



# Spatial Accounting

## Turning Strategic Asset Management Programs into Practical Decision Support Systems

**Daniel Elroi**  
President & CEO, NSGIS  
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AAPA Facilities Engineering Seminar  
Jacksonville, FL, April 24, 2019





# NSGIS™ The Geospatial Experts in Ports

NORTHSOUTH GIS

## NorthSouth GIS LLC

- Consultants and Geospatial System Integrators in Ports
- Founded in 2005
- Headquarters in Los Angeles
- An integral member of the Ports industry
- Esri Gold Partner and leading partner in ports
- Makers of the Enesgy® line of software

## Daniel Elroi

- Founder, CEO (helped start 4 GIS consulting firms in 3 countries)
- 32+ years in the geospatial field
- One of a handful of SMEs in GIS & ports worldwide





# Best Known for Our Geospatial Work in Seaports

- Port of Los Angeles
- Port of Oakland
- Port of Stockton
- Port of Tacoma
- Port Tampa Bay
- Port of Vancouver
- Port of Alaska



- Port of Long Beach
- Port of San Diego
- Port of Hueneme
- Port Houston
- Port of Charleston
- Port Everglades
- Port of Longview
- Port of Columbia County



PORT HOUSTON  
The International Port of Texas





# Contributing to the "Science of Where" in Ports

**Improving Port Security by Providing GIS Benefits to All Stakeholders**  
Jennifer Radcliff – Port of Tacoma  
Eric Patrick – NorthSouth GIS

NSG  
Port of Tacoma  
People. Partnership. Performance.

**GIS and Mass Notification for Managing the Stockton River Port**  
2012 Esri International User Conference  
San Diego, CA  
Chief George Lerner, Port of Stockton Police  
Daniel Elroi, NorthSouth GIS Group

NSG

**PORTVIEW**  
PORT OF OAKLAND - INTERPRETS GIS

**Disaster Resilient GIS Aids Port Security and Benefits All Stakeholders**  
Ron Puccinelli, Port of Oakland  
Daniel Elroi, NorthSouth GIS

NSG

**Enterprise Asset Management and GIS in Ports and Marine Terminals**

AAPA Marine Terminal Management  
Long Beach, September 2015

Daniel Elroi  
President & CEO  
NorthSouth GIS LLC  
delroi@northsouthgis.com

**Geospatial Systems in Ports**  
*A discussion about data*  
Daniel Elroi  
NorthSouth GIS LLC

**A Practical Approach to GIS in Ports**

**PORT TECHNOLOGY**  
www.porttechnology.org

**All necessary measures**  
Major seaports are large, vulnerable targets confronted by an increasingly complex range of high- and low-level threats. **Cliff Agheryan** looks at the balancing act required to stay safe while remaining open for business.

**NSGIS™**  
NORTHSOUTH GIS

**Spatial Accounting:**  
Managing Your Physical and Financial Assets  
Using a Map-Based Dashboard

**Daniel Elroi**  
President & CEO, NSGIS  
delroi@nsgis.com

AAPA Marine Terminal Management Training  
Long Beach, CA, October 4, 2018

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**A discussion about grant funding**  
Daniel Elroi  
NorthSouth GIS LLC

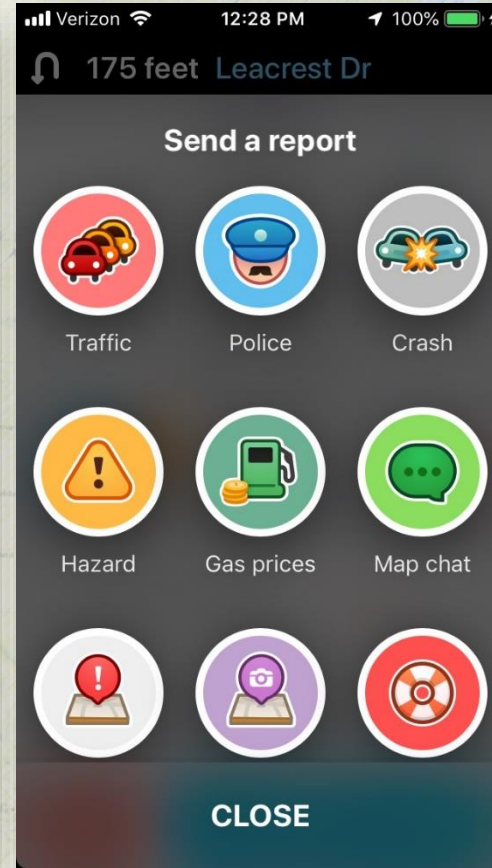
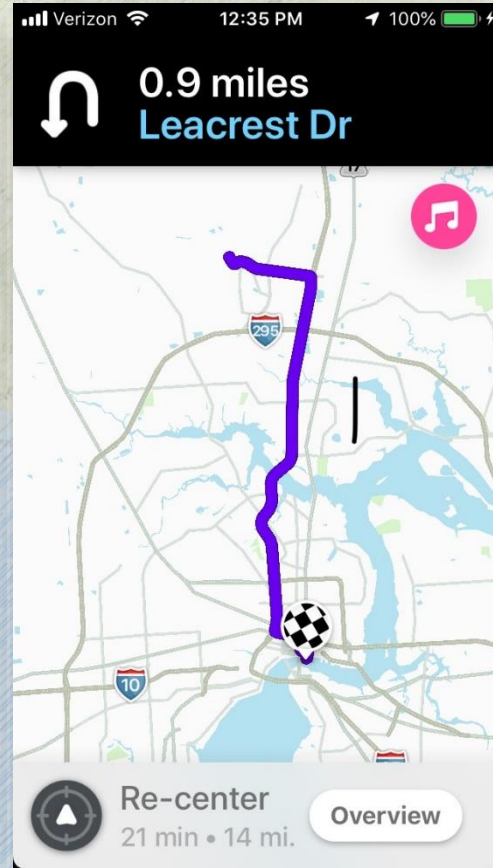
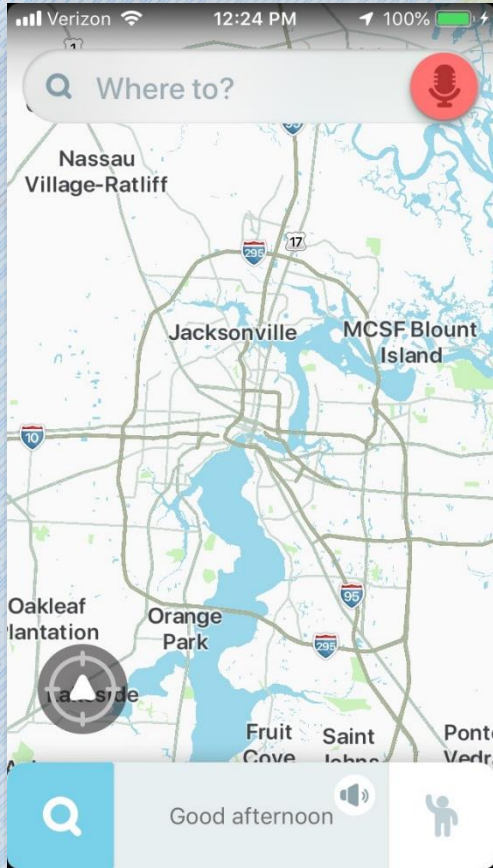
**PORTS**

**PORT OF STOCKTON EMBARKS ON TECHNOLOGY UPGRADE**



# Dispelling that GIS is Just a System of Record

- GIS as a System of Record
- GIS as a System of Insight
- GIS as a System of Engagement





# Main Areas of Applicability for the Enterprise

- Information Management
- Document Management
- Security Management
- Property Management
- Facilities Management
- **Asset Management**

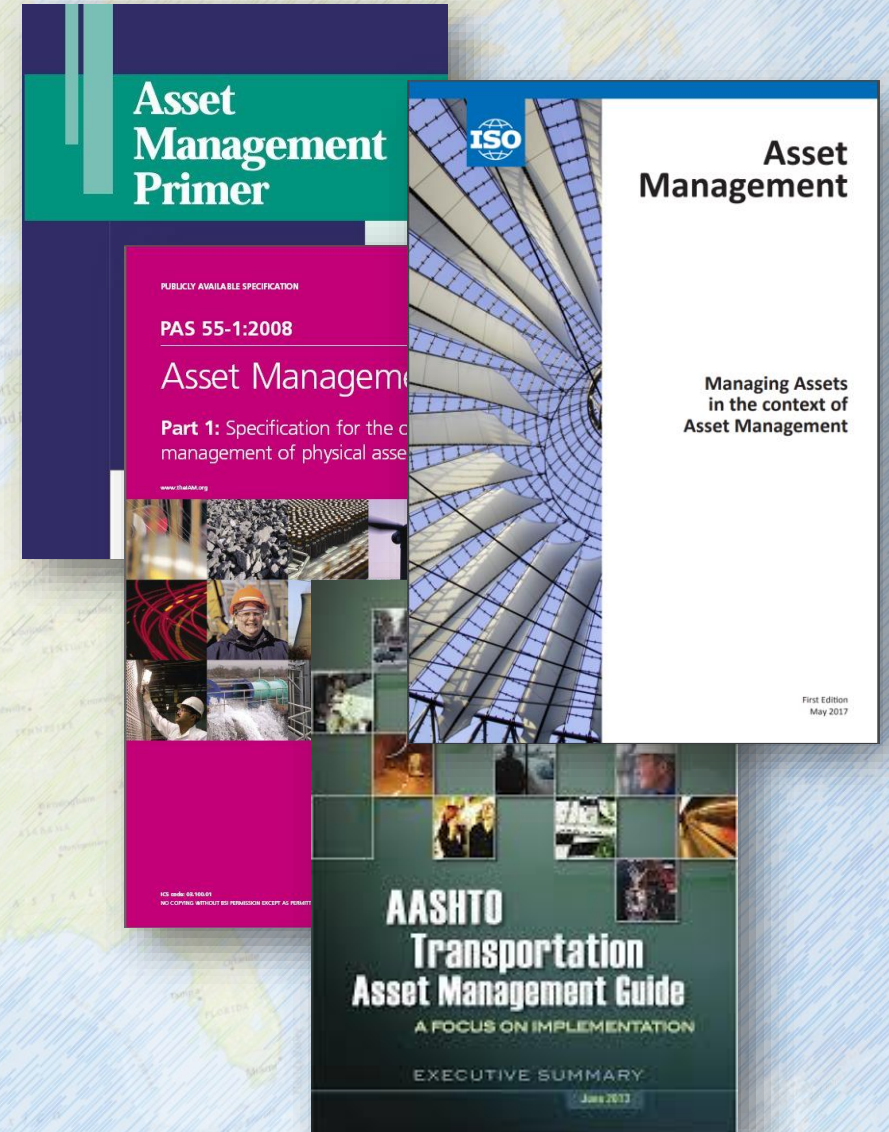




# Strategic Asset Management (SAM)

## Standards

- **Are:** Specifications
- **Are not:** Prescriptions
- **Do:** Provide guidelines
- **Do not:** Provide implementation
- **Can:** Help design a SAM program
- **Can not:** Get a program off the ground





# Key Information Management Components

- Port of Rotterdam seen as the gold standard
- Foundation Systems
  - ERP – Enterprise Resource Planning, *or*
  - EAM – Enterprise Asset Management
  - GIS – Geographic Information System
  - EDMS – Electronic Document Management System
- Expert Systems
  - Engineering
    - Condition Assessment
    - Materials Testing and Lifecycle Modeling
  - Real Estate
    - Mass Assessment
    - Comparables Analysis
  - Fleet
    - Automotive diagnostics



EXPERT SYSTEMS



# Decision Support Management Components

- What is your current “decision support system”?
  - Your brain, memory, knowing where to find information
  - Your institutional knowledge, your “old timers”
  - Your gut feel, your intuition
- What does it lack?
  - Accountability
  - Transparency
  - Repeatability
  - Scalability
  - Resiliency
- What is the new Decision Support System?
  - Let's take a look



Strategic Asset  
Management  
Decision Support System

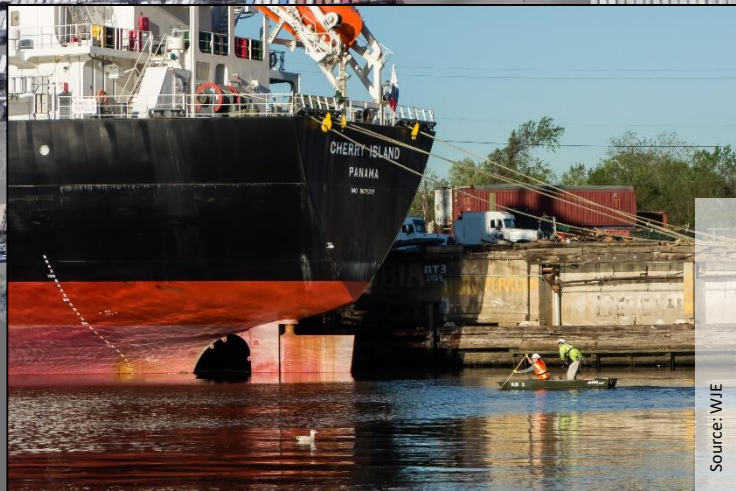
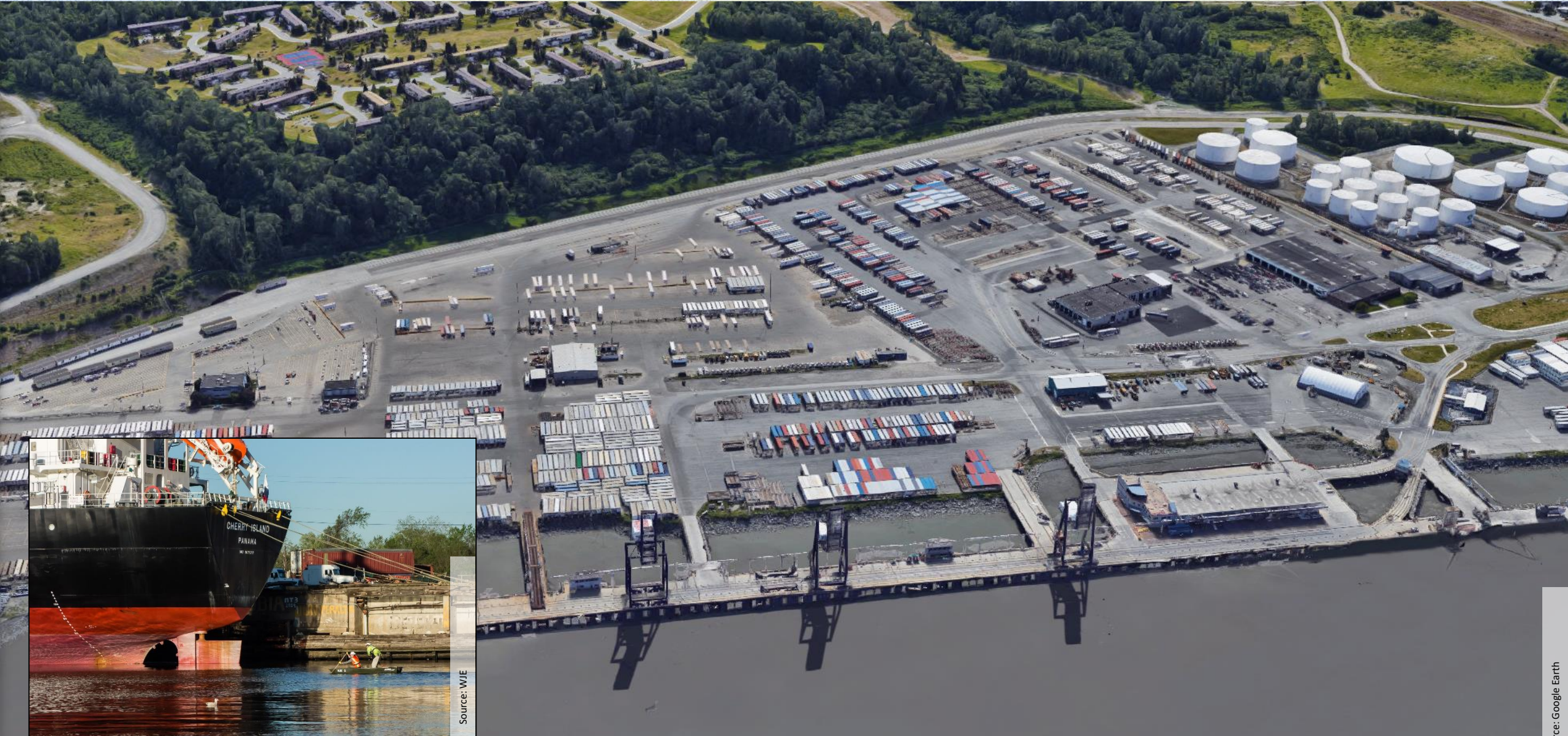


