Thriving Ports in a Competitive Environment

An Esri® White Paper
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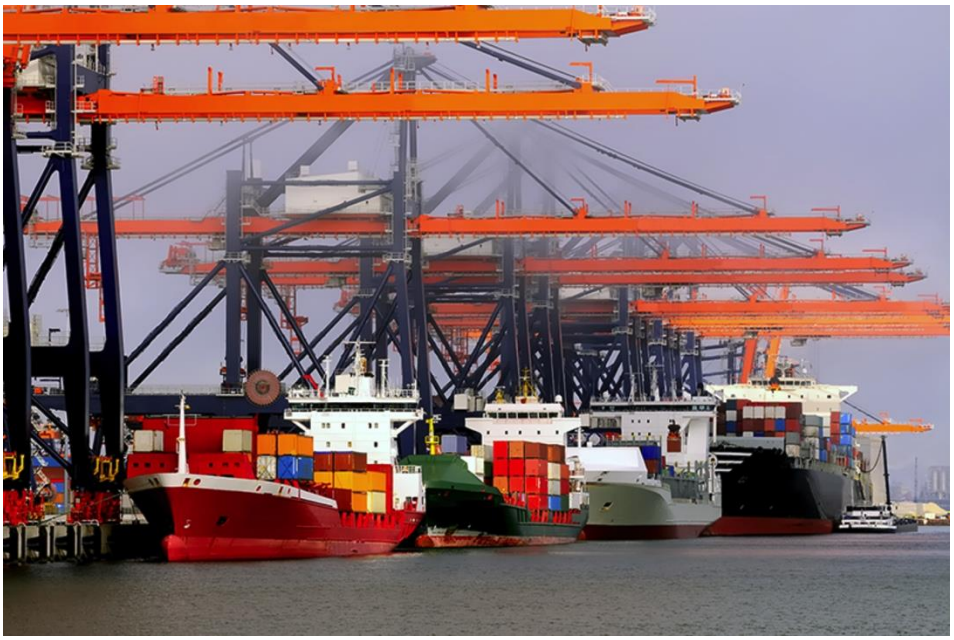
Thriving Ports in a Competitive Environment

The last two decades have witnessed profound change in the international maritime market. Increased global demand for goods and resources is driving the change. This comes concurrent with the globalization of manufacturing and delivery supply chains. At the same time, vessel sizes are growing. This brings even greater demand for port infrastructure investment and changes in how we use facilities. Finally, ports are gaining recognition for the critical role they play in national and regional economies. This pressures them to increase their performance as "corporate citizens" and their sustainability efforts.

Together, these changes have created a highly dynamic port environment. Some ports will gain importance in this environment; others will see world trade move in a different direction. Successful ports will leverage technology to facilitate three fundamental changes:

- Smarter capital investments to meet world shipping demand
- Maximized efficiency (throughput) through greater stakeholder engagement and more collaborative arrangements
- Increased proactivity in developing regional economies for an even greater value added to customers and stakeholders



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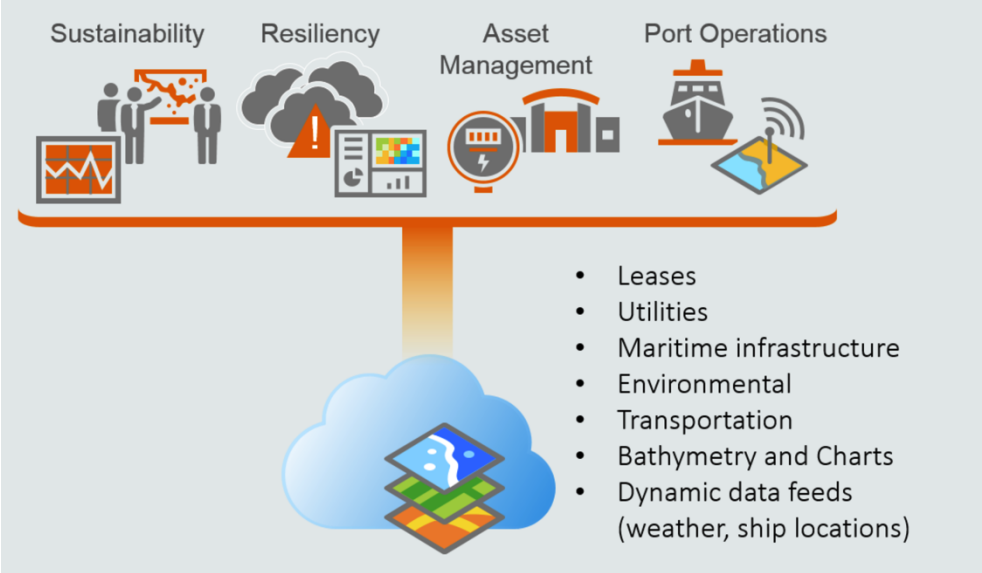
The Role of Information

