JOURNEY OF A PRODUCT
A profile of journey and communication flow

1. Shipper
2. Export port
3. Ocean carrier
4. Customs authority
5. Import port
6. Intermodal transport
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Blockchain solution
GLOBAL SHIPPING
Trends in global shipping since 1997

TEU Volume

Global Financial Crisis

1 Container Shipping: the Next 30 Years McKinsey and Company, October 2017

TEU Trade

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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.

Significant overcapacity
Decrease in shipping prices
Shipper consolidation and cost cutting

TEU Trade
CAGR (%)


0
20
40
60
80
100
120
140
160
180
200

TEU Trade (mm)

8.3%
10.8%
3.9%

1
2
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TEU Trade (mm)
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.
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.

NWSA Revenues by Line of Business (2017)

- **Container**: 83%
- **Non-Container**: 17%
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.

**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.

**NWSA Revenues by Line of Business (2017)**

- 83% Container
- 9% Non-Container
- 8% Real Estate
## REACHING THE GOAL

*NWSA’s plan to hit 6mm TEUs*

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2. **Reduce overall acreage devoted to containers**
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**Strategic Terminal Configuration**

- **GCPT (Tacoma)**
- **T5 (Seattle)**

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Explaining distributed ledger technology
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SINGLE SOURCE OF TRUTH
- All parties have access to identical and accurate information
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SMART CONTRACTS
- Software that enables
  - Automatic transfer of ownership
  - Immediate billing/payment
BENEFITS OF BLOCKCHAIN

How will blockchain impact the NWSA?
BENEFITS OF BLOCKCHAIN

How will blockchain impact the NWSA?

Administrative Automation

• Smart contracts eliminate paperwork such as Bill of Ladings (BOLs)
• Electronic paperwork decreases customs and processing delays

1 The Asian Journal of Shipping and Logistics, 2017
2 The Journal of Commerce, 2018
## BENEFITS OF BLOCKCHAIN

How will blockchain impact the NWSA?

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**INCREASE UTILIZATION & TRUCK TURN RATE**

<sup>1</sup>The Asian Journal of Shipping and Logistics, 2017  
<sup>2</sup>The Journal of Commerce, 2018
TRADELENS SWOT

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

No Blockchain: 24%
CargoX: 35%
TradeLens: 19%
Silsal: 15%
Other Platform: 7%
No Blockchain: 24%
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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

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**Analysis**: review all criteria to make an informed decision.

**Solution**: choose the technology that best meets all criteria.

**Implementation**: develop and train employees on the selected technology.

**Impact**: evaluate the effectiveness and efficiency of the technology.

**Q&A**: address any questions or concerns related to the technology investment.

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DIRECTLY USING BLOCKCHAINS

How does this solution work in practice?

Third Party Blockchains

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

NWSA Employee System

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

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DIRECTLY USING BLOCKCHAINS

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- No “single view” of all operations

NWSA Employee System

Pain Points
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)

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

2. CHOOSE A DEVELOPMENT PLAN
   - Fast time-to-production
   - Ensures system upholds industry standards
   - Requires minimal expertise and infrastructure

Utilize an API
Choose a Consultant

Partners

apiigee
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IMPLEMENTATION
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3. INTEGRATE WITH PARTNERS
   - Join Tradelens, CargoX, and other major blockchain service providers' networks
   - Equip freight forwarders and ground transportation with tools to use API

Key Needs

Utilize an API
Choose a Consultant
How to get started?

Partners

- apigee
- accenture
- TRADELENS
- CargoX

analysis solution implementation impact q&a
### TIMELINE

**NWSA action plan for the next five years**

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*RFID implementation, utilization initiative
TIMELINE

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<td></td>
</tr>
<tr>
<td>Create TL, CargoX, + other partnerships</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stakeholder due diligence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screen API dev/plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Build API</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test API</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*RFID implementation, utilization initiative
# TIMELINE

**NWSA action plan for the next five years**

<table>
<thead>
<tr>
<th>Current innovations*</th>
<th>Create TL, CargoX, + other partnerships</th>
<th>Stakeholder due diligence</th>
<th>Screen API dev/plan</th>
<th>Build API</th>
<th>Test API</th>
<th>Train employees</th>
<th>Update blockchain compatibility</th>
<th>Complete paperless processes adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td>YEAR 1</td>
<td>YEAR 2</td>
<td>YEAR 3</td>
<td>YEAR 4</td>
<td>YEAR 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*RFID implementation, utilization initiative
**IMPACT**

How will our plan affect the bottom line?

