Cloud Computing, The Internet of Things and Maritime Transportation

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Global Transportation Executive
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Digitization Is the Key to Leapfrogging the Industry

Value drivers:
- Faster time to market: ~20%
- Lower operational costs: 5-10%
- Savings with accurate forecasts: 15%
- Higher quality: 20%
- Lower inventory costs: 30%+
- Faster time to completion: 5-10%
- Lower downtime: 5-10%
- Productivity increase: 5-10%

Typical company:
- 200+ Trucks/Busses
- 5,000+ Employees
- 30 Facilities

Digitization benefit:
- Revenue: $200m
- Cost savings: $50M

Source: McKinsey & Company
Digital Business* is enabled by the Internet of Things (IoT)

NETWORKED CONNECTION OF PEOPLE, PROCESS, DATA, THINGS

- **PEOPLE**
  - Connecting people in more relevant, valuable ways

- **DATA**
  - Leveraging data into more useful information for decision making

- **PROCESS**
  - Delivering the right information to the right person (or machine) at the right time

- **THINGS**
  - Physical devices and objects connected to the internet and each other for intelligent decision making

* Gartner coined this term in 2014
## Top Obstacles to Digital Transformation

<table>
<thead>
<tr>
<th>Obstacle</th>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complex Integration</td>
<td>56%</td>
<td>Prefer fully integrated and validated solution over separate best-of-breed vendors</td>
</tr>
<tr>
<td>Need to Automate Extraction of Insights and Resulting Actions</td>
<td>42%</td>
<td>Pick analytics tools as most important enabler</td>
</tr>
<tr>
<td>Data Overload</td>
<td>40%</td>
<td>Cite data management as #1 capability they need to improve</td>
</tr>
<tr>
<td>Expanded Security Vulnerability</td>
<td>76%</td>
<td>Cite security as an important element of IoT implementation</td>
</tr>
<tr>
<td>Siloed Networks</td>
<td>25%</td>
<td>Have experienced increased network strain when implementing IoT initiatives</td>
</tr>
</tbody>
</table>

**Sources:**
- Cisco IoT Purchase Process Global Study, January 2015
- Forrester Research study commissioned by Cisco, November 2014
## Solution Framework for the Digital Journey

### Outcomes
- Integrated Business Processes

### Capabilities Transformation
- Analytics and Applications
- Manage Data from Edge to Cloud
- End-to-End Security
- Unified Connectivity

### Infrastructure
- Fog Compute
- Network as an Enforcer
- Open Standards Network

### Vertical-specific Digital Solutions
- Analytics & Automation + Industry-Leading Partner Ecosystem

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Internet of Things Architecture

Tech Stack

<table>
<thead>
<tr>
<th>Services</th>
<th>Tech / Pro Services</th>
<th>System Integration</th>
<th>Vertical consulting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytics</td>
<td>Algorithms &amp; mining</td>
<td>BI &amp; Visualization</td>
<td>Real Time Analytics</td>
</tr>
<tr>
<td>Middleware</td>
<td>Access &amp; Discovery</td>
<td>ETL / Integration</td>
<td>Event processing</td>
</tr>
<tr>
<td>Data Management</td>
<td>Databases / DWH</td>
<td>Hadoop</td>
<td>NoSQL / NewSQL</td>
</tr>
<tr>
<td>Infrastructure / IaaS</td>
<td>Networking</td>
<td>Compute</td>
<td>Storage</td>
</tr>
</tbody>
</table>

