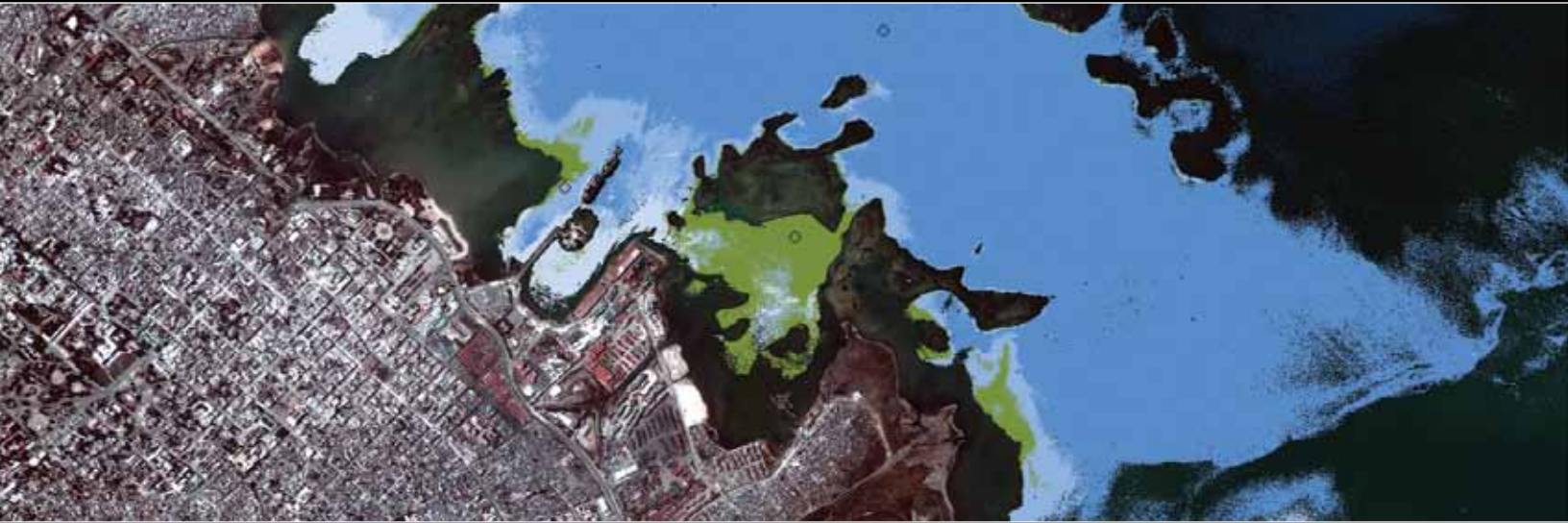


# SOCET GXP® v3.2

## Release enhancements



**With the addition of the Frame-Advanced sensor model, BAE Systems' SOCET GXP® software achieves a new level of support for SOCET SET® workflows, from frame imagery import to advanced product generation.**

**To address customer requirements across many disciplines, advanced capabilities are added for terrain and feature analysis, image exploitation and product creation.**

The overall user experience is superior to previous versions with live previews and galleries added to the SOCET GXP Multiport™ Ribbon interface. Users see processes applied to imagery, graphics and terrain in real-time before they are committed, while flythrough and visualization tools enhance 3-D viewing.

SOCET GXP v3.2 offers a suite of integrated video tools for second- and third-phase post mission analysis. A redesigned video dashboard, new Video Editor and Mission Manager are ideal for collaborative viewing and file sharing. Video feeds are stored in a common location for easy access, minimizing the time required to hunt through numerous directory structures to view, edit and share information.

Hyperspectral and multispectral (HSI and MSI) image processing is extended with the addition of spectral library support and new analysis algorithms for supervised and unsupervised classification. These enhancements are valuable for trend analysis and to establish patterns of activity over time.

New terrain analysis tools include terrain registration, comparison and volumetric analysis. The results from raster analysis can be converted to vector products with automatic attribution in shapefile or feature database format.

Finally, additional enhancements improve algorithmic and display performance, which is evident when handling large data sets.

