STK COMPONENTS

STK Components makes AGI's industry-proven algorithms available in a collection of native Java and .NET development libraries.

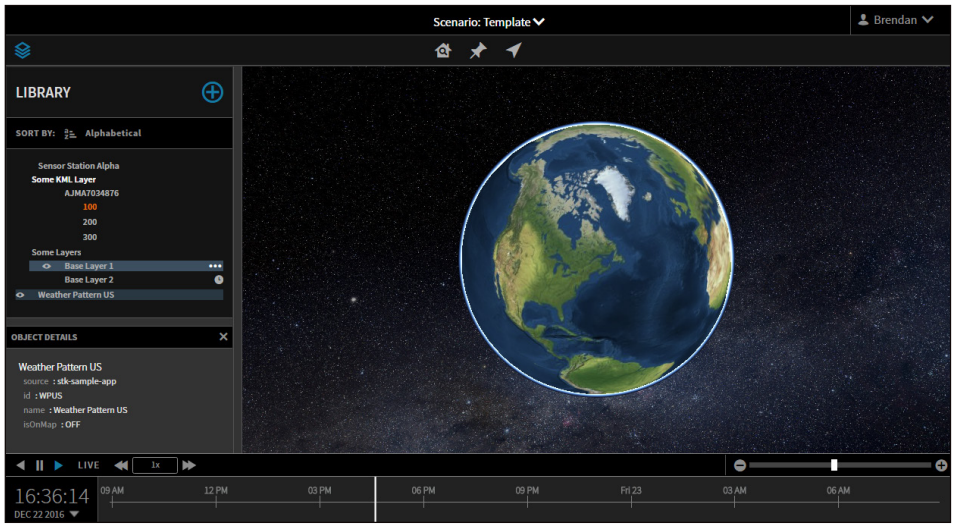
Use our libraries in conjunction with your proprietary business logic to rapidly and affordably develop solutions for your enterprise or programs. Using the key architectural elements of STK Components, build applications that are:

- Platform independent (pure .NET or Java libraries)
- Thread safe and multithreaded
- Highly scalable
- Suitable for thick-client, thin-client, or server deployment

The libraries provide an extensible, open architecture that allows customization virtually anywhere throughout the API. Extend existing capabilities with your own proprietary algorithms or contact AGI to request additional features in a future release of the API.

The libraries offer numerous building blocks, which address some of the following major capabilities:

- Various temporal, translational, and rotational coordinate representations and transformations
- Low and high fidelity models for the Earth and other celestial bodies including support for interpolated terrain surface features
- Geometric primitives representing the kinematics of simple scalars, points, axes, and vectors with respect to different frames of reference
- Simple and advanced propagation algorithms for modeling the motion of land, air, sea, and space vehicles
- Computation of intervisibility (access) and coverage between assets while accounting for various constraints including sensor field of view
- Detailed communications, radar, and navigation system modeling and analysis



- 3D globe and 2D map visualization of time-dynamic objects and analysis results, either using a web browser (Cesium) or as a control in a desktop application (Insight3D)
- Dynamic data analysis for near real-time simulation including data archival and playback

Simulation and Analysis libraries

Dynamic Geometry library. This library provides basic architectural elements and algorithms for modeling time, position, and orientation for accurate vehicle propagation, sensor modeling, and intervisibility calculations. Functionality includes:

- Manipulation of scalars, points, axes, vectors, and reference frames
- Precise platform positioning and orientation
- High-fidelity, time-based intervisibility algorithm accounting for apparent motion, including light-time-delay and atmospheric refraction

Terrain Analysis library. Employs a highly optimized terrain caching implementation to account for terrain when computing altitudes and performing intervisibility and coverage computations.

