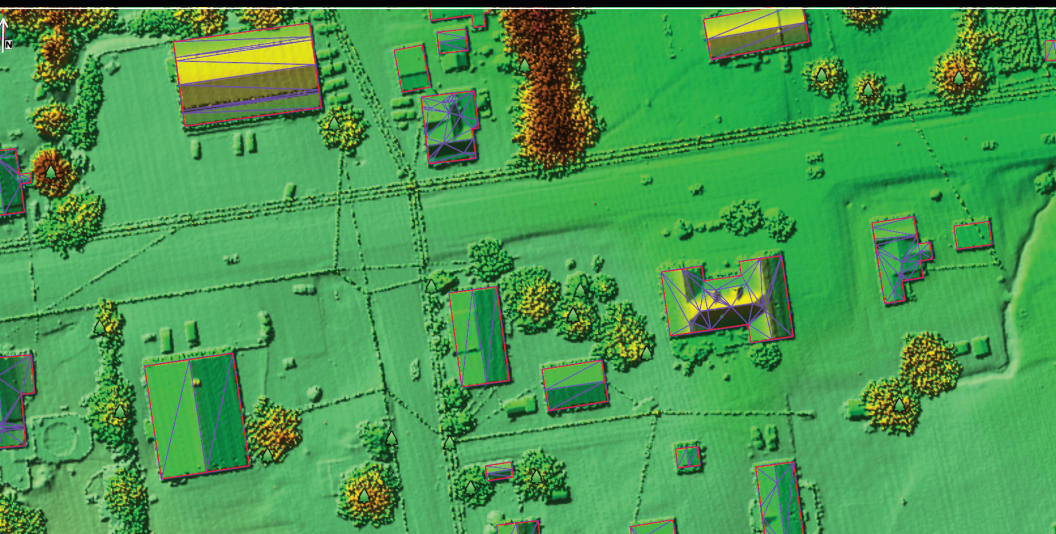


SOCET GXP[®] v4.0

Release enhancements



BAE SYSTEMS

SOCET GXP® v4.0 focuses on significant technology advances to support the achievement of a goal we envisioned nearly 10 years ago:

**TO MERGE IMAGE EXPLOITATION,
PHOTOGRAMMETRY, AND
MAPPING TASKS INTO A SINGLE
COMMERCIAL PRODUCT.**

The release introduces advanced 3-D building modeling and data visualization, and extends capabilities for automated geospatial analysis and production, photogrammetry, and full-motion video to satisfy user-driven requirements.

v4.0

AT A GLANCE

Key enhancements are in the areas of feature extraction, including planimetric feature compilation, interactive terrain editing, 3-D site and building modeling, and visualization.

The 3-D modeling capability incorporates automatic texturing and attribution, building templates, 3-D viewing synchronized with Multiport® image display, and detailed analysis with 3-D line of sight.

Integrated 2-D and 3-D feature collection, visualization, and interactive terrain editing support traditional geographic and engineering mapping.

For these applications, we have redesigned the user interfaces and added an advanced Drawing Toolbox with custom editing and cue cards to simplify production.

LiDAR capabilities include the groundbreaking Automatic Feature Extraction (AFE) tool that identifies certain 3-D objects within point clouds.

We have answered customer requests for improved image search. The Stereo Model Manager catalogs, organizes, and maintains image pairs and loads stereo models automatically when roaming, or manually with a right-click option.

The new iCee atmospheric correction algorithm allows for more accurate spectral classification results.

Additional enhancements include terrain and surface modeling with triangulated irregular network (TIN) support across the application and the new High-Resolution Elevation (HRE) terrain format.

CORE

With each release, SOCET GXP has integrated numerous geospatial analysis and image exploitation tools. Now end-to-end photogrammetric functionality is a reality in v4.0. New technology is embedded into intuitive interfaces, resulting in superior efficiency and usability.

Licensing

- A new version of the Sentinel WlmAdmin tool 8.4 must be installed for SOCET GXP v4.0 to run (included with release)
- A fix is included to keep the MAC locking code consistent, regardless of the status of the network card

Job Service Queue

- Job Queue can be viewed in the Workspace Manager
- Displays job name, host, status, start time, and completion percentage
- Includes a link to the log file for each job

Multiport

- Multiports can be renamed to manage open windows
- Option for Multiport panels to be tabs instead of split panels
- Dockable windows are available in the Multiport: Drawing Toolbox, Layer Manager, cue cards, count graphics, templates list, and autolabels