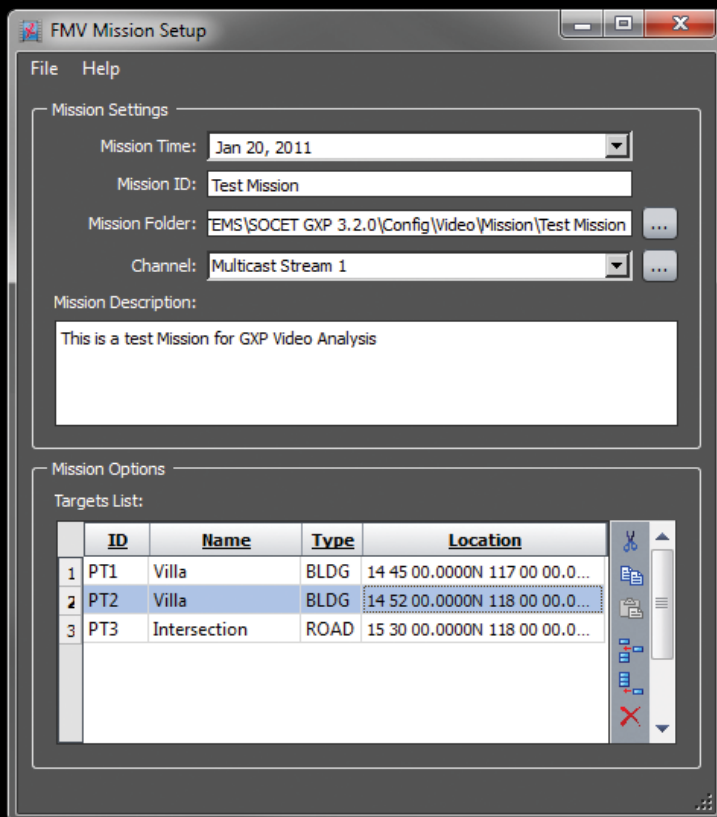
# Video analysis

The redesigned Video Analysis tool adopts the familiar look and feel of the SOCET GXP Multiport Ribbon to improve usability when viewing multiple files or streams simultaneously.

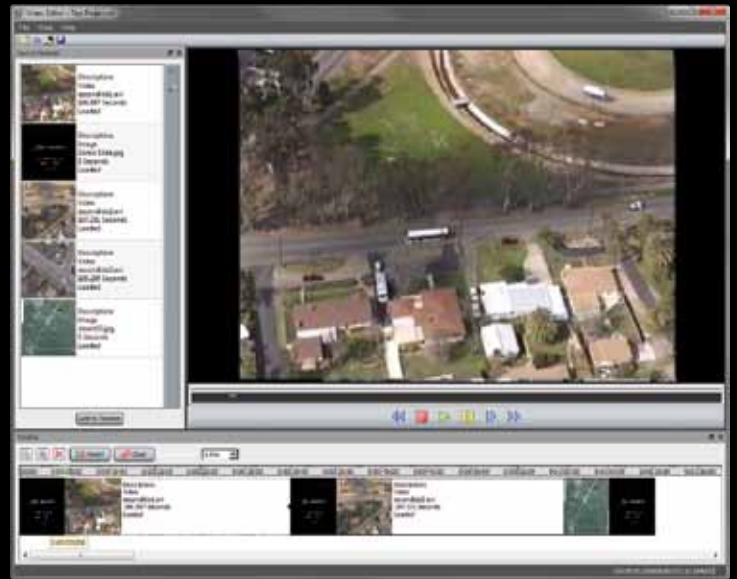
The new Video Editor and Mission Manager are integrated, giving analysts the power to create and exploit products, configure collaboration settings, synchronize the exploitation environment and easily share information about where files are saved. User-defined dockable panels can be turned on and off or transferred to other parts of the screen as needed.

SOCET GXP provides geopositioning to allow fusion with other geospatial data such as terrain, features and additional images. With a single button click, still frames from a video sequence can be moved into the SOCET GXP Multiport for editing. For further analysis, enhanced visualization and mission planning operators can launch Google Earth™ directly from the Multiport. Viewing and analysis tools track moving objects such as vehicles in video feeds and plot the course of the platform from which the video was acquired — such as an unmanned aerial system or an aircraft.

Advanced search and review controls provide slow-motion or frame-by-frame metadata analysis and video bookmarking for playback and analysis. Image enhancements can be applied to video streams on the fly for brightness, contrast, saturation, hue, sharpness, smoothing and edge detection. Additional object-tracking tools manage real-time coordinates, speed and bearing.



New Mission Manager facilitates collaboration.



New Video Editor is integrated with the Mission Manager for easy editing and file sharing.