# Decision Support System





# Decision Support System



Source: WJE

Source: Google Earth



# Decision Support System



Source: WJE

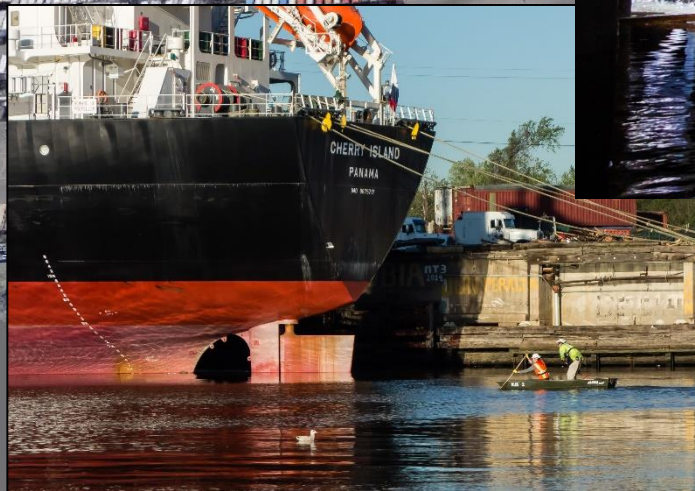


Source: WJE

Source: Google Earth



# Decision Support System



Source: WJE

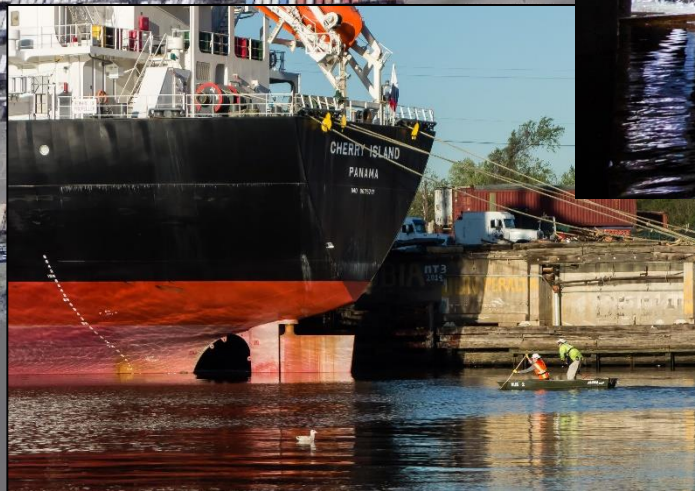
Source: WJE

Source: Port of Alaska

Source: Google Earth



# Decision Support System



Source: WJE

Source: Port of Alaska

Source: Google Earth



# Decision Support System

- “It’s broken, it needs to be fixed, now!”
- “We’ll have to stop operations if we don’t fix”
- “We’ll have to stop operations in order to fix”
- “Somebody is going to get hurt”
- “We’re not meeting the lease terms”
- “It’s not in the budget”
- “We should have inspected sooner”
  
- But...
- “It’s broken, it needs to be fixed, now!”









# Let's Start with Condition Assessments








# Put All Assessments in a Database

**Inspection ID: 875643** ✕

**Property:** Berth 2  
**Asset ID:** 25464  
**Date of Inspection:** 5-2-2017  
**Type of Inspection:** Baseline  
**Scope of Inspection:** Berth 2 superstructure and substructure inspections  
**Inspection Created by (User):** administrator  
**Inspection Created by (Firm):** WJE  
**Asset Condition Rating:** 74  
**Superstructure Rating:** 4  
**Substructure Rating:** 4

---

[View Additional Details](#) [Edit Feature](#)



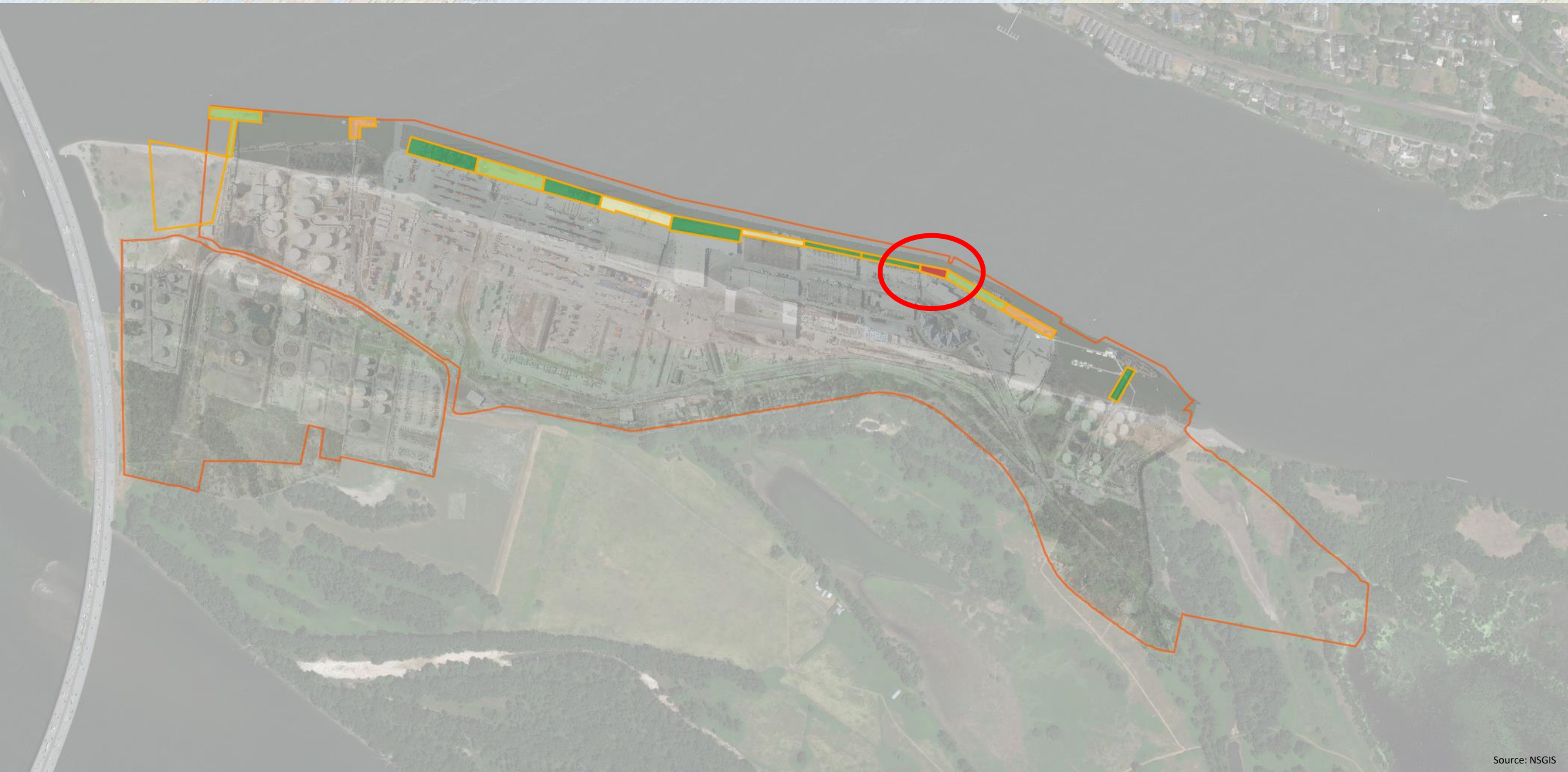


# Visualize the Condition of One Aspect





# Look at the Overall Rating to Identify Trouble





# Access Current and Past Assessments

View Inspection × < Quick Tools

+  
-

Close

Inspection Location  
Click [here](#) to view the inspection location.

Inspection Attributes

Created Date  
08/07/2018 18:57

Created By  
administrator

Last Edited Date

Last Edited By

Property  
Berth 9

Asset ID  
23524

Inspection Date(s)  
10-10-2017

Inspection Type  
Baseline

Scope of Inspection  
Berth 9 superstructure and substructure inspections

Inspection Firm  
ABC

Responsible Engineer  
Fiona Maury

Inspection ID  
045685

Asset Condition Rating (ACR)  
8

Superstructure Rating  
2

Substructure Rating  
3

Bulkhead Rating  
3

Fender System Rating  
1



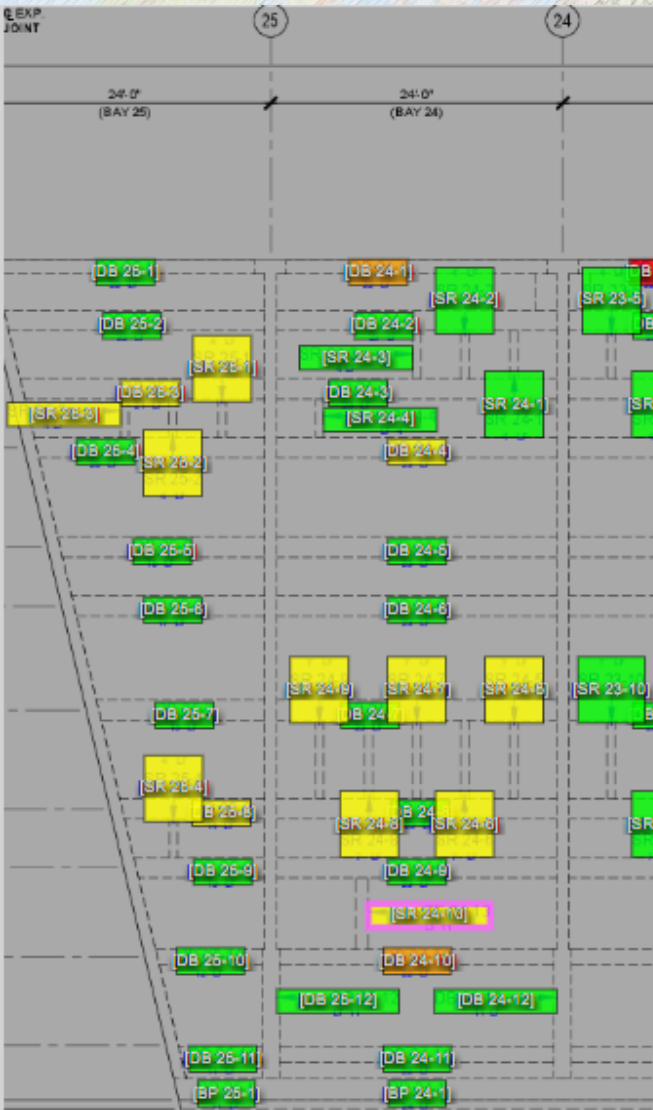
View Documents

Total Document Count: 5

	Inspection	Container ID	Document ID	Created Date	Created By	Last Edited Date	Last Edited By	Document Name	Document Date	Description	URL
	Berth 9	2e23e1ff-c95c-4865-9ca9-0b1ce3e64094	262ccb2d-6591-4040-ad7b-9edefafd5f04		administrator		administrator	Plannotate Project	7/2/2018, 5:00:00 PM		FF0B3FF7-2F8E-4F03-BB96-CB639F796539
	Berth 9	2e23e1ff-c95c-4865-9ca9-0b1ce3e64094	933973a0-8c11-469b-9b4e-528d634ce961		administrator		administrator	Plannotate Elemental Inspection	6/3/2018, 5:00:00 PM		212343B7-F157-494E-97FB-CEE682228149
	Berth 9	2e23e1ff-c95c-4865-9ca9-0b1ce3e64094	f0270ba7-0218-4402-ae72-011c4d9b0343		administrator		administrator	Berth 9: Follow Up Action	5/2/2018, 5:00:00 PM		Demo2_Follow-upAction_Baseline_2018-05.pdf



# Retrieve Inspection Records



▼ Photos

5/10/2018 10:14:31 AM

Rotate Download Rotate

Tags:

Comment:

**The Port** Maritime Asset Follow-up Actions Cargo Terminal – Wharf 101 July 25, 2018 Page 1 of 24

**Property:** Cargo Terminal **Asset ID:** Wharf 101

**Inspection Type:**  Baseline  Routine  Special **Inspection Date:** May 9 & 10, 2018

**Scope of Inspection:** Above Water

**Inspection Firm(s):** Prime: Wiss, Janney, Elstner Associates, Inc. (WJE)  
Underwater: N/A

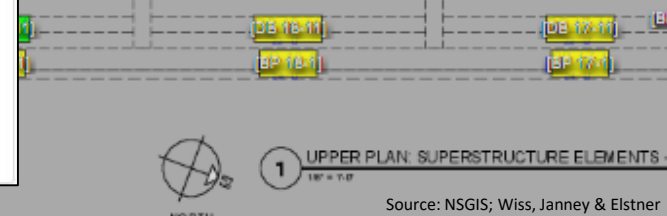
**Reported By:** Patrick Marra, WJE **Report Date:** July 25, 2018

**Follow-up Actions**

<b>Item No.:</b>	1	<b>Priority:</b>	<input type="checkbox"/> Priority <input checked="" type="checkbox"/> Routine
<b>Component:</b>	Superstructure		
<b>Element Type:</b>	RC Deck Beams	<b>Element ID(s):</b>	DB 4-1, DB 5-1, DB 6-1, DB 7-1, DB 8-1, DB 9-1, DB 10-1, DB 11-1, DB 15-1, DB 16-1, DB 18-1, DB22-1, DB 23-1,
<b>Condition Identified:</b>	Diagonal crack present at ends of frontal beams, possibly indicative of shear distress.		
<b>Reason for action:</b>	Condition may reflect past overloading or underlying deficiency in structure.		
<b>Recommended Action:</b>	Follow-up investigation (In-Depth Inspection) to include structural calculations.		

