DESKTOP

LuciadLightspeed

V2018.0

DATA SHEET

HEXAGON GEOSPATIAL | LUCIAD

LuciadLightspeed is a modular and extensible desktop solution for geospatial situational awareness. Users can bring in a multitude of data sources (any format and type) together in a common operational map.

LuciadLightspeed provides the foundations for advanced geospatial analysis applications. Developers can create high performance C2 and location intelligence applications thanks to the clean design, modular structure and powerful visual analytics capabilities that can be plugged in. Using its configurable API, you can add support for custom data or databases, add your own symbology or match user interaction and look and feel to your company's needs and style.

Luciad's desktop solution comes ready-to-use, allowing users to drag 'n drop or connect to more than 200 data formats and databases with unparalleled performance, all while preserving data precision. Data can be explored in a 2D or 3D map view, table view or vertical intersection view. Annotate maps and print or export the result to report your findings.

WHO NEEDS LUCIAD'S DESKTOP SOLUTION?

These are just a few examples of why users turn to LuciadLightspeed for their geospatial data challenges:

- You want to provide your control room staff with a **common operational picture**
- You need to stay informed via **shared tactical plans in NVG format**, visualized with appropriate military symbology
- You have to **analyze complex airspaces delivered as AIXM 5.1 data** using 3D visualization
- You want to **create a certified Recognized Air Picture**
- You need to correctly represent data for the Polar region
- You want to **explore twitter feeds for trend analysis** and **security of big events**
- You need to **detect patterns in traffic** and get alerted on unexpected behavior
- You want to **explore data in 4D**, represented geographically, as time series as well as plot views
- You have **multi-gigabyte shape files** that you want to share as WMS but you do not want to rasterize it before publishing

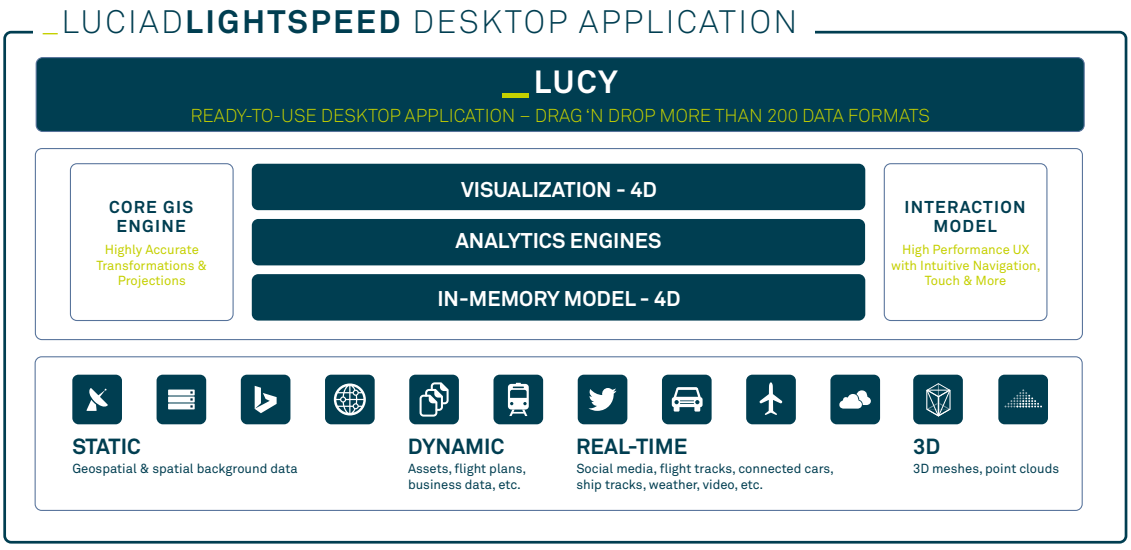


Figure 1 - Luciad's desktop solution connects to more than 200 data sources with an intuitive drag 'n drop user interface. Its core GIS engine and visual analytics capabilities offer beautiful visualization and powerful data analysis.