3D Multiport

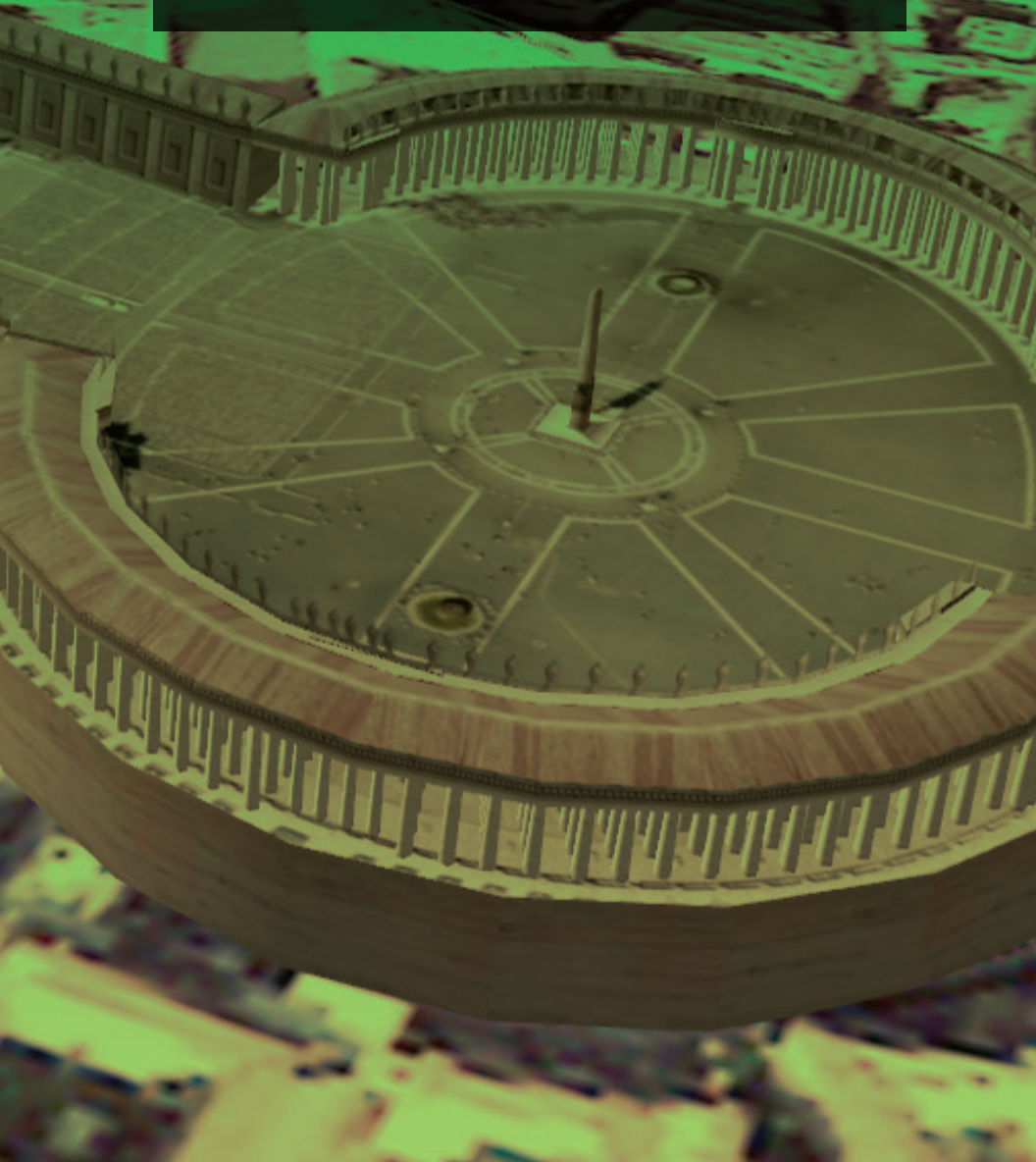
- Use imagery for perspective viewing and navigation for a birds-eye view
 - Left mouse button - Adjust camera look angle
 - Double-click - Zoom to a place
 - Click middle mouse wheel - Roam camera in XY direction
 - Speed roam - Based on cursor distance from center of screen
 - Scroll middle mouse wheel - Zoom in to a specific point
 - Right mouse button - Horizontal movement, orbit camera around center, and increase or decrease camera elevation
 - Glove tool - Move the camera in the XY plane
 - Q-key - Reset the 3-D Multiport view
- 3-D modes
 - Free Mode provides interactive mouse controls for 3-D viewing
 - Route Mode flies along ordered list of waypoints
 - Orbit Mode flies around a target placed in the 3-D view
- Synchronized with the 2-D Multiport to visualize 3-D features, terrain, point clouds, and imagery

New data types supported

- TIN
- LAS point clouds
- Read/write HRE
- Geoid support - EGM96, GEOID03, EGM2008, custom
- COLLADA models are imported

Product generation

- Autolabels can be added to templates
- Work with multiple panels from the Finishing Tool
- PowerPoint® export added to the Finishing Tool Ribbon