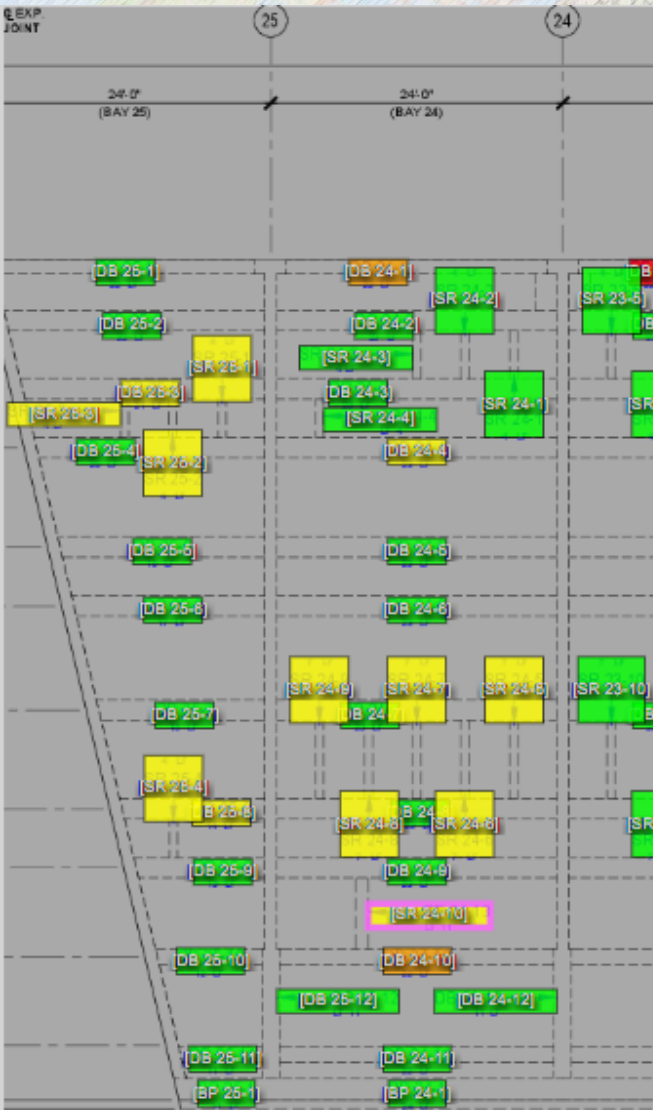
**Figure 1.** Typical appearance of diagonal crack on front beam, marked in red for visibility. Note that the crack shown does not appear to originate at the supporting element.

**SAMPLE**





# Let's Not Stop There!



## Photos



Tags:

Comment:



The Port

Maritime Asset  
Follow-up Actions

Cargo Terminal – Wharf 101  
July 25, 2018  
Page 1 of 24

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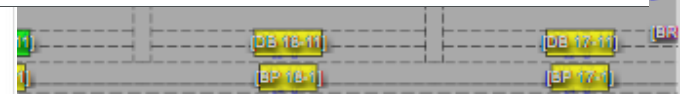
### Follow-up Actions

<b>Item No.:</b>	1	<b>Priority:</b>	<input type="checkbox"/> Priority <input checked="" type="checkbox"/> Routine
<b>Component:</b>	Superstructure		
<b>Element Type:</b>	RC Deck Beams	<b>Element ID(s):</b>	DB 4-1, DB 5-1, DB 6-1, DB 7-1, DB 8-1, DB 9-1, DB 10-1, DB 11-1, DB 15-1, DB 16-1, DB 18-1, DB22-1, DB 23-1,
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Figure 1. Typical appearance of diagonal crack on front beam, marked in red for visibility. Note that the crack shown does not appear to originate at the supporting element.

SAMPLE



1

UPPER PLAN SUPERSTRUCTURE ELEMENTS



# Use Spatial Accounting!

- A visual dashboard into your data, maps and documents
- Manage both physical and financial assets together
- Including real estate