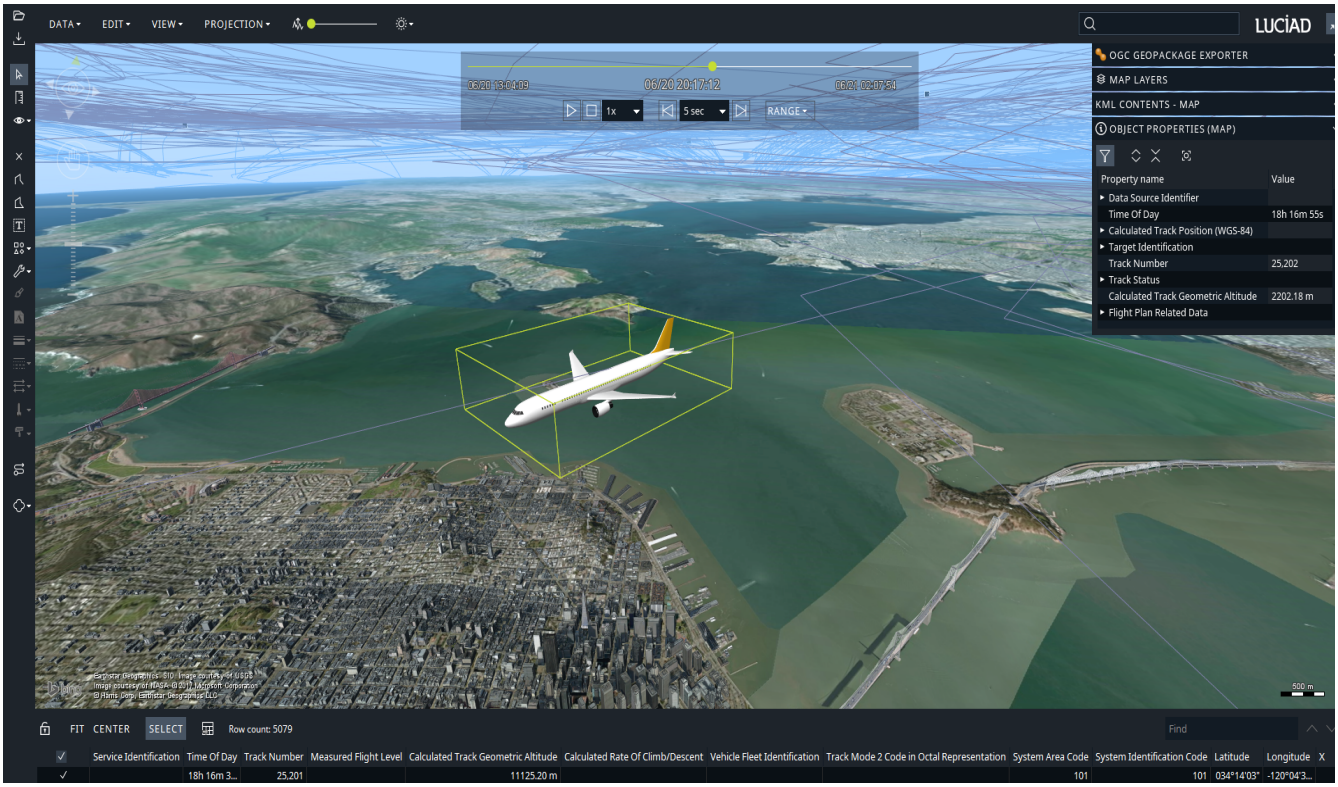


Figure 2 - Starting in LuciadLightspeed's application template Lucy, you can drag and drop your geospatial data, visualize it, add additional data layers and run analyses.

KEY BENEFITS

BEST-IN-CLASS PERFORMANCE	Unprecedented user experience with hundreds of thousands of track updates per second, on-the-fly LOS calculations, real-time data access and without pre-processing.
RETAINED GEOSPATIAL POSITIONING ACCURACY	Ensures precision on world scale for visualization, transformation and calculation of any data.
PLATFORM INDEPENDENCE	Runs on all platforms (with or without GPU, server, desktop, tablet, embedded, high-end or low-end) that support Java, including Windows, Mac and Linux.
FLEXIBILITY	Designed to optimize the customizability and interoperability of your applications. Offers one single API for 2D and 3D visualization. The product allows you to meet 100% of your project requirements.
EASE OF USE AND LOWEST TOTAL COST OF OWNERSHIP	Makes for efficient and sustainable applications by enabling rapid development, customization, ensuring source code and backward binary compatibility, and eliminating the need for data pre-processing.