Spatial Analysis library. Enables the computation of asset coverage over point sets, lines, regions, volumes, and dynamic platforms to measure effectiveness using:

- Flexible gridding algorithms
- Complex coverage definitions
- Extensible figures of merit

Communications library. Provides computational elements for analyzing signal transmission between moving or stationary platforms with configurable signal processing and propagation models. Features include:

- Analog and digital radio frequency and digital optical signal types
- Transmitter, receiver, transceiver, and transponder devices
- Various antenna gain pattern models, including Gaussian, parabolic, and custom patterns

- Amplifier, filter, mixer, modulator, and demodulator signal processors
- Support for signal characteristics including modulation, polarization, data rate, GPS PRN code, etc.
- Environmental models that account for signal attenuation and other effects based on ITU and other standard specifications
- Complex, multi-link communications system analysis, including jamming or interfering elements
- Link budget analysis between arbitrary nodes of the signal propagation graph

Employ the metrics produced by the Communications library as access constraints to determine intervisibility between objects. Or use them with the Spatial Analysis library as figures of merit to determine coverage characteristics over a path, region, or set of points.

Radar library. This library extends the capabilities of the Communications library to provide radar system performance analysis.

Along with the signal modeling functionality provided by the Communications library, the Radar library provides:

- Attitude dependent radar target cross section modeling
- Support for monostatic and bistatic radar systems
- Multiple target signal returns and intended target identification
- Metrics for dwell time, integrated signal-to-noise ratio, probability of detection, etc.

Like the Communications library, use the metrics available in the Radar library to determine intervisibility between objects or coverage characteristics.

TIREM library. Extends the capabilities of the Communications and Radar libraries with loss prediction over irregular terrain and seawater.

Navigation Accuracy library. Model the GPS constellation using various data formats and configurable receivers to compute the navigational accuracy of terrestrial and spatial points. This library Includes algorithms for:

- Dilution of Precision (DOP)
- Navigational accuracy
- Receiver Autonomous Integrity Monitoring (RAIM)

You can also use the following to determine how communication links contribute to GPS errors:

- Multi-channel front-end model for GPS receivers
- Communications specific receiver noise model
- Carrier to Noise thresholds to determine tracking availability
- Signal jammers
- Models of all current operational GPS signals

Route Design library. Generate trajectories and attitudes for aircraft, ground vehicles, and ships using vehicle-specific characteristics. Functionality includes:

- Pre-defined route procedures
- Vehicle attitude modeling
- Terrain constrained procedures

Tracking library. Incorporate support for dynamically acquired data using the elements from this library. Integrate processing, visualization, and analysis for development of decision support, situational awareness, and distributed-simulation applications using:

- Optimized one-point analysis
- Data filtering and event processing
- Software transactional memory system
- Archiving and playback

Segmented Propagation library. Supplies architectural elements for computing vehicle trajectories where the manner of propagation changes with time. Capabilities allow:

- Performing numerical propagation with arbitrary stopping conditions.
- Solving for a trajectory by varying initial conditions and other propagation settings subject to arbitrary constraints on the motion and final conditions.

Orbit Propagation library. Provides industry-recognized force model algorithms for numerically propagating satellite orbit state and covariance through any orbit regime including LEO, MEO, GEO, HEO, and interplanetary missions. Includes impulsive and finite maneuver modeling capabilities.

Aircraft Propagation library. Propagate an aircraft through various maneuvers subject to flight phase performance models and wind effects. With defined aerodynamic and propulsion models, orientation of the aircraft can be determined assuming coordinated flight.

Visualization libraries

Cesium Analytics Software Development Kit. Visualize time-dynamic objects and analysis on a 3D globe or 2D map in a web browser. This JavaScript visualization library enhances the open source Cesium project with the following proprietary features and rendering techniques:

- Complex sensor shapes and fields-of-view
- 3D time-varying vectors
- Fan geometry for rendering azimuth/elevation masks and view-sheds

Cesium library. Produces CZML content for browser-based visualization (with Cesium) representing STK Components objects and analysis results. Build client-server applications connecting interactive time-dynamic 2D and 3D displays with web services that use the power of the other STK Components analysis libraries.

Insight3D Visualization library (Windows only). Visualize time-dynamic objects and analysis in a control embedded in your custom desktop application. Provides a high performance, accurate 3D globe, which renders a wide array of graphical primitives and custom terrain and imagery with flexible animation and camera control.