# Map Your Billing System





# Connect To Your Lease Management



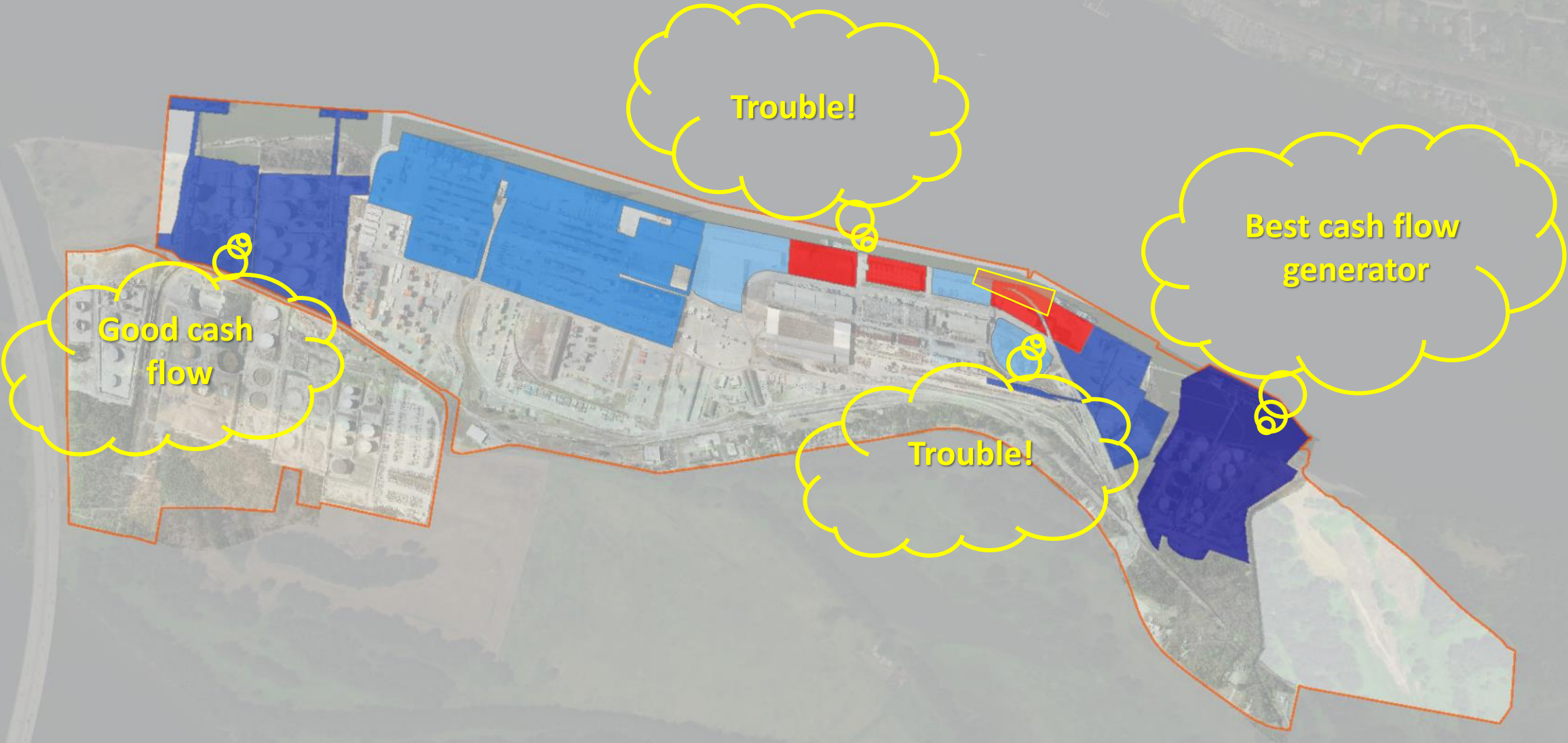


# Connect To Your Work Order System





# Visual Profit & Loss Report: Cash Flow Map



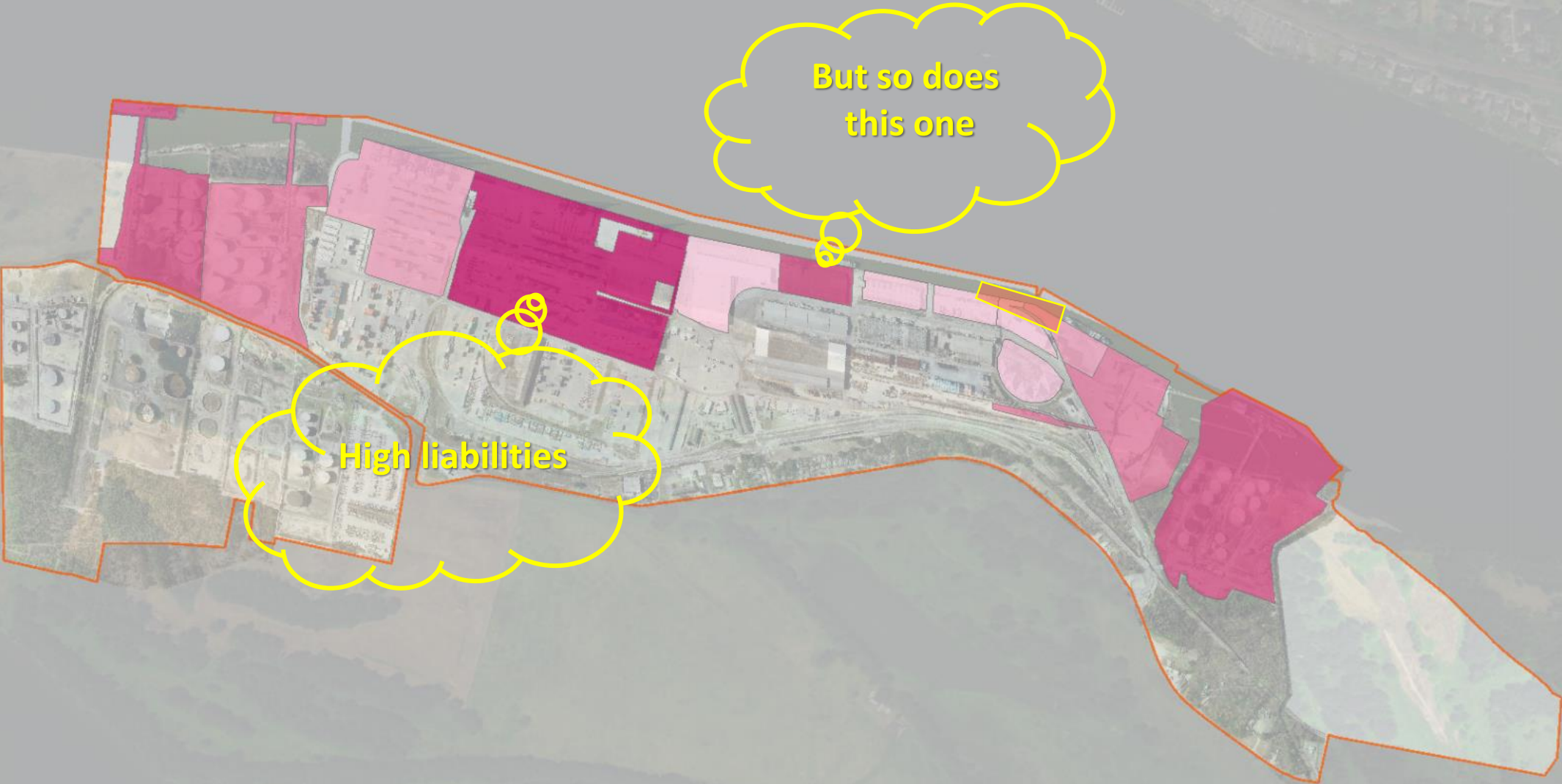


# Add The Asset Register



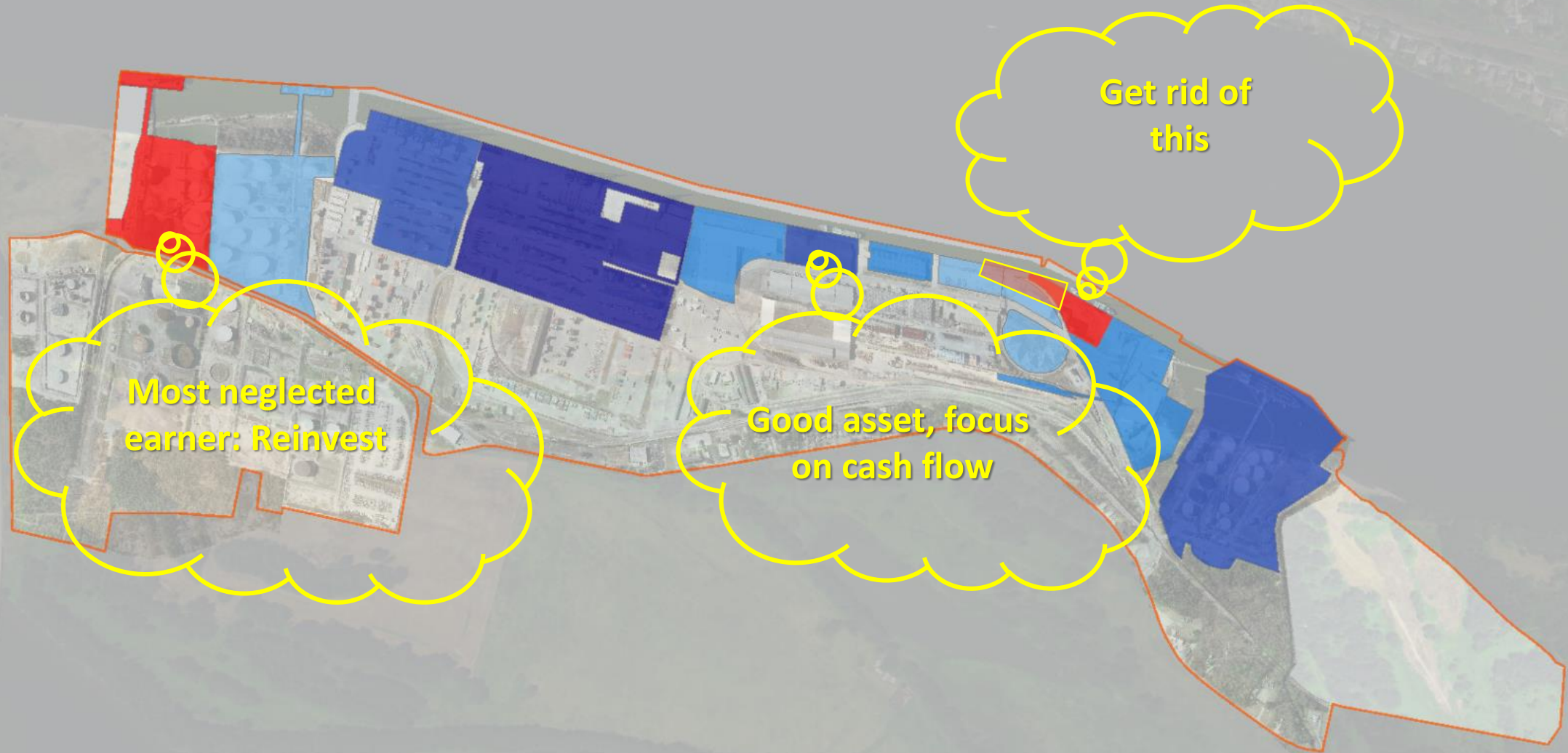


# Quantify All Liabilities





# Visual Balance Sheet: Net Asset Values





# “But Wait, There is More...”





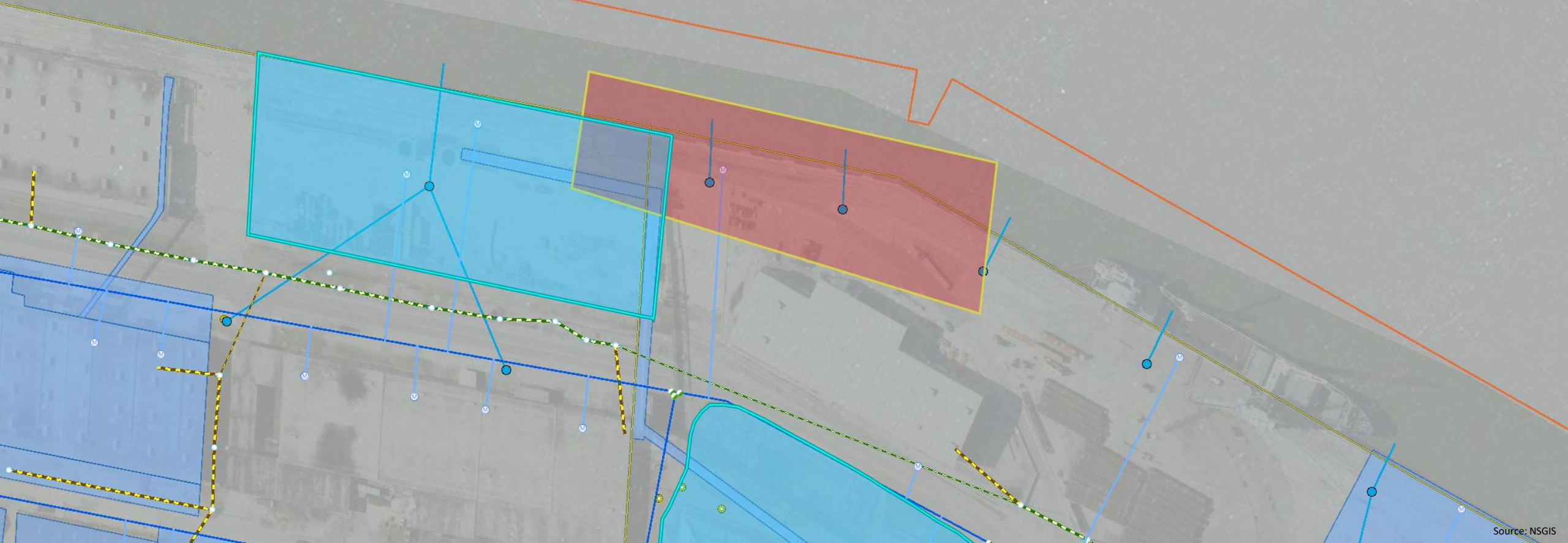
# Visualize Your Utilities, Infrastructure, Leases

Current Lease: Many Grains ◀ 2 of 2 ▶ ✕

Current Lease: Many Grains

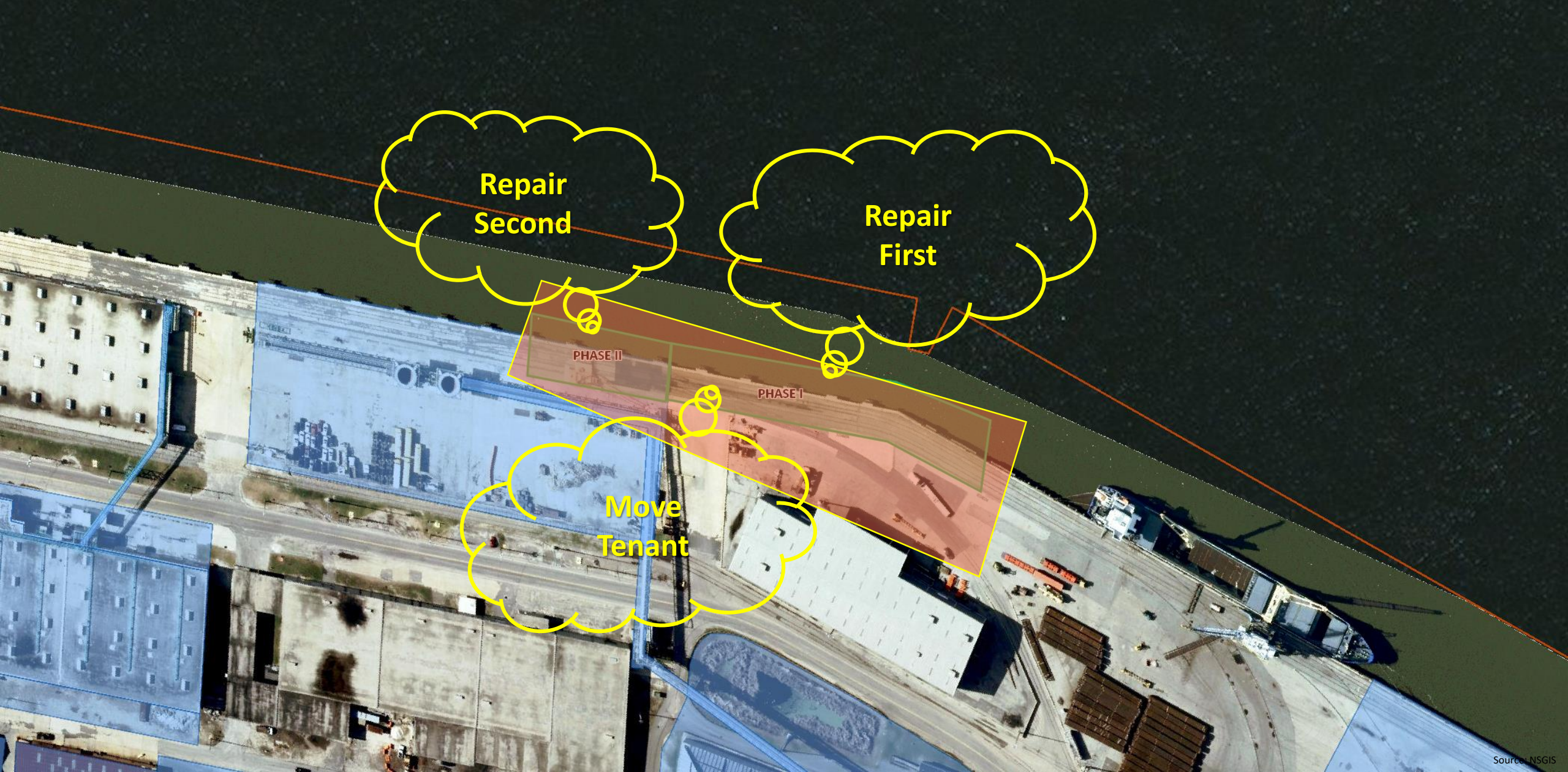
Tenant: Many Grains  
Address: 1209 Grains Ctr  
Lease ID: 1  
Amendment ID: 1  
Agreement Start Date: Feb 14, 1984 4:00 PM  
Agreement End Date: Dec 30, 2078 4:00 PM  
Term Type: Term  
Port Contact: Andre Doe -- 123-456-7890  
Emergency Contact: Noam Doe -- 147-852-3690

[View Additional Details](#) | [Run a Report](#)





# Use a Map-Based Dashboard



Repair  
Second

Repair  
First

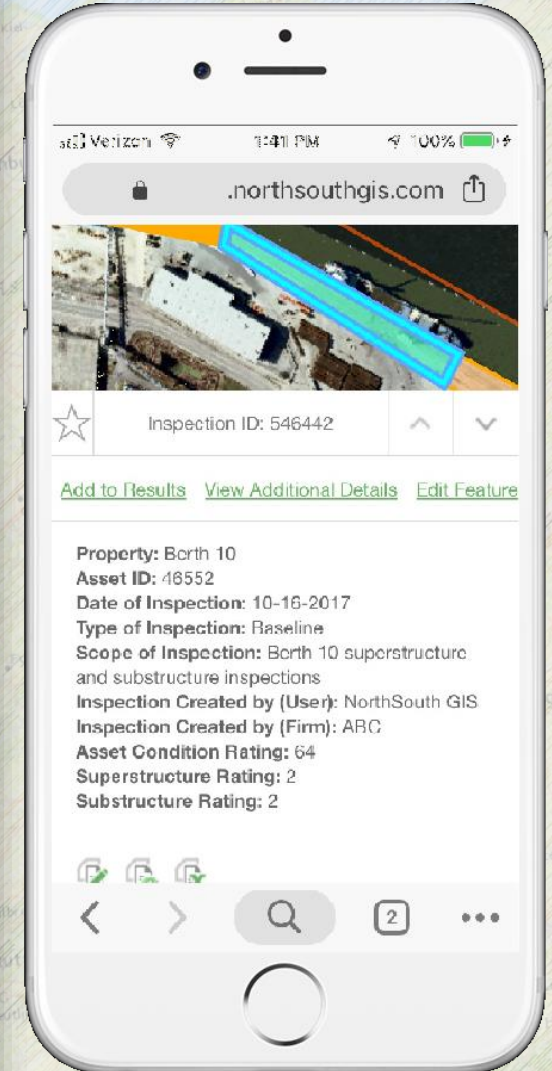
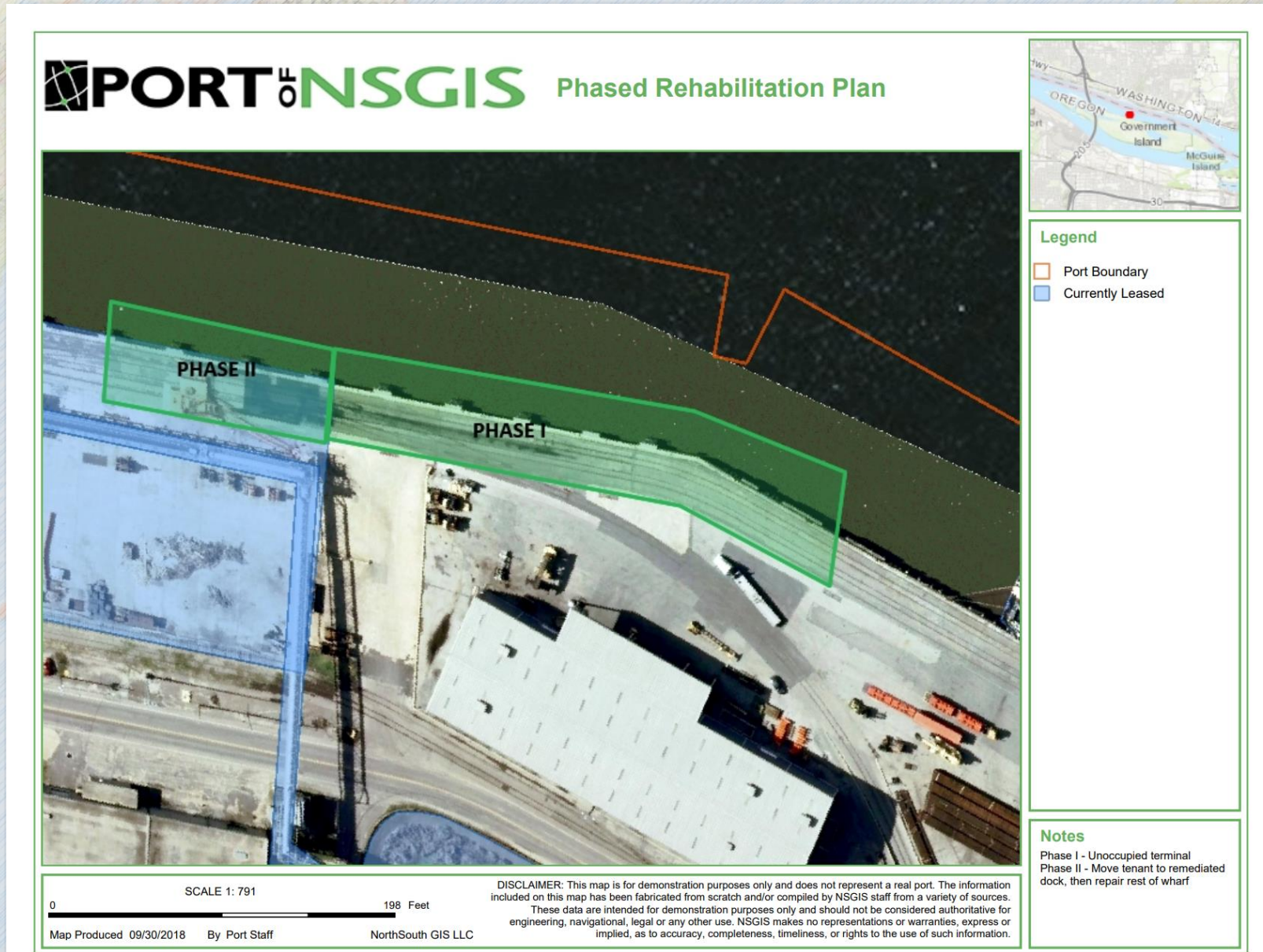
PHASE II