**Financial Projections**

- **Annual Cost Savings**
- **Project Expenses**
- **Net Position**

![Financial Projections Chart](chart.png)
**IMPACT**

How will our plan affect the bottom line?

Financial Projections

- Annual Cost Savings
- Project Expenses
- Net Position

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual Cost Savings</th>
<th>Project Expenses</th>
<th>Net Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>$8.4mm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$8.4mm in Project Expenses
Impact

How will our plan affect the bottom line?

$8.4mm in Project Expenses

$12.8mm in Estimated Cost Savings

Financial Projections

- Annual Cost Savings
- Project Expenses
- Net Position
IMPACT

How will our plan affect the bottom line?

Financial Projections

Annual Cost Savings
Project Expenses
Net Position

$8.4mm in Project Expenses
$12.8mm in Estimated Cost Savings
$2.5mm NPV over 5 Years
JOURNEY OF A PRODUCT
A profile of journey and communication flow

1. Shipper
2. Export port
3. Ocean carrier
4. Customs authority
5. Import port
6. Intermodal transport

Blockchain solution

1. Shipper
2. Export port
3. Ocean carrier
4. Customs authority
5. Import port
6. Intermodal transport
APPENDIX

BASE SLIDES
3: Journey of a Product
8: Global Shipping
11: The Northwest Seaport Alliance
14: Reaching the Goal
18: What is Blockchain
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
45: Journey of a Product
46: Appendix

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49: Customer Needs
50: API Development Path
51: Public vs. Private Platform
52: CargoX
53: TradeLens
54: Stages of Digitization by Industry
55: Why Accenture
56: Do Nothing

INDUSTRY
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59: Shipping in North America
60: Shipping in North America 2
61: Shipping in North America 3
62: Shipping Blockchain Platform
63: Leading Ship Operator's Share of the World Liner Fleet
64: Stakeholders
65: Ports & Terminals
66: Ocean Carriers
67: Customs Authorities
68: Freight Forwarders/3PL
69: Intermodal Transport
70: Shippers
71: Jan 1, 2019 RFID Requirement
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76: Case Study: Floral Shipment
77: Case Study: Floral Shipment 2
78: Pros/Cons of Blockchain (General)
79: Public vs Private Blockchains (Technical)
80: Smart Contracts
81: Benefits of Blockchain
82: What is Blockchain 2
83: How Does Blockchain Work
84: Other Blockchain Uses
85: Direct to Blockchain System
86: Apigee API Management

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88: Impact
89: Cost of Delays per Day
90: Areas of Cost Savings
91: Consolidated Financials
92: Cost Savings Estimate
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*

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

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>Develop In-House</th>
<th>Hire Consultants</th>
<th>Purchase Existing Solution</th>
<th>Outsource Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of Implementation</td>
<td>Yellow</td>
<td>Green</td>
<td>Yellow</td>
<td>Green</td>
</tr>
<tr>
<td>Speed of Implementation</td>
<td>Red</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Green</td>
</tr>
<tr>
<td>Cost</td>
<td>Green</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
</tr>
<tr>
<td>Customization</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
</tr>
<tr>
<td>Customer Experience</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
</tr>
</tbody>
</table>
## PUBLIC VS. PRIVATE PLATFORM

<table>
<thead>
<tr>
<th>CONTROL</th>
<th>PUBLIC: Control distributed among all members</th>
<th>PRIVATE: Controlled by centralized authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEMBERSHIP</td>
<td>PUBLIC: Globally available</td>
<td>PRIVATE: Closed network</td>
</tr>
<tr>
<td>PRIVACY</td>
<td>PUBLIC: Competitors cannot see transactions</td>
<td>PRIVATE: Competitors cannot see transactions</td>
</tr>
<tr>
<td>SECURITY</td>
<td>PUBLIC: Encrypted and extremely secure</td>
<td>PRIVATE: Encrypted and extremely secure</td>
</tr>
</tbody>
</table>

