Release guide

LuciadLightspeed 2022.0

8 July 2022

Contents

About this release

With this 2022.0 release, LuciadLightspeed is ready for GeoBIM. Data in the IFC format is now directly supported. Furthermore, we added an important set of improvements and enhancements that were high on our customers' wish lists.

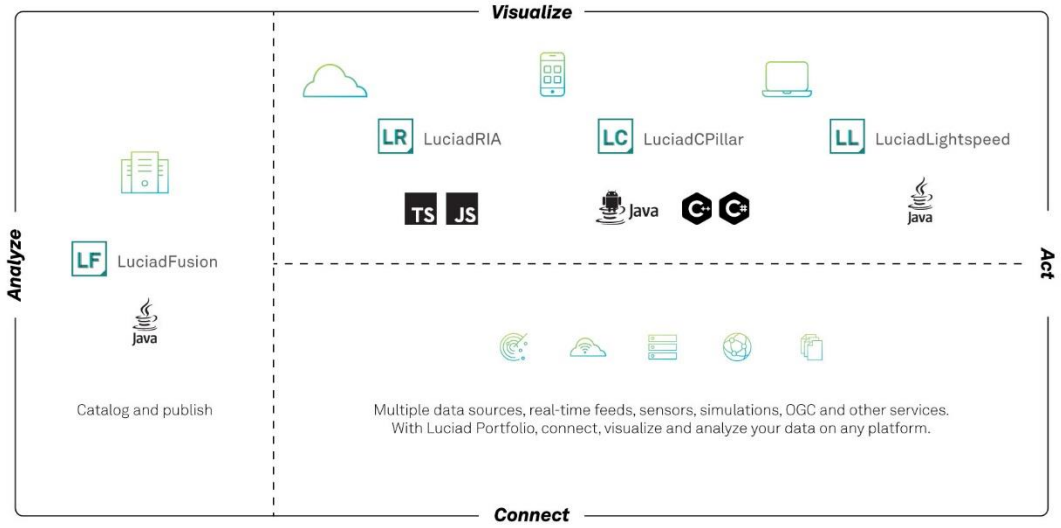

Figure 1:The Luciad Product Portfolio.

Benefits of the new features

Support for Building Information Models (BIM) in the IFC format

The Industry Foundation Classes (IFC) format is an open file format used by Building Information Modeling (BIM) programs. It contains a model of a building or facility, including spatial elements, materials, and shapes. In recent years, GeoBIM has become necessary to bring situational awareness into infrastructure projects, and vice versa.

This 2022.0 release of LuciadLightspeed brings support for IFC. The IFC models can be decoded and are then converted into OGC 3D Tiles for efficient visualization. This conversion can be done on the fly, resulting in “drag and drop” of IFC data. Depending on the size of the IFC model, this may take a while. Therefore, LuciadLightspeed also offers the capability to pre-compute the 3D tiles dataset once. Visualization will be instantaneous afterwards. Multiple IFC models can be combined into one 3D Tiles dataset, if required.

IFC models contain geometries as well as metadata. LuciadLightspeed allows you to correlate between the OGC 3D Tiles data and the properties inside the IFC. These properties can then be used to style, filter, or select elements from the IFC model.

For easy access to the metadata, LuciadLightspeed offers a tool to convert the IFC dataset into the GeoJSON format. This conversion maintains the properties stored inside the IFC dataset, together with a bounding box for each item. The unique identifier stored inside the 3D Tiles data is also present in the GeoJSON data. You can perform this conversion to GeoJSON programmatically, or you can run a convenient IFC data conversion script from the command line.

Support for data in the IFC format has also been added to Lucy, the LuciadLightspeed high-level application framework.