## Video Dashboard

Redesigned Ribbon interface, tear-out panels and overall improved usability

## Video Editor

Added capabilities to build complex video products using slicing, splicing, bumpers and title graphics

## Mission Manager

Set-up missions with save folders and video channels, share event log details with multiple users and import target information

## Ticker

Rapidly view scrolling remarks added by analysts through the collaborative Event Log

## Digital video recording (DVR)

New play, pause, rewind and record options

## Heads Up Display (HUD)

View the HUD, or simply turn it off to simplify the video environment and output frames without the HUD burned in

## Formats

Supports MPEG-2, MPEG-2 with H.264 encoding, Apple® QuickTime®, .asf, .wmv and .avi

## Sensor models

Supports KLV metadata (104.5 and 601.1) for precise mensuration operations

## Interoperability

Supports STANAG 4609 NATO motion imagery interoperability standard

## Visualization

Supports viewing, and object and source platform tracking operations in SOCET GXP and Google Earth

# Usability

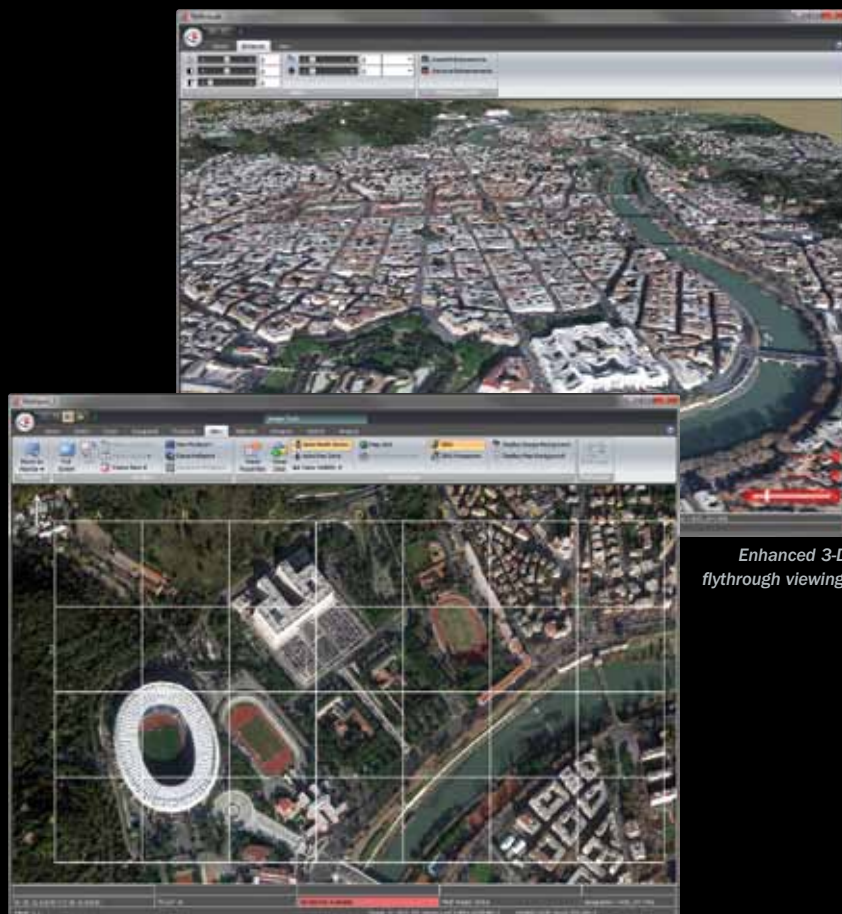
## New features, user-defined tools and shortcuts make it easy to work with large data sets and create finished products.

When merging photogrammetry into mainstream image analysis, ease of use is particularly important for quick analysis.

- Several Ribbon and mini-toolbar buttons have live previews for viewing results of an applied action prior to selecting the best solution
- New functionality is added for loading reference data with a single mouse click to improve map and image background features
- Redesigned Virtual Mosaic™ options give analysts the best accuracy possible when working with multiple images and sensor types

New image exploitation tools eliminate the need for stereo imagery or stereo hardware — an easy-to-use mensuration tool measures object height and a simple 3-D building extraction tool is designed for use on a single image.

Improved flythrough capabilities offer an enhanced 3-D viewing experience for large, high-resolution terrain data sets and familiar standard controls. Reference imagery and maps such as DPPDB, CIB®, and CADRG are automatically loaded into a Multiport for greater situational awareness when working with data sets that may cover a small field of view. The imagery and maps can be used as a control source for glove align, registration or triangulation processes. Other enhancements include saving Multiports as Workspaces, an optimizer for faster application startup, enhanced Target and Marker auto-label fields and internationalization.



Enhanced 3-D flythrough viewing.

Use the GRG tool to create custom grids for mission planning.

