All Aboard: Shipping With Blockchain

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Keaton Layman
Christopher Beardsley
Overview

Blockchain Benefits

Market Analysis

Recommendation
Blockchain Benefits
Blockchain Market and Success

Connected Industry
Blockchain Market and Success

Connected Industry

Digitalizes Paperwork
Blockchain Market and Success

- Connected Industry
- Digitalizes Paperwork
- Saves Money

Blockchain Benefits

Market Analysis

Recommendation

Appendix
Market Analysis
Industry Projects

Global Shipping Business Network
Industry Projects

Global Shipping Business Network

Blockchain Benefits

Market Analysis

Recommendation

Appendix
Industry Projects

Global Shipping Business Network

Blockchain Benefits

Market Analysis

Recommendation

Appendix
Industry Projects

Global Shipping Business Network

Blockchain Benefits

Market Analysis

Recommendation

Appendix
TRADE+LENS

- Developed by Maersk and IBM
- Worldwide Cloud for Shipping Information
- Connects the Entire Industry with a Secure Private BlockChain
TradeLens SWOT Analysis

**Strengths:**
- Ready to Implement
- Massive Database
- Subscription Based

**Weaknesses:**
- Small Market Share

**Opportunities:**
- Universal Growth Potential

**Threats:**
- Governing Bodies
- Industry Lack of Trust
- Many Competitors
Maersk and IBM Incentives

- Universal Blockchain platform in the shipping industry
- More data

- Ownership
- Subscription Bases Profiting
Shipping Market Share by Blockchain Project

- TradeLens
- Oracle
- Sisal
- Accenture
- Samsung
- Nothing
## Decision Methodology

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Financial Analysis

Invest Now:

(High Risk)

- Non-Universal (3%)
- $750,000 Initial Investment
- Cost: $100,000 Per Year

NPV = $5.2 Million
(10 Years)
Financial Analysis

Invest Now: (High Risk)
- Non-Universal (3%)
- $750,000 Initial Investment
- Cost: $100,000 Per Year

Invest Later: (Low Risk)
- 10% Annual Operations Savings
- $750,000 Initial Investment
- Cost: $100,000 Per Year

NPV = $5.2 Million (10 Years)
NPV = $6.5 Million (5 Years)
Financial Analysis

1. **Invest Now:** 
   - High Risk
   - Initial Investment: $750,000
   - Subscription Cost: $100,000 per year
   - 10% Annual Operations Savings
   - NPV = $5.2 Million (10 Years)

2. **Invest Later:** 
   - Low Risk
   - Initial Investment: $750,000
   - Subscription Cost: $100,000 per year
   - 10% Annual Operations Savings
   - NPV = $6.5 Million (5 Years)

3. **Compare:** 
   - $6.5 - $5.2 = $1.3 Million + Mitigated Risk
   - Invest Later

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Recommendation
Universal Standard Needed
TradeLens Recap

- Lack of Current Participation
- Lower Chance of Success in the Future
Going Forward

2018
TradeLens Public Release

2019

2020
Development of Industry Standards by major Ocean Lines

2021
Universal Platform Adopted by Entire Industry

2022
NWSA Blockchain Investment

2023
Patience is a Virtue

Wait → Observe → Invest

Blockchain Benefits  Market Analysis  Recommendation  Appendix
<table>
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<tr>
<th>Ocean Line</th>
<th>Alliance</th>
<th>Percent Market Share</th>
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<td>Maersk/Hamburg Sud</td>
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<td>34.3</td>
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<td>Ocean Alliance</td>
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<td>Hyundai</td>
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<td>Total</td>
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Percent Shares in Each Blockchain

Share of Ocean Shipping by Blockchain Initiative

- None: 31.8%
- TradeLens: 19.7%
- Oracle: 29.0%
- Samsung: 1.9%
- Accenture Combo: 3.0%
- Silsal: 14.6%
Global Shipping Leaders

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<th>Ocean Line</th>
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<td>ONE (MOSKL/K Line/NYK)</td>
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<td>ZIM</td>
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NPV Calculations (Invest Now)

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<tr>
<th>Year</th>
<th>Discount Factor</th>
<th>Undiscounted Cash Flow</th>
<th>Undiscounted Subscription Cost</th>
<th>Present Value</th>
<th>Discounted Value</th>
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Net Present Value: $5,220,965.47
NPV Calculations (Invest Now)

