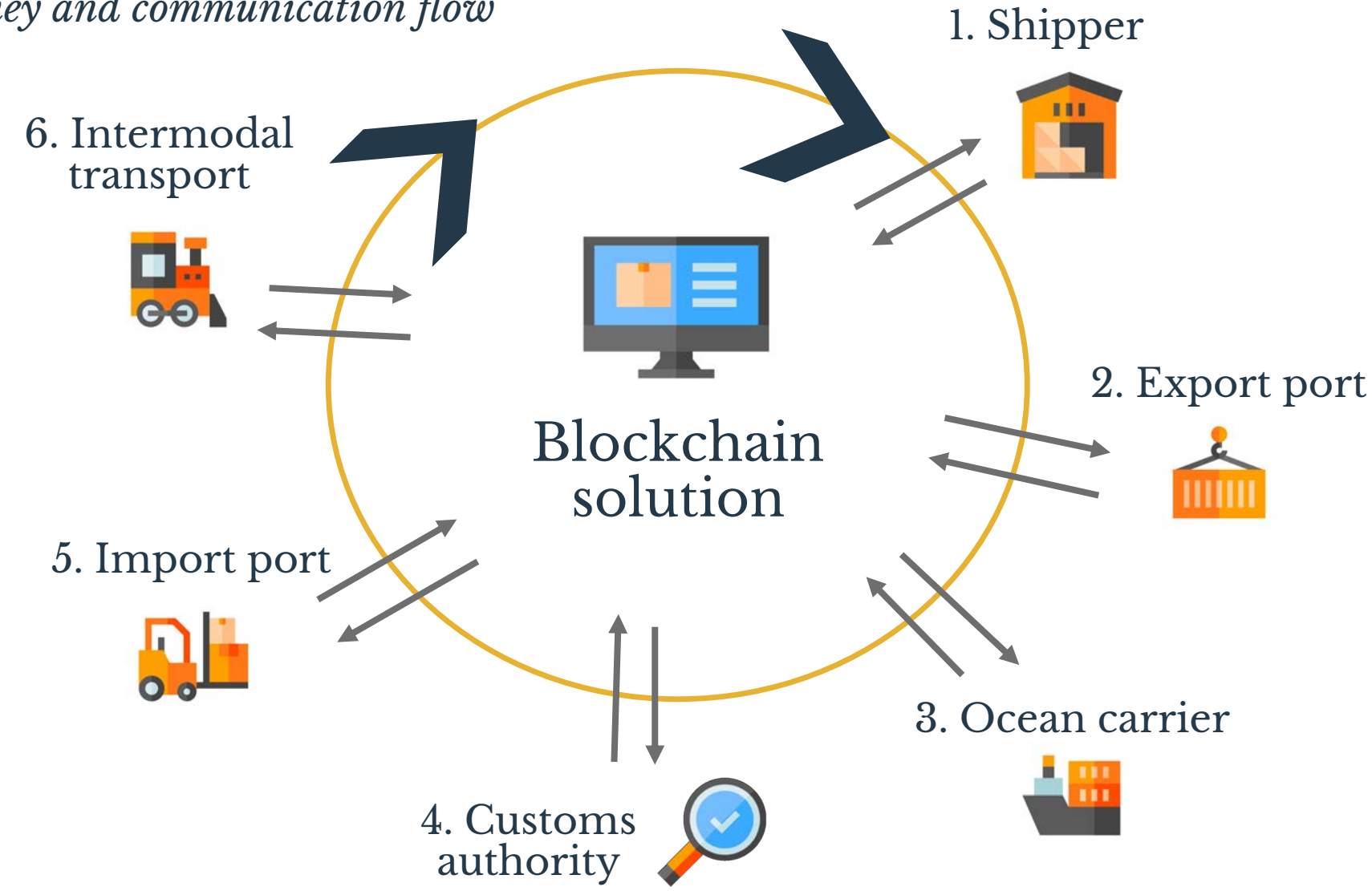
A profile of journey and communication flow



analysis solution implementation impact q&a

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3: Journey of a Product
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14: Reaching the Goal
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23: Benefits of Blockchain
24: TradeLens SWOT
26: Blockchain Shipping Solutions
29: Charting a Course
31: Directly Using Blockchains
32: Using an Intermediary API
35: Sample API Interface
37: Implementation
40: Timeline
44: Impact
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55: Why Accenture
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93: Accenture Project Fees
94: API Development and Training Costs
95: Sensitivity Analysis (Overruns vs Savings)
96: Sensitivity Analysis (DR vs Savings)

STRATEGIC CONSIDERATIONS

analysis solution implementation impact q&a

RISKS AND MITIGATIONS

Shoring up questions/considerations with our recommendation

RISK		MITIGATION	
Industry Shift	• "The industry is primed for disruption," but who will the prevailing disrupter be? • Extremely fragmented players • Value add is most significant when end-to-end consensus is in effect	**Flexible API**	• Compatible with today's major players and potential new market entrants • Owned material (NWSA will be able to edit whenever necessary)
Adoption	• Industry movement is slow • Potentially low adoption rates	**Partner with Leaders**	• Partnering with TradeLens and CargoX will ensure high adoption rate amongst freight/truckers

analysis solution implementation impact q&a

CUSTOMER NEEDS

Considerations of customer wants/needs

One Platform

Ocean want all of their information in one place and don't want to juggle multiple platforms

Confidentiality

Businesses highly prefer confidential transactions to public ones

Smart Contracts

Smart contracts allow for easier transacting

Independence

Firms don't want a service that is controlled by their direct competitors

Security

Partners want to ensure transactions and contracts are stored safely and encrypted

Visibility

Visibility is key to shipping maximize efficiency

API DEVELOPMENT PATH

Choosing the right technology investment for NWSA

CRITERIA	Develop In-House	Hire Consultants	Purchase Existing Solution	Outsource Development
Ease of Implementation				
Speed of Implementation				
Cost				
Customization				
Customer Experience				

PUBLIC VS. PRIVATE PLATFORM

	PUBLIC	PRIVATE
CONTROL	Control distributed among all members	Controlled by centralized authority
MEMBERSHIP	Globally available	Closed network
PRIVACY	Competitors cannot see transactions	Competitors cannot see transactions
SECURITY	Encrypted and extremely secure	Encrypted and extremely secure

CargoX

TRADE LENS

Nexledger

CARGOX

Independent blockchain solution

CONTROLLERS

01

INDEPENDENT

- Developed by CMA-CMG
- Independently managed by each member of the chain

CUSTOMERS

02

~32%[1] OF MARKET SHARE

- CMG-CMA (11.6%)
- Cosco (12.4%)
- OOCL
- Evergreen Marine (5.2%)
- Yang Ming (2.8%)

FUNCTIONALITY

03

SERVICES

- Smart contracts eliminate paperwork
- Real-time transparency and updates
- Customs support

TECHNOLOGY

04

PUBLIC BLOCKCHAIN

- Open network
- Smart contract enabled
- Independently managed by each member of the chain

[1] Top Ten Shipping Companies. Champion Freight. November 1st, 2018. https://www.championfreight.co.nz/top-ten-shipping-companies

TRADELENS

Private blockchain solution

CONTROLLERS

01

IBM/Maersk Controlled

- Developed by IBM/Maersk
- Entirely controlled by IBM/Maersk
- Competitors' data protected

CUSTOMERS

02

~19.5%[1] OF MARKET SHARE

- Maersk (17.7%)
- Hamburg Sud
- Pacific International lines (1.8%)

FUNCTIONALITY

03

SERVICES

- Smart contracts eliminate paperwork
- Real-time transparency and updates
- Customs support

TECHNOLOGY

04

PRIVATE BLOCKCHAIN

- Closed and permissioned network
- Smart contract enabled
- Controlled by one, centralized authority

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STAGES OF DIGITIZATION BY INDUSTRY

Digitisation of the container industry is still in early stages but will fundamentally change our industry

STAGE 01

- Digital impact primarily in **operations** and **cost reductions**
- Limited digital disruption in the industry

Construction · Oil & Gas · Pharma

STAGE 02

- **Digital engagement with customers** increasingly important
- **Increasing personalisation** of the customer experience using advanced data analytics

Manufacturing · Transport & Logistics · Healthcare · Education · Airlines · Auto

STAGE 03

- **Advanced technologies** and **data analytics** constantly deployed to find competitive advantages

Banking · Retail · Telco · Media

Digital technology will:

Vastly improve the customer experience

Enable next level optimation of operations

Fundamental and profound change to our industry

WHY ACCENTURE

Building an Application Program Interface (API)

CASE STUDY:

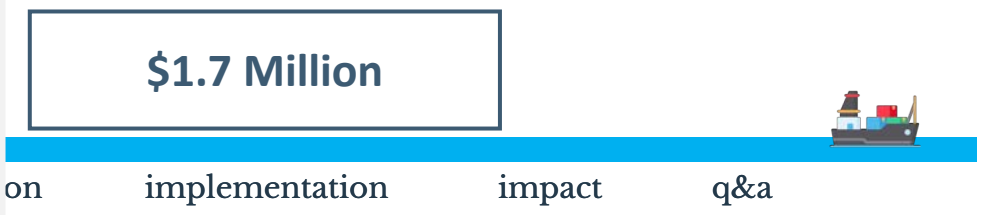
AB InBev, APL, Kuehne + Nagel, European Customs