1. Physical Devices
   (The “Things” in IoT, distributed analytics)

2. Connectivity
   (Comm & Processing Units, Data in motion)

3. Platform & Data Warehouse
   (Aggregation & Access)

4. Big Data / Analytics
   (Accumulation, Analysis & Transformation)

5. Application
   (Reporting, Analytics, Control)

IoT Stack

- Vertical Industry Solutions
- Cloud based & Mobile Solutions
- Cloud, Prime, Whiptail
- UCS, Switches, Routers, WiFi
- Sensors, Devices, Machines, Intelligent Edge Nodes
- Big Data / Analytics (Accumulation, Analysis & Transformation)
- Platform & Data Warehouse (Aggregation & Access)
- Connectivity (Comm & Processing Units, Data in motion)
- Physical Devices (The “Things” in IoT, distributed analytics)
- Application (Reporting, Analytics, Control)
- Services: Tech / Pro Services, System Integration, Vertical consulting
- Analytics: Algorithms & mining, BI & Visualization, Real Time Analytics
- Middleware: Access & Discovery, ETL / Integration, Event processing
- Data Management: Databases / DWH, Hadoop, NoSQL / NewSQL
- Infrastructure / IaaS: Networking, Compute, Storage

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Digital Transformation

The use of technology to radically improve performance.
The New Digital World
Accelerate Business Processes, Introduce New Services

IP-Based Dispatch and Incident Response
Extending Life-Saving Communications

Automated Super Terminal
More Efficient Shipping, Lower Costs

On-Board Wi-Fi
Centralized Ticketing
Enhanced Passenger Experience

Real-Time Incident Alerts and Live Video
Safer, Faster Roadways

Centralized Traffic Management
Greater Mobility and Collaboration

“Digital disruption will displace 40% of incumbent companies in the next 5 years.”
- John Chambers, Cisco 2015 Partner Summit
Connected Transportation Sectors

- Connected Maritime
- Connected Freight and Logistics
- Connected Aviation
- Connected Roadways
- Connected Rail
- Connected Mass Transit
Digital Transportation Delivers

Greater Safety and Security
Improved Operational Efficiency
Greater Mobility
Better Passenger Experience
Passenger/Crew Communication
- **Satellite communications**
  - There are two broad service categories for maritime: *Mobile Satellite Services (MSS)* and *Very Small Aperture Terminals (VSAT)*.
    - MSS is offered by the likes of Inmarsat and Iridium, and offer volume-based charging.
    - For vessels with heavier communications needs, such as cruise ships, or oil and gas rigs, VSAT is often preferable.

- **Ship-to-shore Wi-Fi communications**
  - MTN, which provides communications systems for cruise ships, is building out these facilities, which will enable vessels to offload large amounts of data when in range of the shore.
  - SeaFi, promoted by Disault’s firm Sea-Tech, is another.

Crew Management
- Modern crew-management systems use a central server that collects data from computers around the vessel. The captain manages work and rest hours, maintains the conditions for vessel certification. This data gets transferred to on-shore systems, typically via VSAT links.

Cargo Tracking
- For constant cargo monitoring, special sensors are designed which are placed inside the container units and linked to the communication antennas.
  - The sensors register the location of the container, along with other environmental variables, and they then communicate the data to the receivers.
  - The receivers can then send the information via local Wi-Fi to a central data aggregation system on the vessel, and from there it can be returned to the client’s tracking system.
<table>
<thead>
<tr>
<th>Technologies</th>
<th>Description</th>
<th>Implications</th>
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</table>
| Business Intelligence & Analytics | • Internet-based protected websites such as “Cargo Portals” enable to query maritime vessel operators for real-time space availability and pricing, to book shipments, etc  
• Cruise lines connect with their past and future passengers in digital space. The customers discover its offerings via advancements such as QR codes

  • The solution enables situational awareness by collecting data from systems and sensors onboard, combining them with operational knowledge, and providing them in the right format to fleet management offices and/or suppliers’ support systems.

  • Port State Control (PSC)* mobile tool-kit has been successful in operations.

  • The mobile app offers functions: taking and marking pictures, typing comments, recording voice notes, follow up progress and generate reports that can be sent to shore directly from the device.

  • The IMO’s directive on the use of electronic maps from 2012 onwards has driven the industry toward the adoption of high-speed connectivity.

  • There are two broad service categories for maritime: Mobile Satellite Services (MSS) and Very Small Aperture Terminals (VSAT).