### NPV Calculations (Invest Now)

#### Operation Expenses (in Thousands)

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<th></th>
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#### Undiscounted Subscription Cost

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</table>

#### Annual Operation Expenses Growth:

0.01073

#### Annual Operation Expenses Savings Rate from Blockchain:

0.03

#### Undiscounted Cash Flows:

1237129.338 1250399.51 1263812 1277368.41 1291070.21 1304918.981 1318916.3 1333063.77 1347362.99 1361815.592

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*The cost of all that documentation could be as high as 22% of the overall cost of the physical transportation* - CEO of TradeLens (White)

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**STATEMENT OF REVENUES, EXPENSES AND CHANGES IN NET POSITION**

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**Sensitivity net pension liability to changes in the
discount rate.**

The table below presents the net pension liability of employees, calculated using the discount rate of 7.30 percent as well as what employers’ net pension liability would be if it were calculated using a discount rate 1 percentage point lower (5.5 percent) or 1 percentage point higher (8.5 percent) than the current rate (dollars in thousands):

<table>
<thead>
<tr>
<th>December 31, 2017:</th>
<th>Pension Trust</th>
<th>% Decrease</th>
<th>Discount Rate</th>
<th>% Increase</th>
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<td>$1,093</td>
<td>$887</td>
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<td>Discount rate</td>
<td>6.50%</td>
<td>7.50%</td>
<td>8.50%</td>
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Detailed information about the pension plan’s fiduciary net position is available in the separate issued DRS financial reports. Additional actuarial and pension plan information is included in the DRS 2017 Comprehensive Annual Financial Report (CAFR), including descriptions of actual data, assumptions, methods, and plan provisions related to the preparation of GAAP EFC and GAAP MR. Additional details regarding this information is included in the IRS 2017 Report on Financial Condition and Economic Experience Study on the CAFR website.
NPV Calculations (Invest Later)

<table>
<thead>
<tr>
<th>Year</th>
<th>Discount Factor</th>
<th>Undiscounted Cash Flow</th>
<th>Undiscounted Subscription Cost</th>
<th>Present Value</th>
<th>Discounted Total Future Cash Flow</th>
<th>Net Present Value</th>
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<td>0</td>
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Discounted Value
- 1,531,272
- 1,426,717
- 1,341,443
- 1,270,730
- 1,209,913

Present Value vs Discounted Value

<table>
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<td>500,000</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>500,000</td>
<td>-</td>
</tr>
</tbody>
</table>
NPV Calculations (Invest Later)
NPV Calculations (Initial Investment)

Initial Investment: Port of Seattle + Port of Tacoma
$650,000 + $75833 = $725833

Conservative Estimate: $750,000

Port of Seattle 2018 Budgeted Revenue: 670 million

Port of Tacoma 2018 Budgeted Revenue: 70 million
Why Tradelens will not win

- Too much competition in the Market
- They are the biggest Competition to the other companies
- Not enough transparency
Risk
Tradelens Prescriptions

Subscribing to Events

The TradeLens platform provides several types of event subscriptions:

- **Port**: subscribes to all events for a specific port of call. This includes all events originating, passing through, and arriving at the port.

- **Country**: subscribes to all events for a specific country. This includes all events originating, passing through, and arriving at the country.

- **Organization**: subscribes to all events that are determined to be associated with the organization.

- **Terminal**: subscribes to all events that pass through a specific terminal.

- **Delegation ID**: subscribes to either import events, export events, or all events for a specific shipment or container. The delegation IDs are returned on the "E468 Start Shipment Tracking" and "E278 Start Container Tracking" events and the appropriate one (import, export, all) is used to set up the subscription.
Alternatives

Cloud Computing

(add in the large cloud computing company succeeding in this industry)

The only risk we can see from waiting is losing out on a potentially earlier investment with a possible winner, but it is safer to wait.

Investigate what other ports are doing, like NWSA!!

Could we lose business if someone else successfully uses it and we don’t?
APL and Accenture said they plan to pilot their product by the end of this year. Accenture said it has tested its technology with other pilot shipments that range from beer to medical supplies.