"The consortium… successfully tested a **blockchain solution** that can **eliminate** the need for **printed shipping documents** and save the freight and logistics industry hundreds of millions of dollars annually." – Accenture News Release

The new process reduced the requirement for data entry by 80 percent, streamlined cargo checks, and reduced customs risk.

accenture

- Successfully tested blockchain solution to eliminate printed shipping documents
- Industry leader in API consulting and development
- Ensures system upholds industry standards



DO NOTHING

Why taking no action is not feasible for the current industry

Competitor ports: TradeLens

- >20 port and terminal operators, including:
  - PSA Singapore
  - Patrick Terminals
  - Port of Halifax
  - Port of Rotterdam
  - Port of Bilbao
  - PortConnect
  - Port of Philadelphia
  - International Container Terminal Services Inc
  - Modern Terminals in Hong Kong
  - PortBase
  - Port of Philadelphia
  - Global APM Terminals (covers 234 marine ports)

Case study: 1Q15 port congestion

- Ports of LA and Longbeach
- ~4 months of congestion causing delays, lost business, and backlog, with continuing delivery delays through the second quarter
- East Coast ports charged $1,000 surcharges, on top of their already-higher price per container rates

moorehead

at anchor

INDUSTRY

analysis solution implementation impact q&a

GLOBAL CONTAINER TRADE BY INDUSTRY

5-year growth rate (%), value of trade (billion USD)

Raw materials

^ 2%
$1,262

High tech

^ 3%
$589

Machinery parts

^ 2%
$542

Consumer goods

^ 3%
$480

Automotive

^ 2%
$402

Chemicals

^ 3%
$397

Cap. equipment

^ 2%
$360

Fashion

^ 3%
$313

Perishables

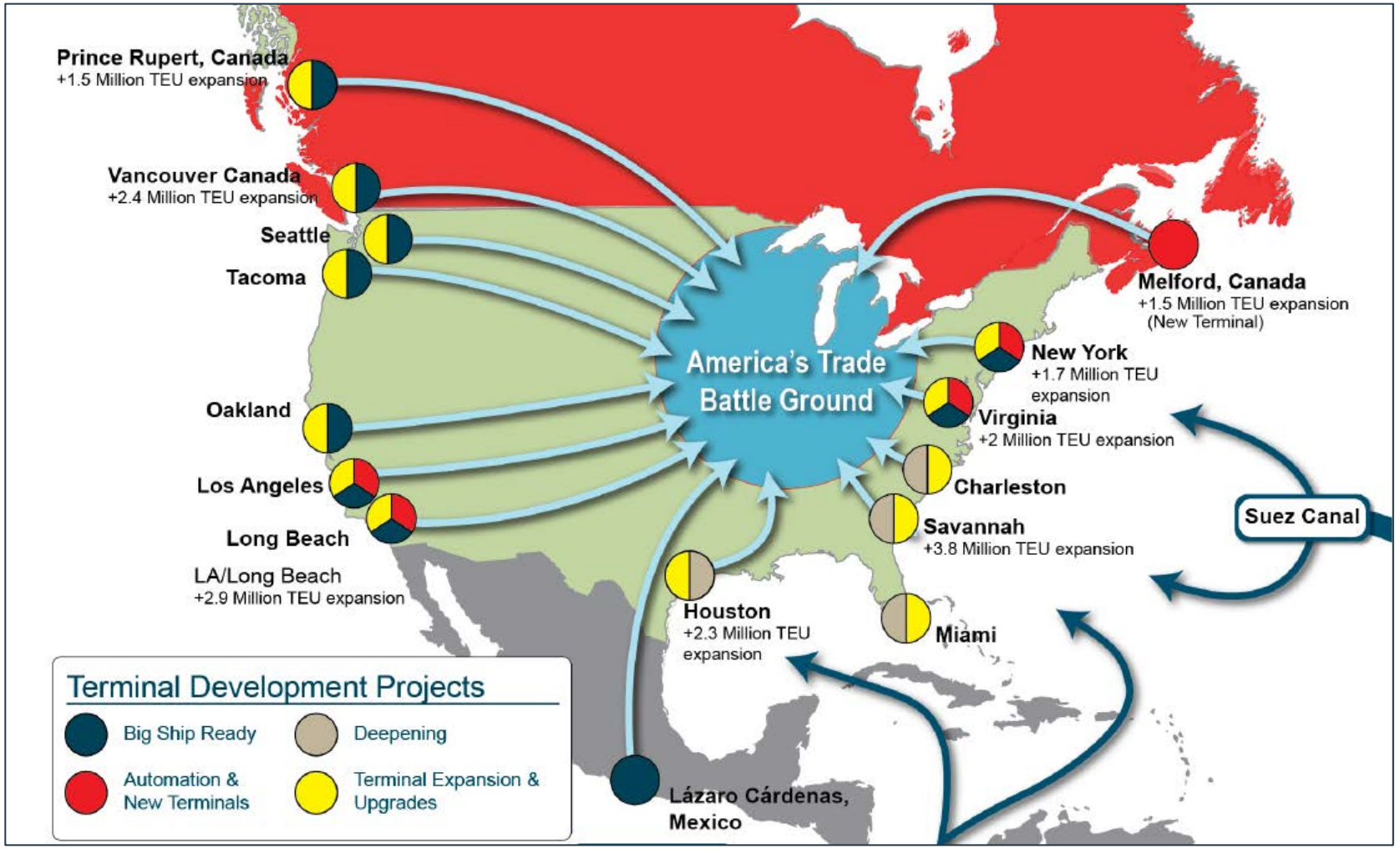
^ 5%
$174

Source: Accenture, 2017

SHIPPING IN NORTH AMERICA

NWSA's competition

Source: NWSA 2015 Strategic Plan



1. Global Trade Slowdown
2. 6.8mm TEU expansion on West Coast
3. Shipping companies searching for savings
4. Competition for customers is increasing

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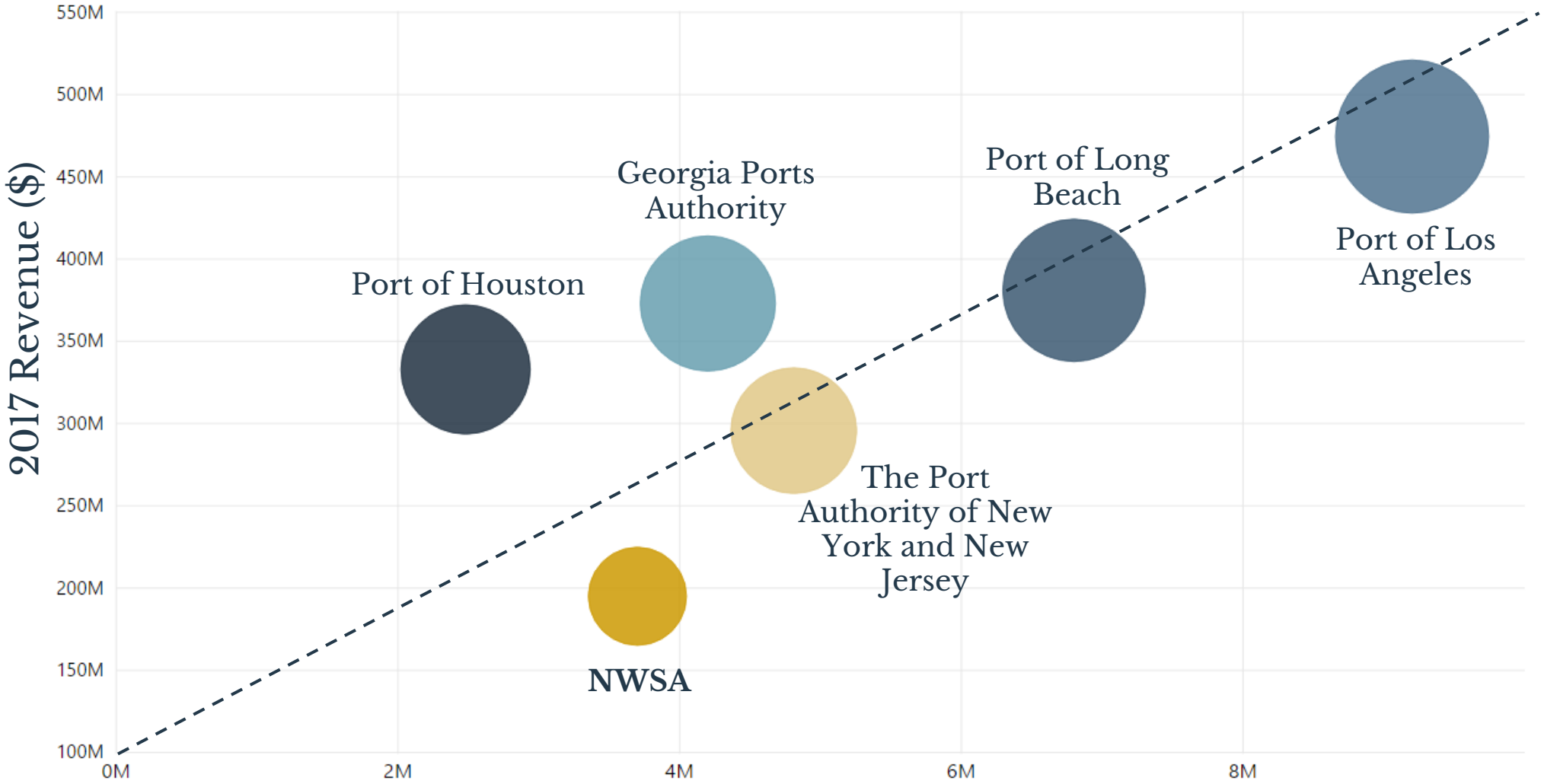
SHIPPING IN NORTH AMERICA 2

How do the major players stack up?