### Example Platforms
- **PUBLIC**: CargoX
- **PRIVATE**: TradeLens, Nexledger
## CARGOX

**Independent blockchain solution**

### CONTROLLERS

01

<table>
<thead>
<tr>
<th>INDEPENDENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Developed by CMA-CMG</td>
</tr>
<tr>
<td>• Independently managed by each member of the chain</td>
</tr>
</tbody>
</table>

### CUSTOMERS

02

<table>
<thead>
<tr>
<th>~32%¹ OF MARKET SHARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• CMG-CMA (11.6%)</td>
</tr>
<tr>
<td>• Cosco (12.4%)</td>
</tr>
<tr>
<td>• OOCL</td>
</tr>
<tr>
<td>• Evergreen Marine (5.2%)</td>
</tr>
<tr>
<td>• Yang Ming (2.8%)</td>
</tr>
</tbody>
</table>

### FUNCTIONALITY

03

<table>
<thead>
<tr>
<th>SERVICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Smart contracts eliminate paperwork</td>
</tr>
<tr>
<td>• Real-time transparency and updates</td>
</tr>
<tr>
<td>• Customs support</td>
</tr>
</tbody>
</table>

### TECHNOLOGY

04

<table>
<thead>
<tr>
<th>PUBLIC BLOCKCHAIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Open network</td>
</tr>
<tr>
<td>• Smart contract enabled</td>
</tr>
<tr>
<td>• Independently managed by each member of the chain</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONTROLLERS</th>
<th>CUSTOMERS</th>
<th>FUNCTIONALITY</th>
<th>TECHNOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM/Maersk Controlled</td>
<td>~19.5%(^1) OF MARKET SHARE</td>
<td>SERVICES</td>
<td>PRIVATE BLOCKCHAIN</td>
</tr>
</tbody>
</table>
|   • Developed by IBM/Maersk   
   • Entirely controlled by IBM/Maersk   
   • Competitors’ data protected |   • Maersk (17.7%)   
   • Hamburg Sud   
   • Pacific International lines (1.8%) |   • Smart contracts eliminate paperwork   
   • Real-time transparency and updates   
   • Customs support |   • Closed and permissioned network   
   • Smart contract enabled   
   • Controlled by one, centralized authority |

\(^1\)Top Ten Shipping Companies. Champion Freight. November 1\(^{st}\), 2018. https://www.championfreight.co.nz/top-ten-shipping-companies
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

**STAGE 02**
- Digital engagement with customers increasingly important
- Increasing personalisation of the customer experience using advanced data analytics

**STAGE 03**
- Advanced technologies and data analytics constantly deployed to find competitive advantages

Digital technology will:
- Vastly improve the customer experience
- Enable next level optimisation 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.

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

$1.7 Million
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
GLOBAL CONTAINER TRADE BY INDUSTRY

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

- **Raw materials**: 2%, $1,262
- **Consumer goods**: 3%, $480
- **Cap. equipment**: 2%, $360
- **High tech**: 3%, $589
- **Automotive**: 2%, $402
- **Fashion**: 3%, $313
- **Machinery parts**: 2%, $542
- **Chemicals**: 3%, $397
- **Perishables**: 5%, $174

Source: Accenture, 2017
SHIPPING IN NORTH AMERICA

NWSA’s competition

Global Trade Slowdown

6.8mm TEU expansion on West Coast

Shipping companies searching for savings

Competition for customers is increasing
How do the major players stack up?

Sources: IBIS World, US Port and Harbor Operations
SHIPPING IN NORTH AMERICA 3

Key players and market share

Port of Long Beach: 16.2%
Georgia Ports Authority: 14%
Port of Houston: 12.5%
The Northwest Seaport Alliance: 11.3%
The Port Authority of New York and New Jersey: 10.6%
Other: 6.0%

Sources: IBIS World, US Port and Harbor Operations
## SHIPPING BLOCKCHAIN PLATFORM PLAYERS