OVERVIEW

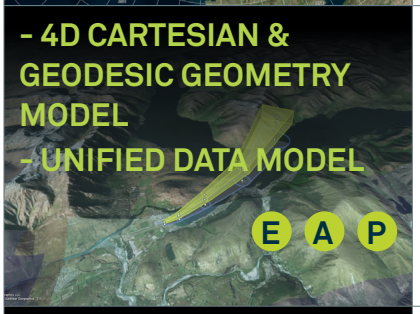
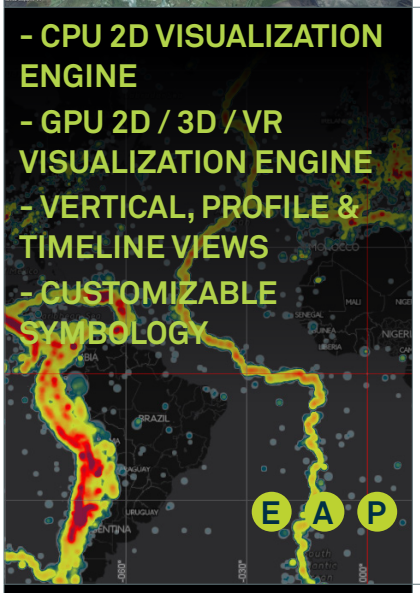
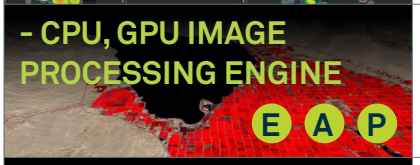
The LuciadLightspeed options have been organized into product tiers. Depending on the needs of your organization, you can opt for LuciadLightspeed Essential, Advanced or Pro. From the Advanced and Pro tiers, you can still extend the functionality available to you with extra options.

FUNCTIONALITY	ESSENTIAL	ADVANCED	PRO
Core GIS Engine	✓	✓	✓
Projection, Datum & Geoid Models	✓	✓	✓
Transformation and Projection Engine	✓	✓	✓
4D Cartesian & Geodesic Geometry Model	✓	✓	✓
Unified Data Model	✓	✓	✓
CPU 2D Visualization Engine	✓	✓	✓
GPU 2D/3D/VR Visualization Engine	✓	✓	✓
Vertical, Profile & Timeline Views	✓	✓	✓
Customizable Symbology	✓	✓	✓
CPU, GPU Image Processing Engine	✓	✓	✓
2D/3D/4D Interaction Model	✓	✓	✓
Visual Analytics	✓	✓	✓
High Quality, Large Format Printing	✓	✓	✓
Raster Connectors	✓	✓	✓
Vector Connectors	✓	✓	✓
Point Clouds & Reality Meshes	✓	✓	✓
OGC Standards	✓	✓	✓
Advanced Raster Connectors	×	✓	✓
Advanced GIS Engine	×	✓	✓
Real-time Engine	×	✓	✓
Tiling Engine	×	×	✓
Database Connectors	×	○	✓
Terrain Analysis Engine	×	○	○
Weather & Environment Standards	×	○	○
Graph & Routing Engine	×	○	○
CAD Connectors	×	○	○
Radar Connectors	×	×	○
Aviation Standards	×	×	○
Defense Standards	×	×	○
Defense Symbology	×	×	○
Maritime Standards	×	×	○
S-63	×	×	○

