# GXP® Tools for Structured Observation Management (SOM)

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Agenda

- Introduction to solutions powered by the GXP Platform™

- Summary of new Activity Reporting Tool (ART) module for SOCET GXP® for Structured Observation Management (SOM) workflows

- Live software demonstration of SOCET GXP ART

- Summary of new GXP WebView® SOM tools for enabling web based SOM workflows

- Live software demonstration of SOCET GXP ART

- Live software demonstration of GXP WebView SOM

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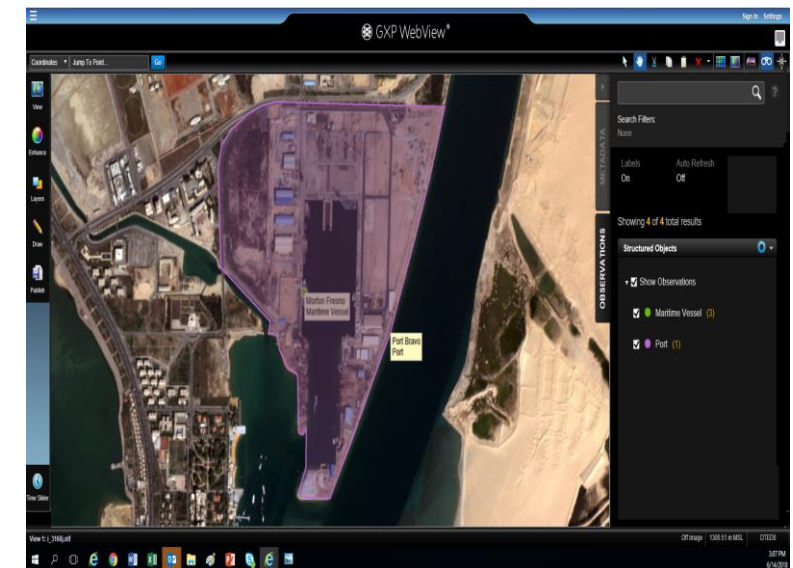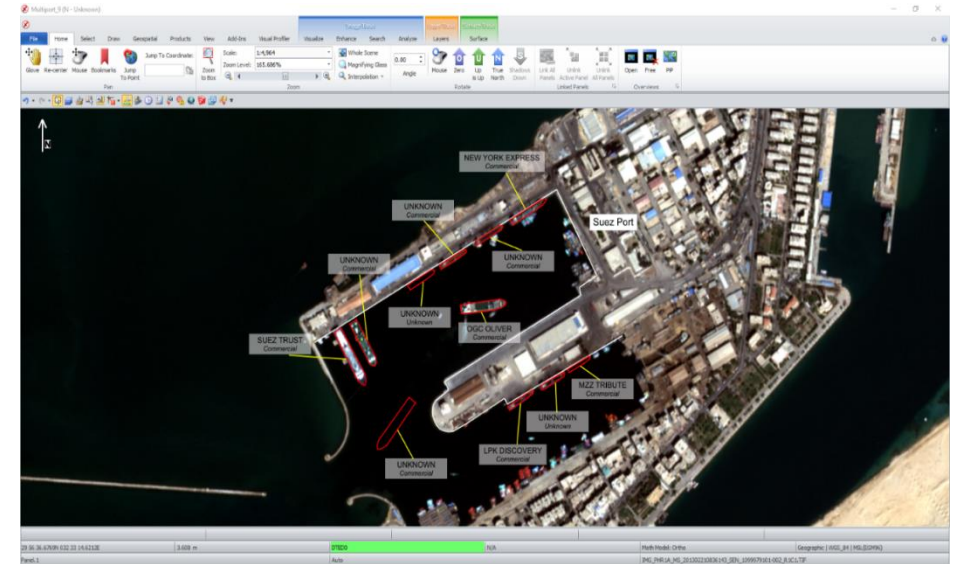
The GXP product suite