Sources: IBIS World, US Port and Harbor Oprations



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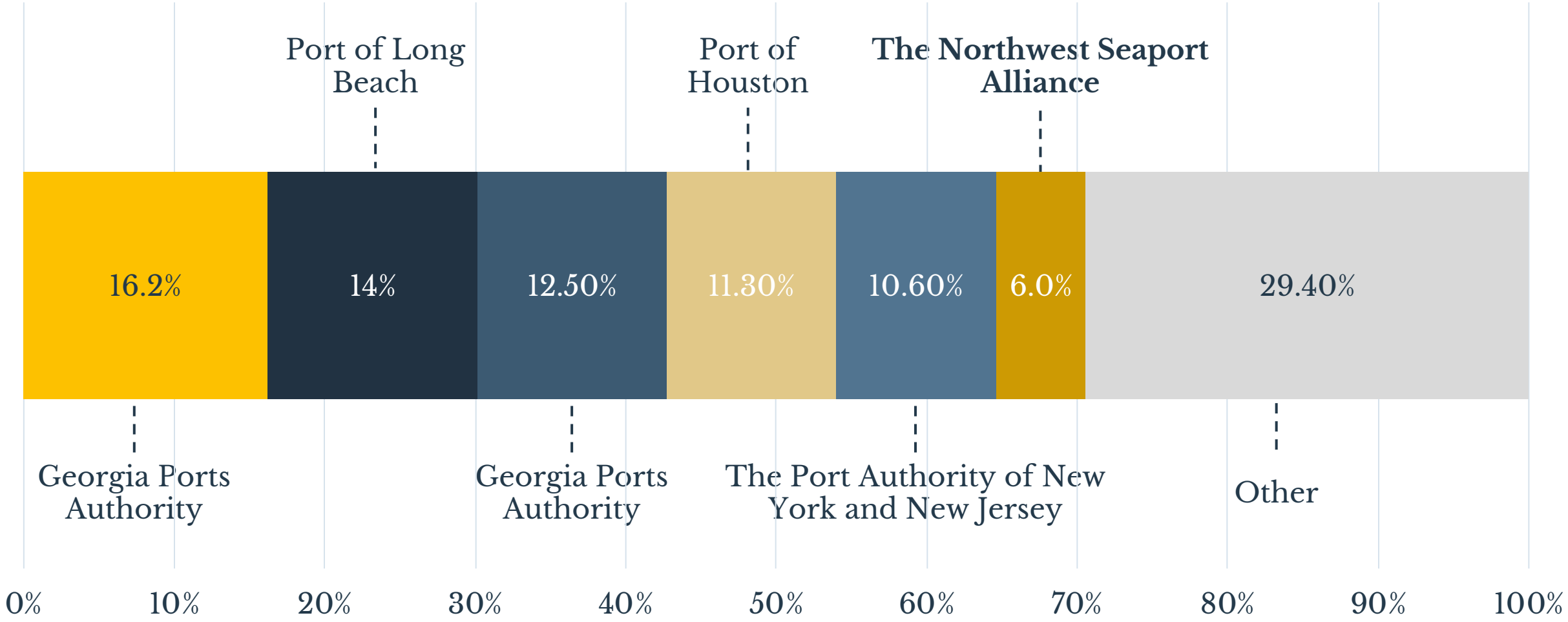
SHIPPING IN NORTH AMERICA 3

key players and market share

Sources: IBIS World, US Port and Harbor Oprations



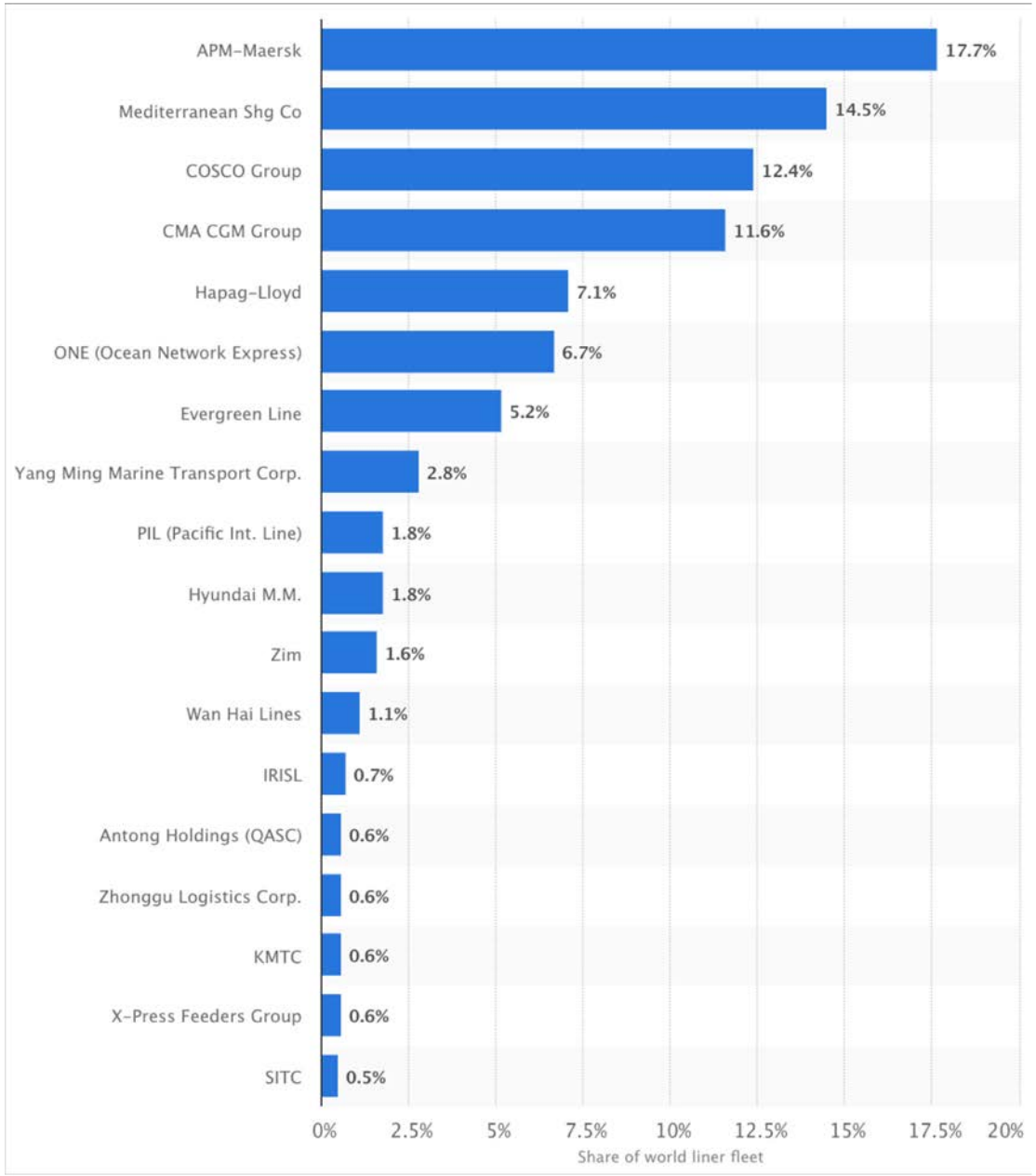
SHIPPING BLOCKCHAIN PLATFORM PLAYERS

	CARGOX	TRADELENS	SILSAL	NEXLEDGER	GLOBAL SHARED CONTAINER PLATFORM
Carrier Operator(s)	COSCO Shipping Lines, CMA CGM, Evergreen Marine, OOCL, Yang Ming, DP World, Hutchison Ports, PSA International & Shanghai International Port	A.P. Moller–Maersk Group	Mediterranean Shipping Company (MSC)	Hyundai Merchant Marine (South Korea)	"a confirmed carrier in the 10-20 global ranking"[2]
Tech Partner(s)	CargoSmart	IBM	Abu Dhabi Ports	Samsung SDS	Blockshipping
Market Share	35%	19.5%	14.5%	1.8%[1]	~1.5%

[1]Wall Street Journal, October 2018
[2]Bitcoinist, May 2018

LEADING SHIP OPERATOR'S SHARE OF THE WORLD LINER FLEET

As of October 30, 2018



STAKEHOLDERS

Ports & Terminals

Provide: location data for thru packages
Benefit from: real time visibility to use in terminal planning, greater predictability

Ocean Carriers

Provide: ocean-leg location data
Benefit from: connections to global ports

Customs authorities

Provide: import/export clearance
Benefit from: more informed risk assessments, less manual paperwork

Freight forwarders/3PL

Provide: transport plan, intermodal handoff plans
Benefit from: improved visibility of customs clearance brokerage

Intermodal Transport

Provide: disposition of shipments on trucks, rail, etc.
Benefit from: improved utilization of assets

Shippers

Provide: paperless data exchange
Benefit from: early notification of issues, transparency to validate surcharges, less safety stock

PORTS & TERMINALS

Stakeholder trade-off analysis

Provide:

- location data for thru packages

Benefit from:

- real time visibility to use in terminal planning, greater predictability

Port of Tacoma

Port of Seattle

THE NORTHWEST SEAPORT ALLIANCE

OCEAN CARRIERS

Stakeholder trade-off analysis

Provide:

- ocean-leg location data

Benefit from:

- connections to global ports

CUSTOMS AUTHORITIES

Stakeholder trade-off analysis

Provide:

- import/export clearance

Benefit from:

- more informed risk assessments, less manual paperwork

FREIGHT FORWARDERS/3PL

Stakeholder trade-off analysis

Provide:

- transport plan, intermodal handoff plans

Benefit from:

- improved visibility of customs clearance brokerage

INTERMODAL TRANSPORT

Stakeholder trade-off analysis

Provide:

- disposition of shipments on trucks, rail, etc.

