

SkylineGlobe 6.5

Technology Overview

www.SkylineGlobe.com

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SkylineGlobe Products

The SkylineGlobe suite of interactive applications allows you to build, view, query and analyze customized, virtual 3D landscapes. This 3D view is created by merging aerial and satellite photography and imagery, terrain elevation data and other 3D and 2D information sources, including geospatial data layers. Our software's unique capabilities allow "on the fly" data fusion from disparate and distributed sources without data pre-processing, allowing you to keep your 3D environment as current and relevant as the underlying data.

Skyline's range of products allows users to design an implementation customized to meet their unique requirements. Deployment options include the ability to work in a networked or disconnected (off-line) mode and make content available to the public or keep it restricted to secure networks and authorized users. Skyline's software also allows the creation of custom interfaces designed to support the needs of different types of users.



SkylineGlobe Enterprise

The **SkylineGlobe Enterprise** Bundle is an integrated software suite containing all of the necessary Skyline software components to set-up your own customized, privately-hosted 3D visualization solution. It includes TerraExplorer Pro with TerraDeveloper, TerraExplorer Plus, TerraBuilder and TerraGate with Direct Connect. The SkylineGlobe Enterprise solution is scalable, with licenses to support from ten to tens of thousands of concurrent users.



SkylineGlobe Enterprise allows you to make your enterprise data instantly accessible to your users via an interactive 3D environment. With the capability to fuse massive amounts of raster and feature data "on the fly", SkylineGlobe Enterprise is a unique solution for a turn-key system that doesn't change the way you work or store your data. SkylineGlobe Enterprise supports data streaming in native formats, eliminating the need for time-consuming and expensive data pre-processing. As a result, a SkylineGlobe Enterprise implementation is quick to deploy, cost effective and the data available to end-users can easily be kept current.

Whether deploying a web based application or a desktop application, SkylineGlobe Enterprise provides a full Application Programming Interface (API) allowing you to customize it according to your requirements. Because SkylineGlobe Enterprise is based on OGC standards, such as WFS and WMS, it can operate as a seamless 3D interface with other existing, legacy systems within your organization.

SkylineGlobe Enterprise Bundle Components



TerraBuilder

Generates terrain and urban model databases from a wide variety of data types. The TerraBuilder terrain builder product creates 3D terrain databases from imagery and elevation data, whereas TerraBuilder CityBuilder creates fully textured urban models (3DML) from 3D mesh models and classification layers and/or from model layers.

TerraGate

Powerful network data server technology for streaming massive amounts of 3D geographic, mesh, map, and feature data to thousands of concurrent users, giving each user uninterrupted viewing.

TerraGate Component with DirectConnect

Delivers 3D terrain data from terrain databases (MPT) or directly from the original sources through the DirectConnect extension. It also hosts collaboration sessions for TerraExplorer users and enables extended TerraExplorer Pro API capabilities in the SkylineGlobe web application.

TerraGate SFS Component
 Delivers feature and map data in OGC Web Feature Service (WFS), Web Map Service (WMS), and 3D Mesh Layer Service (3DML) protocols and provides TerraCatalog search interface (CSW) for remote users.

TerraExplorer Pro

Powerful, easy-to-use tool for editing, analyzing, annotating and publishing photo-realistic interactive 3D environments. Allows users to fly over and edit geo-referenced 3D terrain databases created through TerraBuilder and overlay unique information.

• SkylineGlobe Viewer: Standard TerraExplorer Viewer that provides advanced API

capabilities only when it is embedded in a SkylineGlobe web application. After installation, TerraExplorer Viewer can be run either as a stand-alone application, providing only standard capabilities, or from the SkylineGlobe web application, using the Internet License to provide advanced API.

SkylineGlobe Web Package

Complete out-of-the-box web application for publishing interactive 2D and 3D geospatial environments that increase understanding and improve decision making. Website users can navigate through an intuitive, virtual environment, viewing, analyzing, and annotating data in its geographical context. You can customize the application, from the included data layers to the application tools and commands, as well as create customized subsites for different user groups.

TerraBuilder

TerraBuilder allows users to quickly create, edit and maintain Skyline 3D terrain databases.

TerraBuilder Family

The TerraBuilder family of tools generates 3D terrain and urban model databases from a wide variety of data types. The TerraBuilder terrain building product creates 3D terrain databases from imagery and elevation data, whereas TerraBuilder CityBuilder creates fully textured urban model databases (3DML) from 3D mesh models and/or from model layers. These photo-realistic, geographically accurate, and stream-optimized databases can be included in local TerraExplorer projects or published to remote clients via TerraGate.