ToolBox

Layer Filter:

Active Layer: Building_A [Rome_FDB]

Draw - Features

Select Apply

Active Tool - Append modifier by Ctrl + tool

Ctrl + tool to add here

Parameters - Draw - Double line drain

Max Elevation Difference Between Banks: Meters

Max Monotonicity Difference: Meters

Max Elevation Adjustment: Meters

Breakline Layer:

Layer Manager | ToolBox | Templates

Cue Card - Draw - Double line drain

Max Elevation Difference Between Banks

Side View Across the River

Max Monotonicity Difference

Side View Along a Riverbank

Double Line Drain (DLD)

Draw a double line drain terrain from a multiline feature that consists of exactly two lines. The double line drain is a geometry that consists of two approximately monotonic polylines which delineate the banks of a river.

Monotonic means that the elevations along a bank are consistently decreasing or increasing.

Algorithm: Given two approximately monotonic lines, the algorithm adjusts the elevations of the line vertices to be as monotonic as possible while satisfying the three constraints: **Max Elevation Difference Between Banks, Max**

DRAWING TOOLBOX

The Drawing Toolbox has been a primary focus of SOCET GXP v4.0 development. It provides access to an extensive palette of drawing modes and tools to add basic annotations, or extract and edit complex features and terrain. A cue card window offers step-by-step instructions for all drawing tools and a Layer Manager window controls viewing and access to data layers in the Multiport.

Advanced drawing operations and 2-D feature collection

- Advanced drawing and feature collection including buffers, parallel lines, trim/extend, thin level of detail, square, curve, arc, static, freehand/stream digitize, monotonic, copy/rubber stamp, move, rotate, scale, 3-D extrude, and 3-D walls
- 2-D and 3-D snapping for grid, points/vertices, lines, and planes, plus a custom snap cursor to improve collection efficiency by providing visual cues during extraction
- Terrain editing algorithms for area and geomorphic functions in TIN and Grid formats
- Options to apply algorithms on-the-fly or to existing features
- Easily stack drawing operations or algorithms to create custom tools for subsequent uses
- Share segments and vertices
- Collect multiple features at the same time
- 2-D icons and drawers for user-defined icons

3-D modeling

- Numerous 3-D tools for rapid building creation
- Union and subtract elements, such as building awnings and courtyards, respectively
- COLLADA models
- Automatic texture patching

IMAGERY

A wide range of image improvements has been implemented for simple tasks such as using the glove cursor to shift, rotate, and stretch images, to more complex processes like triangulation that previously required merging segmented images together. The new Stereo Model Manager and auto-loader enable dynamic roaming and data extraction from stereo images to improve data compilation on exploitation workstations.

Glove Align

- The glove cursor moves, stretches, and rotates an image into alignment with other data layers including other images, maps, terrain, or features

Stereo Model Manager

- Automatically catalog, organize, and maintain image pairs from a chosen source; load into a stereo or split-screen stereo Multiport
- Next Stereo Model loads stereo models automatically when roaming, or manually with a right-click option

Merge Segments

- Used with scanning sensors that acquire large continuous images, which are typically broken up into segments when delivered
- Merges individual segments on-the-fly into a virtual scan

Image Collections

- Open hundreds to thousands of images into a SOCET GXP Workspace

ArcGIS® Server Image Server Extension connection

- Connect to Esri® Image Server and stream images, and mosaic datasets

WEB MAPPING SERVICE (WMS)

The Web Mapping Service is a method of providing geospatial data in the Multiport as a data layer. WMS data supplements existing geospatial data and can be used to provide situational awareness.

- Native WMS is integrated with Web map background
- Web Services Client: Updated to support latest OGC international standard for WMS/WFS/WCS

SYNTHETIC APERTURE RADAR (SAR)

Commercial satellites such as RADARSAT-2, COSMO-SkyMed, and TerraSAR-X have increased the applicability of SAR image technology. SAR analysts have traditionally exploited only the magnitude portion of the sensor data. In SOCET GXP an analyst can view and exploit magnitude, phase, and complex data from any SAR sensor for spectral processing.

View SAR options – choose how to view SAR data

- Magnitude
- Phase
- Complex

Anamorphic Correction

- Squares image pixels on-the-fly — raw radar data is often not square
- More pixels in the range or cross range directions
- Presents a cleaner picture
- Button acts as toggle switch

SAR colorization

- SAR imagery can now be colorized
- Toggle between grayscale and color views

HYPERSENSPECTRAL AND MULTISPECTRAL IMAGE PROCESSING

SOCET GXP processes and integrates multiple data types including hyperspectral and multispectral imagery. Define signatures of interest, adjust the thresholds for determining spectral matches in real time, and snapshot to PowerPoint for quick product generation.