Large international ports are complex organizations. They manage and maintain assets, facilities, utility networks, and utility consumption. They coordinate and optimize transportation infrastructure and minimize traffic congestion and environmental impacts. They coordinate leases and tenants and monitor performance. And they must coordinate all these activities to ensure unencumbered throughput to protect profit and sustainability.

To be effective, modern ports must realize the value in their information. However, even the best ports, characterized by their silos of information, only share data at the departmental level. Each team collects its own data—about assets, leases, facilities, weather, cargo, emissions, employees, and more. Yet the teams all rely on each other. They work best when they share information and collaborate freely with each other and other port stakeholders. Thus, an effective information sharing platform is the keystone to a modern, smart port environment.

Esri's ArcGIS® platform provides that framework for information integration. ArcGIS creates a unified information layer. Esri provides all the tools to manage, share, analyze, and act on this information so your departments can quickly make data available to the entire organization and promote cross-departmental awareness and collaboration. Your teams can better understand how the port operates and make stronger decisions for greater efficiency and effectiveness.

Using maps and geographic information system (GIS) tools, your work force will be able to access this information from any device and make better decisions, both in the office and in the field. ArcGIS helps executives, senior managers, knowledge workers, and field staff use and understand information that is timely, accurate, consistent, and spatial so they can act on the challenges your port faces today.



The ArcGIS Platform Diagrammed for Port Use

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Our Modern Challenges

Capital Planning and Strategic Asset Management

Vessel sizes have increased steadily over the past three decades. Ports must provide deeper, wider docks; stronger quays; and larger cranes. Only a limited number of ports can accommodate 10,000 twenty-foot equivalent unit (TEU) ships and larger. Ships as large as 22,000 TEUs are currently being designed. For ports to keep up, they must make costly improvements to their infrastructure if they want to support these ships.

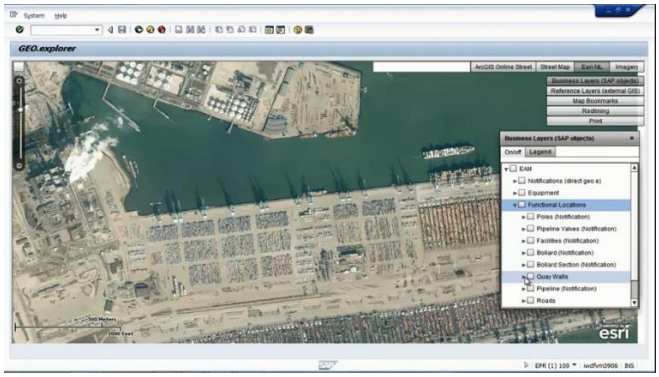
At the same time, ports have a limited amount of land and space, and many are constrained by surrounding urban development that prevents further growth. Thus, many ports need to focus on the highest and best use of their assets and resources. They need total, detailed awareness of current asset conditions. They must understand a full asset life cycle and how to run effective cost analyses. Together, these behaviors help senior port managers make informed, cost-effective investments.

ArcGIS helps meet these challenges. The technology helps you get the highest and best use of assets while planning proactive, cost-effective capital investments. ArcGIS provides tools in four key areas:

- Asset inventory
- Condition assessment
- Field inspections
- Capital investment

At Esri, we know your port's value lies in expert systems designed to optimize your port development and asset management. Instead of trying to replace these systems, Esri enhances them. We've partnered with the world's leading providers of port support systems, including Autodesk, Microsoft, IBM, and SAP. As a result, the ArcGIS platform can connect to and integrate with many of your existing systems, promoting better communication and information exchange throughout your port.