Benefit from:

- improved utilization of assets

Advent Intermodal Solutions

CSX HOW TOMORROW MOVES

SHIPPERS

Stakeholder trade-off analysis

Provide:

- paperless data exchange

Benefit from:

early notification of issues, transparency to validate surcharges, less safety stock

IKEA®

amazon

FOXCONN

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JAN 1, 2019 RFID REQUIREMENT

Moving toward global acceptance

• Network asset visibility: support identification and tracking of assets typically associated with operations within a facility, but to a growing extent also across wider-spread container logistics networks.

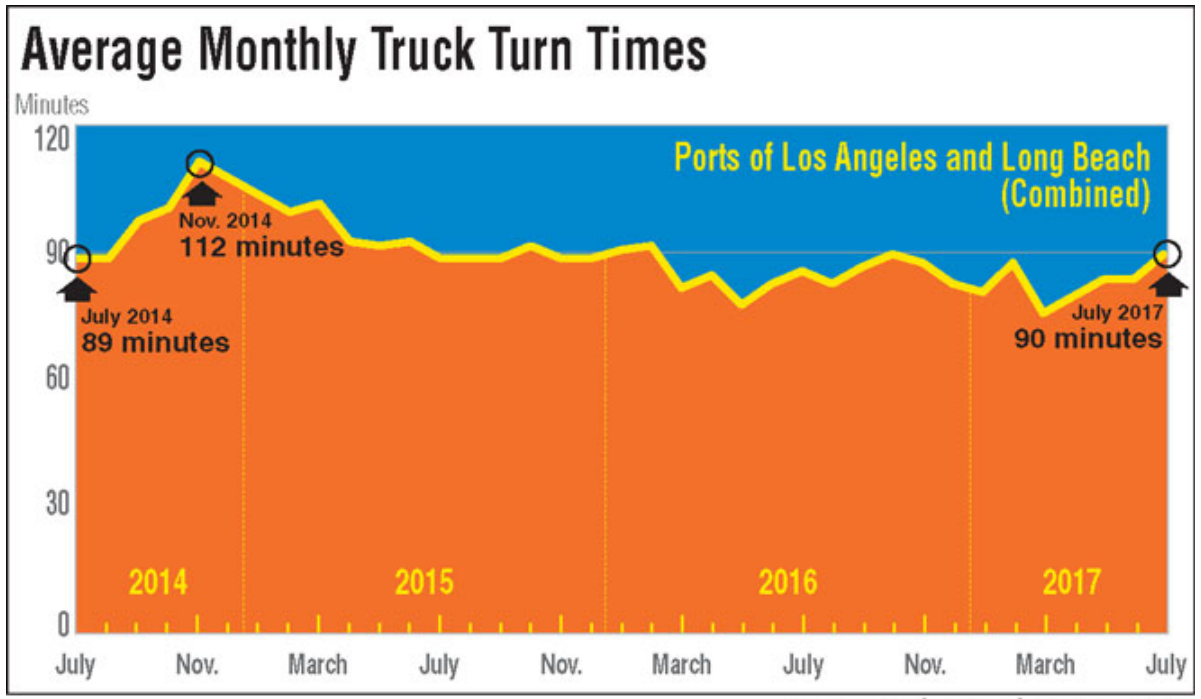
• Process automation: automate previously manual processes with the goal of improving operational productivity and/or equipment utilization.

• Safety: ensure the safety of employees, as well as hard assets.

• Security: secure an asset or uniquely identify an individual, generally in conjunction with other security technologies such as biometrics.

AVERAGE TRUCK TURN TIMES (LA)

how does NWSA compare to other US ports?



Source: Harbor Trucking Association

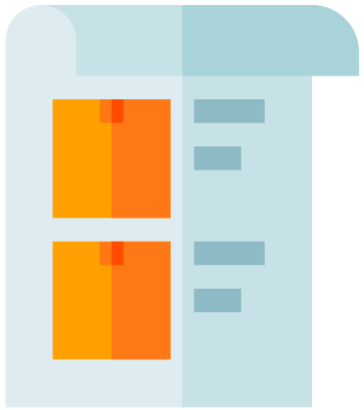
Place	2 hrs	24 hours	7 days	30 days	90 days	Average
T18	100	105	105	110	105	105
Husky	65	70	100	120	110	93
PCT	205	120	140	135	145	149
T46	75	95	100	90	85	89
WUT	85	90	95	95	90	91
T30	0	75	90	85	85	84
EST (TCT)	0	75	75	80	75	76
Matson (Tac)	0	0	80	60	60	67
						94

INDUSTRY RESISTANCE TO BLOCKCHAIN

Main sticking points for container logistics participants

organization resistance to change

cost of technology



time to build network of distributed parties (nodes) to participate

Blockchain is a technology that's optimally used in a public, trustless environment running head-on into an industry that pathologically seeks trust. In a theoretical world, a public blockchain with thousands of participants (nodes) would provide that trust.

BLOCKCHAIN

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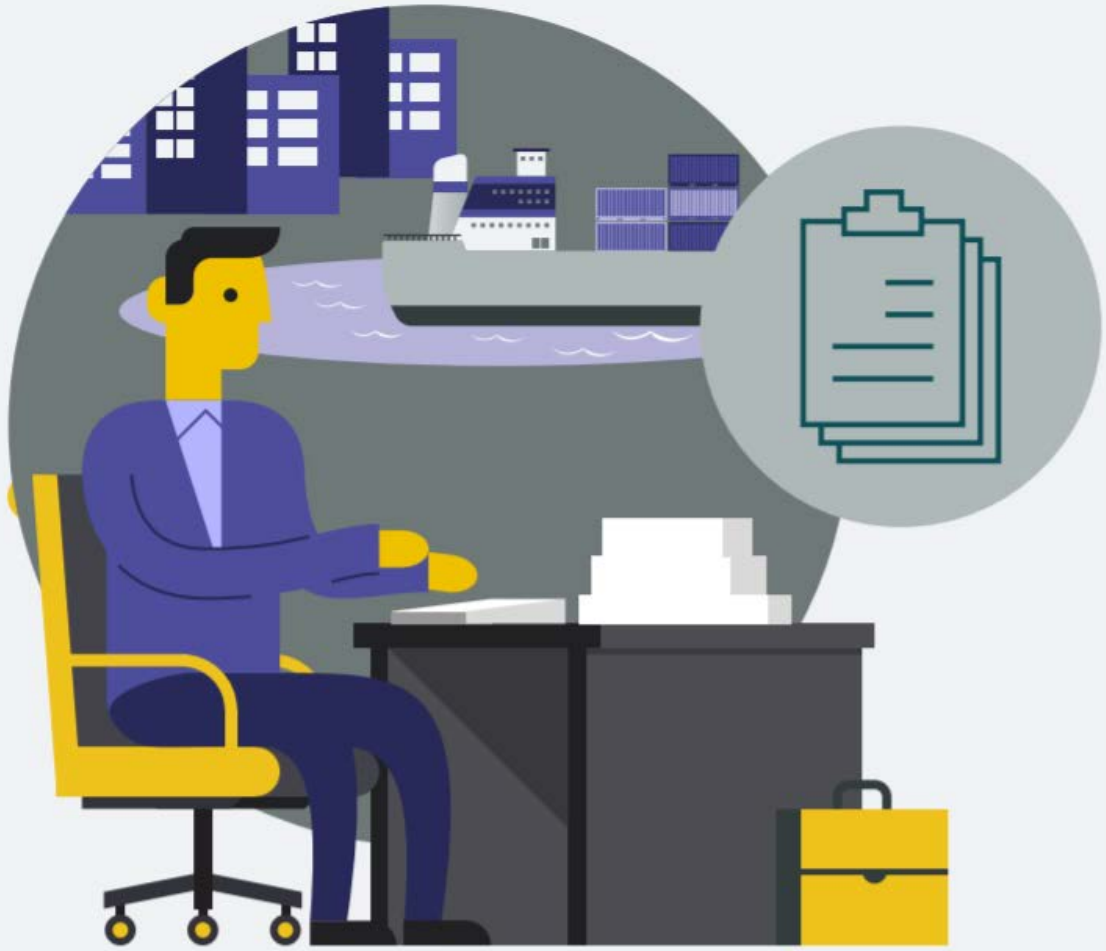
SCALE & IMPACT

Ocean freight is entrenched in outdated methodology

The ocean freight industry accounts for

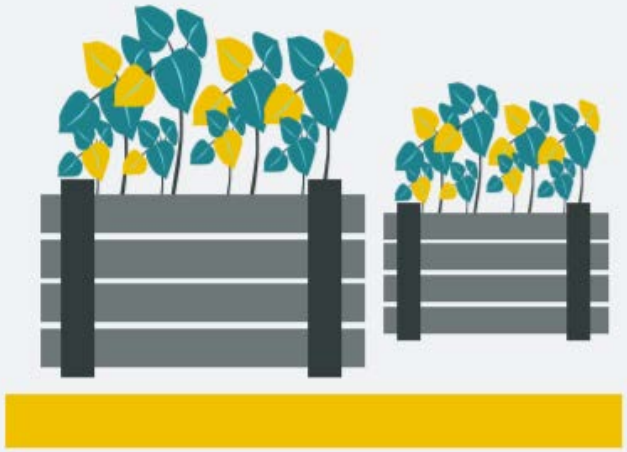
90% of goods in global trade,

but transport remains highly dependent on a flood of paper that is never digitized.