Dark Subtraction

- Used to correct in-scene spectra

Scatter plot analysis

- User-designated selections on the scatter plot highlight pixels in the associated image
- Multiple classes can be created
- Invert individual bands
- Real-time legend

Histogram updates

- Visual color ramp displayed on input histogram
- Histogram threshold inversion available
- Hidden preferences store user settings

Colorization lookup table updates

- Color intensity default is red for high intensity and blue for low intensity
- Enabled for floating point imagery
- Colorize NDVI, NDWI, and Band Math outputs without saving
- Add, remove, and customize colorization bins for easy classification

iCee atmospheric correction

- Convert digital number to ground material reflectance
- Fully automated in-scene atmospheric correction
- Multiple sensors supported
- Enables consistent supervised classification matching from spectral libraries
- Improves change detection



TERRAIN AND SURFACE MODELING

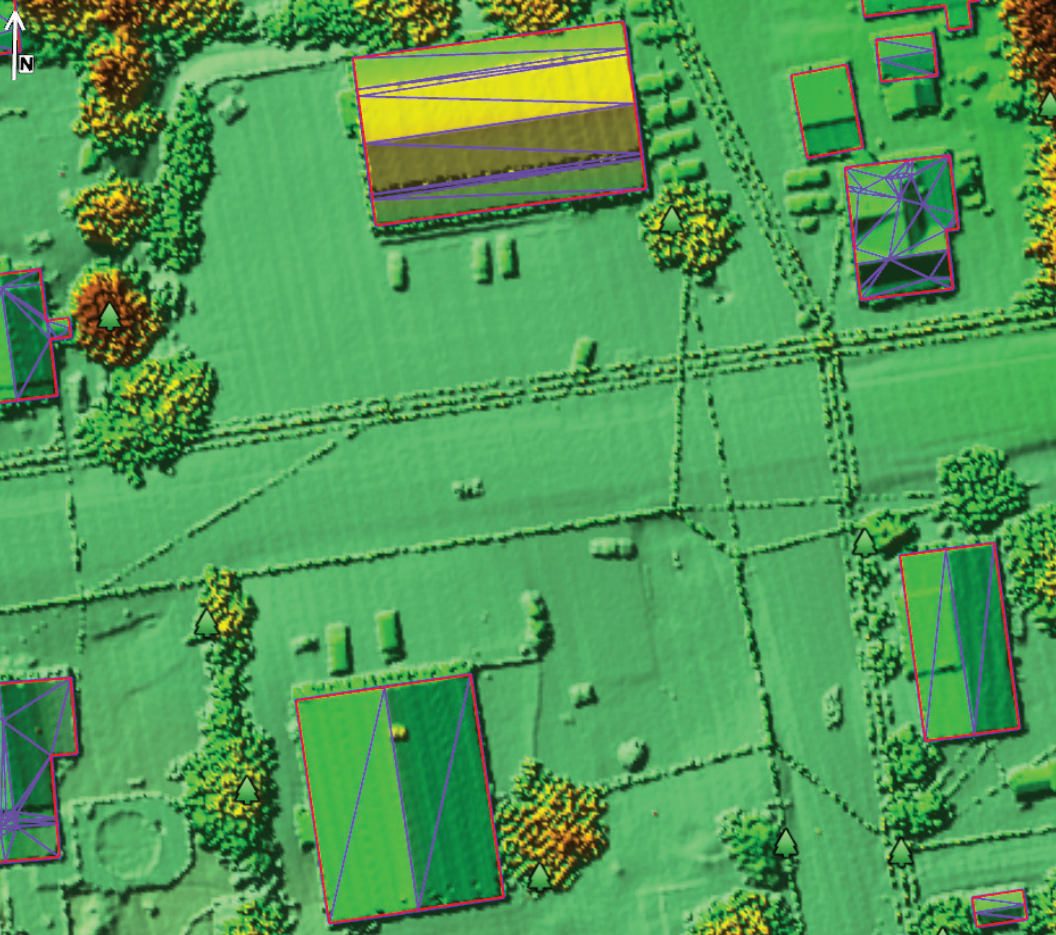
Imagery and terrain go hand-in-hand when analyzing geospatial data. Worldwide DTED coverage level 0 is included with the SOCET GXP installation to eliminate issues related to projective imagery taken and used without information related to the base elevation of the target area. The Drawing Toolbox integrates features and terrain providing productivity advantages in support of creating and editing terrain and surface models.