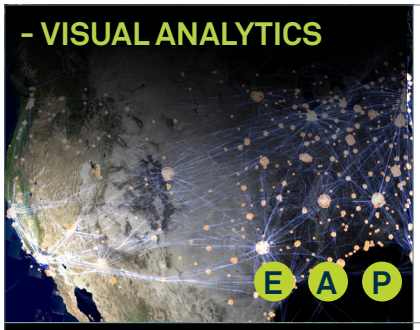
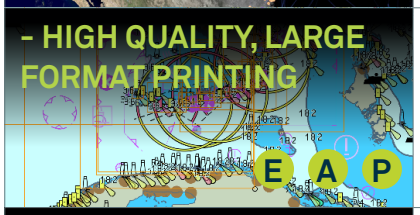
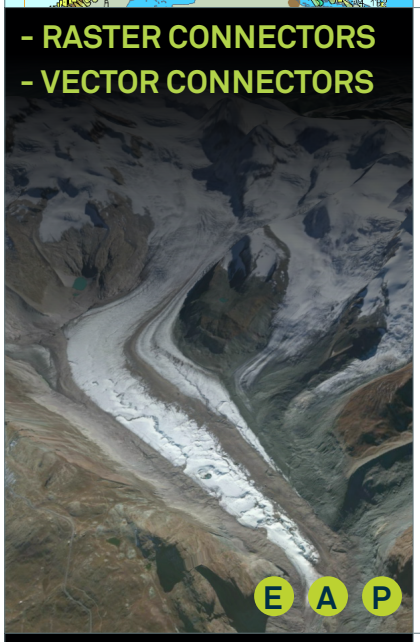
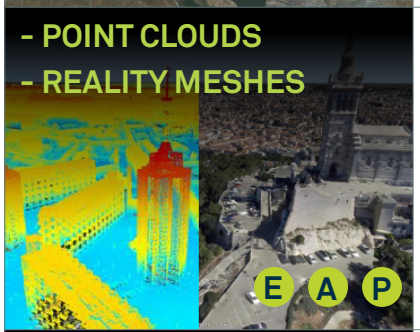
✓ Feature included ✓ Optional feature × Feature unavailable

FUNCTIONAL SPECIFICATION

Below is a high-level, non-exhaustive overview of the functionality available in the LuciadLightspeed Essentials tier. You can use the functionality it offers out-of-the-box or extend it to meet user specific requirements.

	• Access and represent data in any coordinate reference system (geodetic, geocentric, topocentric, grid) and in any projection. • Perform advanced geodetic calculations, transformations, and ortho-rectification. • Boost performance with the support for concurrent data access, asynchronous painting, and low-end hardware. • Tools and API for easy integration into C, C#, and C++ applications that maintains the performance of the GPU, and for integration into Maven development projects.
	• Model any data format regardless of size, represent all object geometries and their metadata, and apply any data filter. • Includes support for complex geometries like geo-buffers, arcs and arc bands, radar coverage volumes, and so on. • Accurately visualize radar coverage beams and other sensor detection ranges as 3D volumes, and set up geo-fencing for those volumes.
	• Visualize data in an accelerated 2-D/3-D view or a non-accelerated 2-D view, or even a Virtual Reality stereoscopic view. • Visualize data with height information in a vertical view or a profile view, and visualize dynamic data in a timeline view. • Apply flexible styling (layers, icons, line styles, fill styles, transparency...) to your data and customize it using the OGC-defined Styled Layer Descriptor/Symbology Encoding (SLD/SE) standards. Use hardware-accelerated styling expressions to update your dynamic data at runtime. • High-performance terrain rendering is integrated in the view. If elevation data is present, all data can be draped automatically over the terrain. • Advanced labeling and decluttering of vector data.
	• Advanced, fully interactive graphical processing and visualization of raster data, including High Dynamic Range (HDR) and multi-spectral imagery.
	• Many controllers for map interaction are ready to use: standard map controls (zoom, pan, select), editing/creating geometries, rotating, distance measurements, multi-touch, and more. You can easily create other controllers for custom interaction.

E Included in Essential A Included in Advanced P Included in Pro

	• Rapidly gain a thorough understanding of your geospatial data using advanced visual analytics tools. Configure clustering algorithms to aggregate a multitude of data objects into easily distinguishable clusters based on their properties. Slice and filter data dimensions for analysis. Use swipe, flicker, and portholes to uncover similarity and change between images. Perform and density calculations, and display the resulting heat maps with hardware acceleration.
	• Configure, preview and print snapshots of LuciadLightspeed views in high quality, including custom layers. Print on large formats or use multi-page support to stitch together a large print.
	• Access data in many vector and raster formats. • Apply multi-leveling and tiling. • LuciadLightspeed's visualization and analysis capabilities are data-agnostic, so it is complementary with any data format. Adding support for new, custom formats is a straightforward, well-documented process, but most common data formats are already supported. Out-of-the-box native support for: • **Raster data:** BIL, Bing Maps, BMP, DTED, ESRI TFW and JGW, ETOPO, GeoTIFF and BigTIFF, GIF, JPEG, JPEG2000, MapInfo TAB, PNG, PPM, USGS DEM. • **Vector data:** CGM, Collada, ESRI Shape, GeoJSON, MapInfo MIF & MAP, LIDAR LASer and LASZip (LAZ), OpenFlight (3-D), OSGB 3D meshes, SVG, Wavefront OBJ (3-D).
	• Connect to and visualize unlimited point clouds and reality meshes. • Smart loading of 3D tiles. • GPU-based visualization. • Expression-based styling and filtering of point clouds. • Combine 3D data with terrain, other geodata, annotations and measurements. • Supports OSGB, LAS, LAZ, OGC 3D Tiles. Out-of-the-box native support for: OSGB, LAS, LAZ, OGC 3D Tiles
	• Connect to several OGC web services, and read data in several OGC formats. Standards, formats, and services: OGC GeoPackage, GML, KML, WCS, WFS(-T), WMS, WMTS, OGC Filter 2.0 (Spatial filter capabilities can be enabled from the Advanced GIS Engine listed under Advanced and Pro options), OGC Symbology Encoding (SE), ISO 19115 metadata.