APL Ltd., owned by the world’s third-largest container line CMA CGM SA, together with Anheuser-Busch InBev NV, Accenture, and freight forwarding giant Kuehne + Nagel


Samsung SDS

South Korea’s Hyundai Merchant Marine Co. held trial runs last year using a system developed with Samsung SDS Co.

the Port of Rotterdam, has partnered with major Dutch bank ABN AMRO and the IT subsidiary of Samsung

the infrastructure behind the project was developed by BlockLab – a Dutch company established by Port of Rotterdam Authority. It will also involve two other decentralized platforms – Samsung’s Nexledger, created back in 2017, and Corda, an open-source blockchain platform launched by enterprise software firm R3.


Distrust of TradeLens

"Without a joint solution, we're going to waste a lot of money, and that would benefit no one." - Hapag-Lloyd CEO

A digital solution in which the 5-7 biggest liner companies develop joint platform is the only realistic way forward for the container sector.

“I won’t mince words here – we do need to get the other carriers on the platform. Without that network, we don’t have a product. That is the reality of the situation.” - Head of Tradelens

“We are not going to invest in something that is some company’s baby that they have exclusive copyright on and [that] will be a closed system. We need to have an open system.” - ONE CEO

The platform has only managed to get one carrier outside the Maersk Group — Pacific International Lines (PIL) — to join

https://shippingwatch.com/carriers/Container/article10602520.ece
The CargoX platform is based on the CargoX’s Blockchain Document Transaction System technology. It allows companies to create, transfer, and state ownership of information and the various types of freight shipping documents.

Shipping, freight forwarding, NVOCC, exporting and importing companies, forwarder alliances and networks providing solutions for logistics and supply chains all over the world can join to use the CargoX platform.

CargoX pointed out that users need not implement any new infrastructure. The systems stores documents and data securely encrypted on a public globally accessible blockchain network.

ShipChain

There really isn’t much to gain for an enterprise by using private or permissioned blockchain systems, due to the lack of inherent trust in them — they could just as well use a centralized database, as it would behave the same. A public blockchain, with its incentive mechanisms such as tokens, truly fosters the trust of the ecosystem without having to trust all of the players involved. - CEO of ShipChain

Industry Opinions

50% reported real-time container visibility as a top concern of freight forwarders

91% said the creation of agreed standards and protocols is essential

82% said standards should be done by a neutral party

EDI and API scored the highest, blockchain the lowest on standards that will help shipping the most

“Through 2020, 90 percent of the blockchain initiatives in supply chain are going to be the proof of concept variety,” said Andrew McLoone, director of operations at the third-party logistics provider (3PL) BDP International, said at the JOC Logistics Technology Conference on a panel about using the technology for ocean bill of lading production. “When people talk about it, they talk about visibility and the ability to reduce paper trade. When it comes to visibility, we’re not sure blockchain is the accelerator. [Artificial intelligence] and machine learning are more likely opportunities. But when we talk about documentation, we do think there are opportunities when you look at how blockchain allows you to transfer cryptocurrency among partners.”
GE Port Optimizer at Long Beach

GE Transportation and the Port of Long Beach have recently completed a three-month technology pilot to improve cargo flow. [They showed] 14+ days faster access to information, improved turn times while increasing throughput, more productive turns, and all leading to increased supply chain performance.

Port Optimizer™ is cloud-based software that enhances supply chain performance and predictability by delivering real time data-driven insights through a single portal to stakeholders across the supply chain. Integrating data from across the port, combining machine learning and deep domain expertise, it helps the supply chain monitor and respond to dynamic conditions, align people and resources, and proactively communicate across functions – enabling maximum port cargo flow and delivery performance.

The port has stated that it will be building an online portal for transactions dealing with tracking and transporting containerized cargo. The Port will be working with New Jersey-based logistics software provider Advent Intermodal Solutions LLC, whose eModal port community system is already in use by terminal operators at Oakland, to develop the portal.

Development of the portal is already in progress, with a projected launch date in the third-quarter 2018.

Federal Maritime Commission commissioner Rebecca Dye recently convened 3 teams of 34 supply chain experts to advise on recommendations for operational challenges.

The result was unanimous among the groups, which called for the creation of a detailed national portal that would share critical data and further supply chain visibility. Collected data could reflect container, chassis and dray truck availability.