- GXP Xplorer® for data catalog, discovery, and dissemination
  - Web and mobile clients
- GXP WebView for image streaming, data visualization, SOM workflows, Movement Intelligence (MOVINT) exploitation, Precision Point Mensuration, and product publishing in a Web browser
- GXP InMotion™ Video Server and Video Desktop applications for video mission management and exploitation
- SOCET GXP for advanced imagery exploitation, product generation, MOVINT and geospatial production
- SOCET GXP Workflow Improvement Module (WIM) for a direct GXP Xplorer connection inside of SOCET GXP enabling rapid data discovery and review
- Tracking Analytic Software Suite (TASS) for creating and analyzing MOVINT from Full Motion Video (FMV), Wide Area Motion Imagery (WAMI), and Ground Moving Target Indicator (GMTI) sources

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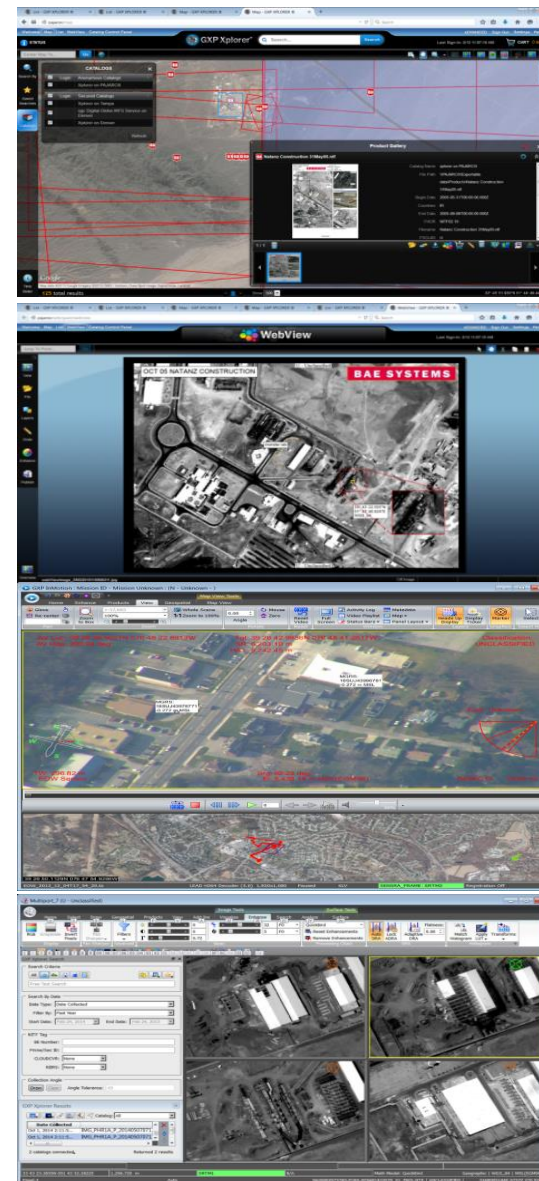
GXP product suite: built on the GXP Platform

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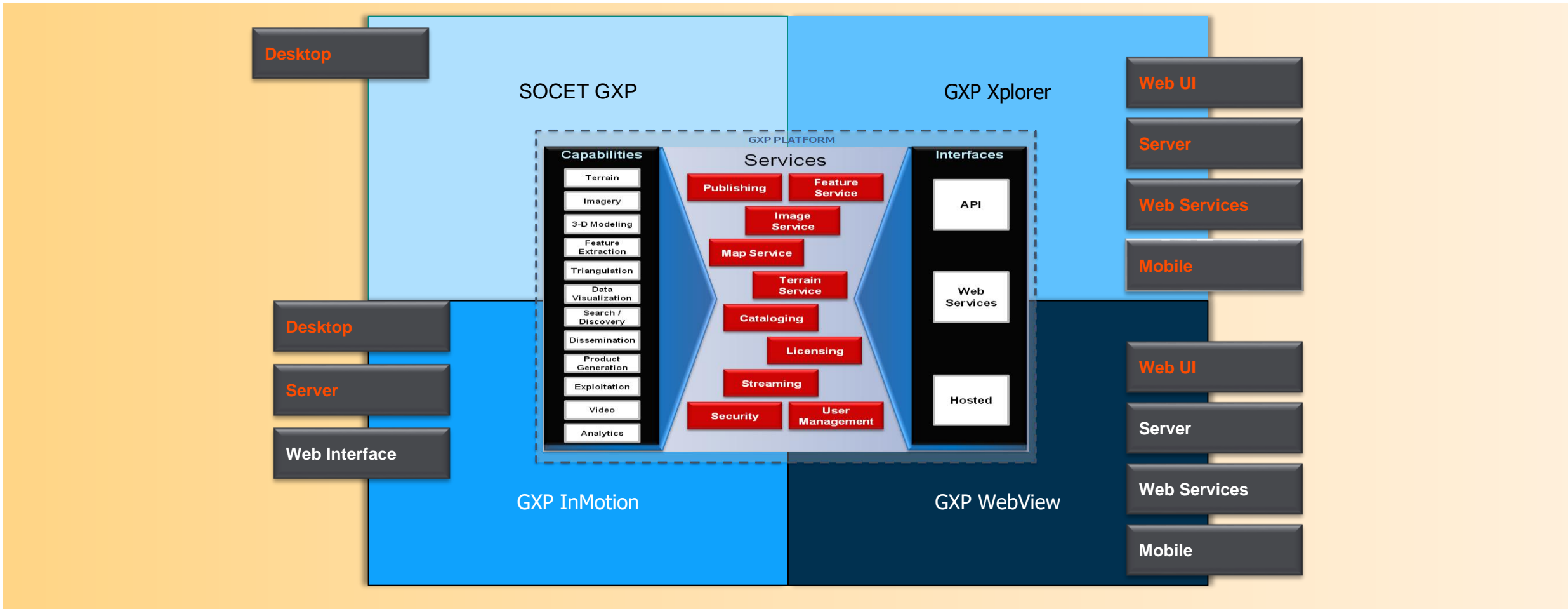
Activity Reporting Tool (ART) in SOCET GXP