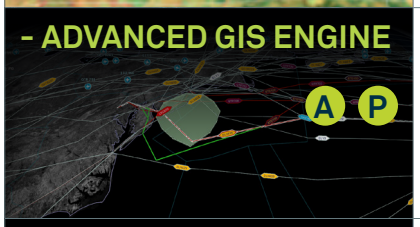
E Included in Essential A Included in Advanced P Included in Pro

(A) Optional in Advanced (P) Optional in Pro

- Connect to and visualize specialized raster formats, and access a GDAL connector to add support for several other raster formats.

Formats:
ECW, GeoPDF, GeoSPOT, JPEG2000 (encoding), MrSID, Spot DIMAP, Swiss DHM.

GDAL-supported formats including:
ARC/Info Binary Grid (AIG), BSB Nautical Chart Format, ARC/Info Export E00 GRID, ENVI HDR Labelled Raster, ERDAS Imagine, ERDAS Imagine Raw, ILWIS Raster Map, Intergraph Raster, PCI Geomatics database File, PCRaster, Sentinel 1 SAR SAFE, Sentinel 2, SAR CEOS, SRTM HGT, GDAL Virtual, ASCII Gridded XYZ, and so on.

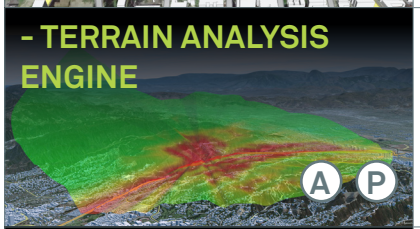


- Calculate binary topological relations (e.g. overlaps, contains) and perform constructive geometry on shapes (e.g. union, intersection).

- Designed to optimally handle and visualize dynamic data, including live radar video feeds. Enables you to play back simulations in fast-time or real-time. Also includes playback controls and continuous label decluttering.

- Add support for connecting to multiple spatial databases.

Database formats:
IBM DB2, Informix Geodetic and Spatial Datablade, OGC GeoPackage, Oracle Locator and Oracle Spatial, PostGIS (PostgreSQL spatial database extension), SAP HANA (Beta), Microsoft SQLServer, SQLite,Terrain analysis engine

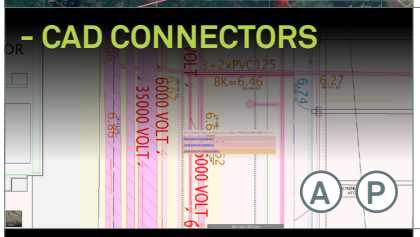


- Perform calculations on terrain data, such as line-of-sight (LOS), or hypsometric calculations, and get an alternative view on the terrain data. The engine can use hardware acceleration (OpenGL and OpenCL) to reach unparalleled performance for both calculations and visualization.

- Integrate environmental data, and preserve dimensional information for further visual analysis.

Formats:
NetCDF ISC, GRIB V1/V2 weather data (WMO/ICAO Bulletin)

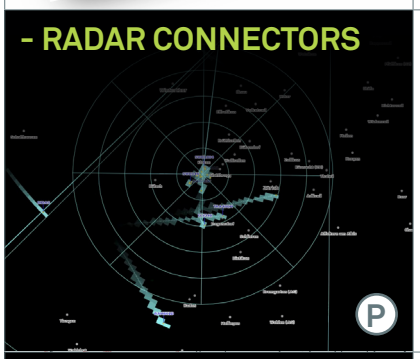
- Exploit the network structure of your geospatial data, and make use of algorithms to construct graphs and solve your routing challenges. The Graph Engine offers support for all kinds of network-related processing, such as shortest path or cross-country movement calculation. Also enables the creation of flexible cost functions. Exchange your data in the GDF format.