PHASE I

Move  
Tenant



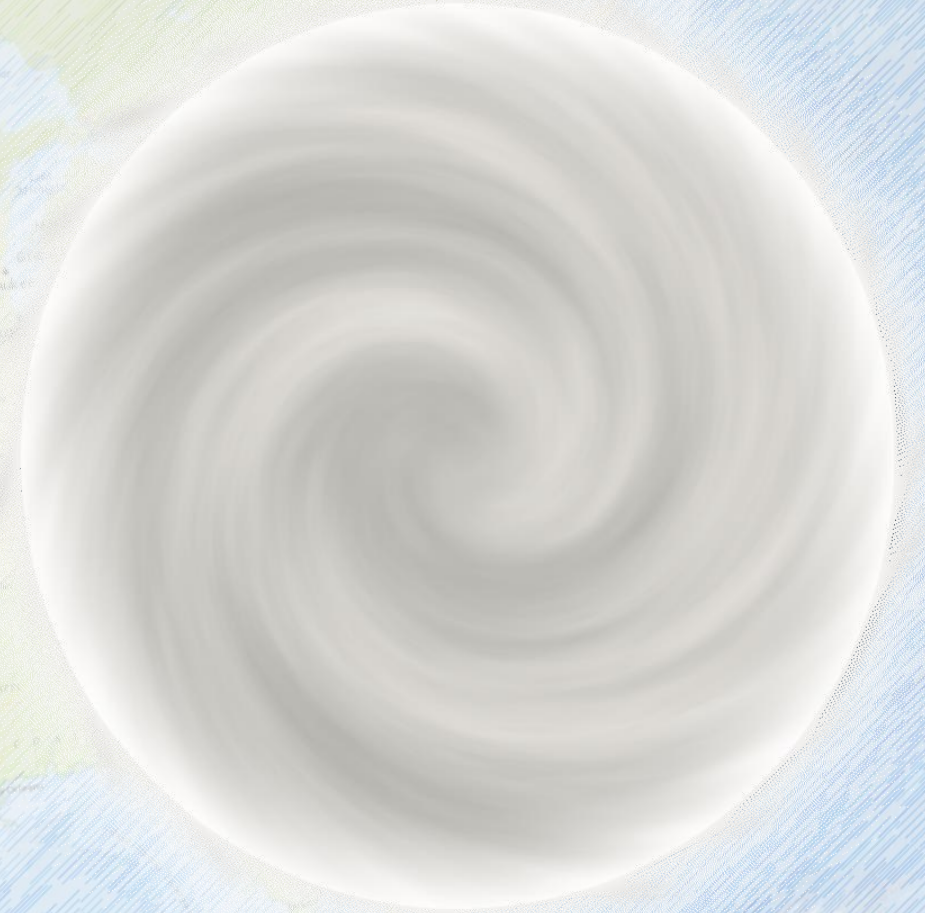
# Operational Decision Support & Planning Tool





# Let's Recap

- Spatial Accounting is the concept of:
  - Connecting different Systems of Record using geospatial systems, especially GIS
  - Implementing the principles of Strategic Asset Management as a Decision Support System
  - Delivering it as a map-enabled System of Engagement
- This requires:
  - Existing systems to be connected
  - New systems to be added
  - Collaboration across the enterprise





# How Does One Get There, Incrementally?

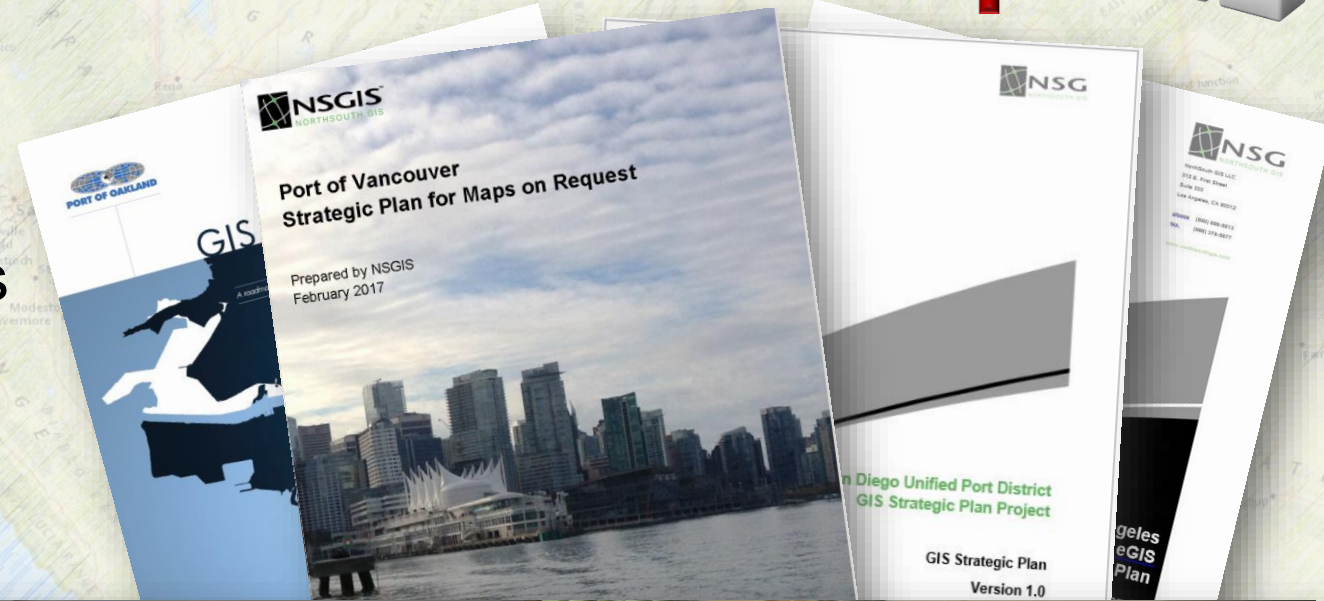
- “We have nothing” or “We have pieces”
- “We don’t have the experts to do this”
- “I’ve heard this is very expensive”
- “We’ve tried this before, it failed”
- “I already *have* a day job!”
- “We’re just a small port”
- “Channel deepening”
- “Cyber-security”
- “Something urgent came up”
- “My commissioners don’t get it”





# GIS Strategic Plans

- **What:** Interviews across port, budget, staffing, 100s actions
- **ROI:**
  - Coordinated vision
  - Sync with port master plan & strategic asset management plans
  - Road map
  - Basis for budget requests
  - Bridge gap with IT
  - Better communication with leadership





# Assessment of Paper Records

- **What:** Catalog paper, scanned and digital documents
- **ROI:**
  - Catalog of available data
  - Prioritization for conversion to GIS so only most reliable data is used
  - Gain value from GIS even before starting on data conversion and even from documents that are never converted
  - Map- and metadata-based search and retrieval of documents



The composite image illustrates the transition from physical paper records to a digital GIS-based system. The top left shows a physical office space filled with paper documents, representing the current state of paper records. The top right shows a screenshot of a web-based GIS application interface, representing the digital solution. The bottom part shows a detailed map of a facility with various infrastructure labels, representing the data being cataloged and made available through the GIS system.

**Documents Found 31**

- Bldg333\_Electrical.PDF File Up
- Industrial Facility Electrical Site Plan.jpg File Up
- Del Monte Facility Site Electrical Demo Plan.pdf File Up**
  - Description: Berth 3 Del Monte F
  - Owner: pohgeolinker
  - Project: 03654-P2 Del Monte
  - Status: Active
  - Audience: General
  - Classification: [Buildings and Struc
- Reefer Rows Electrical Site Plan.JPG File Up
- Del Monte Facility Electrical File Up

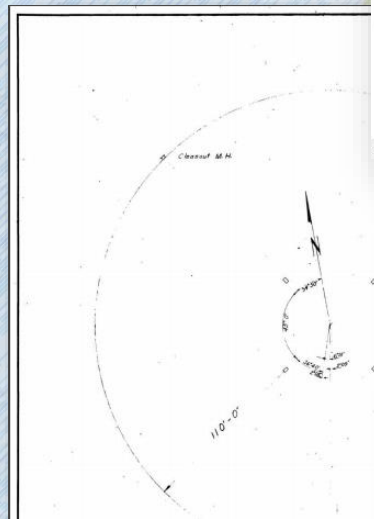
**Map Labels:**

- 92012 Cool Carrier Facilities
- South Main Terminal Utilities
- 94026 Del Monte Facility
- 30205 Del Monte Facility Improvements
- Port Fire Hydrant Locations
- 80091 Infrastructure Mapping
- 142490.BB South 6360-08
- L-1022 Wharf and Embankment Stabilization
- 64 Wharf 1 & 2
- 1-283 Utilities Master Plan Phase 1 & 2
- 03654-P2 Del Monte Facility Electrical Plan
- 04-129 Del Monte Facility Site Plan
- 6360-02 South Main Terminal Elevation Map
- L-1258B Expans Proje



# Spatial Index of Digital Documents

- **What:** Spatially search and retrieve record drawings
- **ROI:**
  - Reduced risk of using wrong or incomplete document sets
  - Easier for new staff to find documents
  - Some ports have reported 90%+ reduction in search for as-builts



**Energy by NSGIS**

Search... Sign out

Drawing: Sundowner Terminal Water Main Master Plan

Number: ST- 5400  
Type:  
Date:  
Series: Record Drawing

Work Order:  
Project Number:

[Add to Results](#) [View Additional Details](#) [Edit Feature](#)

Port of N... 0 50 100ft County of Clark, Oregon Metro, Bureau of Land Management, State of Oregon, St...

**View Documents**

Total Document Count: 2

	Drawing	Document Name	Description	Document Type	File Name
	Yam-10200	Yamaguchi Potable Mains Plan	Initial drawing specs for potable mains at Yamaguchi	PDF	TN-438(1).pdf
	Yam-10200	Yamaguchi Detail Plan Final Edition	Final version of plans showing mains detail and booster	PDF	TN-543(1).pdf

Classifications: Access Control, Buildings and Structures  
Edited Date: 05/19/2016 10:55:03  
Edited By: administrator

- 6000-101-B  
[Installation of HID Global System](#)  
[Download all sheets](#)
- 6056 US Naval Station Bldgs No. 321 & 323 Conversion of 2nd Fl to Barracks (9321 & 9323)

Sheets selected for export:  
[Clear](#)

- 6000-101-A Installation of HID Global System
- 6000-101-B Installation of HID Global System

[Refine Search](#) [Create Zip File](#) [Close](#)

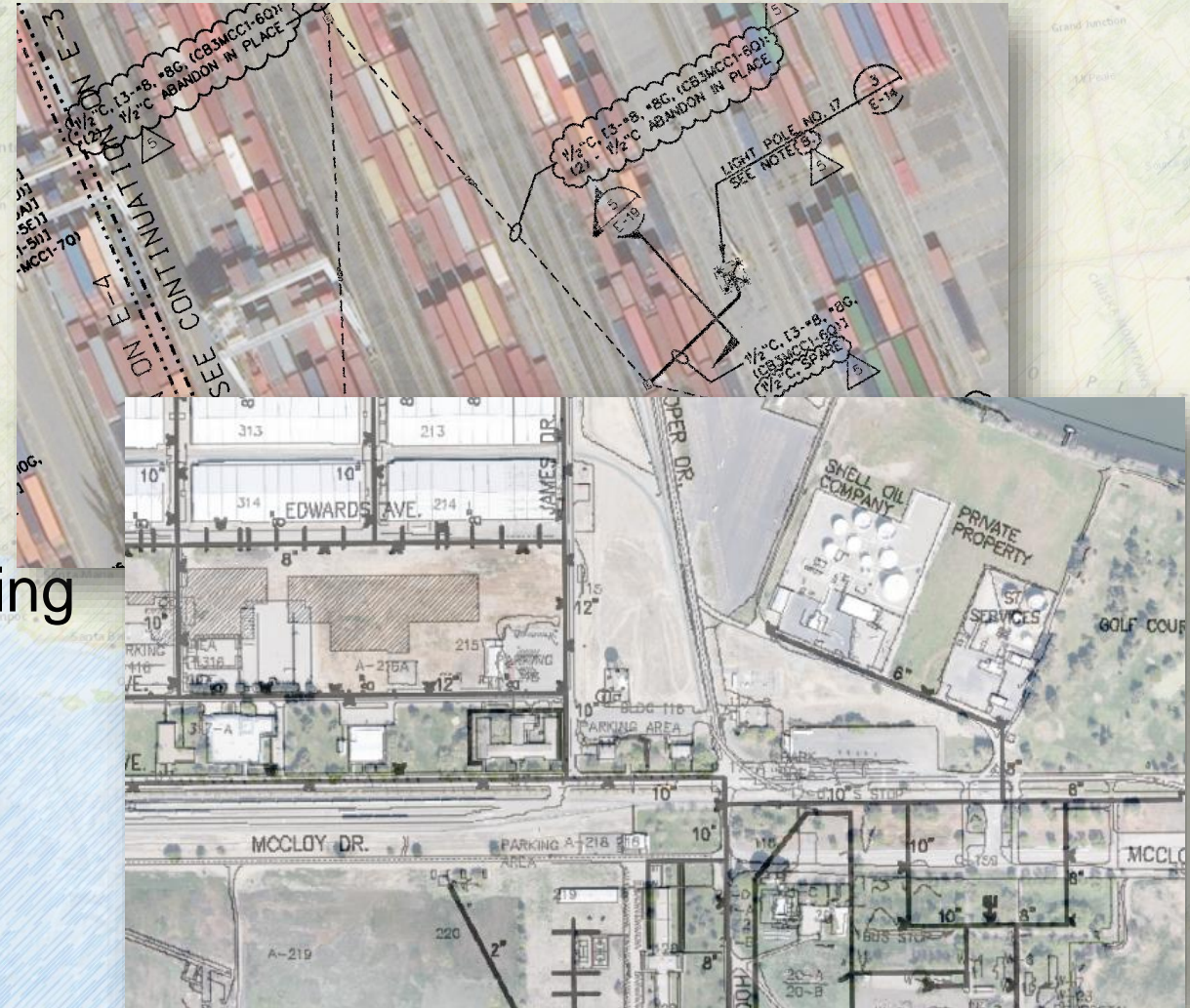
Still working. Loading PortView map data...