- Support for TIN, Grid, and point cloud formats
- Automatically or interactively create contour labels
- Line of Sight displays hidden or visible areas, or both
- Integrated with the 3D Multiport for improved visualization
- Terrain Toolbox algorithms can be applied while collecting features or applied to existing features
- Edit by block option to lock editing actions to a single block within a terrain file
 - Update status per block to allow tracking and edit status for large jobs
- Preferences - Performance improvements for level of detail when zooming out

TRIANGULATED IRREGULAR NETWORK

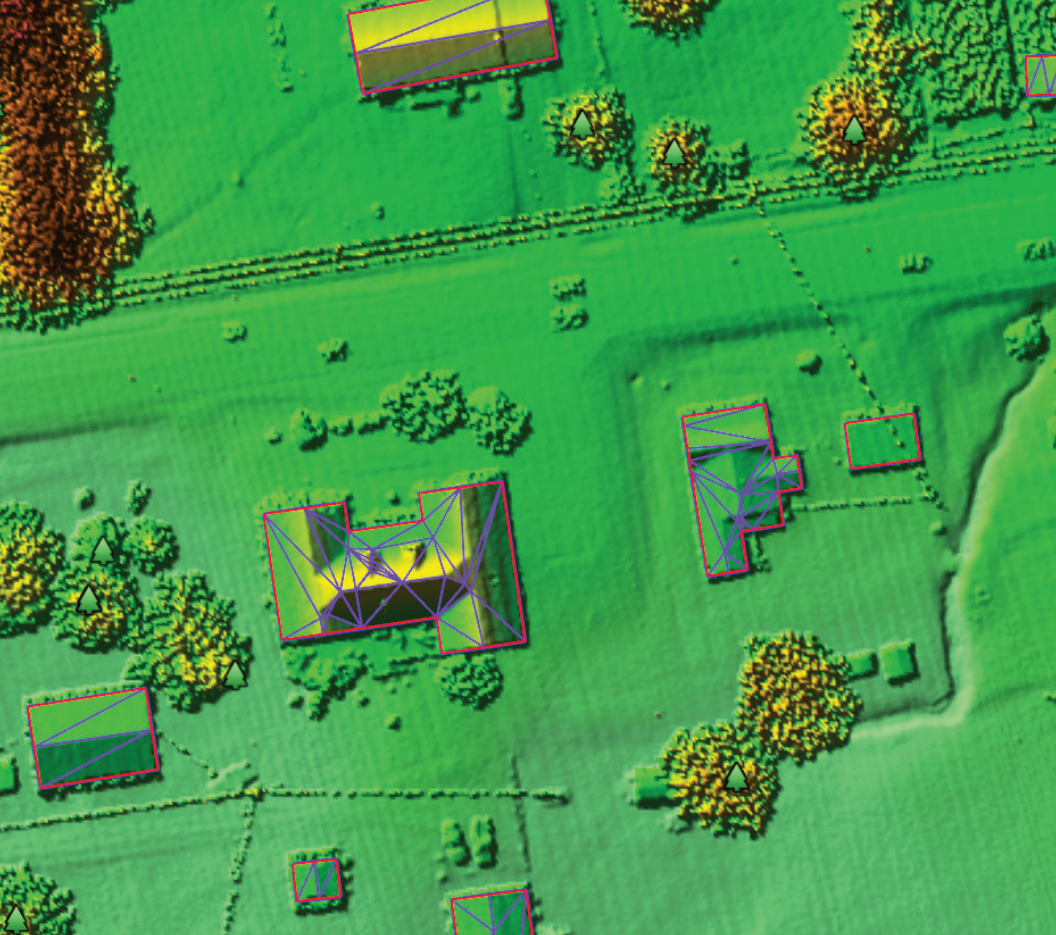
The TIN terrain format consists of triangles constructed on a set of irregularly spaced mass points and breaklines that represent individual elevations and change of slope. The format is used extensively in SOCET GXP for visualization, editing, and product generation.

- Stored in a database
- Mass point and breakline data can be added or removed as classes or features from features, databases, or shapefiles