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Object Based Production with Structured Observation Management (SOM)

- Workflow
  - Create, view, and analyze object-based observations
  - Record observations in a SOM database
  - Exploit imagery and observations in a single user interface
  - Exploit and analyze in a web or desktop client
  - Use for order of battle analyses and other investigations
- Benefits
  - Integrates SOM (collection) and Object Based Production (analysis)
  - Supports highly transactional continuous enrichment of knowledge about objects
  - Enables analysts at all levels to view SOM data and authorized users to build content
  - Facilitates building useful Ontologies and Knowledge Layers from SOM content
- Technology
  - Based on production COTS software currently in use (GXP Xplorer, GXP WebView, SOCET GXP)
  - Software and data can both be hosted by Amazon Web Services® (AWS®) or GovCloud (US)
  - Metadata consistent with standards base schema

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SOCET GXP Activity Reporting Tool (ART)

- ART provides capability for analysts to efficiently track, record, and report activities of interest, such as vessels in a port, recording changes over time

- Integrated with exploitation capabilities of SOCET GXP and GXP WebView

- Systematically step through collection process, or make observations whenever needed

- Graphically update information to reflect changes that have occurred over time, and visually verify that all changes have been reported correctly

- Outputs include a Feature Object Database (FODB) of objects and activities for change analysis and machine analytics

- Several FODBs are compatible
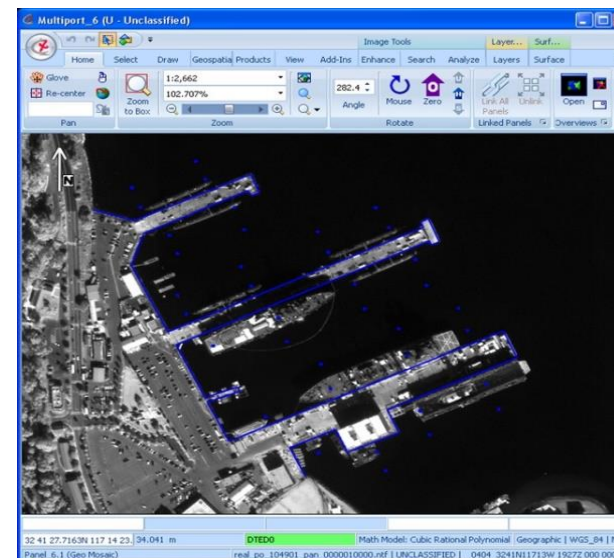
**Objects,
observations,
geometries**

Image courtesy of DigitalGlobe®.

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ART in SOCET GXP

Image courtesy of Airbus®.

Whenever new images are available, view the graphics of previous objects and activities and update them to record change.