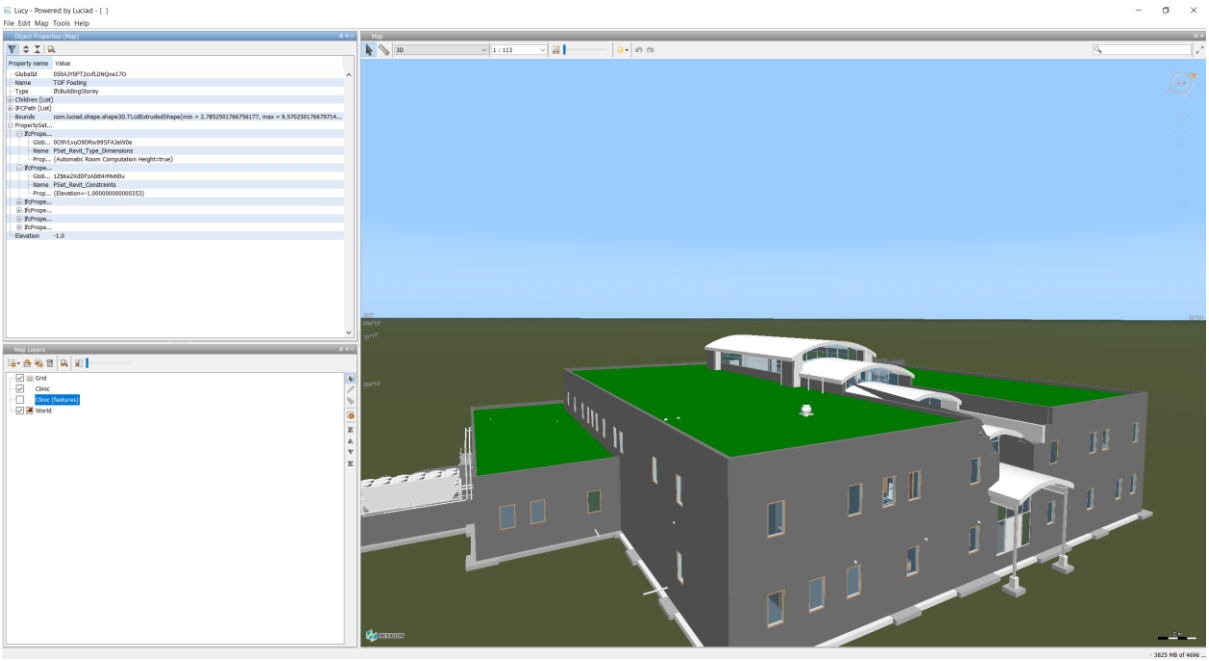

Figure 2: IFC data visualized in Lucy. The object properties can be explored via the standard properties panel.

Sample code to get you started

The decoder sample is the main access point for testing LuciadLightspeed IFC support. Furthermore, several articles have been added to complete the product documentation with information about the IFC format and how to handle it. These articles are easily accessible via the link to the documentation page “Data Formats: IFC.”

Extended OGC SE styling capabilities

OGC Symbology Encoding (SE), previously called Styled Layer Descriptor (SLD), is a standard for cross-platform and cross-vendor style definition. It mainly focuses on vector data, but also includes some parameters for defining the appearance of raster data.

OGC SE is widely used. Nevertheless, its expressive power is limited with respect to label styling options. This is one of the primary reasons that the industry introduced the concept of vendor options. Vendor options are key/value pairs that can be set on a symbolizer to customize settings that are not available in OGC SE.

For labeling, this mechanism has already been used within the Luciad Portfolio products. A typical use case is street labeling. Now we have used the concept of vendor options to support the label box styling settings.