AUTOMATIC FEATURE EXTRACTION

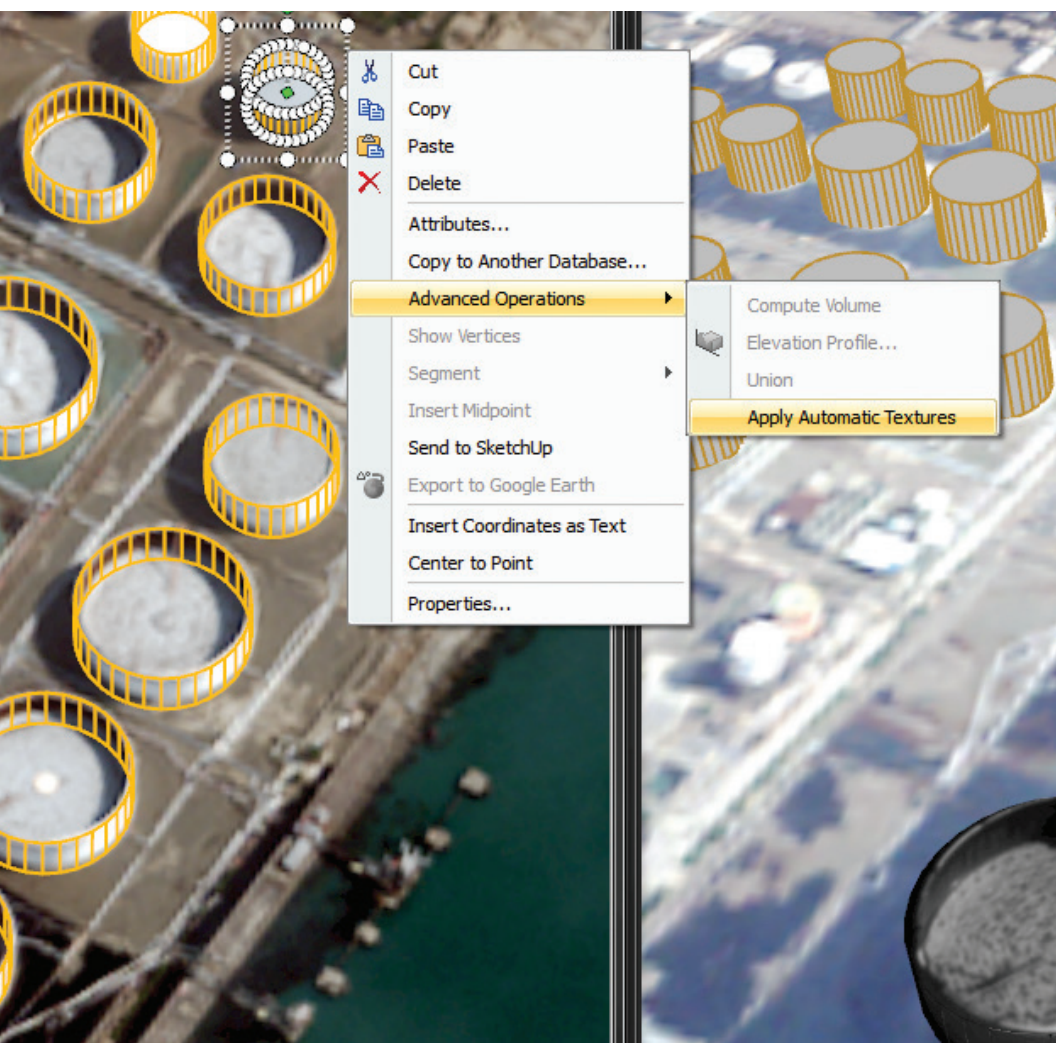
AFE generates 3-D building features and trees from a high-resolution digital surface model (DSM) derived from NGATE or LiDAR. Achieve success rates above 90% when using dense, accurate LiDAR point clouds.



- Model flat and complex rooftops, such as gabled, hipped, peaked, mansard, etc.
- Optional parameters to control the level of detail for automatic features
 - Height and width parameter constraints for buildings and trees
 - Roof fidelity
 - Building squaring
- Building output options
 - Full 3-D triangles
 - Centroid points
 - Footprints
 - Roof detail
- Optional output of a bare-earth terrain model from the input DSM