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GXP WebView Structured Observation Management and Object Based Production

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View existing observations in image exploitation client GXP WebView

- Observations are graphically displayed on streamed image being exploited
- Structured metadata obtained via the SOM Geodatabase is viewed by clicking an observation graphic
- Observations are filterable spatially, temporally, and contextually
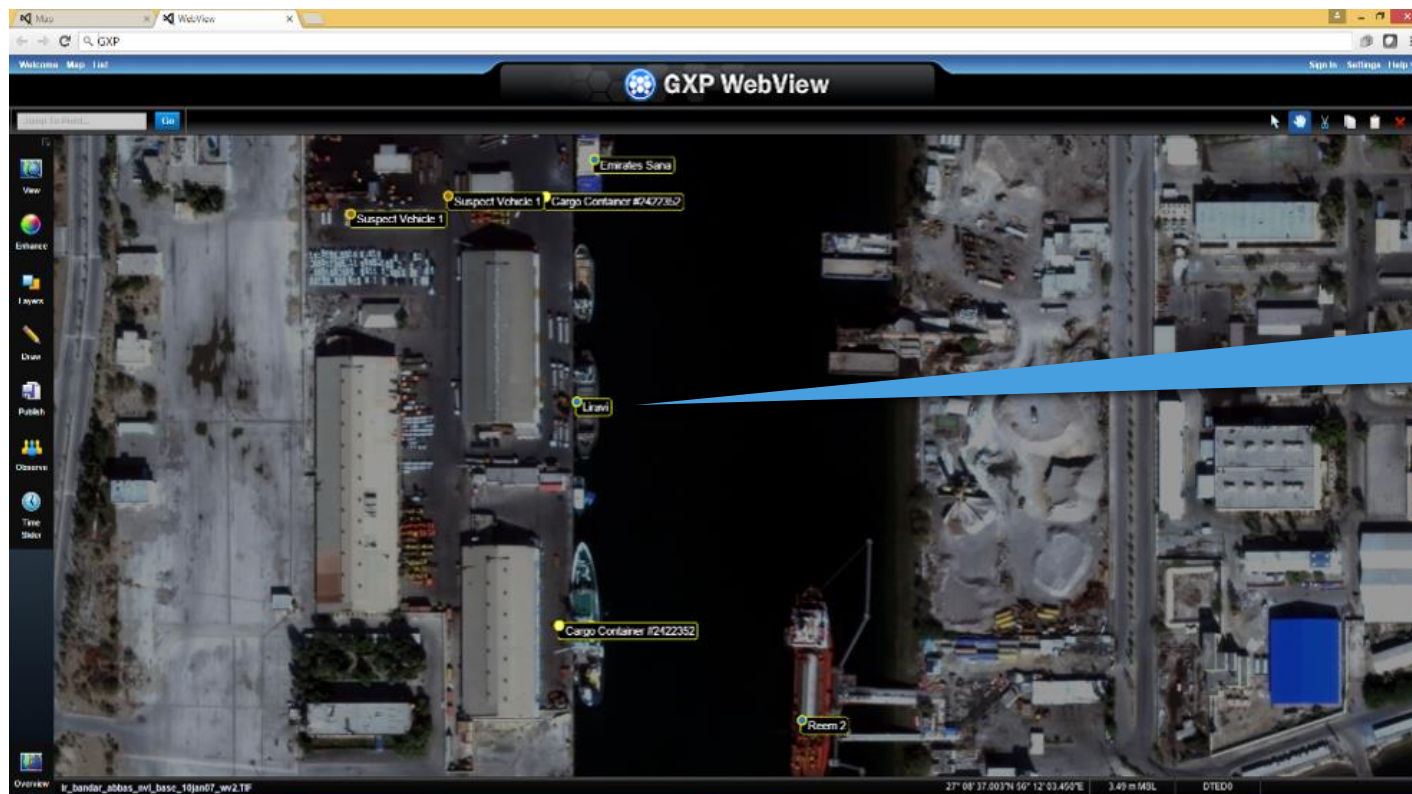
The ability to visualize and filter observations right in the exploitation client provides views to assess potential patterns and form conclusions

Image courtesy of DigitalGlobe®.

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Create new observations

- Structured metadata for observations is auto-populated from image metadata where possible
- Pick-lists based on allowed values and previous entries reduce time and maintain consistency
- Observations are published to the FODB via the SOM DB REST API
- Objects and relationships can also be created

Image courtesy of DigitalGlobe.