Standards Organization

A.P. Moller – Maersk, CMA CGM, Hapag-Lloyd, MSC and Ocean Network Express plan to establish container shipping association

15th November 2018 – Singapore – Ocean Network Express announces that five container shipping companies intend to create an association with the purpose of paving the way for digitalization, standardization and interoperability in the container shipping industry.

IT executives from A.P. Moller – Maersk, CMA CGM, Hapag-Lloyd, MSC and Ocean Network Express are currently discussing the creation of common information technology standards which shall be openly available and free of charge for all stakeholders of the wider container shipping industry.

“It’s in the customers’ and all stakeholders’ best interest, if container shipping companies operate with a common set of information technology standards”, says André Simha, CIO of MSC and spokesperson of the group.

“We are striving for less red tape and better transparency. The timing is right, as emerging technologies create new customer friendly opportunities. Together, we gain traction in delivering technological breakthroughs and services to our customers compared to working in our own closed silos”, he adds.

A need for a neutral and non-profit association

Whilst the shipping industry already has multiple organizations and associations, the members of the group identified a need for a neutral and non-profit body for ocean carriers that is driven by delivering benefits for the industry and its stakeholders.

“That is why we will also welcome new members with open arms to join the association”, Simha concludes.

The association has no intent of developing or operating any digital platform, but aims to ensure interoperability through standardization. Similarly, the association will not discuss any commercial or operational matters.
the Blockchain In Transport Alliance (BiTA), has quickly grown into the largest commercial blockchain alliance in the world, with nearly 500 members in over 25 countries that collectively generate over $1 trillion in revenue annually.

BiTA is a member-driven organization; members are primarily from the freight, transportation, logistics and affiliated industries. Alliance members share a common mission of driving the adoption of emerging technology forward. We accomplish this by developing industry standards; educating members and others on blockchain applications/solutions and distributed ledger technology (DLT); and encouraging the use and adoption of new solutions.

https://www.bita.studio/
The container shipping industry digitalization drive has shown signs of stalling in the last few years. INTTRA has previously tried to drive standards adoption across individual carriers in the container shipping industry, notably around creating a standardized bill of lading format and carrier invoicing. Those efforts never got off the ground and INTTRA, like other software companies in the industry, has focused on normalizing data within its own systems rather than developing industry standards.

United Nations (Gov Regulation)

United Nations Centre for Trade Facilitation and Electronic Business

Its principal focus is on facilitating national and international transactions, through the simplification and harmonization of processes, procedures and information flows, and so contributing to the growth of global commerce.

UN/CEFACT [Should] work with national delegations and its experts to establish working groups to progress the following new technical specifications. The establishment of a technical working group to review existing work by standards organizations in order to identify if there is a need to collaborate with them on a possible framework for inter ledger interoperability specifications that would define:

- Standards for on-chain metadata;
- Standards for inter-ledger notarization

https://uncefact.unece.org/display/uncefactpublicreview/Public+Review%3A+Blockchain+Whitepaper

http://www.unece.org/cefact/about.html
The new consortium, powered by Oracle Cloud Blockchain Service, involves CMA CGM, Cosco Shipping (and subsidiary brand OOCL), Evergreen Marine, and Yang Ming. All but Yang Ming are part of the Ocean Alliance, and collectively those lines deploy roughly one-third of total containership capacity. The terminal operators include DP World, Hutchison Ports, PSA International Pte Ltd, and Shanghai International Port, the largest companies in that industry outside of APM Terminals. CargoSmart, a shipment management software provider, is owned by Cosco.

CargoSmart projects a 65% reduction in the amount of time required to collect, consolidate, and confirm data from multiple parties and to handle shipping data that is repetitive in different documents by leveraging its blockchain shipment documentation solution.