- Import and visualize your computer-aided designs and drafts into LuciadLightspeed to see your design in context.

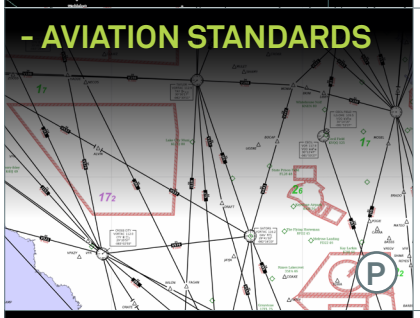
Formats:
Autocad DWG/DXF, Microstation DGN

- Fuse, tile, and multi-level large amounts of data using the tiling engine.
- Build globes with detailed and accurate point-sampled terrain data, centimeter-accurate area-sampled (multispectral) imagery, and multi-dimensional weather data and imagery.



- Visualize radar data captured in the ASTERIX format on your map. Combined with the Real-Time Engine, the Radar Connector offers fast and flexible visualization of ASTERIX data, including radar video (ASTERIX Cat 240).

Formats:
Eurocontrol ASTERIX categories 1, 8, 10, 11, 21, 30, 48, 62, 240 and 244



- Model and visualize aeronautical data such as airspaces, navaids, procedures and grid MORAs (minimum off route altitude) in accelerated 2-D and 3-D views. The visualization support includes options for custom styling.

Formats:
AIXM (3.3, 4.0, 4.5, 5.0 and 5.1), ARINC 424, DAFIF(T)

- Integrate the various military data formats at your disposal, for full situational awareness.

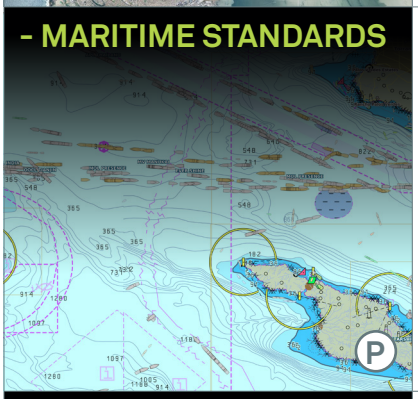
Formats:
ADRG, ASRP, BCI, CADRG, CIB, ECRG, NITF, NSIF, USRP, VPF products (VMAP0, VMAP1, VMAP2(i), DNC, DCW) including Geosym symbology

E Included in Essential A Included in Advanced P Included in Pro

(A) Optional in Advanced (P) Optional in Pro

- Full support for symbols and tactical graphics of the latest military symbology standards, in 2-D and 3-D. NATO Vector Graphics support increases interoperability. This support encompasses the lookup, creation, visualization, and editing of military symbols and tactical graphics.

Symbology standards/format:
APP-6A, APP-6B, APP-6C, MS2525b, MS2525c, NVG, TTA-106



- Rapidly visualize electronic navigational charts in 2-D and 3-D. Complies with standards defined by the International Maritime Organization (IMO) and the International Hydrographic Organization (IHO). Decodes data in the IHO S-57 format, and visualizes the charts in compliance with the IHO S-52 visualization standard.
-

Formats:
IHO S-57, IHO S-52, UKHO AML

- Decode and visualize electronic navigational charts in the encrypted IHO S-63 format.
-