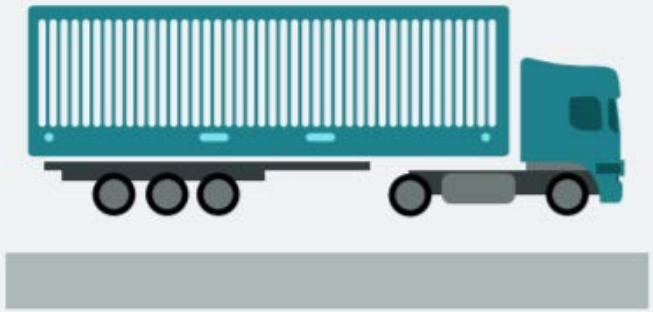


CASE STUDY: FLORAL SHIPMENT

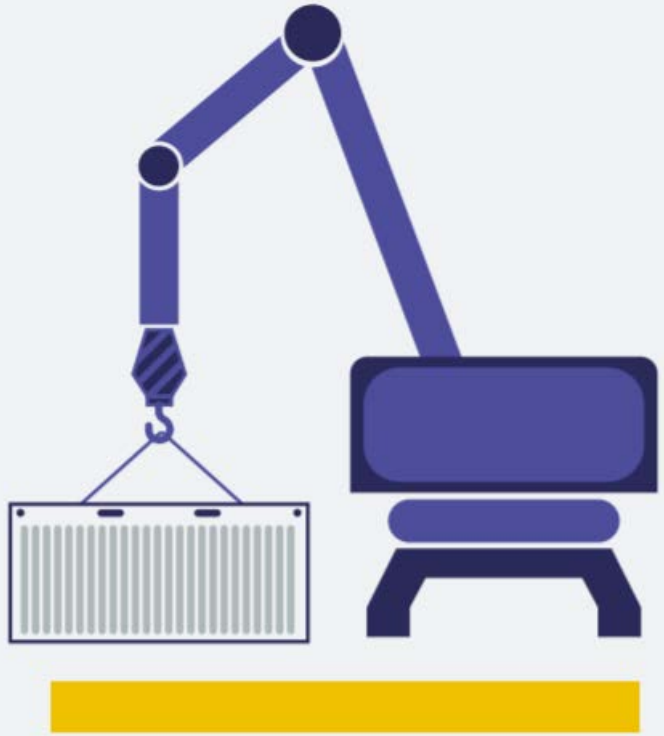
Delivery is expedited through a blockchain application, resulting in fresher end products (PT. 1)



The flower grower **starts** the process by readying and **recording** international shipment batch.



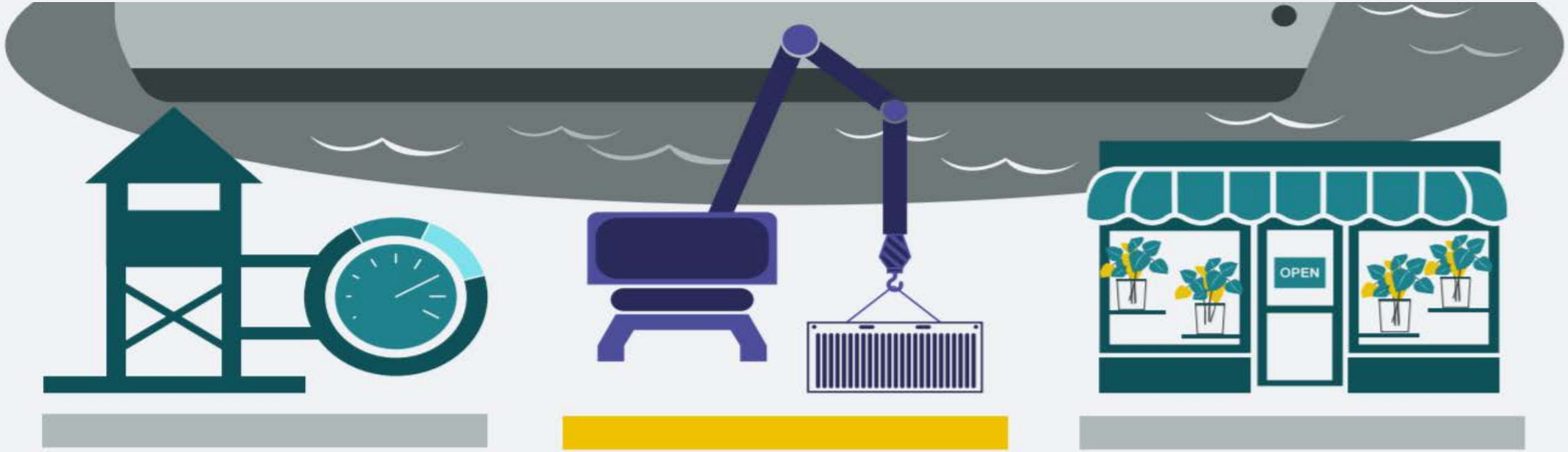
As the container awaits transfer to port, officials **submit approvals electronically**. Blockchain confirms the transaction and executes a **smart contract**, releasing the shipment.



Transfer to ocean carrier.

CASE STUDY: FLORAL SHIPMENT 2

Delivery is expedited through a blockchain application, resulting in fresher end products (PT. 2)



All parties have end-to-end **visibility** of the container's progress through the supply chain.

The container arrives at the destination port and clears customs.

Retailer receives the flowers on time and **signs electronically**. Contract completion is relayed back to the blockchain.

PROS/CONS OF BLOCKCHAIN (GENERAL)

High level trade-offs with blockchain technology

Pros

Auto-triggering

- E.g. in smart-contracts, transactions are automatically approved and carried out.
- In the case of a financial transaction, money exchanges hands; in the case of equivalent tokens, tokens are verified and trusted throughout the network.
- (w/in involved supply chains, this eliminates majority of physical paper use)

Verification

- Members within the blockchain either deny or approve additional blocks.
- If approved, the block is added to the chain of records.

Cons

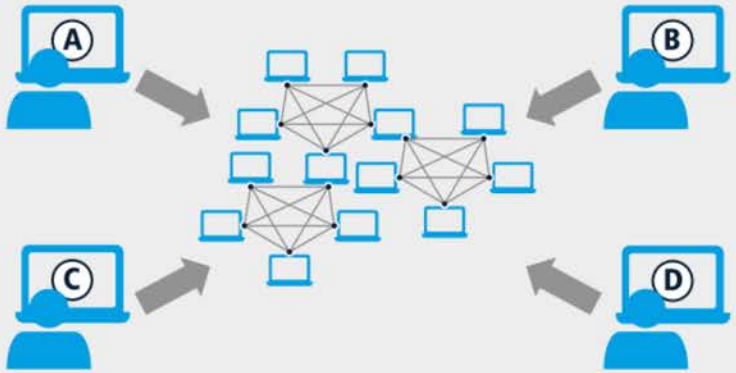
"Wasteful"

- Due to reliance on multiple nodes to verify content, the consensus ultimately means nodal repetition of a task over and over to do a single verification.
- Slower, more expensive network of devices, speed cost — the larger the chain, the greater the loss of efficacy and speed without fracturing the data being queried.

Immutability as a flaw

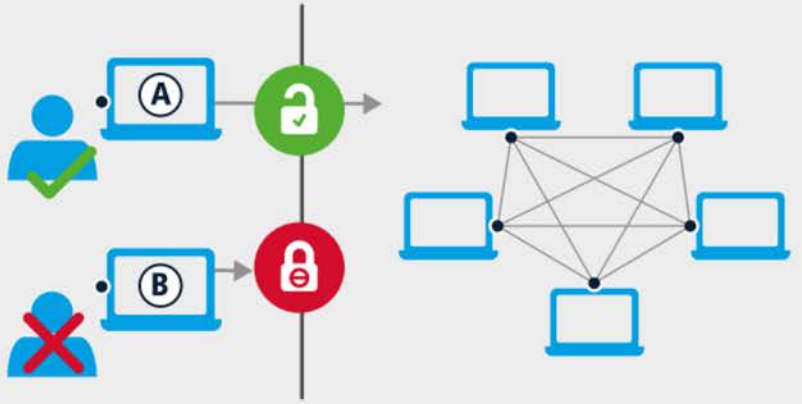
- Once a mistake is made, there is no correcting it.
- (Possible to issue a retraction or a linked transaction).