The TerraBuilder family includes the following products:

- TerraBuilder This terrain building product merges aerial photos, satellite images, and digital elevation models of different sizes and resolutions into a photo-realistic, geographically accurate terrain database.
- CityBuilder Merges 3D mesh models together with classification layers, and/or other model layers into a multi-resolution and stream-optimized 3D Mesh Layer database (3DML).
- PhotoMesh Fully automates the generation of high-resolution, textured, 3D mesh models from a set of oblique 2D images.

TerraBuilder: This component of Skyline's product suite merges aerial photos, satellite images, and digital elevation models of different sizes and resolutions into a photo-realistic, geographically accurate terrain database. This 3D terrain database can then be used as the

base terrain in a TerraExplorer project or added to a TerraExplorer project as an additional imagery or elevation layer that is seamlessly integrated with existing terrain data.

In order to create the terrain database, raster files are imported to a TerraBuilder project, and then manipulated



to achieve the desired 3D terrain database result. TerraBuilder edit options include cropping using various TerraBuilder tools, geographic adjustment and reprojection, and color and elevation modification. The completed TerraBuilder project can be processed into a single stream-optimized file (MPT) and then loaded directly in TerraExplorer, or it can be published to remote TerraExplorer clients using the TerraGate Terrain service.

Alternatively, the project (TBP) can be directly published for streaming, without preprocessing, from Skyline's TerraGate server. The published project, built from optimized and native source data, is streamed using the DirectConnect component, which employs advanced mechanisms to build data on-demand, and leverage cache technology for performance and scalability optimizations. Support for multi-core and multi-computer processing can be utilized to accelerate database creation and publishing of massive data sets.

Terrain databases (MPT and TBP) can also be served to WMS/WMTS clients with TerraGate SFS WMS/WMTS service.

Users can easily share, post, find, and load necessary geographic data for a TerraBuilder Project by connecting to **TerraCatalog**, a catalog database. TerraCatalog stores, organizes and manages connections to imagery and elevation sources and projects. All modifications to a source can be updated to the catalog, overriding the existing catalog layer or creating a new layer as required ensuring that changes made can be captured and stored.

TerraBuilder CityBuilder: CityBuilder, a TerraBuilder application, merges 3D mesh models generated by TerraBuilder PhotoMesh and/or layers with individually referenced 3D models into a stream-optimized and fully textured urban model. These layers are combined, in CityBuilder, with mesh layer classification information to create a 3D mesh layer database (3DML) that fully supports spatial and attribute queries. The 3DML database can be made available to local TerraExplorer clients or published to remote clients using the TerraGate SFS 3DML service. In TerraExplorer, the generated 3DML layers are integrated seamlessly into the terrain, and can be measured, analyzed, and queried using TerraExplorer's advanced analysis and spatial query capabilities.

TerraBuilder PhotoMesh: TerraBuilder PhotoMesh creates a high resolution textured 3D mesh model from standard 2D images. Featuring standard acquisition requirements (equipment and techniques) and entirely automated processing, PhotoMesh's technology offers a significant reduction in cost and time, compared to traditional modeling methods.

PhotoMesh supports a wide range of input formats and resolutions. Multi-core and multicomputer processing can be utilized to accelerate database creation and publishing of massive data sets.

The resulting photo-realistic, consistent 3D model can be easily merged, in CityBuilder, together with classification and identification layers, and other individually-modeled layers, into a single stream-optimized 3D database (3DML).

TerraGate

is a powerful network data server technology designed to stream 3D geographic terrain databases in real-time.

TerraGate Family

The TerraGate family of tools supports the clientserver data delivery requirements of Skyline's 3D technology. This powerful network feature and terrain server technology efficiently streams massive amounts of 3D geographic, mesh, map, and feature data to thousands of concurrent users, giving each user uninterrupted viewing. TerraGate suite is compliant with the following OpenGIS Implementation Specifications:



- OpenGIS® Web Feature Service (WFS) Implementation Specification
- OpenGIS® Web Feature Service Transactions (WFS-T) Implementation Specification
- OpenGIS® Web Map Service (WMS) Implementation Specification
- OpenGIS® Web Map Tiling Service (WMTS) Implementation Specification
- OpenGIS® Catalog Service: Web (CSW) Implementation Specification

TerraGate includes the following components:

TerraGate Component: A powerful network data server technology that provides the

following services, via the TerraGate server:

- TerraGate Terrain Service Streams 3D geographic data across a network from terrain databases created by TerraBuilder (MPT) or directly from the original sources through the DirectConnect extension.
- **TerraGate Internet License Service** Enables the use of extended TerraExplorer SkylineGlobe Viewer API capabilities from authorized domains.
- **TerraGate Collaboration Service** Hosts TerraExplorer Collaboration sessions to which multiple users can connect and work together in the 3D environment.