Most of our port customers invest in ArcGIS to improve asset management. They use GIS to map and manage their land assets to better understand location, lease terms, capacity potential and availability, and use constraints. This streamlines many processes and reduces the time it takes to understand location issues so managers and workers make faster and stronger decisions. Many ports map and manage their utility assets to support not only daily operations but also master planning and infrastructure improvements. An increasing number of ports also map maritime infrastructure to better understand risk to current revenue and opportunity for future revenue increases.

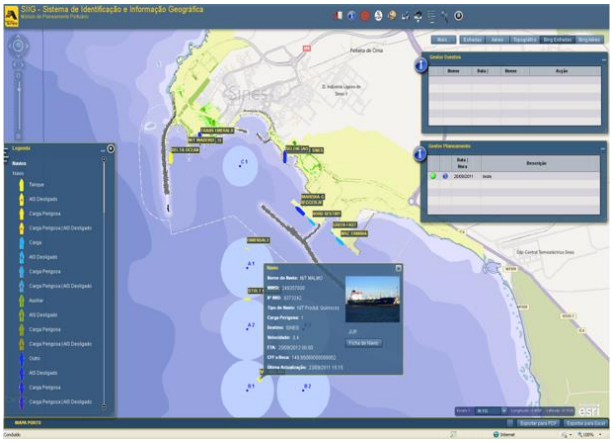


A Comprehensive View of Assets at the Port of Rotterdam

Maximizing Port Operations

Smart ports understand that creating a collaborative environment is critical to improving productivity and increasing competitive advantage as emphasized in a recent European Union report from the MONALISA Project:

> *"Ports are departure and arrival hubs for different means of transportation requiring a coordinated approach, addressing the goals of the transport system as a whole, with smooth and seamless operations at sea, at port … as well as connections to hinterland transportation" Seamless and sustainable transports enabled by STM (Sea Traffic Management) require an efficient and collaborative port." (Lind, et al)*



Berth Occupancy and Berth Planning at the Port of Sines

Collaborative decision making (CDM) is an airport operations concept. Ports are embracing CDM because it envisions real-time information sharing among port departments, shipping companies, terminal operators, pilot organizations, drayage teams, and rail companies. When everyone works together, there are greater operational efficiencies, and throughput is maximized. This effort starts with a common operational picture and greater situational awareness based on shared information.

Esri's technology is used by organizations worldwide to give them this common operational view to improve performance. With the ability to integrate real-time vessel

movements, weather and tidal information, land-based transport movements, berth occupancy, and port business systems, ArcGIS provides a location platform designed to give port operators a portwide view of all current activity.

Esri technology seamlessly integrates with leading document management and business intelligence systems. It integrates with most port operational systems, including Saab Technologies' Klein Port System, to give port operators a comprehensive view of operations. Your key port actors can drive improved performance and your staff can view what they need, wherever and whenever necessary. Ports that do this see immediate benefits and return on investment.

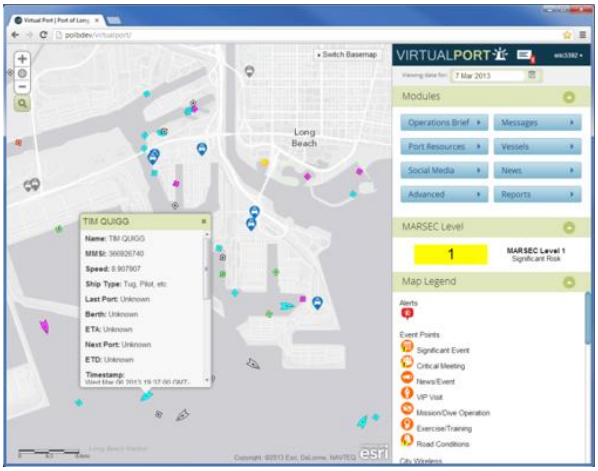
Port Security and Resiliency

Your port must be prepared to respond to and recover from sudden disruptions (e.g., extreme weather). Resilient ports require a strong security network, effective business continuity plan, and emergency management plan. Portwide visibility and control give your port complete awareness by letting executives and senior managers envision the port's current and future states.