PUBLIC VS PRIVATE BLOCKCHAINS (TECHNICAL)



PUBLIC, PERMISSIONLESS BLOCKCHAINS

- Anyone can join the network and submit transactions
- Anyone can contribute computing power to the network and broadcast network data
- All transactions are broadcast publicly



PRIVATE, PERMISSIONED BLOCKCHAINS

- Only safelisted (checked) participants can join the network
- Only safelisted (checked) participants can contribute computing power to the network and broadcast network data
- Access privileges determine the extent to which each safelisted participant can contribute data to the network and access data from the network

Figure 6: Key differences between public, permissionless blockchains and private, permissioned blockchains; **Source:** Accenture

SMART CONTRACTS

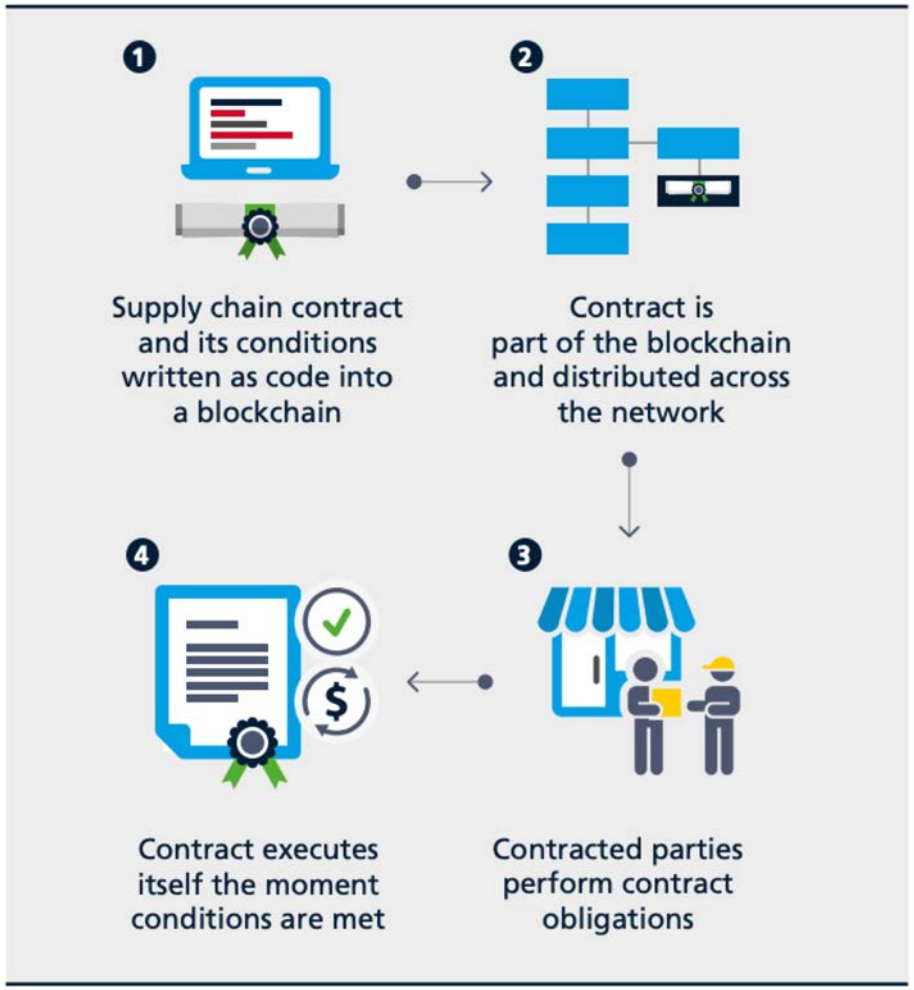


Figure 21: How smart contracts could work in the logistics industry; **Source:** DHL

BENEFITS OF BLOCKCHAIN

how will blockchain impact the shipping industry

Administrative Automation

- Smart contracts eliminate paperwork such as Bill of Ladings (BOLs)
- Electronic paperwork decreases customs and processing delays [2]

Clear Communication

- Real-time transparency and updates
- All transactions are clearly defined and traceable

Drive Demand

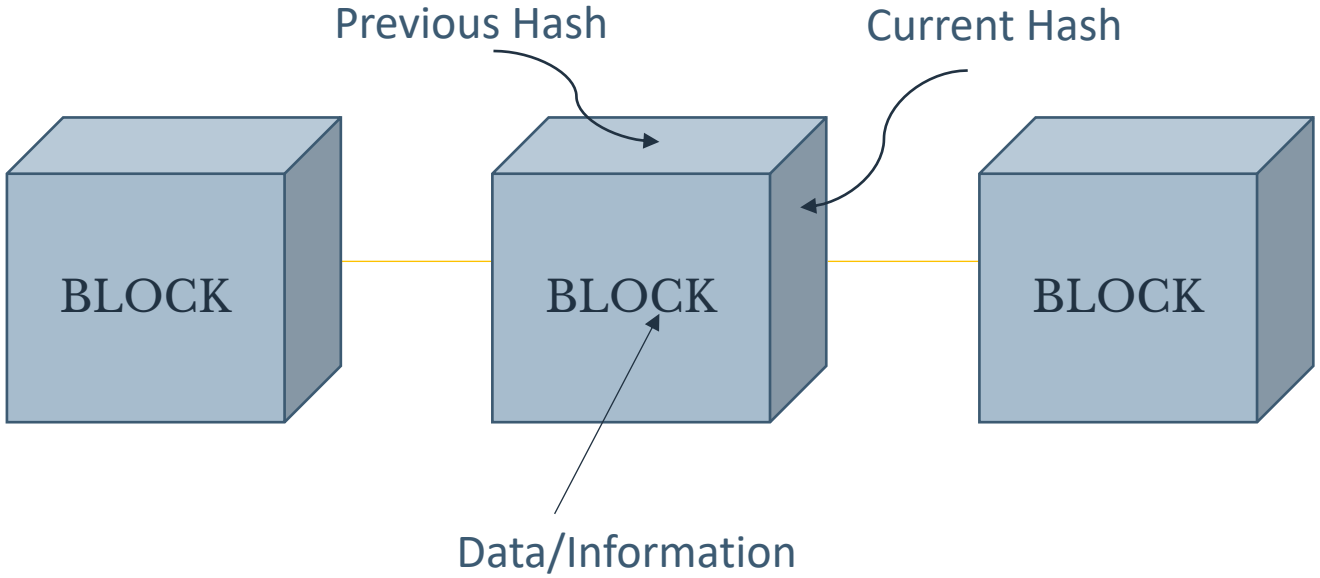
- Competition for North American trade is fierce
- Time and cost are two important factors determining customer behavior [1]

INCREASE UTILIZATION & SHIP TURN RATE

[1] Shippers' Choice Behaviour in Choosing Transport Mode: The Case of South East Asia (SEA) Region. Chia-Hsun Chang and Vinh Thai. 2017.
[2] Skepticism of Maersk-IBM's TradeLens hit bigger blockchain questions. Eric Johnson. JOC. Aug. 13 2018.