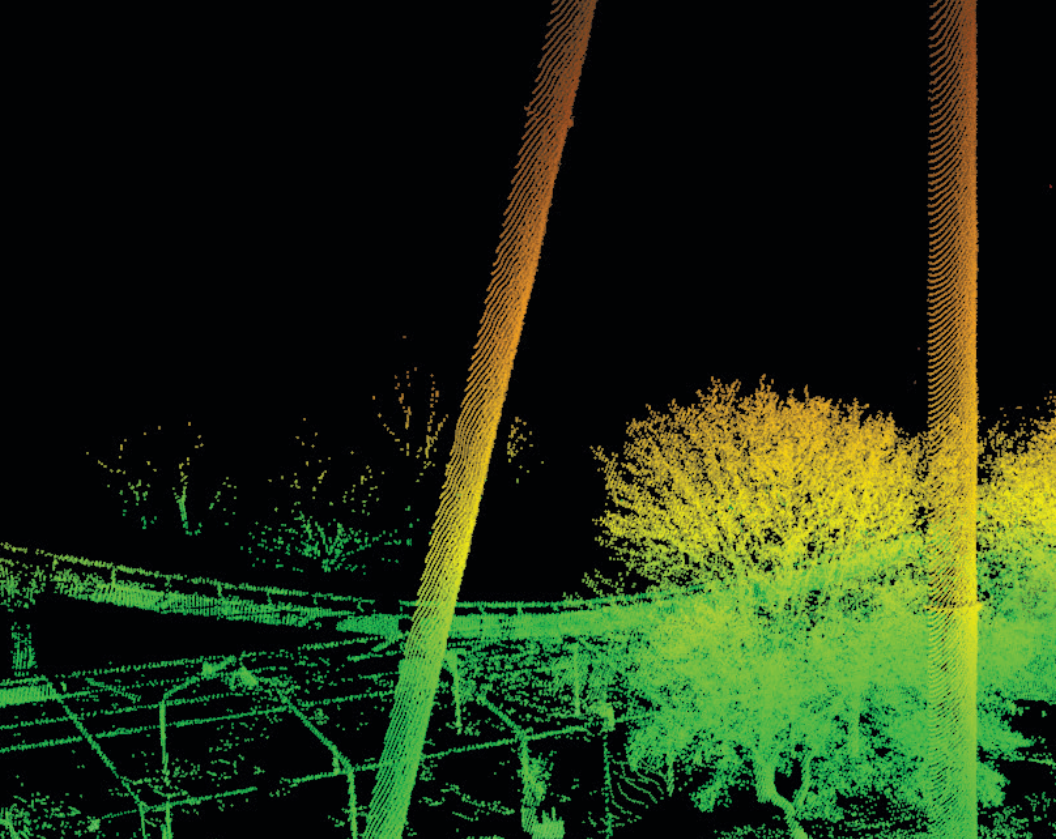
AUTOMATIC TEXTURING

Using registered imagery, texture building facades to create a realistic perspective model. Textures follow the orientation of the building face regardless of how the image is oriented, and are corrected for projective distortions. Textures are saved in a feature database.



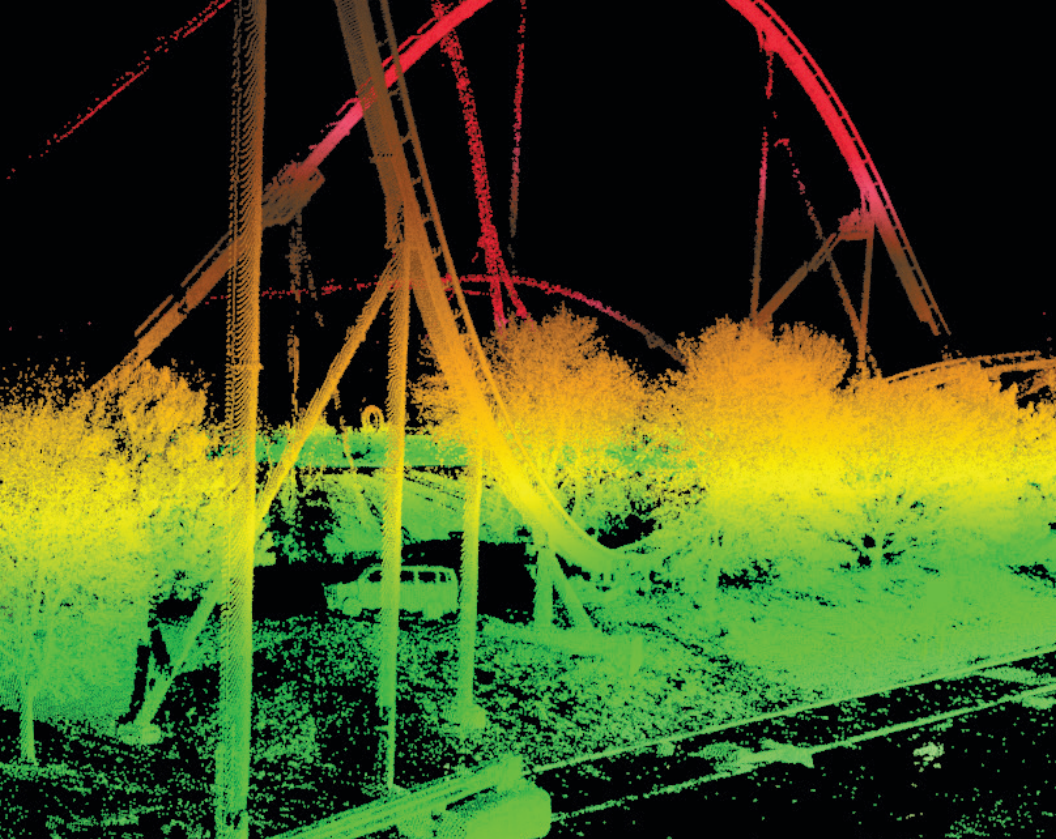
- A texture patch consists of image pixels used to replace a shaded texture on a 3-D feature, such as the side of a building, with true image content
- Automatic texture patching extracts the imagery patches from geospatially oriented images and applies them to 3-D features for visualization in tools such as the 3D Multiport
- Texture selection prioritization:
 - Projected resolution
 - Look angle
 - Pixel contrast





LiDAR

LiDAR sensors provide point clouds of data as individual XYZ points, typically in very dense collections over an area. Point clouds are true 3-D representations of the raw data collected by the sensor and are generally used for visualization, exploitation, and analysis. LAS files can be imported into SOCET GXP as point clouds, TIN, or Grid formats. TIN and Grid formats are commonly referred to as 2.5D surfaces and are used as terrain or surface models.