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ART in GXP WebView

Visualize objects observed across the enterprise right on the exploitation image to assess potential patterns and support new observations.

Create observations of activities in database with structured metadata attributes, auto-population, filtered pick-lists, cloning, and auto-complete fields. Enables rapid recording of change and knowledge build-up.

Filter by time, location, attributes, context, and relationships for clearer understanding of relevant information.

Image courtesy of DigitalGlobe.

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Latest enhancements: GXP WebView SOM tool

- Disseminate observations collected in SOCET GXP ART to others using GXP WebView

- See locations of objects observed over time overlaid graphically on the image

- Visualize changes in the scene with time slider

- See metadata about the activities observed

- Observations can also be inserted through the GXP Xplorer API by developers and viewed in GXP WebView

- GXP WebView dynamically reflects all attributes stored with the observations, without pre-configuration

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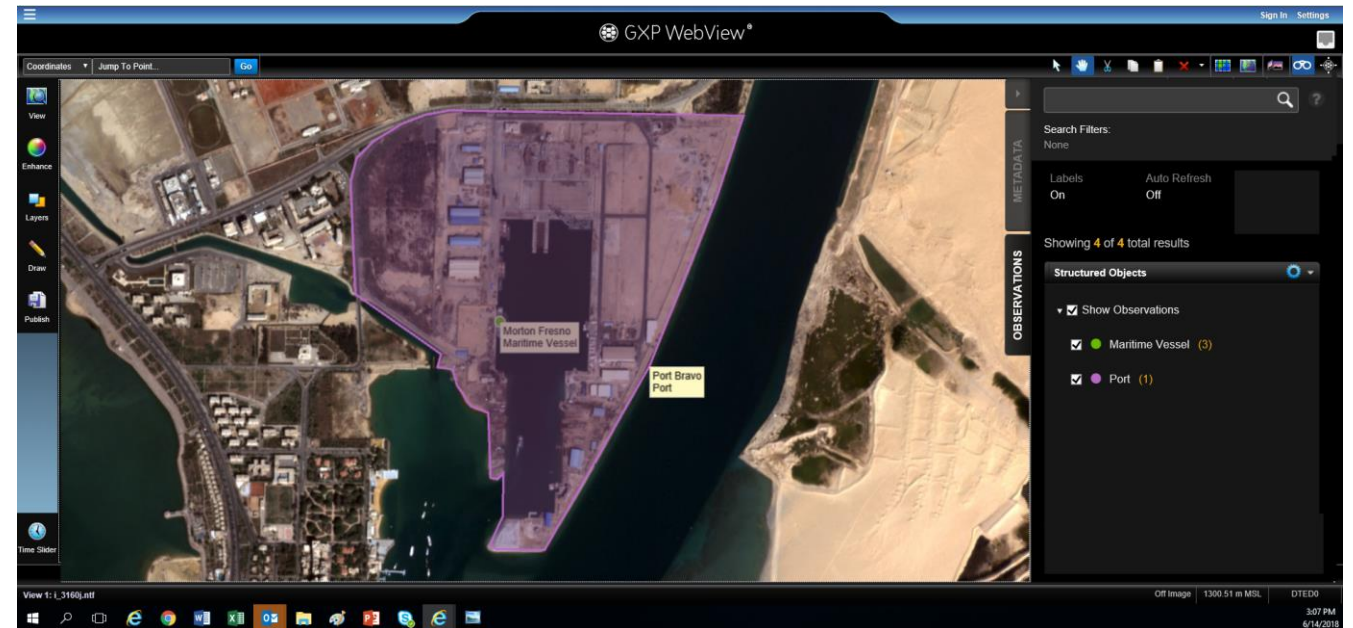
For SOM databases with relationships: review history and relationships of objects