Formats:
IHO S-63

USE CASES

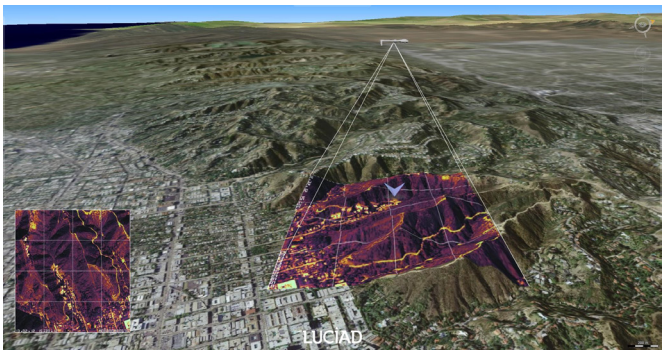


Figure 3 - Real-time video draping from UAV feed

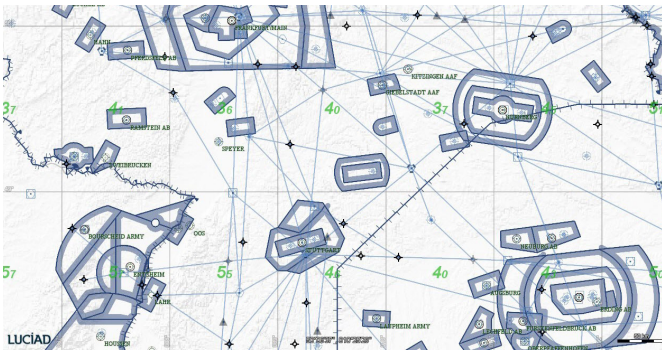


Figure 4 - 2-D aeronautical data

Figure 5 - Line-Of-Sight (LOS) analysis and LOS routing on 3-D terrain

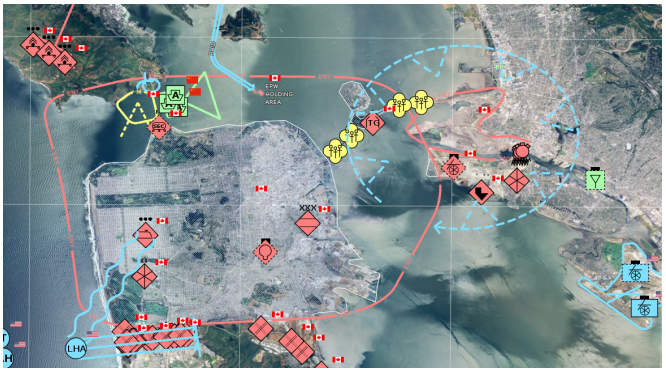


Figure 6 - Full military scenario visualized with LuciadLightspeed military symbology capabilities

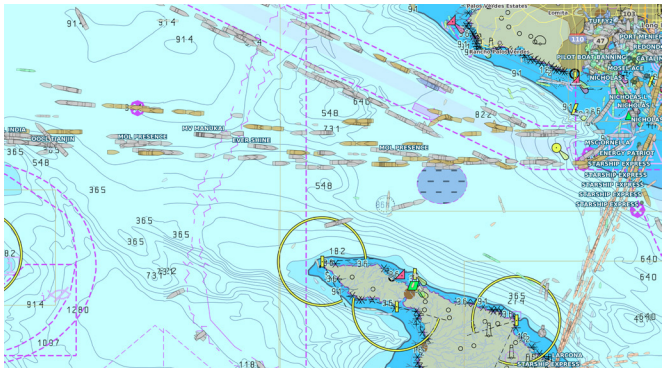


Figure 7 - Vessel plots integrated with Electronic Navigational Charts

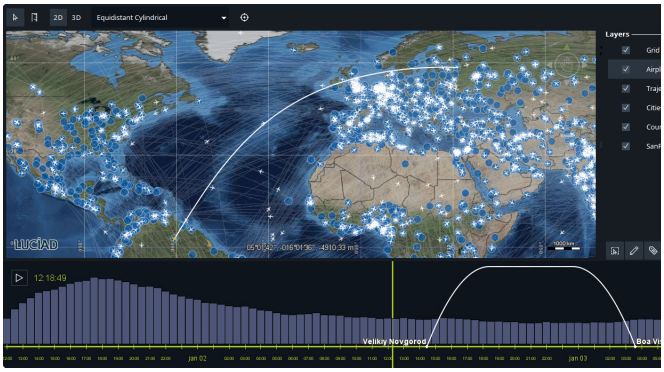


Figure 8 - Dynamic aircraft tracks and trajectories visualized on a timeline below a LuciadLightspeed map

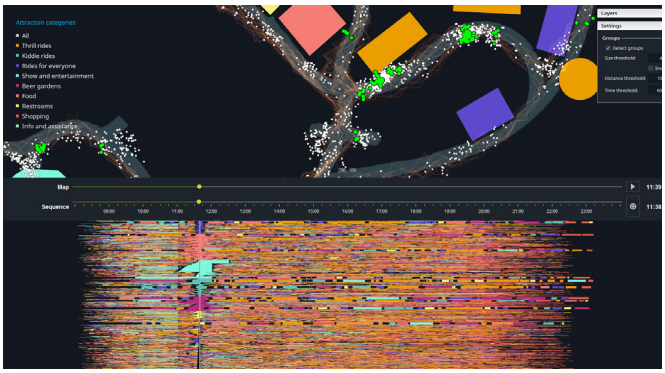


Figure 9 - Visual analytics on large people flow data sets using spatial and non-spatial views.