TerraGate Spatial Framework Services (SFS) Component: A powerful network feature

server technology that provides the following services, via the SFS server:

- Web Feature Service (WFS) Streams feature layers (points, lines and polygons) via the OGC WFS protocol to any application that reads the WFS standard. Remote clients have read-write access to edit the feature layers and save changes to the data source using the WFS-T protocol. WFS also supports advanced spatial and attribute queries from its clients. WFS can stream from Shape files and from the Oracle, SQL server, PostGIS and ArcSDE databases.
- Web Map Service (WMS/WMTS) Streams geo-registered map images via the WMS server from terrain cache databases. WMTS serves georeferenced map tiles (for increased speed and reduced bandwidth requirements).

- **3DML Service** Publishes multi-resolution and stream-optimized 3D Mesh Layer databases.
- Catalog Service: Web (CSW) Provides TerraCatalog search interface for remote users. TerraCatalog is a catalog database that helps you access, manage and organize your raster, feature and 3DML sources and projects located in storage files or on remote servers.

Imagery & Elevation DirectConnect Arc sde OGC* Ordas ER Mapper ORACLE* MrSID* Terrain Terrain Data	TerraGa	Terrain	
Maps Maps Web Map Service	ťe	Maps: WMS	TerraExplorer
Catalog Catalog Service Web	Ten	Catalog: CSW	WMS Client
3DML ORACLE SQLServer PostGIS 3DML Service	Gate	3DML	WFS Client
Features Arc shape Arc spe SQL Server PostGIS Cache Data Cache Cache Cache Cache Cache Cache	SFS	Features: WFS	

TerraExplorer

TerraExplorer is a powerful, easy-to-use set of client-side applications for exploring, analyzing, annotating and publishing photo-realistic interactive 3D environments.

The TerraExplorer set of products enables users to explore and annotate a geo-referenced 3D terrain database created through TerraBuilder. Users can customize the database with data from a network, local drive or the Internet. Overlaying data specific to the user's requirements onto a 3D map creates a targeted, interactive picture that can meet the needs of a diverse user base and the specific requirements of each individual user. TerraExplorer



can be used in a local desktop environment, accessing terrain and content data directly, or in a network environment via the TerraGate server.

TerraExplorer Family

All the products in the TerraExplorer family are built utilizing the same underlying technology. All tools, developed using the TerraExplorer Pro API, can be activated by all tools in the TerraExplorer family: TerraExplorer, TerraExplorer Plus, and TerraExplorer Pro.

TerraExplorer: Available as either an integrated ActiveX control or a stand-alone application, TerraExplorer provides the ability to navigate, analyze, and annotate high-resolution 3D landscapes created with the SkylineGlobe products. Users can overlay the terrain with basic objects, imagery layers and feature layers (in .fly, .shp, or .kml/.kmz formats), as well as analyze the terrain using a robust set of measurement and terrain analysis tools. Users who want to present their 3D project to others can create a multi-step presentation that combines a customized flight route with a particular display of the project.

TerraExplorer Plus: Featuring most of TerraExplorer Pro's editing and analysis tools, TerraExplorer Plus also enables you to run tools and extensions that utilize the full TerraExplorer Pro API making it the ideal TerraExplorer version for GIS analysts and developers. Users can import feature and raster layers from a variety of sources, including the TerraCatalog database, as well as overlay all 2D and 3D objects.

TerraExplorer Pro: Includes all the real-time 3D terrain viewing capabilities found in the TerraExplorer Viewer, as well as all the tools required for editing, analyzing, and annotating photo-realistic interactive 3D environments. It adds to TerraExplorer Viewer and TerraExplorer Plus publishing capabilities, feature layer editing and querying, advanced objects and drawing tools, as well as a set of tools for professional usage.