### RSET generation

Up to three times performance improvement

### Live preview and galleries

Added to Multiport Ribbon and mini-toolbar buttons to view algorithm results before applying

### File System view

Moved display to bottom of Workspace Manager and added filtering capabilities to locate data quickly

### Internationalization

Added support for two-byte character files and improved localization

### Text data importer

Enhanced to allow complete control when selecting rows and columns to include with data imports

### Glove Align tool

Added rotation and scale

### Snap to ground (on-demand correlator)

Automated XYZ measurement in stereo or split-screen stereo using image correlation for height measurement

### Raster-to-vector

Added algorithms for image classification, terrain analysis and Line of Site results; vectors can be saved into a feature database or shapefile

### Map and image background

Performance improvements for faster load, right-click to open with option to open reference map and reference image simultaneously

### Grid reference graphic (GRG)

Added functionality to create and edit a GRG with controls to specify labels, line intervals, color and font

### Height Measurement and Simple Building tool

Added capability to take 3-D measurements and create 3-D drawings using monoscopic imagery

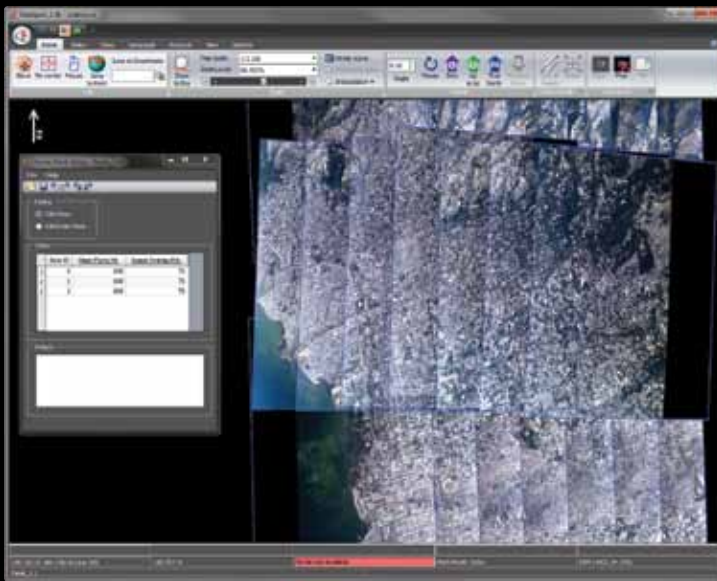
### Virtual Mosaic

New modes added for Ortho On-the-Fly™, Affine Master and Rigorous Master options

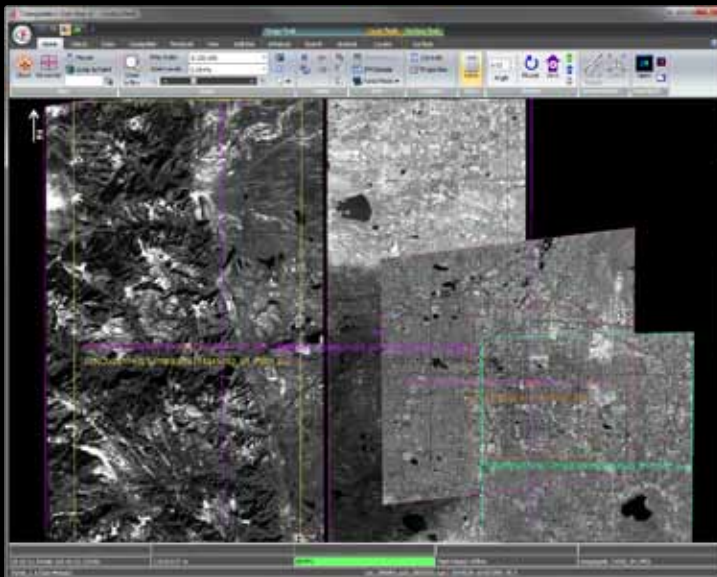
### Flythrough

Performance improvements, enhanced controls and new capability to use high-resolution terrain as a surface





The frame import process is used to flip, rotate and order images.



Eliminate specialized windows when triangulating images.

## Sensor models

**SOCET GXP® now includes a sensor model for frame cameras — the primary data sources for many users in multiple vertical and geographical markets.**

The Frame-Advanced sensor model, which debuted in SOCET SET® v5.5, is now part of SOCET GXP® v3.2, and is used in the geospatial production process from frame import through triangulation to finished products.