- Open a link relationship view for deeper analysis
- Review the history of observations about an object both spatially and temporally
- See relationships between objects, such as when a ship was in various ports
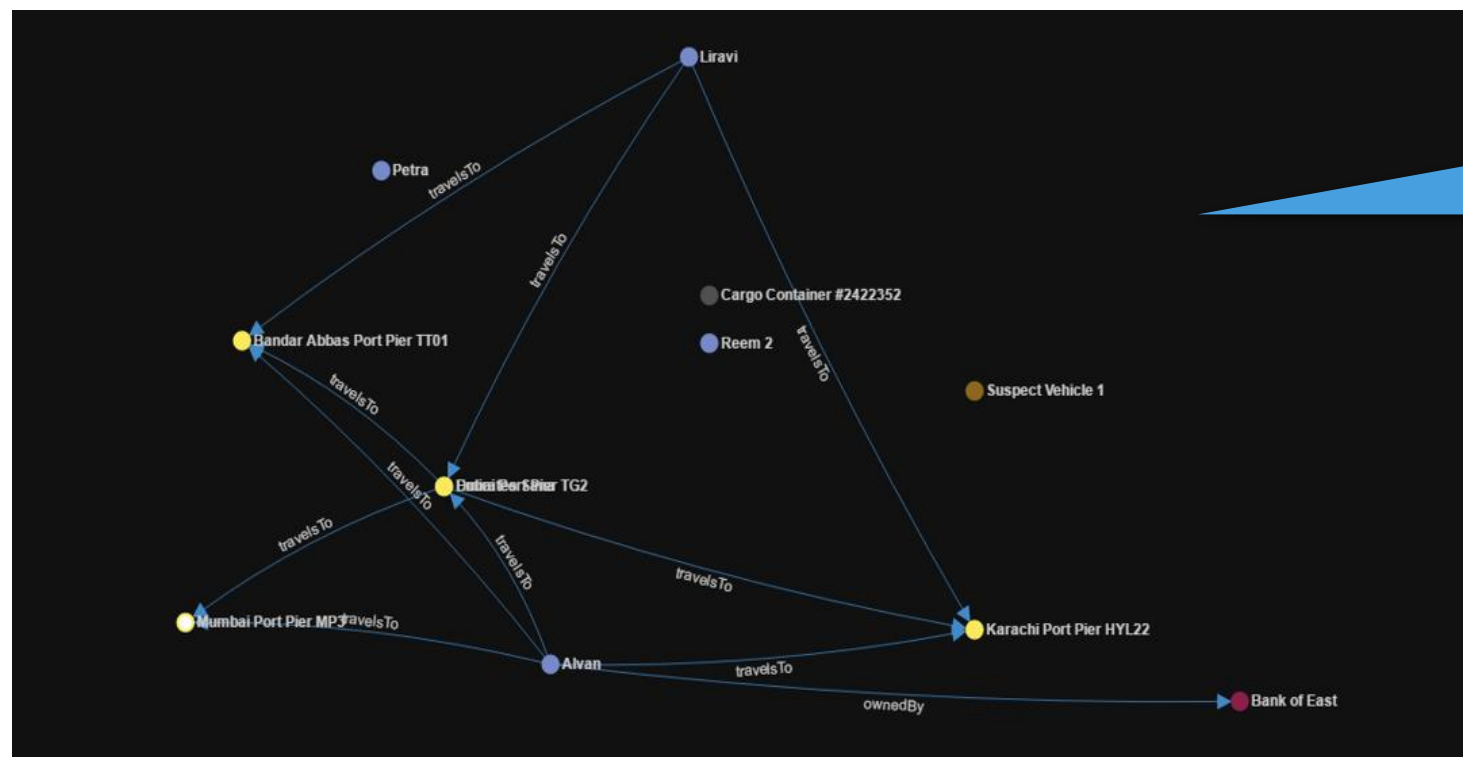
The buildup of knowledge is readily visualized. This approach directly supports highly transactional continuous enrichment of knowledge about objects

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Future release: review spatio-temporal history and relationships in textual detail

- Review the current status of an object
- Analyze details of the history of observations and relationships about an object in time and space

Alvan

Associations

| Associations	Start Date	End Date	Classification	Confidence
ownedBy Bank of East	2009-05-01T00:00:00Z	2009-06-01T00:00:00Z	UNCLASSIFIED	Probable
travelsTo Karachi Port Pier HYL22	2011-03-26T21:07:00Z	2011-04-26T21:07:00Z	UNCLASSIFIED	Possible
travelsTo Dubai Port Pier TG2	2011-03-23T21:07:00Z	2011-04-23T21:07:00Z	UNCLASSIFIED	Confirmed
travelsTo Bandar Abbas Port Pier TT01	2011-03-19T21:07:00Z	2011-04-19T21:07:00Z	UNCLASSIFIED	Confirmed
travelsTo Mumbai Port Pier MP3	2011-03-20T21:07:00Z	2011-04-20T21:07:00Z	UNCLASSIFIED	Confirmed