  • Cloud-based technology is used by vessels to store inspection and owner’s manuals. It provides boat owners email notices when maintenance is required.                                                                                                                                                                                                                                     | • P&O Cruise’s 2013–15 brochure includes interactive technology that can be accessed from tablets and smartphones.                                                                                                                                                                                                                                                                                                   |

  • Kongsberg Maritime has embedded Attunity replication technology as part of the new business intelligence and operational support solution.                                                                                                                                                                                                                                                                                                                             | • 3500 DNV-classed ships are using PSC tool-kit as a cost-effective solution for expertise among officers preparing ships for flawless PSC inspections.                                                                                                                                                                                                                             |

  • Imtech Marine offers always-on broadband communication solution that covers all major shipping routes and provides guaranteed quality of service                                                                                                                                                                                                                                                                                                                                            | • Vessel Vanguard, an Internet-based boat maintenance technology firm, uses the technology for City Dock*.                                                                                                                                                                                                                                                                                                 |
| Social Media and Web 2.0       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                     |
| Mobile and Location-Aware Technology |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                     |
| Networking and connectivity   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                     |
| Cloud                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                     |

Source: Gartner Hype Cycle, 2012
Cisco Cloud Collaboration Services
Taking advantage of new cloud services, ‘cloud-connecting’ them to, and extending value of existing infrastructure and collaboration investments.
Effective Delivery Improves

- Workload Deployment Choice
- Take Advantage of Cloud Benefits
- Making Connections between Services
- Analytics & Management
The Way We Buy & Use Services Has Changed

<table>
<thead>
<tr>
<th>Past</th>
<th>Today</th>
</tr>
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<tbody>
<tr>
<td>Fixed contracts</td>
<td>Annuity based agreements</td>
</tr>
<tr>
<td>Rigid, incremental capacity</td>
<td>Elasticity, scale on-demand</td>
</tr>
<tr>
<td>Capex / Opex decision</td>
<td>Investment fluidity</td>
</tr>
<tr>
<td>IT deployment, big projects</td>
<td>IT services broker, user downloaded</td>
</tr>
<tr>
<td>Business case, ROI, hierarchy</td>
<td>Cost effective, available to all</td>
</tr>
<tr>
<td>Role based tools, IT decide</td>
<td>Work my way</td>
</tr>
</tbody>
</table>
Open & Extensible Cloud Environment – Customer, Cisco & Partner Clouds
Hybrid Collaboration - Connecting Premises & Cloud, extending value

Cloud Services

Partner Collaboration Cloud

Cisco Collaboration Cloud

Public Cloud Services

Customer Private Cloud / On Premises
Connecting Cloud Services

Simple Collaboration – extending the range of services
Cisco Collaboration Cloud Services

Cloud Connected Endpoints

- EVERY POCKET
- EVERY DESK
- EVERY ROOM

Cisco Cloud Partner Ecosystem

- Partner Collaboration Cloud
- Cisco Collaboration Cloud
- Customer Private Cloud / On Premises
More Cisco Resources

Websites
Cisco product and solution collateral and architecture diagrams available online
www.cisco.com/go/transportation
www.cisco.com/go/iot

Videos
Cisco Connected Transportation and Smart Cities
Cisco Connected Mass Transit
Cisco Connected Roadways
Cisco Connected Rail and Real-time Analytics
Cisco Connected Train
TechWise TV and Cisco Connected Transportation

Transportation Case Studies
LINZ AG
ASFiNAG (video and case study)
Alaska DOT
Aegean Motorway
Hamburg Port Authority (video & case study)
Bombardier
Long Beach Container Terminal (LBCT)
California Shock Trauma Air Rescue (CALSTAR)
Copenhagen Airport
Austin Airport and Boingo (video)
Dubai Roads and Transit Authority (RSA)
City of Mississauga
Lufthansa
National Airport of Romania
Tokyu Corporation
Transport for London (video)

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Digitizing Transportation

Safety  Mobility  Efficiency