ArcGIS delivers a common operational picture that can be shared portwide. This includes tools for the following:

- Vessel tracking
- Sensor inputs
- Field visibility
- Environmental monitoring

Ports are already becoming resilient with Esri technology. They make information available to staff wherever and whenever it's needed, on any device. For example, when a port documents and publishes asset data with ArcGIS, its operators can mitigate utility interruptions and restore services more quickly. ArcGIS lets these ports access intelligent maps showing utility infrastructure, perform tracing to isolate leaks, and discover where abnormal utility operations have damaged assets. With detailed basemaps, ArcGIS gets responders to the right location faster and allows them to better understand each event's potential impact on surrounding assets and activities. This leads to fewer utility interruptions and more quickly restored services.



A Common Operational Picture of the Port of Long Beach

Port Sustainability/Green Ports

Ports are under increasing pressure to find the most efficient use of their limited geography. They must mitigate environmental impact while growing profitability and performance and sustaining positive community relationships. They have become beholden to *triple bottom line accounting*—the need to thrive in economic, social, and environmental conditions—to maximize their value to the community and pursue sustainable growth. They must become transparent "port cities" or "green ports."

Ports become "green" by minimizing congestion, pollution, emissions, rising sea-level impacts, storm disruption, and more. They restore the harbor and coastal activities. Through proactive community involvement and transparency, ports improve goodwill and increase sustainability.

Esri® technology makes this easy. Spatial technology helps streamline workflows through visualization and analysis of port information. It becomes easier to manage new development, dredging, permitting, and litigation. Furthermore, many ports map trade data combined with community data (e.g., industrial properties or surrounding businesses) to help port officials improve business development and make decisions that will attract and retain customers while providing greater value to the larger regional economy.

Promote portwide green initiatives and projects by publishing interactive maps that the public can view.

A Single Platform to Integrate Your Business

Ports are leaving behind disparate information systems in favor of a comprehensive operational picture. ArcGIS is the industry leader in a spatial platform that supplies this common operational view.

ArcGIS visualizes your existing business systems, converting them into actionable intelligence. That means making informed decisions on your data collected on leases, facilities, and property management; asset and security management; and real-time tracking systems. Esri's platform gives you the information you need, on any device, at any time. As a result, leading ports worldwide have turned to Esri to help them improve their global competitiveness and improve their bottom line.

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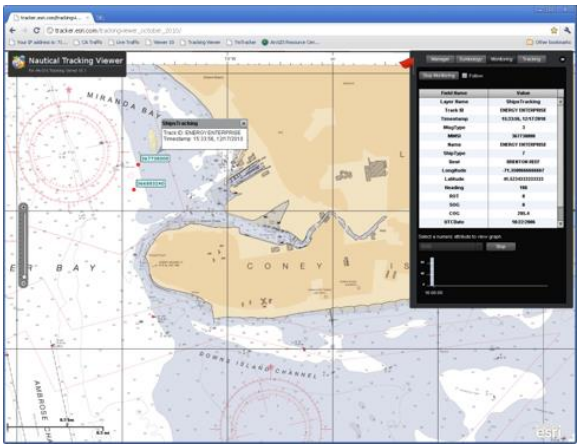
Your Next Steps

You can arrange a preliminary assessment of how Esri's spatial platform, ArcGIS, can help your port achieve its business objectives. When you contact an Esri representative, our port and maritime experts will help you conduct an official business value assessment to understand where the opportunities for a location strategy exist. You will see how bringing spatial information together from your existing port systems can help meet current challenges. Esri's jump-start engagements can help you quickly implement intelligent solutions so you start right away on the path to greater productivity. Meet today's rapidly changing global environment with Esri.



Esri inspires and enables people to positively impact their future through a deeper, geographic understanding of the changing world around them.

Governments, industry leaders, academics, and nongovernmental organizations trust us to connect them with the analytic knowledge they need to make the critical decisions that shape the planet. For more than 40 years, Esri has cultivated collaborative relationships with partners who share our commitment to solving earth's most pressing challenges with geographic expertise and rational resolve. Today, we believe that geography is at the heart of a more resilient and sustainable future. Creating responsible products and solutions drives our passion for improving quality of life everywhere.

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