NWSA Goals/Plan

PNW GATEWAY CRITICAL SUCCESS FACTORS

- Increased terminal utilization
- Productivity enhancements
- Rail competitiveness
- Infrastructure investment
- Regulatory climate

Recent industry changes drive actions to stay competitive

Optimized infrastructure investment strategy

Customer focused solutions to become the gateway of choice

NWSA Growth

CARGO GROWTH GOALS

Seaport Alliance TEU History and Comparison of Baseline and Upside Forecasts

Assumes new string at strategic terminal

2014: 3.4 M TEU 34,000 Jobs

Actual performance 2005-2014

2026: 6M TEU 48,500 Jobs

2014: 3.4 M TEU 34,000 Jobs

2.75%

4.55%
# Port of Seattle Lean Training

## High Performance Organization - 2018 Budget Requests

<table>
<thead>
<tr>
<th>Category</th>
<th>FY '18</th>
<th>FY '17</th>
<th>FY '16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port of Seattle Leadership Development Program</td>
<td>125,000</td>
<td>118,313</td>
<td>58,845</td>
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<tr>
<td>HR Communications Consulting Services</td>
<td>75,000</td>
<td>5,000</td>
<td>1,650</td>
</tr>
<tr>
<td>HR Benefits Manager - backfill position for 6 mos.</td>
<td>52,159</td>
<td>1,000</td>
<td>31,600</td>
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<tr>
<td>Senior Talent Acquisition Representative</td>
<td>13,000</td>
<td>279</td>
<td>6,420</td>
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<tr>
<td>Executive Office College Intern</td>
<td>1.5</td>
<td>26,640</td>
<td>1,650</td>
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<tr>
<td>Commission Staff Assistant - Commission Records</td>
<td>0.0</td>
<td>8,080</td>
<td>5,000</td>
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<tr>
<td>Employee Engagement Survey (Full &amp; Pulse)</td>
<td>1.0</td>
<td>5,000</td>
<td>3,000</td>
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<tr>
<td>Labor Relations Office buildout; Registration for training; Supplies/Software</td>
<td>1.0</td>
<td>7,140</td>
<td>31,600</td>
</tr>
<tr>
<td>A&amp;D Contract Coordinator; Conduct Online Training</td>
<td>0.0</td>
<td>7,000</td>
<td>8,000</td>
</tr>
<tr>
<td>Industrial Hygiene Monitoring Consulting Services</td>
<td>0.0</td>
<td>89,804</td>
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## Other Portwide Business Needs - 2018 Budget Requests

<table>
<thead>
<tr>
<th>Category</th>
<th>FY '18</th>
<th>FY '17</th>
<th>FY '16</th>
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<tbody>
<tr>
<td>Community Outreach</td>
<td>25,000</td>
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<tr>
<td>Portside Stakeholder database</td>
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<tr>
<td>Environmental Justice Near Port Communities Projects</td>
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<td>25,000</td>
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<tr>
<td>Association of Washington Businesses (AWB) Event Sponsorship</td>
<td>45,000</td>
<td>45,000</td>
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<tr>
<td>Accountability/Transparency</td>
<td>146,018</td>
<td>4,970</td>
<td>4,970</td>
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<tr>
<td>Peer Review - Association of Local Government Auditors</td>
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<tr>
<td>Senior Internal Auditor</td>
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<tr>
<td>Payment Card Industry (PCI)</td>
<td>45,000</td>
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<tr>
<td>Compliance/Network Security</td>
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<tr>
<td>Managed Services (Network Monitoring)</td>
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<tr>
<td>Vulnerability Management Software</td>
<td>40,000</td>
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<tr>
<td>Microsoft Consulting Services with the InfoSec Team</td>
<td>10,000</td>
<td>10,000</td>
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<tr>
<td>Continued Process Improvement</td>
<td>24,600</td>
<td>624,775</td>
<td>624,775</td>
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<tr>
<td>Lean Consulting Services; Training Materials/Professional Development</td>
<td>24,600</td>
<td>624,775</td>
<td>624,775</td>
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<tr>
<td>Business Intelligence Performance Measurement training</td>
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<tr>
<td>Business Intelligence Analytical support services</td>
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<td>45,000</td>
<td>45,000</td>
</tr>
</tbody>
</table>

## Other Portwide Business Needs - 2018 Budget Requests

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<th>FY '16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenest &amp; Most Energy-Efficient Port - 2018 Budget Requests</td>
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<td>2,528,240</td>
<td>2,528,240</td>
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<tr>
<td>Industrial Hygiene Monitoring Consulting Services</td>
<td>89,804</td>
<td>89,804</td>
<td>89,804</td>
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</tbody>
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https://www.portseattle.org/sites/default/files/2018-03/_2018_Budget_Book_Combined%20Reduced.pdf