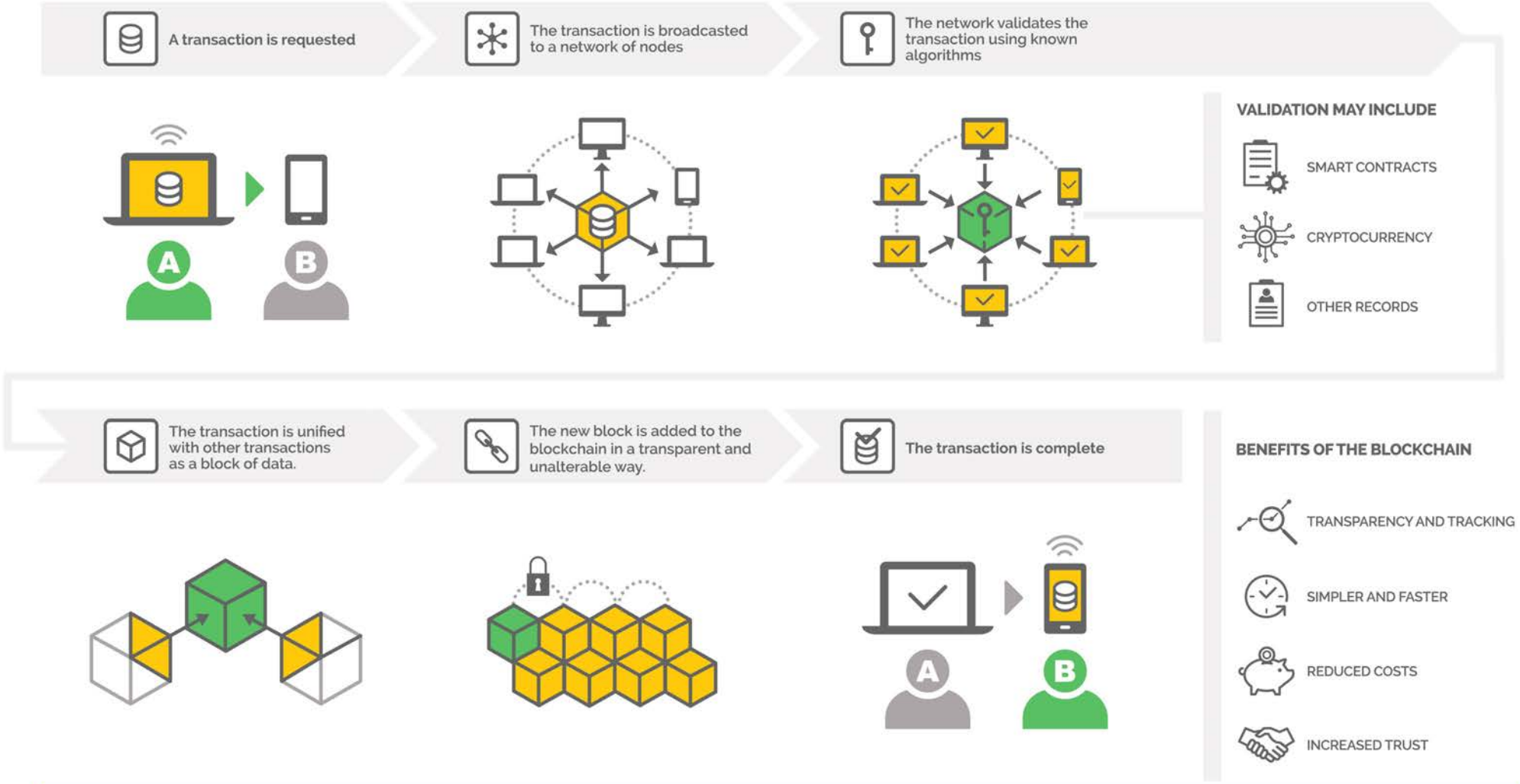
WHAT IS BLOCKCHAIN 2

Explaining distributed ledger technology

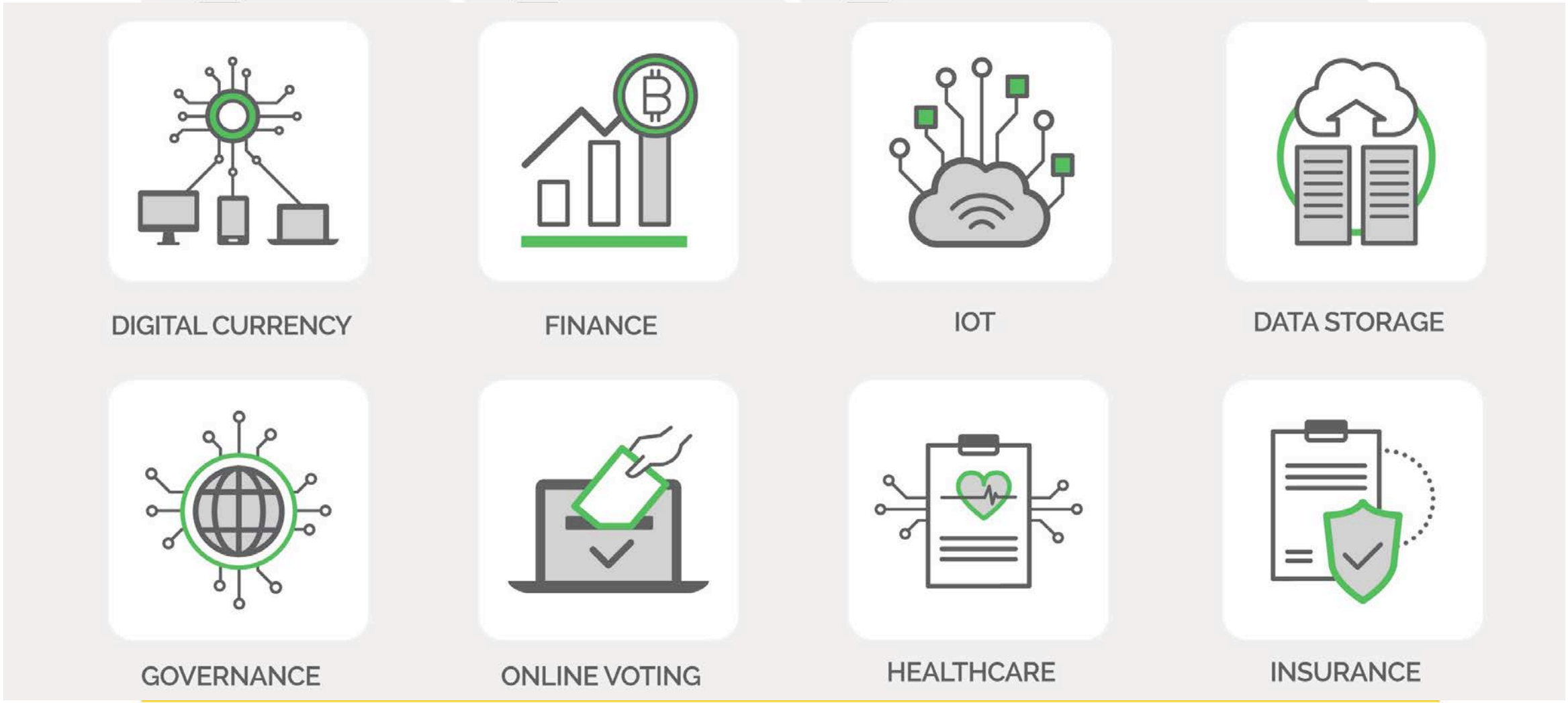


SMART CONTRACTS	ONE TRUTH	PROTECTED DATA
Software that enables: Automatic transfer of ownership & Immediate billing/payment	All parties have access to identical and accurate information All transactions are verified by every party	All prior transactions and records are immutable Can only change database by “adding” entries

HOW DOES BLOCKCHAIN WORK



OTHER BLOCKCHAIN USES



DIRECT TO BLOCKCHAIN SYSTEM

how does this solution work in practice?

Each system has unique commands/ actions

Employees must be trained on each system

TRADE LENS

Third Party blockchains

CargoX

Nexledger

NWSA Employees

No error checking or controls

Each employee communicates directly with Blockchain

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APIGEE API MANAGEMENT

FINANCIALS

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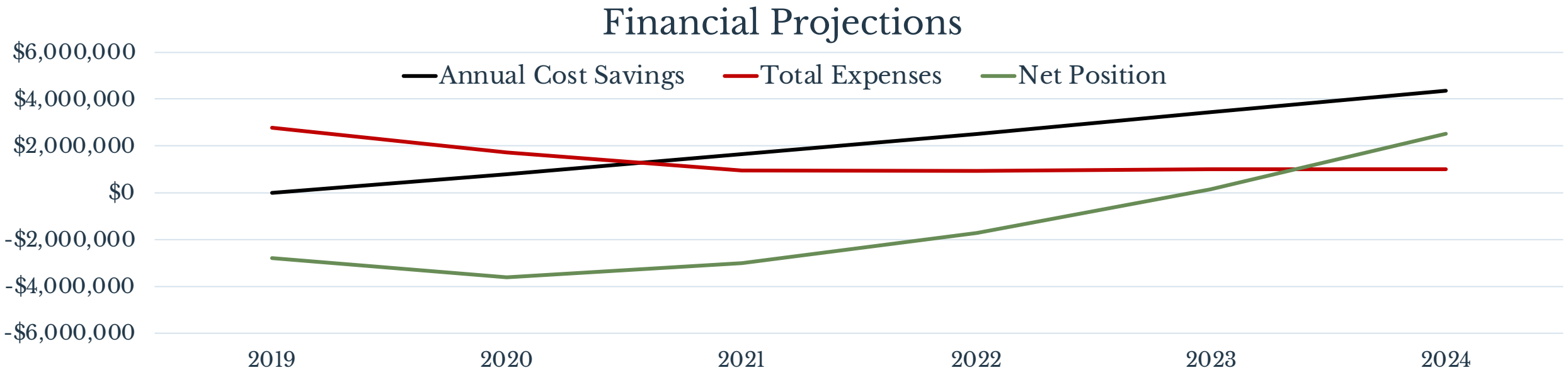
IMPACT

how will our plan hit the bottom line?



Consolidated Income Statement

Year	0	1	2	3	4	5
Annual Cost Savings	$0	$814,080	$1,656,816	$2,528,963	$3,431,297	$4,364,610
Total Expenses	$2,784,000	$1,696,000	$956,732	$973,762	$991,095	$1,008,736
Net Cash Flows	-$2,784,000	-$881,920	$700,084	$1,555,202	$2,440,203	$3,355,874
DCF	-$2,784,000	-$824,224	$611,480	$1,269,508	$1,861,619	$2,392,692
NPV	**$2,527,074**					

COST OF DELAYS PER DAY

breaking down the impact of delayed shipments

Table 4.6 Estimated cost of dwell time, selected countries, 2014–2015

Country	2014 Sample size	2014 Average waiting time (days)	2014 Estimated cost of sample wait (thousands of dollars)	2015 Sample size	2015 Average of waiting time (days)	2015 Estimated cost of sample wait (thousands of dollars)
Australia	4 438	5.50	421 352	2 461	4.52	182 815
Brazil	1 533	6.44	188 822	1 537	5.17	73 630
Canada	151	5.08	13 594	36	2.33	702
Republic of Korea	..	..	..	167	2.64	4 470
South Africa	..	..	..	994	2.32	19 067
United States	188	4.74	12 785	55	1.51	757
Grand total	**11 925**	**4.53**	**892 379**	**9 258**	**3.46**	**349 699**

Source: UNCTAD secretariat calculations, based on data supplied by Clarksons Research (2016) and raw observational data provided by Wilhelmsen Ships Service.