- Accommodates both film and digital cameras
- Uses same underlying mathematics as SOCET SET: collinearity equations with 43 adjustable parameters — six independent exterior orientation parameters per image, 12 constrained exterior orientation parameters per strip (GPS/IMU) and 25 constrained interior orientation parameters per block
- Rigorous error propagation reflects SOCET SET and SOCET GXP practice
- Customers' transition from SOCET SET becomes straightforward

The frame import process is typically considered a complicated photogrammetric procedure. To simplify the process, SOCET GXP offers a step-by-step wizard interface. In the first step the user selects a set of images, which are loaded into SOCET GXP in their native format (TIF, IMG, JPG, NITF, etc.). Additional steps enable the user to associate metadata with the selected imagery to form logical strips and blocks as part of the import process. The resulting triangulation setup file allows easy progression into triangulation if required.

- Uses camera calibration data
- Automatic and manual interior orientation
- Atmospheric and water refraction models
- Exterior orientation
  - GPS/IMU import: Applanix®, SOCET GXP GPS and generic ASCII such as "Image\_ID Strip X Y Z Time"
  - Third-party triangulation ingest: ALBANY, PATB and a generic ASCII importer for formats such as ImageStation® Automatic Triangulation (ISAT)
  - Manual block setup: Uses intuitive, interactive tools to align images, strips and blocks with respect to ground control

### Other new sensor models.

SOCET GXP v3.2 supports the following optical and radar sensors:

- ALOS, COSMO-SkyMed, ASTER and KOMPSAT-2

## Triangulation

**The Ribbon user interface facilitates the triangulation process ensuring faster learning and higher productivity.**

The frame import capability makes it easy to define blocks:

- Constrained adjustment for frame imagery includes GPS or GPS/IMU adjustment using strip constraints and self-calibration of physical camera parameters using block constraints
- Automatic tie-point measurement uses the improved adaptive tie-point matcher for measuring points on disparate imagery with seasonal, temporal or resolution variations
- Automatic tie-point measurement and adjustment of unknown images to control images

# Terrain analysis

Advanced terrain analysis tools include terrain registration, comparison and volumetric analysis.

Results from popular tools such as Line of Sight, Terrain-Shaded Relief and Slope and Aspect can now be converted from raster to vector format. Shapefiles generated are attributed with the values and colors of the tools applied. Terrain analysis tools incorporating new algorithms are listed below:

## Terrain registration

Shift one terrain model to another horizontally and vertically

## Terrain comparison

Graphically display differences between terrain files or between a terrain file and a polygon

## Quality statistics

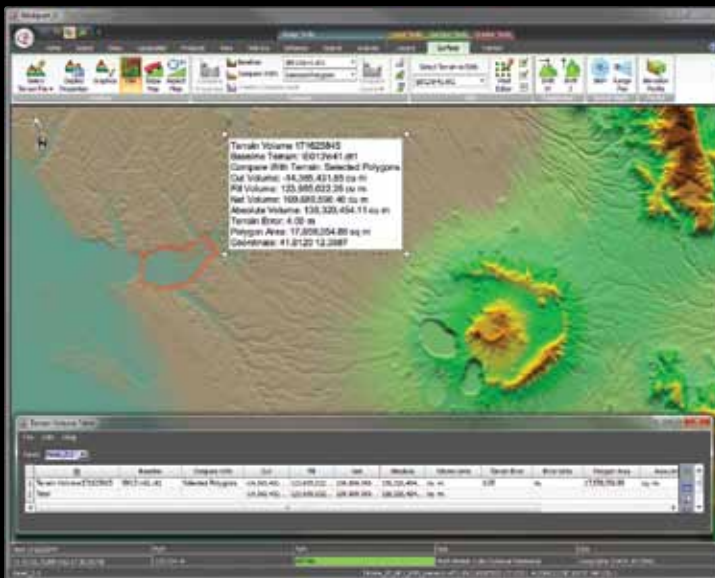
Compare terrain files, a terrain file and a ground control point file or two ground control point files to output statistics on the differences