Observations

Activity	System Creation	Classification	Start Applicability Time	End Applicability Time
Karachi Arriving	2016-03-09T05:40:15Z	UNCLASSIFIED	2011-03-20T21:07:15Z	2011-04-20T21:07:15Z
Karachi In Port	2016-04-11T22:58:22Z	UNCLASSIFIED	2011-03-21T21:07:22Z	2011-04-21T21:07:22Z
Karachi Loading	2016-03-31T20:27:53Z	UNCLASSIFIED	2011-03-23T21:07:48Z	2011-04-23T21:07:48Z
Mumbai Underway	2016-03-09T05:40:26Z	UNCLASSIFIED	2011-03-25T21:08:01Z	2011-04-25T21:08:01Z
Mumbai In Port	2016-03-09T19:23:12Z	UNCLASSIFIED	2011-03-26T21:08:04Z	2011-04-26T21:08:04Z
Karachi Arriving	2016-03-09T05:40:16Z	UNCLASSIFIED	2011-03-28T21:08:32Z	2011-04-28T21:08:32Z
Karachi In Port	2016-03-09T05:40:25Z	UNCLASSIFIED	2011-03-29T21:07:00Z	2011-04-29T21:07:00Z
Karachi Refueling	2016-03-10T05:05:12Z	UNCLASSIFIED	2011-03-29T21:07:00Z	2011-04-29T21:07:00Z
Karachi Departing	2016-03-10T05:35:12Z	UNCLASSIFIED	2011-03-31T21:07:16Z	2011-04-31T21:07:16Z
Bandar Abbas Arriving	2016-03-09T05:43:25Z	UNCLASSIFIED	2011-04-03T21:07:22Z	2011-05-03T21:07:22Z
Bandar Abbas Unloading	2016:03-09T05:40:16Z	UNCLASSIFIED	2011-04-04T21:09:46Z	2011-05-04T21:09:46Z

Details of observations and relationships can be analyzed to discern patterns and test hypotheses.

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Future release: review data analytics and ask questions

- Review graphs and charts of derived analytics that are frequently requested
- In future, ask specific questions to build and run analytics on-the-fly