# Rectification of Scanned CAD Drawings



- **What:** Overlay images spatially without conversion to GIS
- **ROI:**
  - Much easier to use than disjointed standalone scanned drawings
  - Can stitch drawing sets together
  - Retain details that will never be converted to GIS
  - Save one-of-a-kind drawings before they are destroyed
  - Tangible value from document scanning





# Data Conversion and Publication

- **What:** Conversion of 100s map layers from paper, CAD, GIS
- **ROI:**
  - Vetted, authoritative data sources
  - Available any time and on any device
  - Stored on-premise or in the cloud
  - Tools for sketches, measurements
  - Integrates external data sources from city, county, state, NOAA, USACE, etc.
  - Integrates dynamic data with static data sources



OBJECTID	Name	Birth Numbers	Shape	Comments	Shape Area	Shape Len
35	Yolero	164	Polygon	Null	173438.941467	1894.859148
36	Rio Tinto Minerals/Borax	165, 166	Polygon	Null	341539.101761	2653.89374
37	Shell	167, 168, 169	Polygon	Null	399268.094961	5548.865561
38	Pasha	174, 175, 176, 177, 178, 179, 180, 181	Polygon	Null	1683246.804185	7106.326938



# Esri Geospatial Cloud

- **What:** ArcGIS Online\* deployment
- **ROI:**
  - Complete Systems of Record, Insight and Engagement
  - Economical cloud data streams, storage, analysis
  - Available on any device, anytime and anywhere (including offline)
  - Backed by Esri's desktop software
  - Supports third-party software like Enesgy
  - \* also Portal for ArcGIS



Home Gallery Map Scene Groups Content Organization

Port of NSGIS

1. Leases Dashboard

2. Documents

3. Enesgy Documents

4. Smarter Asset Mapping

Storm Drains: 45.585768°N 122.531892°W

Details Media

Type

Cleanout: 72

Number

Date Installed: July 31, 1998

Service Status: Enabled

Facility Identifier: 52060

UniqueFeatureId: 26

Directions

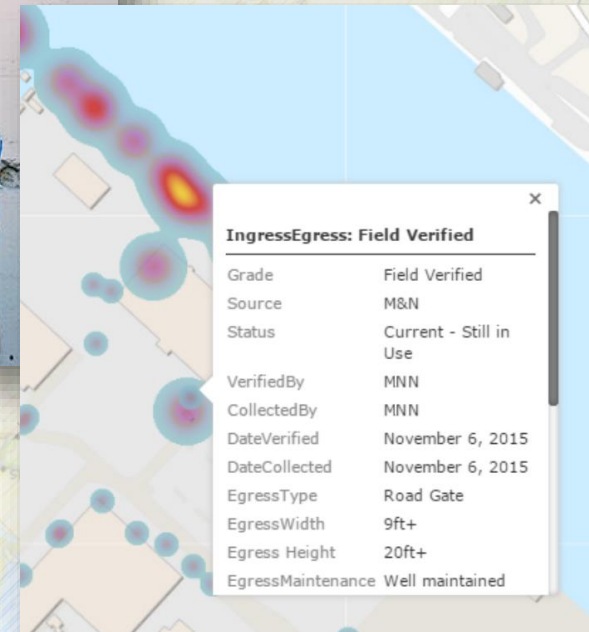
Compass

Add to My Places



# Field Data Capture and Verification

- **What:** Verification and documentation of assets in the field
- **ROI:**
  - Increase confidence in data
  - Field apps eliminate paper
  - Can inspect conditions while verifying locations
  - Capture photos
  - Instant feedback to office



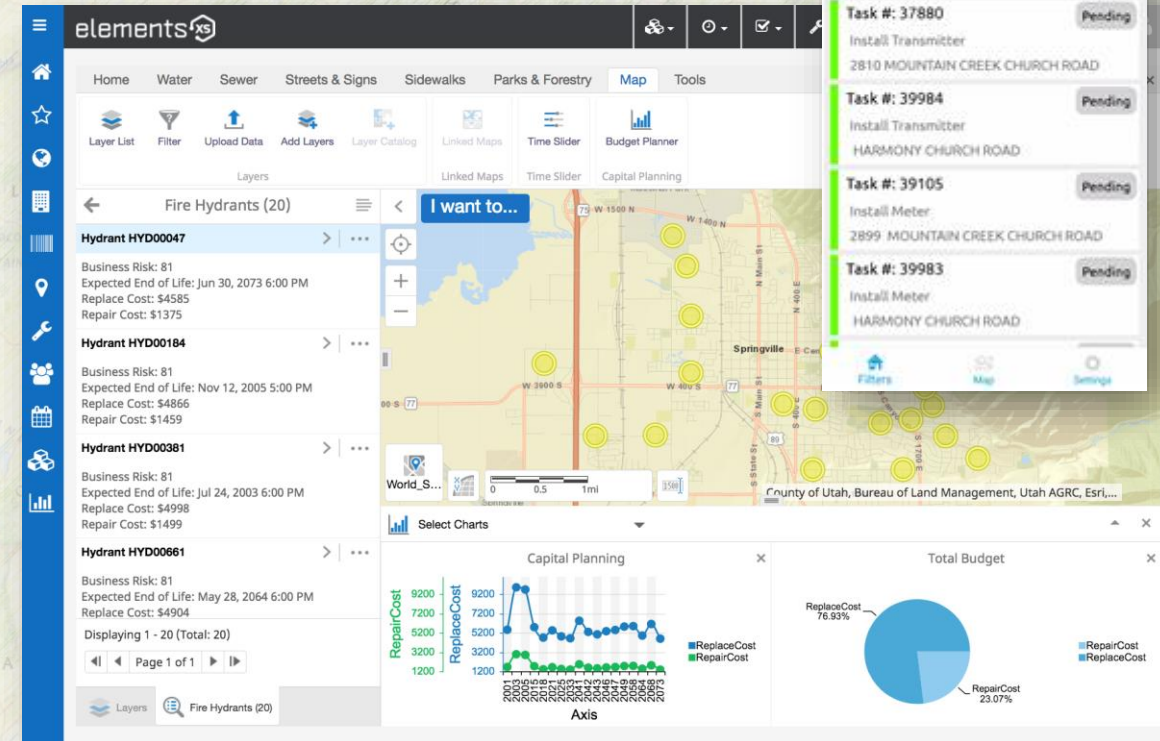
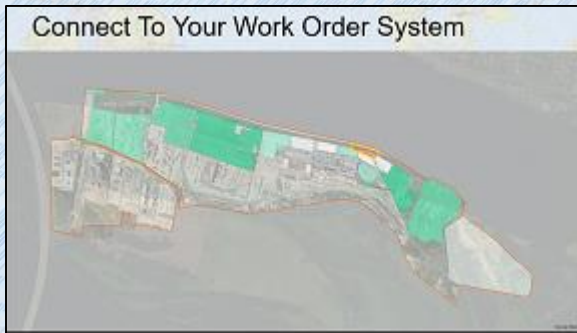






# Facilities and Work Order System

- **What:** GIS-based work order system, linked to finance & docs
- **ROI:**
  - Electronic work orders based on mapped assets
  - Work, labor and cost history retained in a database
  - Correlated to other systems through location information
  - Built-in scheduling and load balancing
  - Inventory control
  - Preventive maintenance planning
  - No paper records
  - Risk-based prioritization





# Long-Term Lease Management



- **What:** Management of commercial property portfolio
- **ROI:**
  - Single map-based view of all properties
  - Differentiate between leased, available, expiring leases
  - Searchable, integrated data, maps and documents
  - Lease abstract and other reports
  - Query and analysis capabilities
  - Alerts and email notifications
  - Linkable to document management system
- Executive dashboard



**Energy by NSGIS**

View Lease

Lease ID: 52 - Sundowner Ter

1900 Morris Ave  
Auckland, NM 22222  
123-456-7890

Lease Type: Long Term  
Start: Mar 31, 1995 4:00 PM  
Expiration: Mar 30, 2074 5:00 PM

Property Address: 1900 Sundowner St  
Property Notes: Approx. 32 acres, 27k sq ft warehouse #510

**View Documents**

Lease	Document Name	File Name	Document Type
Sundowner Terminal	Sundowner Ventures II, LLC and MULTNOMAH COUNTY	Gateway_Center_22610_Lease_21_9_05 - m.r.pdf	Lease
Sundowner Terminal	Additional Grant funding for site	Analyst_Packet.pdf	Memo
Sundowner Terminal	Contact Card	Contact_Card.PNG	Contact Card

**PORT of NSGIS** Port of NSGIS Lease Abstract

Lease ID: 52 Amendment Number: 0  
Account Manager: Andre Doe  
Tenant Name: Sundowner Terminal  
Tenant ID: 47  
Subleased from: N/A

Current Lease Term: 99 year  
Current Lease Expiry: 3/31/2074  
Option: out of a total options of 0

Permitted Options: Terminal & Laydown Yard

Contact Type: Operations Manager  
Mr. Chris Doe  
Director  
1900 Morris Ave  
Auckland NM 22222

Property Name: Sundowner Terminal  
Property Address: 1900 Sundowner St  
Property Size: 8.9 acres 27000 sq. ft.

Next Rent Adjustment Date: 4/1/1990  
Monthly Rent + Additional Rent: 5000 plus

Sign out Tools



# Short-Term Space Assignments/Leases

- **What:** Short-term space assignments/leases
- **ROI:**
  - GIS-power system used to drive the entire process
  - Propose, measure, calculate rates
  - Link and search documents
  - Create instructions for accounting department
  - Review history
  - Send alerts



**Find Lease Information**

Lease Holder: None

Expiring Before: 6/30/2019

Property: None

Ability to Sub-Lease:  None  Yes  No

Permitted Uses: None

Leased Land Size (Acres): 1 | 2

**Small Town Veg**  
Lease ID: 58

Available | **Current** | Expiring

Start Date	Expiration Date
7/31/2011	7/30/2016
Usable Space (sq. ft)	Rentable Space (sq. ft)
53,327.84	62,738.63
Monthly Rent per sq. ft	Rent Adjustment %

Business Type: Commercial

Billing: Tracy Doe, 1700 Meat St, Chicago, IL 88888, Phone: 567-890-1234, Cell: 234-567-8901, Email: tracy@smalltownveg.com

**Energy Lease Manager**

Usable/Rentable Space: 85%

Business Type: Commercial (Bar chart showing 2.0)

Tax Assessible?: Yes 100%

Combined Monthly Rent: No Data



# Permit & Project Cargo Management

- **What:** Single source of information for permitting and project cargo mission planning
- **ROI:**
  - Single source of information on dock capacity, condition assessments, utilities, clearance, other cargo missions
  - Sketch, measure, calculate
  - Propose, notify, track
  - Report
  - Search by description, location and history





# Capital Projects Management



- **What:** Tracking capital projects, exposing through dashboard
- **ROI:**
  - Internal tracking, public sharing
  - Can be used from beginning to drive the process
  - Linkable to document management system

**Enesgy**  
by NSGIS

View Project

Close Edit

Location Attributes

Project Name  
Storm drain modernization

Description  
Replacement of storm drains in the east part of the port, including new catchment basins

Project Owner  
Port of NSGIS

Category  
Port Maintenance

District  
Port

Status  
In-progress

Layers View Project

Capital Project Dashboard

43% on-budget 14% on-schedule \$29.5M

Active Projects 7

- Cross Creek Outfall Inspection and Maintenance (Stormwater Drainage)
- Jackson Ave. Streetscape and Traffic Calming (Transportation)
- Naper Settlement Water Main Replacement (Water Distribution)
- Queensbury Sewer Rehab (Sewer Collection)
- Riverwalk Rehabilitation (Parks)
- Washington St. Bridge Replacement (Transportation)
- Water Relining and Pipe Rehab (Water Distribution)

Phase: PreDesign, Design, Construction, Clos

Status: John Smith, 555-555-1212, jsmith@naperville.gov

**Riverwalk Rehabilitation**  
Project ID: PARK-17-001

Over Budget Behind Schedule

Description: Continuing rehabilitation of the Riverwalk between Eagle Street and Oliver Hoffman Pavilion.

Fiscal Year	Funding Source
2017	General Fund

Estimated Cost	Actual Cost
\$184,000	\$195,000

Estimated Start Date	Actual Start Date
January 1, 2017	March 1, 2017

Estimated End Date	Actual End Date
December 31, 2017	March 1, 2018

Phase: PreDesign, Design, Construction, Clos

Status: John Smith, 555-555-1212, jsmith@naperville.gov



View Documents

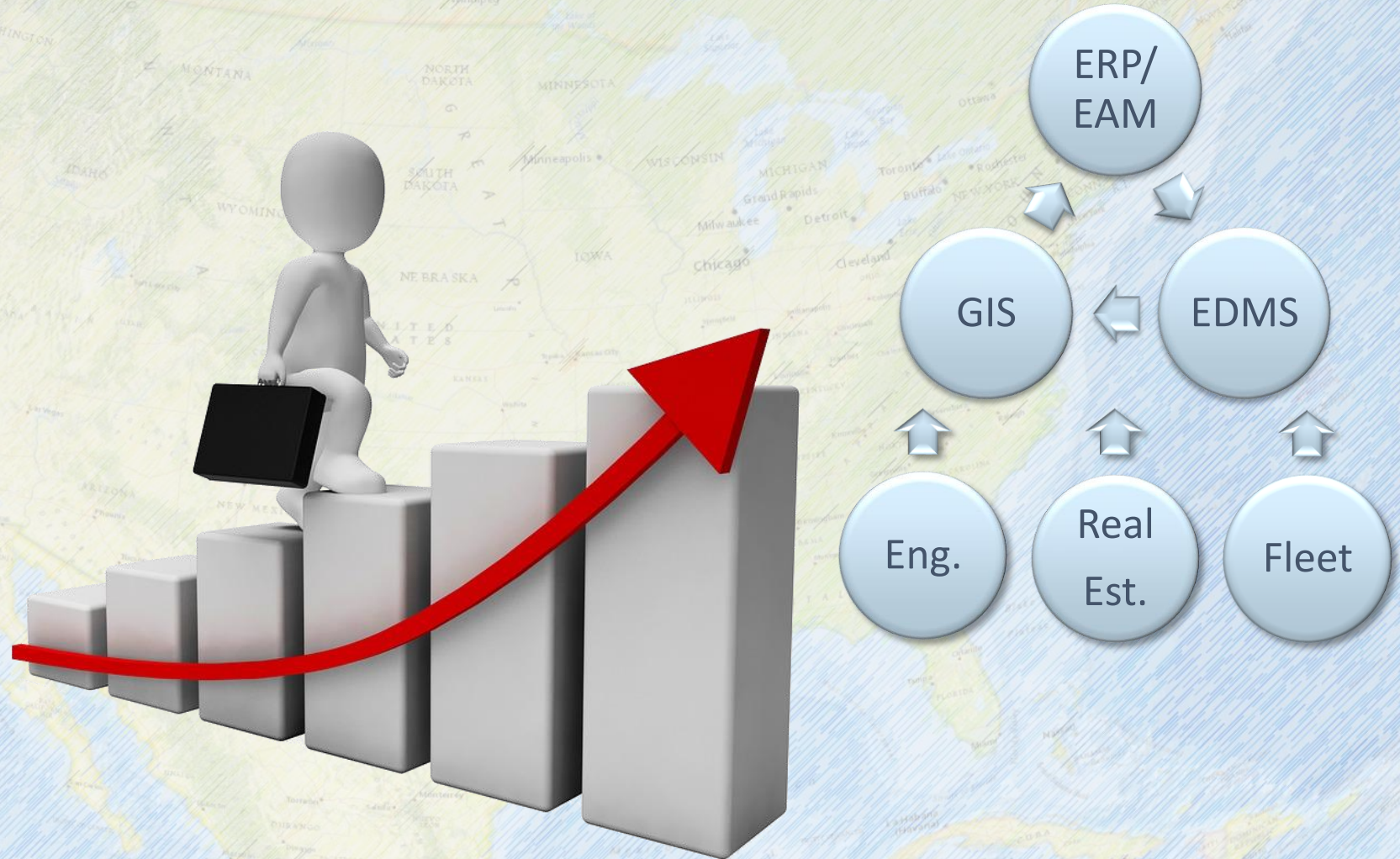
Total Document Count: 2

	Project	Document Name	Document Id	Description
	Storm drain modernization	Storm Drain Problem (Photo)	6f1284e5-4fe9-419e-b0df-49c0fc114dd6	Storm Drain SWM-3001
	Storm drain modernization	5-Year budget	618d0d24-1df2-4372-a24d-4b07c7cfd388	Projections for CIP in Terminal 1, including Storm