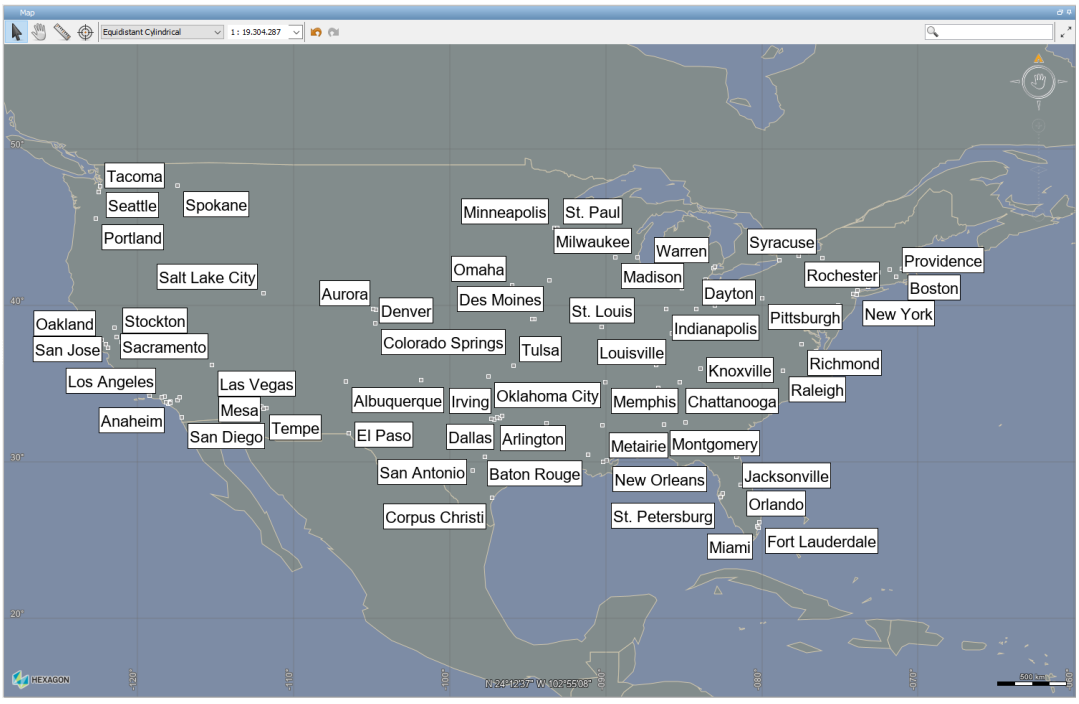

Figure 3: A set of vendor options to support the label box styling settings is now available in LuciadLightspeed.

Other improvements related to OGC SE support in LuciadLightspeed:

- You can now style the points of a line-based shape. By using a PointSymbolizer with the Geometry function “vertices,” the defined point style is applied to all points of the encountered shape. An example use case is the styling of waypoints along an ATS route.
- You can now use the geometry function “interiorPoint” to style a shape using a PointSymbolizer. This function takes a point on the shape border itself (the middle) if it is open, or inside the shape if it is closed.

- You can now adjust the anchor point of icons in OGC SE by using the AnchorPoint property on a PointSymbolizer graphic. An example use case is the alignment of the tip of an arrow icon with the end of a line segment.

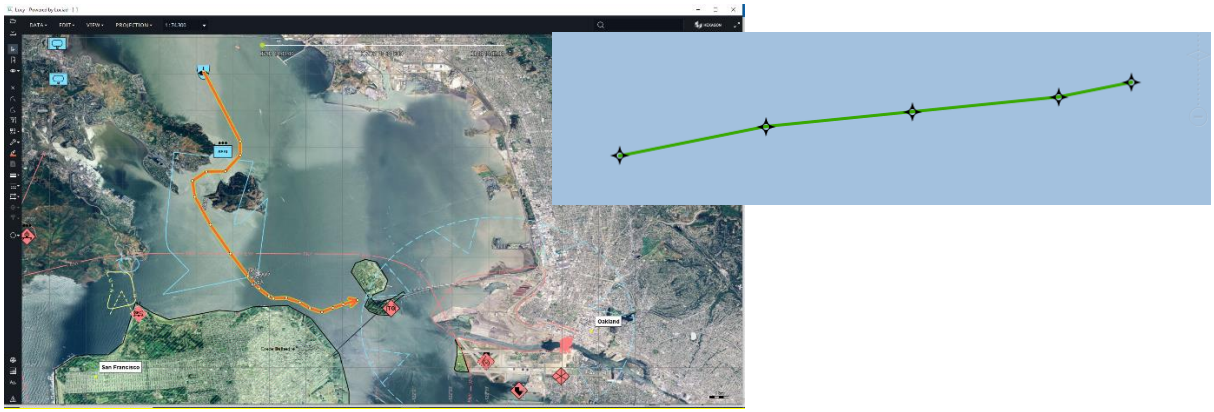

Figure 4: Using the PointSymbolizer in LuciadLightspeed.

Sample code to get you started

The existing OGC SE samples have been extended. For the label box styling, a how-to article has been added: “How to draw a box around labels.”

Area calculation for complex polygons with holes

You can calculate the area of a surface with one of these three methods:

- TLcdEllipsoidUtil.geodesicArea(ILcdShape, ILcdEllipsoid) for shapes with longitude/latitude coordinates
- TLcdSphereUtil.geodesicArea(ILcdShape, double) for shapes with longitude/latitude coordinates
- TLcdCartesian.area(ILcdShape) for shapes with Cartesian (X/Y) coordinates

All these functions now support complex polygons, including islands and holes.

Figure 5: An example of the area of Italy, of which the country borders make up a complex polygon.

Sample code to get you started

A new how-to article has been added: “How to calculate the area of a complex polygon.”