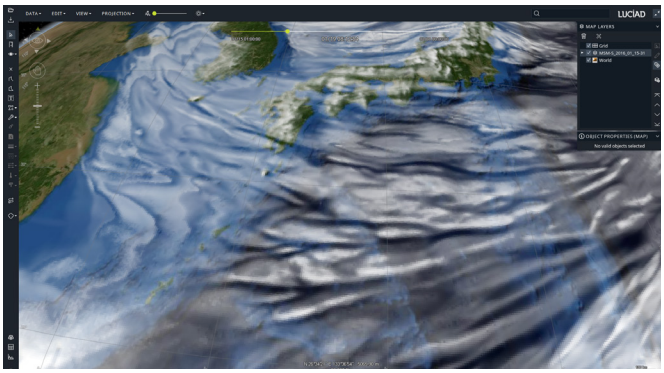


Figure 10 - Temporal analysis of a 4D NetCDF weather cube

Figure 11 - AIXM5 data and flight plan preview in 3D with vertical view.

MORE INFORMATION

LuciadLightspeed comes with:

- An automated installer and a launcher for applications, samples and documentation
- Code samples for all components
- Developer's guide with clear explanations and description of best practices
- API reference offering detailed description of all interfaces and classes
- Release notes to see what is new
- Technical notes to consult technical requirements

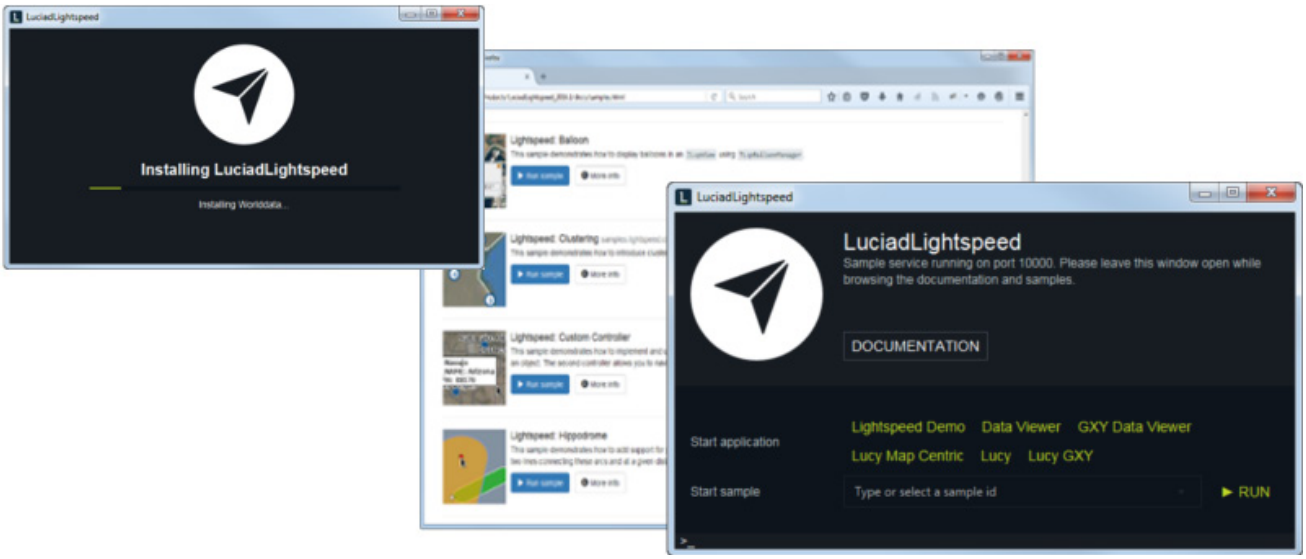


Figure 12 - Installing and launching the LuciadLightspeed samples, demo and documentation

To learn more or schedule a demo, check out the Luciad Developer Platform at **dev.luciad.com** or contact us at **info.luciad.gsp@hexagon.com**.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