# Where is Your Port on This Path?

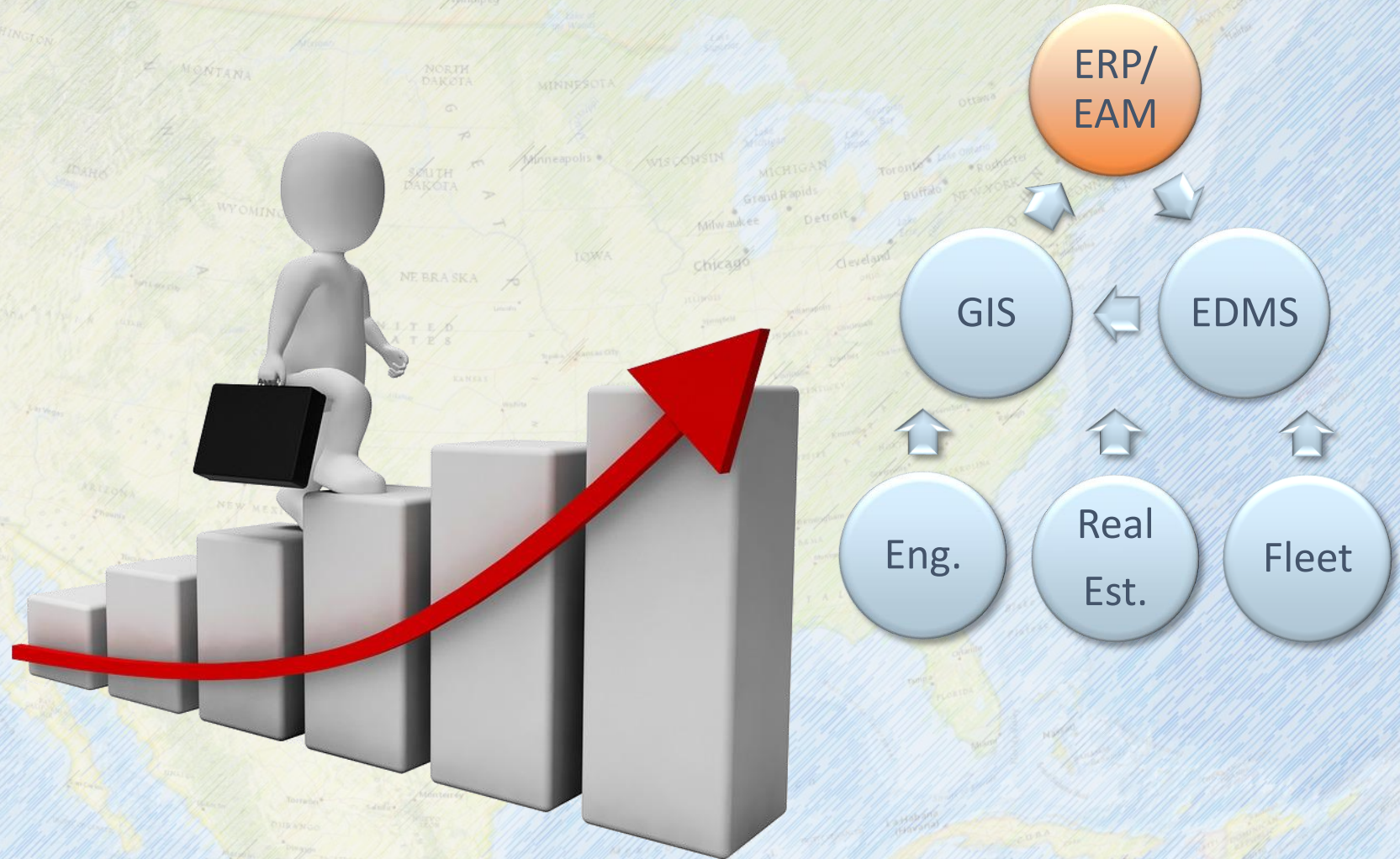
- Do you lack systems or connectivity?





# Where is Your Port on This Path?

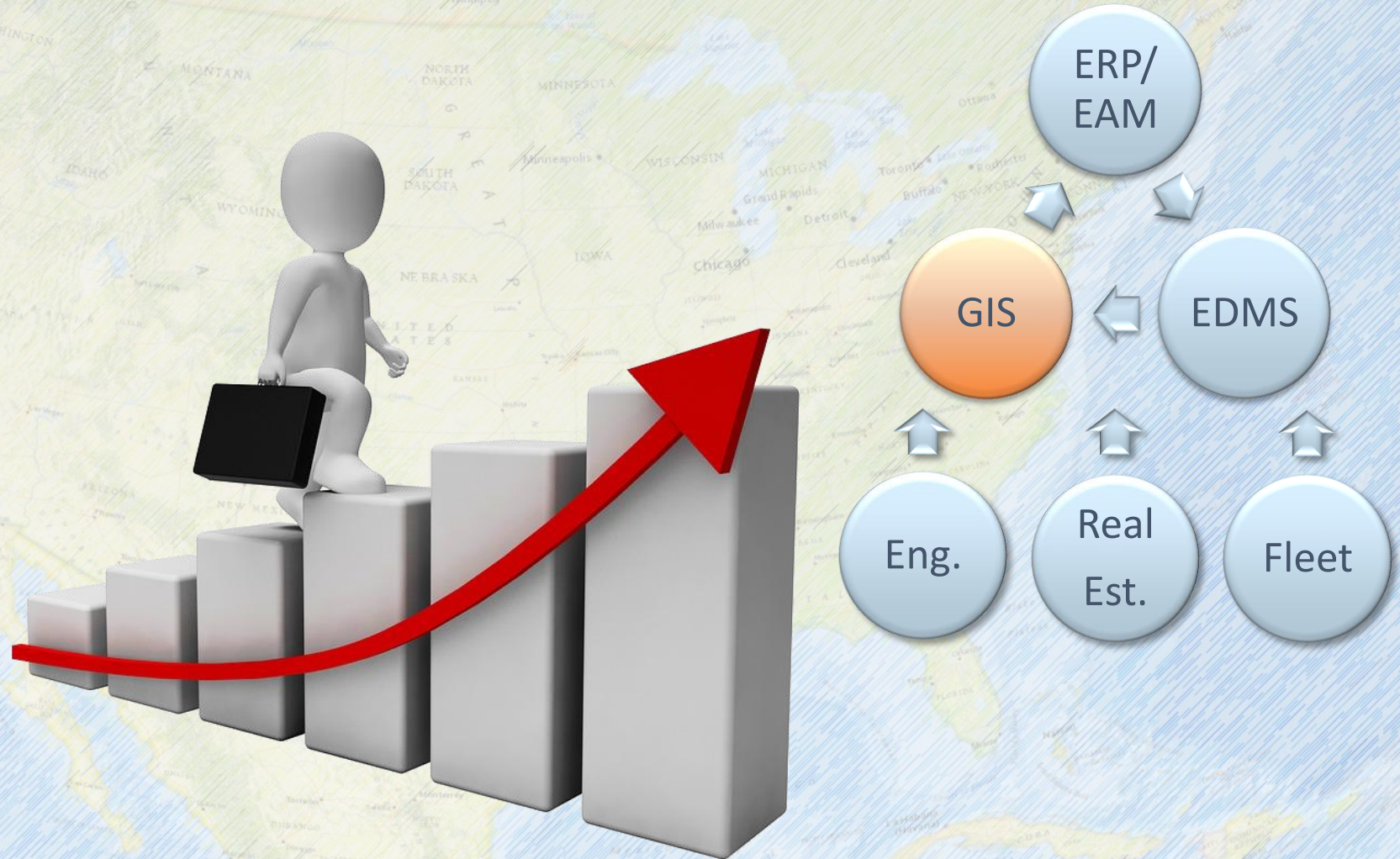
- Or only have enterprise systems for finance?





# Where is Your Port on This Path?

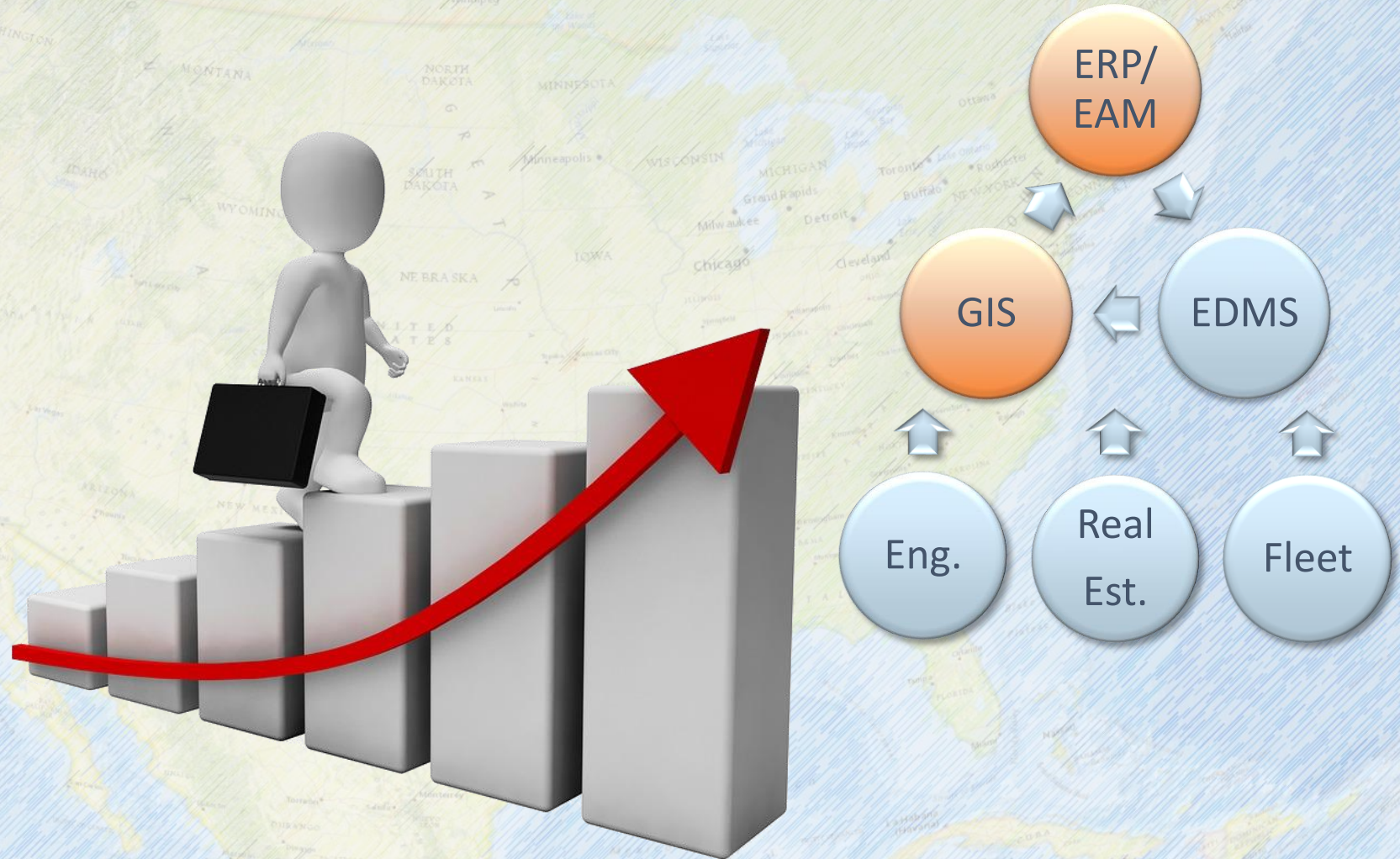
- Or have some GIS but it stands on its own?