<table>
<thead>
<tr>
<th>Carrier Operator(s)</th>
<th>CargoX</th>
<th>TradeLens</th>
<th>SILSAL</th>
<th>NEXLEDDER</th>
<th>GLOBAL SHARED CONTAINER PLATFORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>COSCO Shipping Lines, CMA CGM, Evergreen Marine, OOCL, Yang Ming, DP World, Hutchison Ports, PSA International &amp; Shanghai International Port</td>
<td>A.P. Moller–Maersk Group</td>
<td>Mediterranean Shipping Company (MSC)</td>
<td>Hyundai Merchant Marine (South Korea)</td>
<td>“a confirmed carrier in the 10-20 global ranking”¹</td>
<td></td>
</tr>
<tr>
<td>Tech Partner(s)</td>
<td>CargoSmart</td>
<td>IBM</td>
<td>Abu Dhabi Ports</td>
<td>Samsung SDS</td>
<td>Blockshipping</td>
</tr>
<tr>
<td>Market Share</td>
<td>35%</td>
<td>19.5%</td>
<td>14.5%</td>
<td>1.8%¹</td>
<td>~1.5%</td>
</tr>
</tbody>
</table>

¹Wall Street Journal, October 2018  
²Bitcoinist, May 2018
<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Provide:</th>
<th>Benefit from:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ports &amp; Terminals</td>
<td>location data for thru packages</td>
<td>real time visibility to use in terminal planning, greater predictability</td>
</tr>
<tr>
<td>Ocean Carriers</td>
<td>ocean-leg location data</td>
<td>connections to global ports</td>
</tr>
<tr>
<td>Customs authorities</td>
<td>import/export clearance</td>
<td>more informed risk assessments, less manual paperwork</td>
</tr>
<tr>
<td>Freight forwarders/3PL</td>
<td>transport plan, intermodal handoff plans</td>
<td>improved visibility of customs clearance brokerage</td>
</tr>
<tr>
<td>Intermodal Transport</td>
<td>disposition of shipments on trucks, rail, etc.</td>
<td>improved utilization of assets</td>
</tr>
<tr>
<td>Shippers</td>
<td>paperless data exchange</td>
<td>early notification of issues, transparency to validate surcharges, less safety stock</td>
</tr>
</tbody>
</table>
PORTS & TERMINALS
Stakeholder trade-off analysis

Provide:

• location data for thru packages

Benefit from:

• real time visibility to use in terminal planning, greater predictability
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
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
Provide:

- paperless data exchange

Benefit from:

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

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

Source: Harbor Trucking Association
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.
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*

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Auto-triggering</strong></td>
<td><strong>“Wasteful”</strong></td>
</tr>
</tbody>
</table>
| • 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) | • 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. |
| **Verification** | **Immutability as a flaw** |
| • Members within the blockchain either deny or approve additional blocks.  
• If approved, the block is added to the chain of records. | • 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

**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

INCREASE UTILIZATION & SHIP TURN RATE

---

WHAT IS BLOCKCHAIN 2
Explaining distributed ledger technology

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

SMART CONTRACTS

All parties have access to identical and accurate information

SAMPLE CONTRACT

All transactions are verified by every party

ONE TRUTH

All prior transactions and records are immutable

Can only change database by “adding” entries

PROTECTED DATA
HOW DOES BLOCKCHAIN WORK

1. A transaction is requested
2. The transaction is broadcasted to a network of nodes
3. The network validates the transaction using known algorithms

Validation may include:
- Smart Contracts
- Cryptocurrency
- Other records

4. The transaction is unified with other transactions as a block of data.
5. The new block is added to the blockchain in a transparent and unalterable way.
6. The transaction is complete

Benefits of the Blockchain:
- Transparency and tracking
- Simpler and faster
- Reduced costs
- Increased trust
DIRECT TO BLOCKCHAIN SYSTEM

how does this solution work in practice?

Each system has unique commands/actions

Employees must be trained on each system

Employees must

be trained on

each system

Each employee

communicates
directly with
Blockchain

No error
checking or
controls

Third Party
blockchains

NWSA
Employees

Nexledger

CargoX

TRADE+LENS

analysis solution implementation impact q&a
APIGEE API MANAGEMENT

Apigee API Management

Security · Analytics · Operations · Runtime
Monetization · Mediation · Developer Portal · Monitoring
**IMPACT**

*how will our plan hit the bottom line?*

### Financial Projections

- **Annual Cost Savings**
- **Total Expenses**
- **Net Position**

### Consolidated Income Statement

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

---

**Impact**

*how will our plan hit the bottom line?*
### COST OF DELAYS PER DAY

*breaking down the impact of delayed shipments*

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

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

Source: UNCTAD secretariat calculations, based on data supplied by Clarkson's 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
**CONSOLIDATED FINANCIALS**

how will our recommendations hit the bottom line?