Note: ".." indicates data unavailable or sample too small.

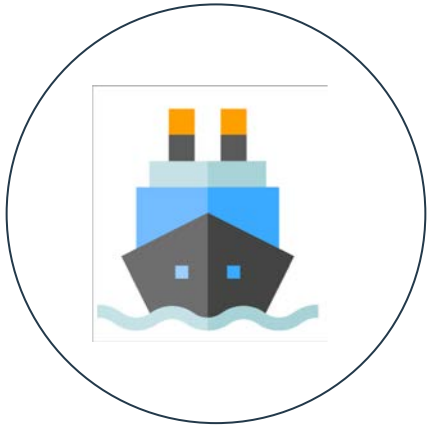
AREAS OF COST SAVINGS

How does this solution work in practice?

TRUCK TURNS

- Trucks have live updates on status of shipments, decreasing their necessary wait times
- Eliminating paperwork decreases delays due to processing of up to 20 documents per shipment

MARITIME WAITING



- Electronic documentation speeds up customs approval
- Smart contracts increase speed of shipment acceptance and transfer of ownership

DECREASE PAPERWORK

- Could eliminate the need for printed shipping documentation
- Around 20% of shipping costs are due to physical paperwork costs

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CONSOLIDATED FINANCIALS

how will our recommendations hit the bottom line?

Income Statement

Year	0	1	2	3	4	5
Annual Cost Savings	$0	$814,080	$1,656,816	$2,528,963	$3,431,297	$4,364,610
Total Revenue	**$0**	**$814,080**	**$1,656,816**	**$2,528,963**	**$3,431,297**	**$4,364,610**
Accenture Project Cost	$2,784,000	$0	$0	$0	$0	$0
API Platform Fees	$0	$240,000	$244,272	$248,620	$253,045	$257,550
Annual Tech Team Salary/Benefits	$0	$700,000	$712,460	$725,142	$738,049	$751,187
Training Costs	$0	$756,000	$0	$0	$0	$0
Total Expenses	**$2,784,000**	**$1,696,000**	**$956,732**	**$973,762**	**$991,095**	**$1,008,736**
Net	***-$2,784,000***	***-$881,920***	***$700,084***	***$1,555,202***	***$2,440,203***	***$3,355,874***

Cash Flows

Year	0	1	2	3	4	5	TV
Net Cash Flows	-$2,784,000	-$881,920	$700,084	$1,555,202	$2,440,203	$3,355,874	
DCF	-$2,784,000	-$824,224	$611,480	$1,269,508	$1,861,619	$2,392,692	$24,370,803
NPV	**$2,527,074**						

Key Financial Assumptions

Assumption	Figure	Source
Inflation	1.78%	US Calculation
Tax Rate	0.00%	NWSA 2017 Financial Report
Discount Rate	7.00%	NYU Stern Industry WACC
Cost Multiplier	0%	

COST SAVINGS ESTIMATE

how much can the NWSA save from our solution?

2017 Expenses	Dollars
Operations	*$40,000,000*
Maintenance	$17,329,000
Administration	$19,560,000
Security	$4,235,000
Environmental	$1,791,000
Total	**$82,915,000**

Estimated Cost Savings

Year	1	2	3	4	5	6
Estimated Operations Cost	$40,000,000	$40,704,000	$41,420,390	$42,149,389	$42,891,219	$43,646,104
Savings Capture	0.00%	20.00%	40.00%	60.00%	80.00%	100.00%
Estimated Cost Savings	$0	$814,080	$1,656,816	$2,528,963	$3,431,297	$4,364,610

Cost Savings			
Key Assumptions	*Figure*	*Units*	*Source*
Estimated Costs Savings	10%	Percent/Year	IBM
Annual Operations Expense	40,000,000	Dollars/Year	NWSA 2017 Annual Report
Annual Increase In Operations Expense (Default)	1.76%	Percent/Year	Annualized US Inflation

ACCENTURE PROJECT FEES

how much will it cost to hire Accenture?

Accenture Project Fees			
Key Assumptions	*Figure*	*Units*	*Source*
Accenture Partner Fees	$340.00	Dollars/Hour	Accenture Fee Estimates
Accenture Manager Fees	$270.00	Dollars/Hour	Accenture Fee Estimates
Accenture Consultant Fees	$220.00	Dollars/Hour	Accenture Fee Estimates
Accenture Analyst Fees	$170.00	Dollars/Hour	Accenture Fee Estimates
Acccenture Support Staff Fees	$60.00	Dollars/Hour	Accenture Fee Estimates
Number of Partners	1	Employees/Project	Assumption
Number of Managers	1	Employees/Project	Assumption
Number of Consultants	2	Employees/Project	Assumption
Number of Analysts	2	Employees/Project	Assumption
Number of Support Staff	1	Employees/Project	Assumption
Average Hours Per Week	40	Hours/Week	Assumption
Project Duration	48	Weeks	Assumption
Estimated Project Cost	$2,784,000.00	Dollars/Project	Calculation
Partner Savings	$522,240.00	Dollars/Project	Calculation
Total Estimated Cost	$2,261,760.00	Dollars/Project	Calculation

API DEVELOPMENT AND TRAINING COSTS

what will it cost to develop the APIs and train staff?

API Development and Maintenance			
Key Assumptions	*Figure*	*Units*	*Source*
Estimated API Platform Fees	$20,000	Dollars/Month	APIGee
Estimated Hours to Train	2	Hours/Employee	Assumption
Average Employee Wage	$40	Dollars/Hour	Payscale.com Average Longshoreman Wage
Average Cost/Employee	$80	Dollars/Employee	Calculation
Number of Direct Jobs	18,900	Total Jobs	NWSA Economic Impact Report
Training Percent	50%	Percentage of Employees Needing Training	Estimate
Training Cost	756,000	Total Cost of Training	Calculation
Average Software Data Scientist Salary	$100,000	Salary/Emloyee/Year	Glassdoor
Benefits and Taxes	$40,000	Dollars/Employee	Investors Business Daily
Size of Team	5	Employees/Year	Estimate
Annual Salaries + Benefits of Team	$700,000	Dollars/Year	Calculation

SENSITIVITY ANALYSIS (OVERRUNS VS SAVINGS)

how dependent are our earnings on cost savings and cost projections?

NPV		Cost Savings						
		4.00%	5.50%	7.00%	8.50%	10.00%	11.50%	13.00%
Cost Overrun Modifier	-30.00%	-$2,638,904	-$1,138,609	$361,685	$1,861,980	$3,362,274	$4,862,569	$6,362,864
	-20.00%	-$2,917,304	-$1,417,009	$83,285	$1,583,580	$3,083,874	$4,584,169	$6,084,464
	-10.00%	-$3,195,704	-$1,695,409	-$195,115	$1,305,180	$2,805,474	$4,305,769	$5,806,064
	0.00%	-$3,474,104	-$1,973,809	-$473,515	**$1,026,780**	**$2,527,074**	**$4,027,369**	$5,527,664
	10.00%	-$3,752,504	-$2,252,209	-$751,915	**$748,380**	**$2,248,674**	**$3,748,969**	$5,249,264
	20.00%	-$4,030,904	-$2,530,609	-$1,030,315	**$469,980**	**$1,970,274**	**$3,470,569**	$4,970,864
	30.00%	-$4,309,304	-$2,809,009	-$1,308,715	$191,580	$1,691,874	$3,192,169	$4,692,464
	40.00%	-$4,587,704	-$3,087,409	-$1,587,115	-$86,820	$1,413,474	$2,913,769	$4,414,064
	50.00%	-$4,866,104	-$3,365,809	-$1,865,515	-$365,220	$1,135,074	$2,635,369	$4,135,664

SENSITIVITY ANALYSIS (DR VS SAVINGS)

how dependent are our earnings on cost savings and discount rates?

NPV		Cost Savings 4.00%	5.50%	7.00%	8.50%	10.00%	11.50%	13.00%
Discount Rate	15.00%	-$3,588,512	-$2,425,208	-$1,261,904	-$98,600	$1,064,703	$2,228,007	$3,391,311
	14.00%	-$3,578,111	-$2,378,952	-$1,179,792	$19,367	$1,218,526	$2,417,685	$3,616,844
	13.00%	-$3,566,744	-$2,330,134	-$1,093,524	$143,087	$1,379,697	$2,616,307	$3,852,917
	12.00%	-$3,554,344	-$2,278,597	-$1,002,851	$272,895	$1,548,642	$2,824,388	$4,100,134
	11.00%	-$3,540,838	-$2,224,174	-$907,511	$409,153	$1,725,816	$3,042,479	$4,359,143
	10.00%	-$3,526,148	-$2,166,684	-$807,220	$552,243	$1,911,707	$3,271,171	$4,630,634
	9.00%	-$3,510,190	-$2,105,934	-$701,677	**$702,579**	**$2,106,835**	**$3,511,092**	$4,915,348
	8.00%	-$3,492,875	-$2,041,716	-$590,558	**$860,600**	**$2,311,759**	**$3,762,917**	$5,214,076
	7.00%	-$3,474,104	-$1,973,809	-$473,515	**$1,026,780**	**$2,527,074**	**$4,027,369**	$5,527,664

analysis solution implementation impact q&a