# Where is Your Port on This Path?

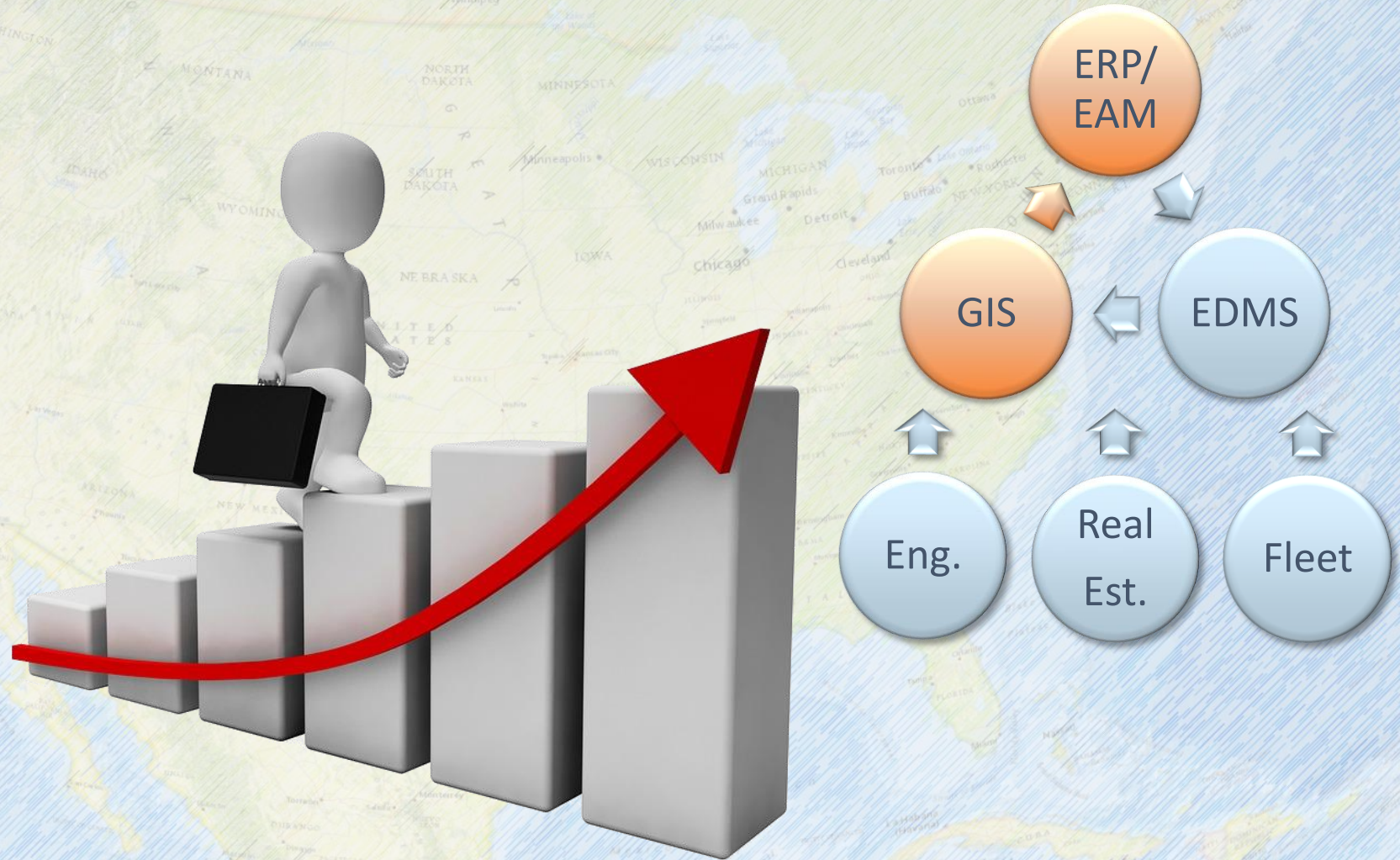
- Or you have some GIS but it isn't an enterprise system?





# Where is Your Port on This Path?

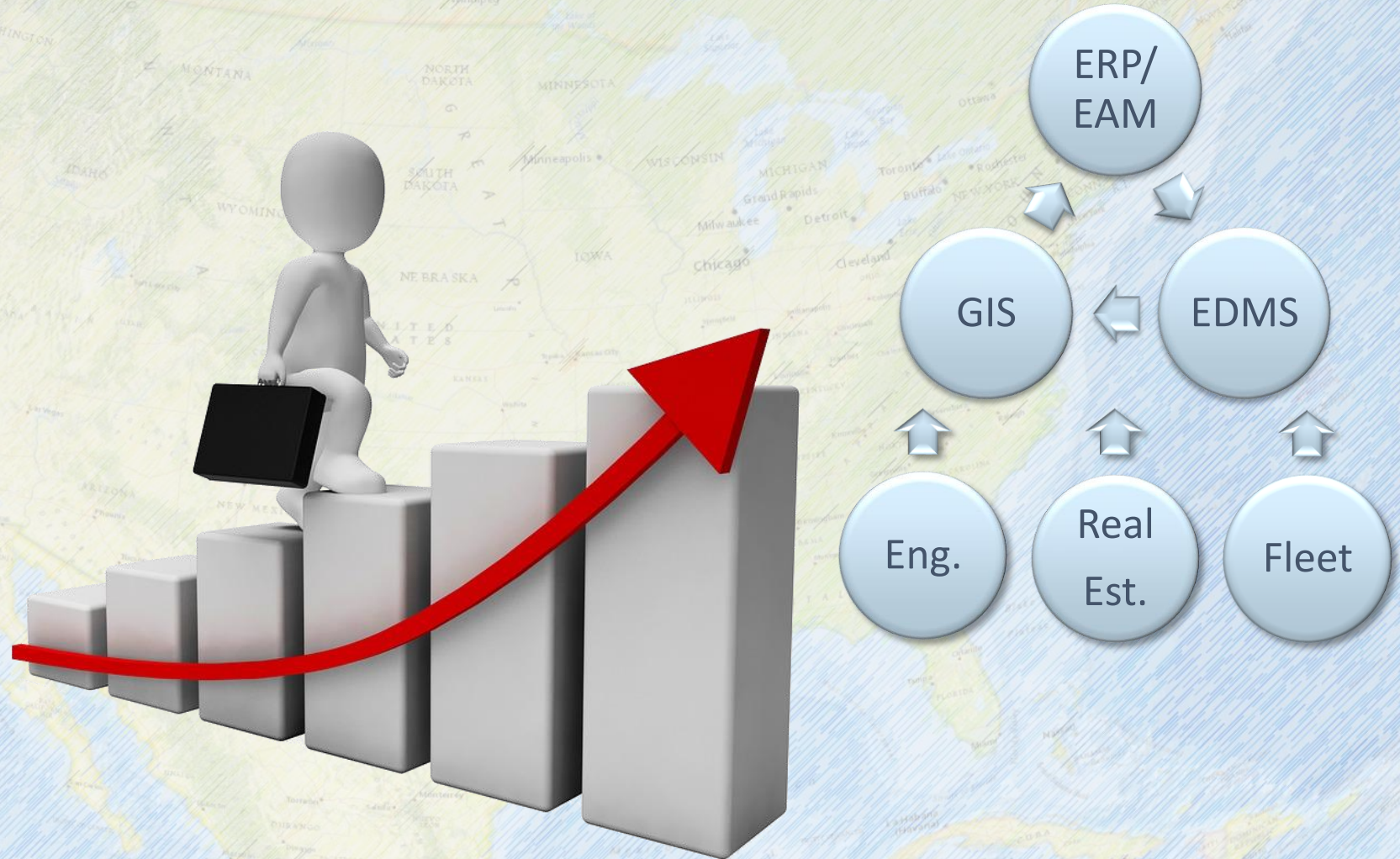
- Or your GIS is connected to some enterprise systems but is not itself an enterprise system?





# Where is Your Port on This Path?

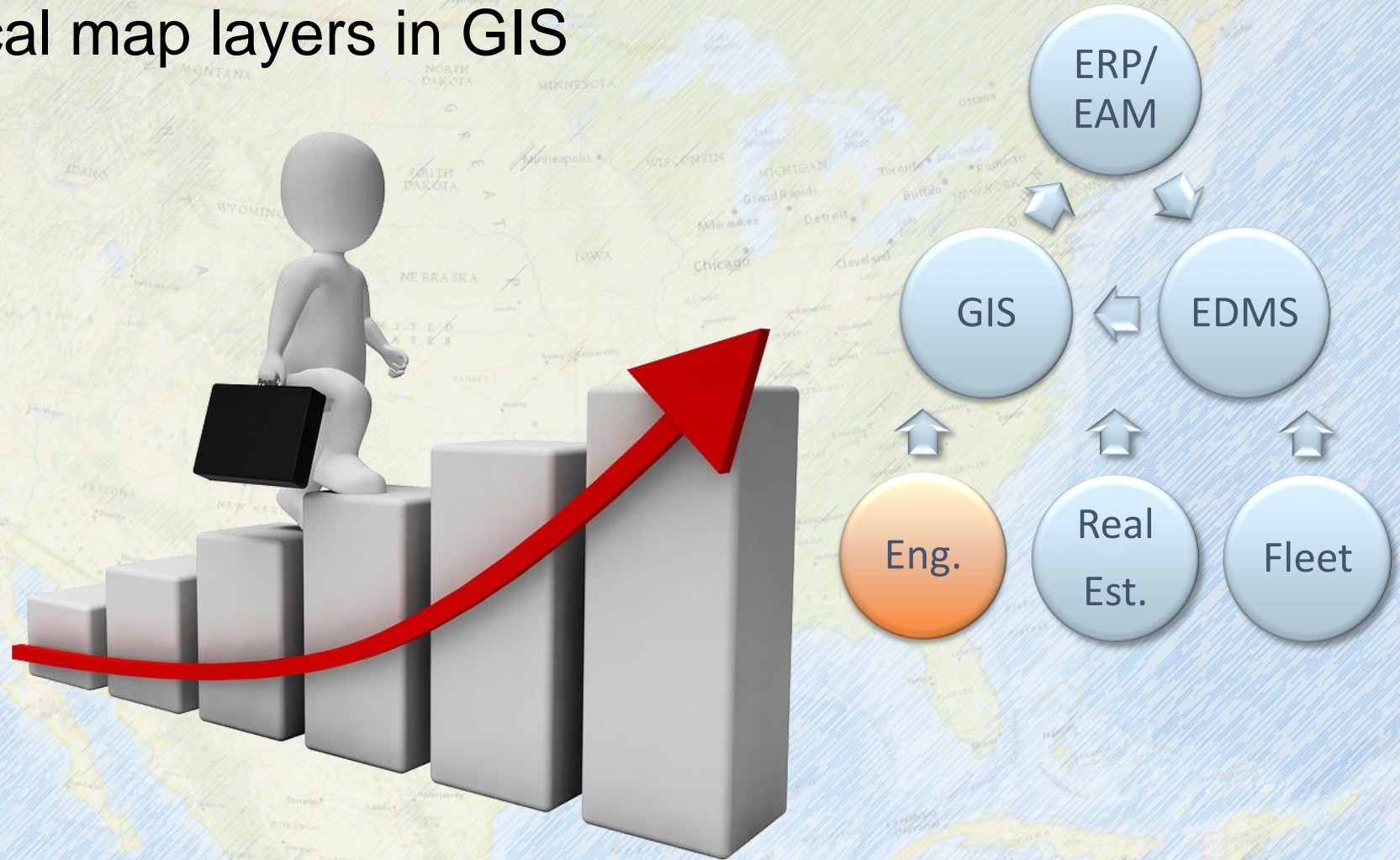
- Perhaps you are still managing everything with Word and Excel?





# Where is Your Port on This Path?

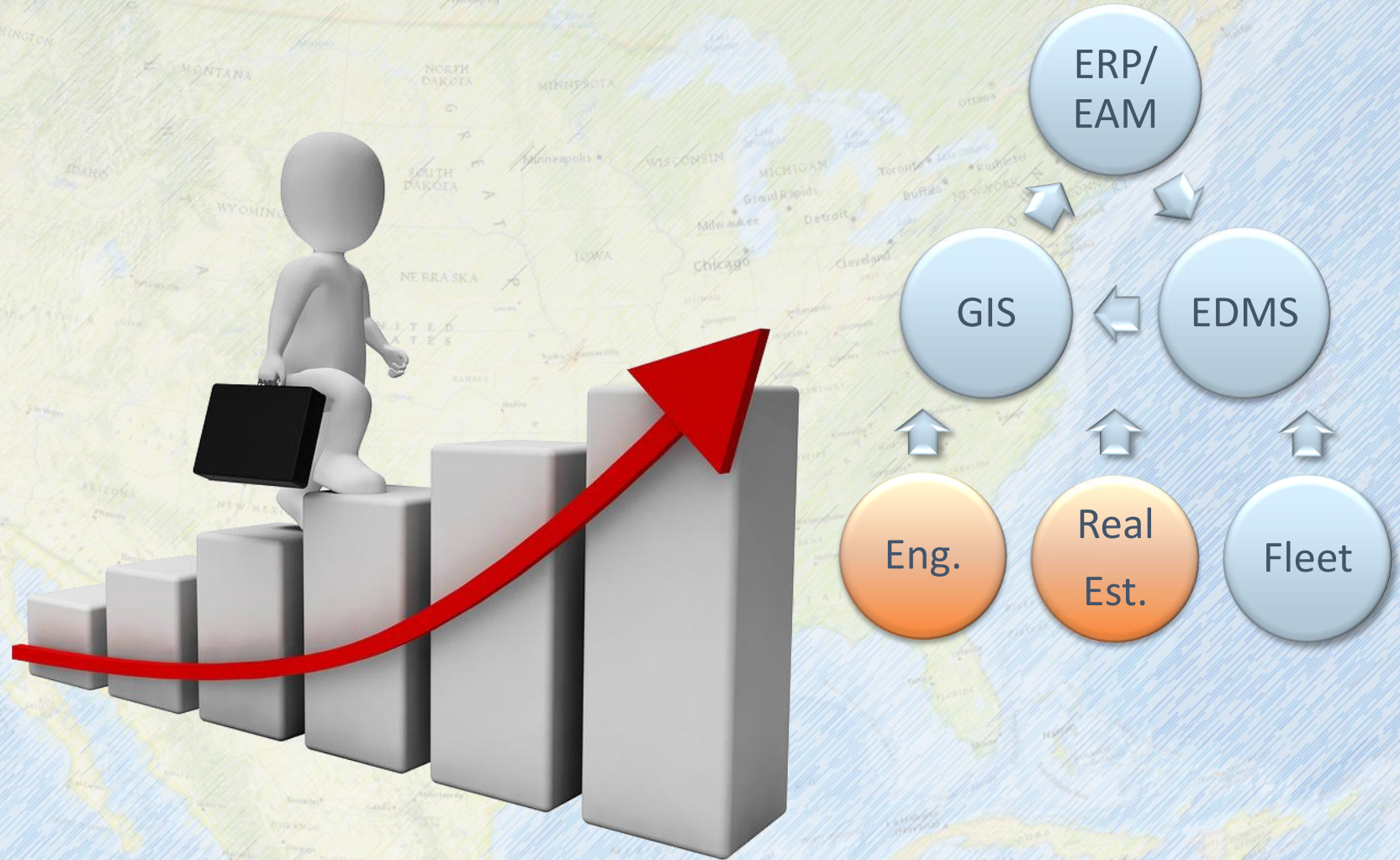
- You can start with specific systems, perhaps to just manage your record drawings
- Or just your critical map layers in GIS





# Where is Your Port on This Path?

- Or have a couple of systems, one for engineering and one for real estate





# Where is Your Port on This Path?

- As long as you have a plan for how you will eventually bring these systems together using the principles of Spatial Accounting
- Your port too can build a Decision Support System that will reflect your Strategic Asset Management Plan
- Not surprisingly, best outcomes if you
  - Have a plan
  - Get buy-in and budget
  - Standardize on a common platform
  - Learn from your peers, contract with experts, grow and hire people to sustain and grow

**Spatial Accounting**  
*turns*  
**Strategic Asset Management Plan**  
*into*  
**Decision Support System**





# Spatial Accounting

## Turning Strategic Asset Management Programs into Practical Decision Support Systems

**Daniel Elroi**  
President & CEO, NSGIS  
[delroi@nsgis.com](mailto:delroi@nsgis.com)

AAPA Facilities Engineering Seminar  
Jacksonville, FL, April 24, 2019