Analytics provide status and statistics for rapid understanding of patterns and trends to aid in investigation
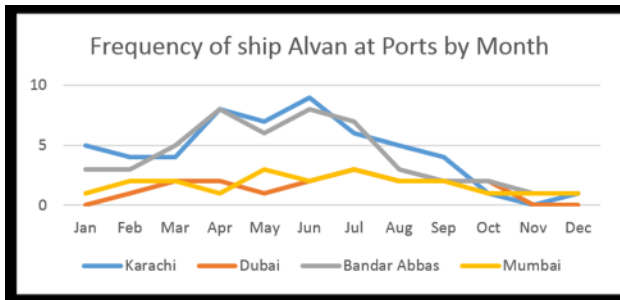
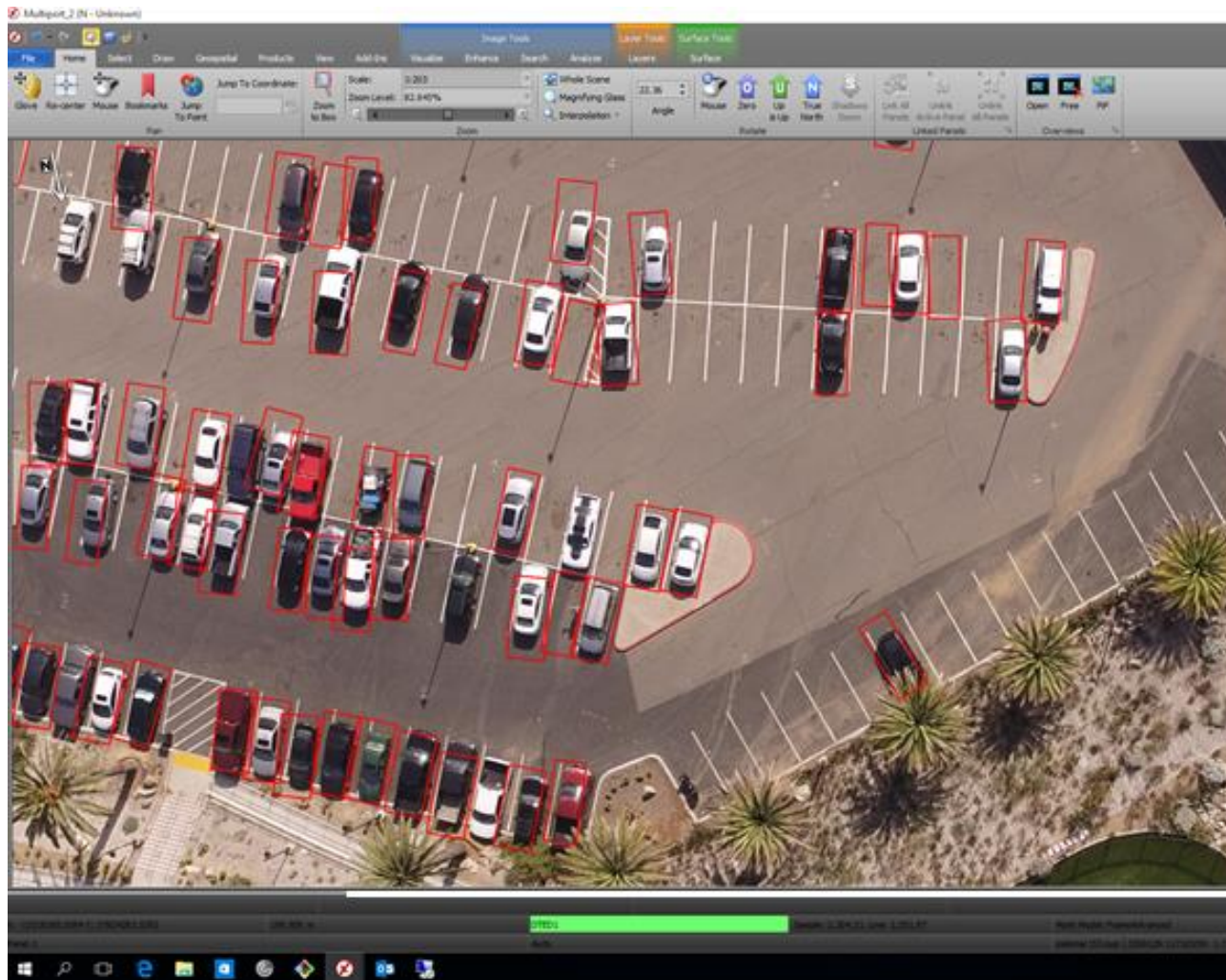How often was ship Alvan in Karachi in the past year?
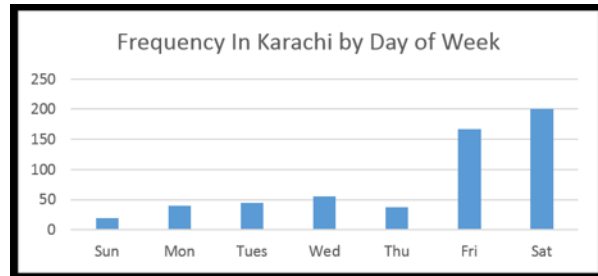
Which days of week was Alvan in Karachi?

What was the maintenance schedule of Alvan?

When were Alvan and Liravi in same port +/- 2 days?

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Future release: review objects auto-detected by Machine Learning

- Machine Learning (ML) detections rendered in SOCET GXP Multiport, possibly as shown at left
- Toggle detections on/off in digital overlay
- Functionality depends on ML (Artificial Intelligence) tool outputs for example:
  - Could display attributes such as score in graphic or in text box
  - User could filter by attributes
  - User could confirm/deny/edit ML detections and send back to ML tool to train it

UAV image with 3.5 CM GSD, courtesy of Palomar College, San Diego. Used with permission.

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Imagery and data providers

BAE Systems would like to thank the following organization for providing data used in this webinar:

- DigitalGlobe®: WorldView-1, WorldView-2, and QuickBird, GeoEye-1

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Questions?

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