Improvements for customers in the aviation domain

Apply constructive geometry to AIS shapes

Since early versions, LuciadLightspeed has been capable of applying topological checks and constructive geometry operations. This capability has now been extended for aeronautical objects that are decoded as so-called “AIS shapes” by the LuciadLightspeed API. It is particularly relevant to all polyline- and polygon-like objects.

Note that the Lucy Drawing capability already supported constructive geometry operations on aeronautical shapes. This capability remains unchanged.

Sample code to get you started

You can load AIS data into the constructive geometry sample of LuciadLightspeed.

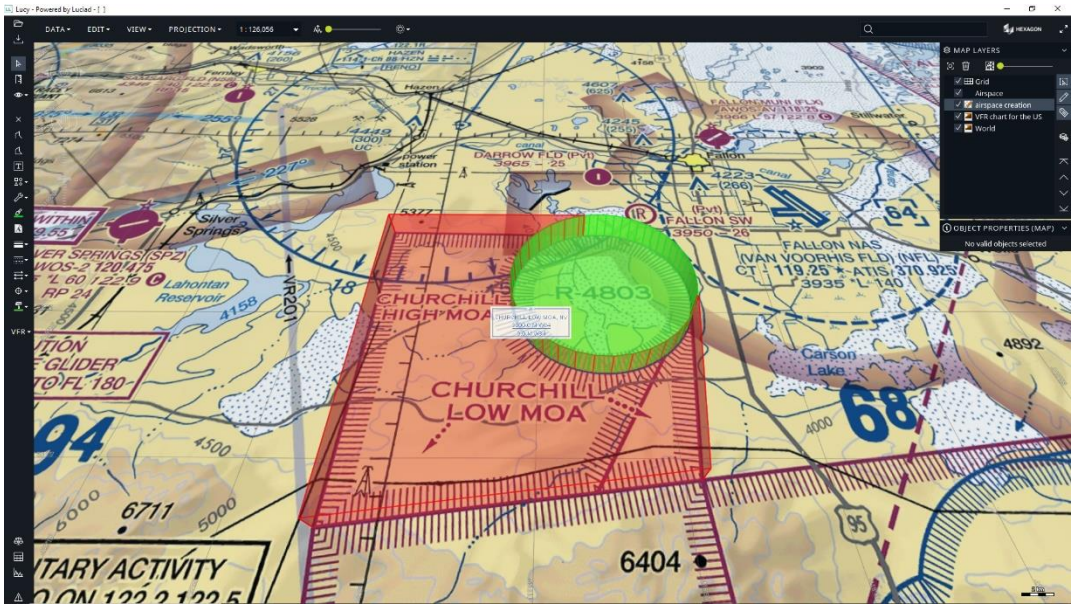

Figure 6 Through a custom Lucy add-on, AIS airspace shapes and constructive geometry operations are combined to create the Churchill Low Military Operations Area (MOA) in Nevada. The MOA consists of a polygonal airspace volume from which a circular airspace volume is subtracted.

DAFIFT support for Minimum Sector Altitude data

The decoder for the DAFIFT aviation format now supports decoding and visualization of Minimum Sector Altitude data. This data defines the lowest altitude that provides a minimum clearance of 1000 feet above all objects located within a circle sector (for example, around a navigational aid).

Other improvements

- Scale locking: A Lightspeed layer can optionally have scale ranges to automatically adjust its visibility based on the view scale. For additional flexibility, it is now possible to adjust the scale value to be considered independent of the view scale. This allows users to “lock” on a scale and keep a layer visible regardless of the current view scale. The article “How to lock scale-based styles to a certain zoom level” provides more information and sample code.
- Support for Draco compression: To reduce the tile size and increase streaming speed, 3D Tiles containing meshes can have their geometries compressed using the Draco library. LuciadLightspeed now supports decoding and visualization of Draco-compressed 3D Tiles. Draco compression can also be applied for point cloud data.
- Java 17 support has been further improved.
    - This release removes a series of occurrences of packages that were split over different jar files. Please consult the “Upgrade considerations” page of the documentation to see the details.
    - The sample code has been adapted; there are no more deprecation warnings when using Java 17.
    - There were some changes in third-party libraries to improve compatibility with Java 17. For example, the samples now depend on the HikariCP third-party library. It is used to illustrate how the database model decoders can use a database connection pooling framework. Also, the version of Ehcache was updated from 3.2.0 to 3.10.0. Again, such changes are documented as “Upgrade considerations.”

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