### Income Statement

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

### Cash Flows

<table>
<thead>
<tr>
<th>Year</th>
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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5TV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Cash Flows</td>
<td>-$2,784,000</td>
<td>-$881,920</td>
<td>$700,084</td>
<td>$1,555,202</td>
<td>$2,440,203</td>
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<td>$2,392,692</td>
</tr>
<tr>
<td>NPV</td>
<td>$2,527,074</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Key Financial Assumptions

<table>
<thead>
<tr>
<th>Assumption</th>
<th>Figure</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation</td>
<td>1.78%</td>
<td>US Calculation</td>
</tr>
<tr>
<td>Tax Rate</td>
<td>0.00%</td>
<td>NWSA 2017 Financial Report</td>
</tr>
<tr>
<td>Discount Rate</td>
<td>7.00%</td>
<td>NYU Stern Industry WACC</td>
</tr>
<tr>
<td>Cost Multiplier</td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>
## COST SAVINGS ESTIMATE

**how much can the NWSA save from our solution?**

### 2017 Expenses

<table>
<thead>
<tr>
<th>Category</th>
<th>Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations</td>
<td>$40,000,000</td>
</tr>
<tr>
<td>Maintenance</td>
<td>$17,329,000</td>
</tr>
<tr>
<td>Administration</td>
<td>$19,560,000</td>
</tr>
<tr>
<td>Security</td>
<td>$4,235,000</td>
</tr>
<tr>
<td>Environmental</td>
<td>$1,791,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$82,915,000</strong></td>
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</table>

### Estimated Cost Savings

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

### Key Assumptions

<table>
<thead>
<tr>
<th>Description</th>
<th>Figure</th>
<th>Units</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Costs Savings</td>
<td>10% Percent/Year</td>
<td>IBM</td>
<td></td>
</tr>
<tr>
<td>Annual Operations Expense</td>
<td>40,000,000 Dollars/Year</td>
<td>NWSA 2017 Annual Report</td>
<td></td>
</tr>
<tr>
<td>Annual Increase In Operations Expense (Default)</td>
<td>1.76% Percent/Year</td>
<td>Annualized US Inflation</td>
<td></td>
</tr>
</tbody>
</table>
## ACCENTURE PROJECT FEES

**How much will it cost to hire Accenture?**

<table>
<thead>
<tr>
<th>Key Assumptions</th>
<th>Figure</th>
<th>Units</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accenture Partner Fees</strong></td>
<td>$340.00</td>
<td>Dollars/Hour</td>
<td>Accenture Fee Estimates</td>
</tr>
<tr>
<td><strong>Accenture Manager Fees</strong></td>
<td>$270.00</td>
<td>Dollars/Hour</td>
<td>Accenture Fee Estimates</td>
</tr>
<tr>
<td><strong>Accenture Consultant Fees</strong></td>
<td>$220.00</td>
<td>Dollars/Hour</td>
<td>Accenture Fee Estimates</td>
</tr>
<tr>
<td><strong>Accenture Analyst Fees</strong></td>
<td>$170.00</td>
<td>Dollars/Hour</td>
<td>Accenture Fee Estimates</td>
</tr>
<tr>
<td><strong>Accenture Support Staff Fees</strong></td>
<td>$60.00</td>
<td>Dollars/Hour</td>
<td>Accenture Fee Estimates</td>
</tr>
<tr>
<td><strong>Number of Partners</strong></td>
<td>1</td>
<td>Employees/Project</td>
<td>Assumption</td>
</tr>
<tr>
<td><strong>Number of Managers</strong></td>
<td>1</td>
<td>Employees/Project</td>
<td>Assumption</td>
</tr>
<tr>
<td><strong>Number of Consultants</strong></td>
<td>2</td>
<td>Employees/Project</td>
<td>Assumption</td>
</tr>
<tr>
<td><strong>Number of Analysts</strong></td>
<td>2</td>
<td>Employees/Project</td>
<td>Assumption</td>
</tr>
<tr>
<td><strong>Number of Support Staff</strong></td>
<td>1</td>
<td>Employees/Project</td>
<td>Assumption</td>
</tr>
<tr>
<td><strong>Average Hours Per Week</strong></td>
<td>40</td>
<td>Hours/Week</td>
<td>Assumption</td>
</tr>
<tr>
<td><strong>Project Duration</strong></td>
<td>48</td>
<td>Weeks</td>
<td>Assumption</td>
</tr>
<tr>
<td><strong>Estimated Project Cost</strong></td>
<td>$2,784,000.00</td>
<td>Dollars/Project</td>
<td>Calculation</td>
</tr>
<tr>
<td><strong>Partner Savings</strong></td>
<td>$522,240.00</td>
<td>Dollars/Project</td>
<td>Calculation</td>
</tr>
<tr>
<td><strong>Total Estimated Cost</strong></td>
<td>$2,261,760.00</td>
<td>Dollars/Project</td>
<td>Calculation</td>
</tr>
</tbody>
</table>
## API DEVELOPMENT AND TRAINING COSTS