## Terrain volume

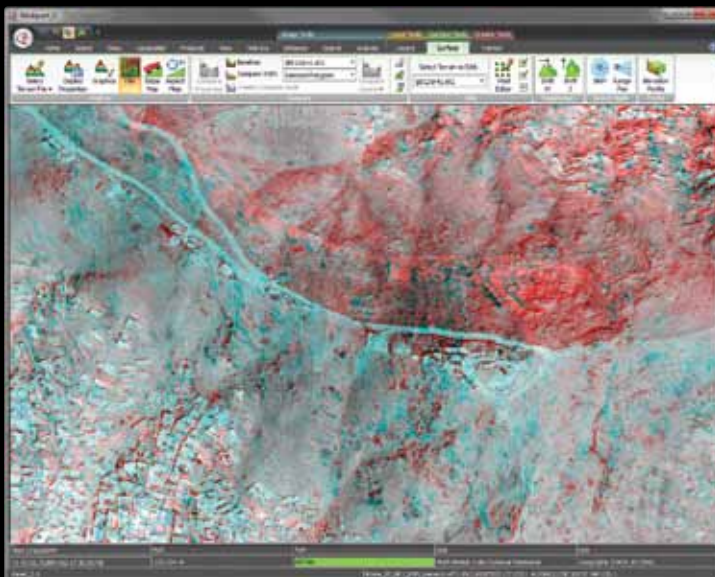
Compute net, fill, cut and absolute volumes between terrain files or between a terrain file and a polygon; additional computations include area, parameter and error analysis

## Next-Generation Automatic Terrain Extraction (NGATE)

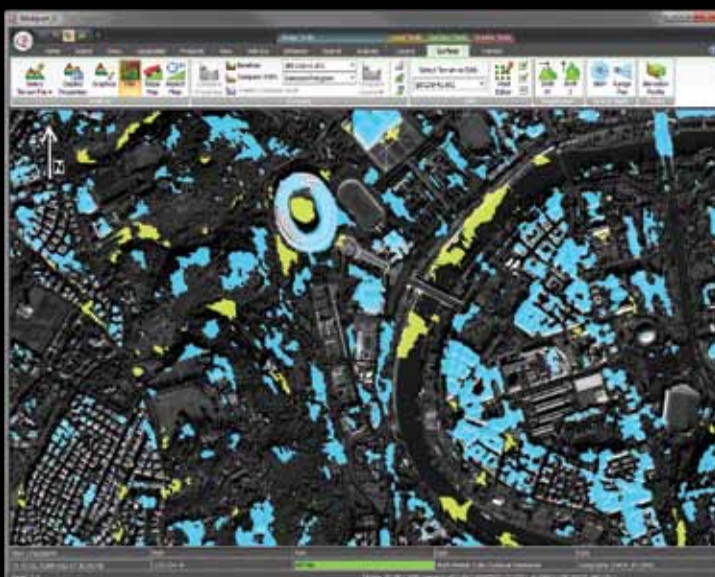
Performance and quality improvements for NGATE allow collection of elevation data in low-contrast areas such as glaciers and deserts; NGATE also extracts bare-earth and surface models simultaneously



Terrain comparison using a polygon to delineate area of interest.



Shifted terrain files showing error in alignment.



Differences in terrain files are highlighted to show elevation change.



# Advanced image analysis

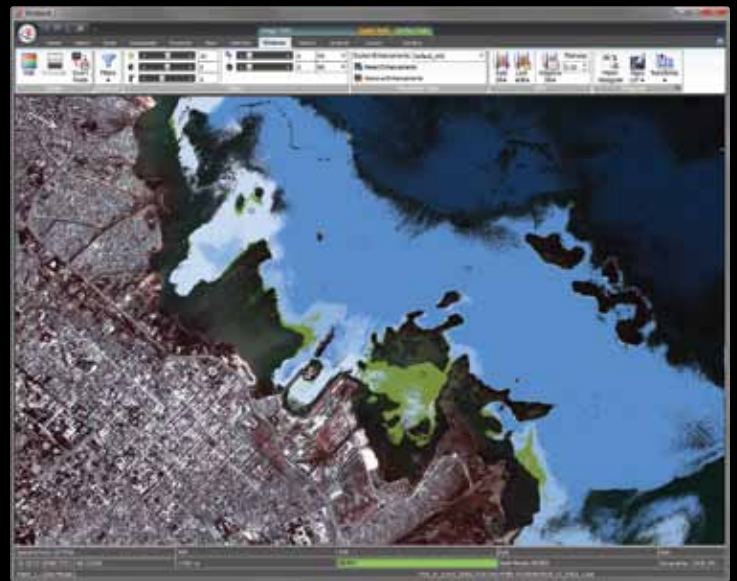
**SOCET GXP v3.2 continues to evolve with an advanced suite of hyperspectral and multispectral (HSI and MSI) image processing tools.**

The Find-in-Scene algorithms now allow users to adjust thresholds, switch algorithms and add-and-remove spectral signatures in real-time using in-scene spectra and the USGS spectral library included with SOCET GXP. New algorithms such as Independent Components Analysis, Minimum Noise Fraction and Constrained Energy Minimization help determine information of interest.