Import LAS files

- Supports versions up to 1.3
- Import LiDAR individual returns as TIN or Grid files
- Import all returns as point clouds

Surfaces can be used for terrain analysis, visualization, and editing

- Generate intensity images from LAS files
- Blunder and small object removal based on user-defined thresholds
- Supports all coordinate systems available in SOCET GXP
- Import point clouds for 3-D visualization

Colorize based on elevation, classification, return, or overlapping imagery

- Filter individual returns on/off
- Import and mosaic multiple LAS files in the 3-D window

SOCET FOR ARCGIS

SOCET for ArcGIS is used to collect feature data from imagery in a SOCET GXP Multiport into Esri file formats through ArcMap. Extraction tools from ArcMap and/or the SOCET GXP Drawing Toolbox can be used to extract or edit data in the Esri geodatabase.

- Extended support for multi-part features (line and polygon)
- Extended support for geodatabase subtypes (performance, foreign language, etc.)
- SOCET for ArcGIS features in the Multiport can leverage advanced drawing tools in the SOCET GXP Drawing Toolbox (parallel, buffer, etc.)
- Extended support for creating features when using Esri tools in the Multiport (rubberbanding, etc.)
- Added support for editing 2-D feature classes

SPATIALLY ENABLED EXPLOITATION (SEE)

SEE is used to collect feature data directly into an Esri format from imagery loaded in a Multiport without ArcMap. SOCET GXP drawing, attribution, and editing tools also can be used in the SOCET GXP environment.

- Extended auto-attribution: Map autolabels (image metadata/custom labels) and auto-attributes to specific fields in the dataset (primarily extends this capability to the geodatabase)
- Extended image metadata parsing capability for parsing additional XML data
- Extended support for geodatabase subtypes
- Performance improvements for KML data sources
- Multi-part feature creation support added (line and polygon)
- Implemented layer (feature class) level locking for file geodatabases and enterprise geodatabases
- EPSG coordinate reference system updates to version 7.9 for transformations with geodatabases

THIRD-PARTY FEATURE EXTRACTION ADD-ONS

Safe Software FME integration

- The feature database plug-in for FME provides the capability to restructure, manipulate, and integrate spatial data from/to SOCET GXP
 - Formats supported:
 - Adobe Acrobat 3D
 - AutoDesk 3DS Max
 - AutoDesk AutoCAD
 - Bentley Systems MicroStation V8
 - OGC CityGML
 - Presagis Openflight
- FME supports more than 275 spatial data formats, including many popular CAD, GIS, and vector feature formats
 - Supports custom schema editing and mapping; includes a wide range of pre-built spatial and attribute transformations

TerraGo® 2-D Publisher

- Create a georegistered PDF file, or GeoPDF®, from georeferenced data and image files loaded as layers in a SOCET GXP Multiport
- GeoPDFs are output from SOCET GXP, then loaded into the Adobe Reader environment; layers can be turned on-and-off

TerraGo 3-D

- Automatic 3-D GeoPDF publishing of terrain, imagery, and models loaded as layers in a SOCET GXP Multiport
- Includes all features available in the TerraGo 2-D Publisher for SOCET GXP

SketchUp

- Connect to SketchUp to use additional tools for 3-D feature editing and texturing

VIDEO ANALYSIS

Play, edit, and analyze video files and live UDP feeds for situational awareness during active operations and forensic analysis. Video stills can be snapshot to SOCET GXP for further analysis and exploitation. Video metadata provides georeferencing and sensor model support for snapshots. Key video analysis capabilities include easy to use DVR controls, collaboration, video enhancement tools, heads-up displays, and automated algorithms such as tracking moving objects.

Custom tools for the intelligence analyst

- View video files, live UDP feeds, GeoPDF
- Real-time situational awareness for active operations and historical data analysis
- Join, host, and view live missions and other analysts' remarks in real time, or on the playback
- Track moving objects, vehicles, and footprints in SOCET GXP and Google Earth
- Send video chips directly into SOCET GXP for fast and accurate analysis
- DoD and IC standards supported
- Integrated with Google Earth to provide sensor position, field of view, and situational awareness for video footprints
- Easily add tags and notes to video for reference
- Full metadata and sensor model integration
- Integrated collaboration and annotation tools
- Add filters such as edge detection while the video plays

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