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

### API Development and Maintenance

<table>
<thead>
<tr>
<th>Key Assumptions</th>
<th>Figure</th>
<th>Units</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated API Platform Fees</td>
<td>$20,000</td>
<td>Dollars/Month</td>
<td>APIGee</td>
</tr>
<tr>
<td>Estimated Hours to Train</td>
<td>2</td>
<td>Hours/Employee</td>
<td>Assumption</td>
</tr>
<tr>
<td>Average Employee Wage</td>
<td>$40</td>
<td>Dollars/Hour</td>
<td>Payscale.com Average Longshoreman Wage</td>
</tr>
<tr>
<td>Average Cost/Employee</td>
<td>$80</td>
<td>Dollars/Employee</td>
<td>Calculation</td>
</tr>
<tr>
<td>Number of Direct Jobs</td>
<td>18,900</td>
<td>Total Jobs</td>
<td>NWSA Economic Impact Report</td>
</tr>
<tr>
<td>Training Percent</td>
<td>50%</td>
<td>Percentage of Employees</td>
<td>Estimate</td>
</tr>
<tr>
<td>Training Cost</td>
<td>756,000</td>
<td>Total Cost of Training</td>
<td>Calculation</td>
</tr>
<tr>
<td>Average Software Data Scientist</td>
<td>$100,000</td>
<td>Salary/Employee/Year</td>
<td>Glassdoor</td>
</tr>
<tr>
<td>Salary</td>
<td>$40,000</td>
<td>Dollars/Employee</td>
<td>Investors Business Daily</td>
</tr>
<tr>
<td>Benefits and Taxes</td>
<td>5</td>
<td>Employees/Year</td>
<td>Estimate</td>
</tr>
<tr>
<td>Size of Team</td>
<td>$700,000</td>
<td>Dollars/Year</td>
<td>Calculation</td>
</tr>
<tr>
<td>Annual Salaries + Benefits of</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sensitivity Analysis (Oversruns vs Savings)

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

<table>
<thead>
<tr>
<th>NPV</th>
<th>4.00%</th>
<th>5.50%</th>
<th>7.00%</th>
<th>Cost Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8.50%</td>
</tr>
<tr>
<td>-30.00%</td>
<td>-$2,638,904</td>
<td>-$1,138,609</td>
<td>$361,685</td>
<td>$1,861,980</td>
</tr>
<tr>
<td>-20.00%</td>
<td>-$2,917,304</td>
<td>-$1,417,009</td>
<td>$83,285</td>
<td>$1,583,580</td>
</tr>
<tr>
<td>-10.00%</td>
<td>-$3,195,704</td>
<td>-$1,695,409</td>
<td>-$195,115</td>
<td>$1,305,180</td>
</tr>
<tr>
<td>0.00%</td>
<td>-$3,474,104</td>
<td>-$1,973,809</td>
<td>-$473,515</td>
<td>$1,026,780</td>
</tr>
<tr>
<td>10.00%</td>
<td>-$3,752,504</td>
<td>-$2,252,209</td>
<td>-$751,915</td>
<td>$748,380</td>
</tr>
<tr>
<td>20.00%</td>
<td>-$4,030,904</td>
<td>-$2,530,609</td>
<td>-$1,030,315</td>
<td>$469,980</td>
</tr>
<tr>
<td>30.00%</td>
<td>-$4,309,304</td>
<td>-$2,809,009</td>
<td>-$1,308,715</td>
<td>$191,580</td>
</tr>
<tr>
<td>40.00%</td>
<td>-$4,587,704</td>
<td>-$3,087,409</td>
<td>-$1,587,115</td>
<td>-$86,820</td>
</tr>
<tr>
<td>50.00%</td>
<td>-$4,866,104</td>
<td>-$3,365,809</td>
<td>-$1,865,515</td>
<td>-$365,220</td>
</tr>
</tbody>
</table>
**SENSITIVITY ANALYSIS (DR VS SAVINGS)**