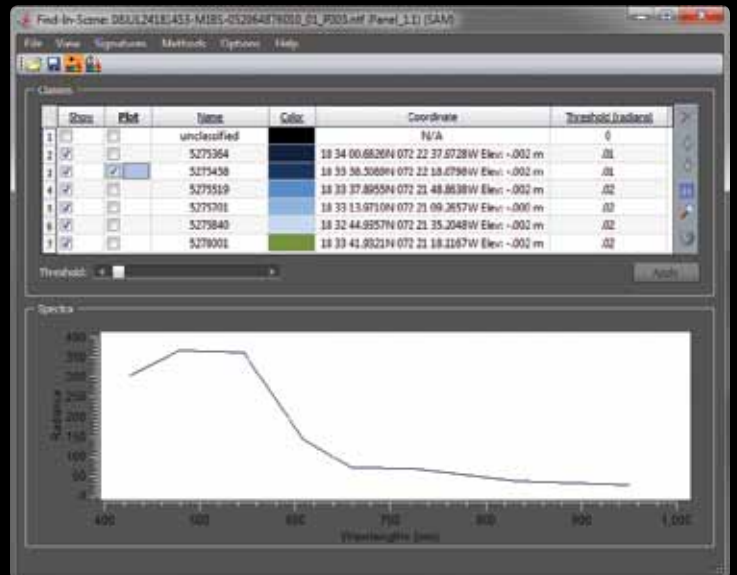
SOCET GXP v3.2 supports the Synthetic Aperture Radar (SAR) community with native handling of Sensor Independent Complex Data (SICD). Detected images are created and displayed in real-time while maintaining the I, Q and phase values for advanced processing.

Enhancements include:

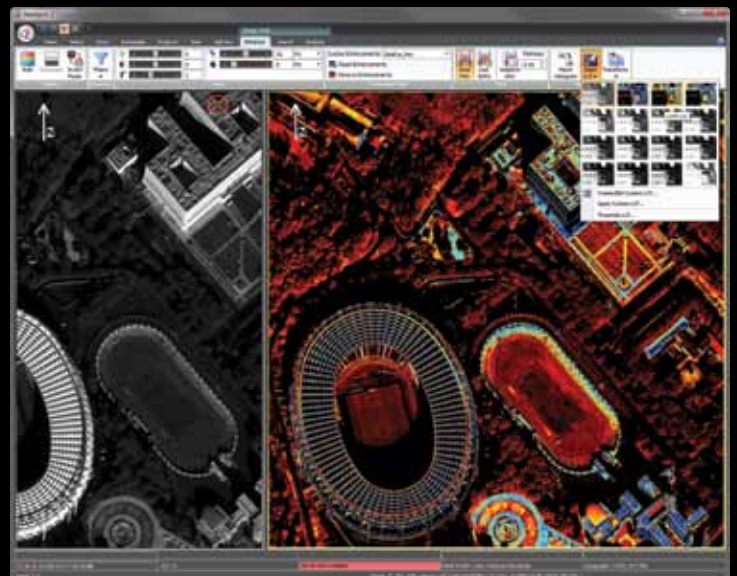
- Improved RSET generation speed for MSI imagery
- Improved histogram manipulation
- Real-time Find-in-Scene supervised classification
  - Collect points and polygons for in-scene spectra; add-and-remove signatures
  - Threshold adjustment
  - Switch algorithms
  - Refine legend
- Colorization
  - Customize colors for grayscale imagery and adjust unsupervised classification colors
- Spectral library support
  - USGS libraries included
  - Import ENVI header and CSV libraries
  - Collect signatures to update existing libraries
  - Use existing Find-in-Scene signatures
- New HSI and MSI algorithms
  - Internal Average Relative Reflectance (IARR)
  - Normalized Difference Water Index (NDWI)
  - Independent Components Analysis (ICA)
  - Minimum Noise Fraction (MNF)
  - Constrained Energy Minimization (CEM)
  - Mahalanobis Distance Classification
- Improved Principal Components Analysis performance
- SICD support
- Detected image is created and displayed on the fly
- Options to view I, Q and phase values on the fly
- Ingest SAR complex image types through user specifications



Find-in-Scene enhanced image.



Improved Find-in-Scene interface allows for threshold sliding and spectra signature charting.



Live preview displayed before selecting algorithm.

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## Feature analysis

Collect and use feature data more efficiently with flexible new tools and automated functionality designed to simplify complex tasks.