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

<table>
<thead>
<tr>
<th>Discount Rate</th>
<th>NPV 15.00%</th>
<th>NPV 14.00%</th>
<th>NPV 13.00%</th>
<th>NPV 12.00%</th>
<th>NPV 11.00%</th>
<th>NPV 10.00%</th>
<th>NPV 9.00%</th>
<th>NPV 8.00%</th>
<th>NPV 7.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.00%</td>
<td>-$3,588,512</td>
<td>-$2,425,208</td>
<td>-$1,261,904</td>
<td>-$98,600</td>
<td>$1,064,703</td>
<td>$2,228,007</td>
<td>$3,391,311</td>
<td>$4,915,348</td>
<td>$5,527,664</td>
</tr>
<tr>
<td>5.50%</td>
<td>-$3,578,111</td>
<td>-$2,378,952</td>
<td>-$1,179,792</td>
<td>$19,367</td>
<td>$1,218,526</td>
<td>$2,417,685</td>
<td>$3,616,844</td>
<td>$4,100,134</td>
<td>$5,214,076</td>
</tr>
<tr>
<td>7.00%</td>
<td>-$3,566,744</td>
<td>-$2,330,134</td>
<td>-$1,093,524</td>
<td>$143,087</td>
<td>$1,379,697</td>
<td>$2,616,307</td>
<td>$3,852,917</td>
<td>$4,359,143</td>
<td>$5,527,664</td>
</tr>
<tr>
<td>8.50%</td>
<td>-$3,554,344</td>
<td>-$2,278,597</td>
<td>-$1,002,851</td>
<td>$272,895</td>
<td>$1,548,642</td>
<td>$2,824,388</td>
<td>$4,100,134</td>
<td>$4,915,348</td>
<td>$5,527,664</td>
</tr>
<tr>
<td>10.00%</td>
<td>-$3,540,838</td>
<td>-$2,224,174</td>
<td>-$907,511</td>
<td>$409,153</td>
<td>$1,725,816</td>
<td>$3,042,479</td>
<td>$4,359,143</td>
<td>$5,214,076</td>
<td>$5,527,664</td>
</tr>
<tr>
<td>11.00%</td>
<td>-$3,526,148</td>
<td>-$2,166,684</td>
<td>-$807,220</td>
<td>$552,243</td>
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<td>$3,271,171</td>
<td>$4,630,634</td>
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<td>$5,527,664</td>
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<tr>
<td>12.00%</td>
<td>-$3,510,190</td>
<td>-$2,105,934</td>
<td>-$701,677</td>
<td>$702,579</td>
<td>$2,106,835</td>
<td>$3,511,092</td>
<td>$4,915,348</td>
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<td>$5,527,664</td>
</tr>
<tr>
<td>13.00%</td>
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<td>-$2,041,716</td>
<td>-$590,558</td>
<td>$860,600</td>
<td>$2,311,759</td>
<td>$3,762,917</td>
<td>$5,214,076</td>
<td>$5,527,664</td>
<td>$5,527,664</td>
</tr>
<tr>
<td>14.00%</td>
<td>-$3,474,104</td>
<td>-$1,973,809</td>
<td>-$473,515</td>
<td>$1,026,780</td>
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<td>$4,027,369</td>
<td>$5,527,664</td>
<td>$5,527,664</td>
<td>$5,527,664</td>
</tr>
<tr>
<td>15.00%</td>
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<td>-$1,903,618</td>
<td>-$352,197</td>
<td>$1,195,699</td>
<td>$2,780,007</td>
<td>$4,583,007</td>
<td>$5,527,664</td>
<td>$5,527,664</td>
<td>$5,527,664</td>
</tr>
</tbody>
</table>

NPV: Net Present Value
Cost Savings: The difference between the present value of future cash flows with and without the savings.
Discount Rate: The rate used to calculate the present value of future cash flows.