SOCET GXP v3.2 reduces the dependency on external software to complete visualization or data collection workflows. Feature databases, shapefiles and ArcGIS® geodatabases warehouse data holdings for immediate use and dissemination.

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## Feature databases

Transfer information from imagery into feature databases for convenient multi-user access.

- Database <NULL> support enhanced
  - Auto-attribution
    - Mensuration (length, height, width, area, etc.)
    - Error estimates (CE/LE)
    - Comprehensive attribution derived from image metadata
  - Enumerated lists
- 

## Enhanced Esri® connectivity

In addition to support for ArcGIS 10, performance increases and new features expedite working in the Esri® world.

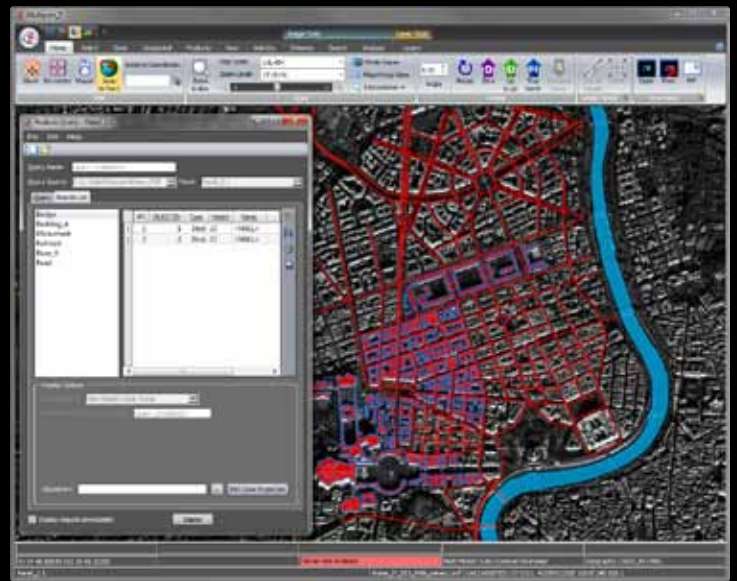
- Connect to ArcGIS 10 geodatabases (personal, file and ArcSDE®)
  - Improved connection times and graphic performance
  - Enhanced geodatabase subtypes
    - Editing, querying and symbology
  - Access geodatabase feature data from non-WGS84 spatial reference systems via ArcGIS transformations
  - Context dependent auto-attribution based on geometry type
    - Mensuration (area, length, width, etc.)
    - Error estimates (CE/LE)
- 

## Spatially Enabled Exploitation

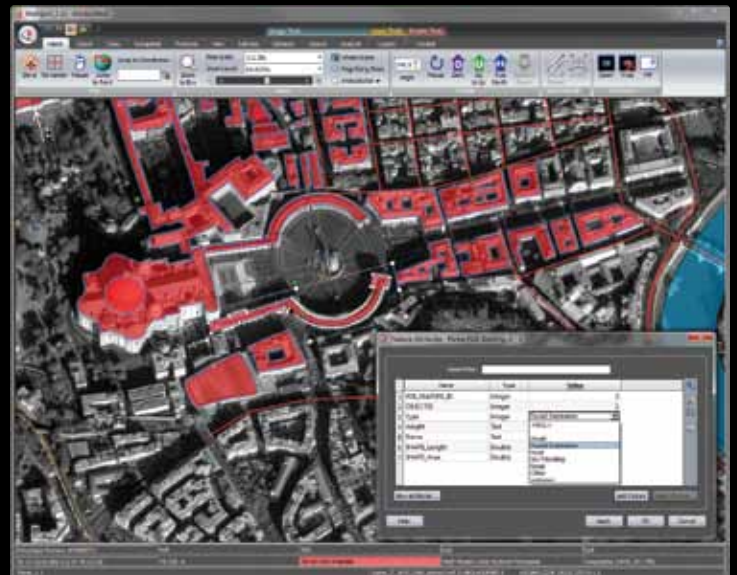
- Select attribution derived from image metadata
  - Enhanced feature class editing and validation (non-editable fields/schema)
  - Multipoint feature class improvements
  - Added read-only support at geodatabase level
- 

## SOCET for ArcGIS®

- Supports new ArcMap® 10 feature collection templates
- Supports 2-D feature classes
- Registers appropriate extension when multiple SOCET GXP versions are present (permission-dependent)
- SOCET GXP Panel Data Manager enhanced layer order reflects ArcMap table of contents



Improved query screen displays results from multiple classes.



Added capability to handle NULL values as attributes.

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