TerraExplorer Products - Main Features

- Easy to use tools for exploring and annotating geo-referenced 3D terrain databases created with TerraBuilder and (optionally) streamed by TerraGate
- Tool for publishing projects that can be viewed by other TerraExplorer product users offline, over a local network or over the Internet
- Efficient streaming of terrain and data overlays over any network
- Interactive drawing tools to create and add 2D and 3D objects and shapes, buildings, text, video, dynamic objects, and terrain objects on a 3D terrain model
- Loads online and offline GIS layers
- Saves layers to GIS standard file formats
- Communicates with external, local and web applications using standard COM interface Controls all static and dynamic objects, information layers and application content
- Provides a robust set of tools for measurement and terrain analysis
- Records a presentation in which you navigate through the 3D World, showing or hiding objects and layers, following dynamic objects, displaying messages and performing various operations
- Creates movies, as AVI from a recorded presentation
- Takes snapshots of the 3D window and saves them to external files
- Hyperlink feature links specific areas or objects to web pages, applications or databases
- Integrates text and web content messages
- Provides connectivity to the TerraCatalog, which can be searched for layers and projects and updated with changes
- Allows users to export the 3D Window, Project Tree, and Navigation Map as ActiveX controls
- Records and displays warnings, messages, and errors to help you troubleshoot any TerraExplorer issue
- Simplifies the translation of user interface text and icons

C2MP Products – Main Features

The TerraExplorer products are also available in a Command & Control Mission Planning (C2MP) configuration which offers unique features for military and defense users. These include the following features:

FalconView Integration

- Allow .RTE files to be imported and used as the basis for dynamic objects, which lets the user see and interrogate the RTE path within the TerraExplorer 3D scene, including any other data that may be loaded at the same time, such as ACO or other relevant features.
- Synchronize TerraExplorer with FalconView such that both applications are updated when the user changes viewpoint in one application or the other.
- Allow threat models to be rendered in TerraExplorer.
- Allow local point models to be rendered in TerraExplorer.

Multi-Tracking Tool

- Provide one common user interface for all supported tracking feeds:
 - Blue Force Tracking
 - Predator Tracking includes support for Video On Terrain or Video Popup for Predator
 - Cursor-on-Target
 - GPS (NMEA protocol)
 - GeoRSS
- Simple interface allows users to easily incorporate additional tracking feeds.

Mil-Std-2525B Symbols Creator

 Gives the user the ability to annotate the terrain with many common MilStd2525B symbols.

Coordinate Marker Tool

- Quick coordinate annotation utility, allowing users to drop variable size shapes with labels for a coordinate in preferred coordinate system, along with an optional customized tag.
- Provides a mechanism for simple real-time interrogation of points on the terrain

Air Combat Order (ACO)

 Provides support for many of the common ACO types, so that data can be viewed in full 3D, including altitude boundaries of zones.

Gridded Reference Graphic (GRG)

- Based on pre-existing tools for GRG creation in the community.
- Provides for creation of a GRG from TerraExplorer, so users can see POIs quickly and easily.
- Assists in outlining the grid with varying distance (meters or feet) offsets, labeling objects, and preparing the view for a snapshot, ready for printing or further annotation as needed.

*Sales and exports of the TerraExplorer C2MP products are subject to United States

Department of State (ITAR) controls.

SkylineGlobe Web Package

SkylineGlobe Web Package (SGWP) is a complete out-of-the-box web application for publishing interactive 2D and 3D geospatial environments that increase understanding and improve decision making.

Your website users can navigate through an intuitive, virtual environment, viewing, analyzing, and annotating data in its geographical context. With a powerful community tool and online publishing capability, SGWP promotes project collaboration and



data sharing. Other robust capabilities include extensive raster and feature layer support, powerful drawing tools, advanced analysis tools, and search functionality.

Using the SGWP's Manager interface, you can customize your application to your organization's needs, from the included data layers to the application tools and commands. If your application is intended for multiple target audiences (e.g. groups of interest or different user privileges), you can easily create **customized subsites**, so that each group sees only the data and tools that are relevant or of interest to it.

Main Components

SkylineGlobe 3D Web Application: 3D web application with an extensive set of tools and capabilities.

• Advanced Capabilities: Additional features are available for web users with a TerraExplorer Pro or Plus license.

SkylineGlobe 2D Web Application: 2D web application in which users can navigate, search,

and edit customized 2D maps.

2D Mobile Web Application: 2D web application that provides mobile access to your 2D maps.

Management & Customization

- **SkylineGlobe Website Administration**: A back-end, web-based application, that enables you to easily manage and customize your application.
- **API Development**: API extensions for the development of customized SkylineGlobe web tools.

SkylineGlobe Solutions

SkylineGlobe Solutions include all the tools needed to build your own privately hosted, 3D visualization platform based on SkylineGlobe technology. Three different software bundles are available to meet your specific 3D visualization needs:

- SkylineGlobe Enterprise Solution
- SkylineGlobe Plus Solution
- SkylineGlobe Basic Solution

SkylineGlobe Enterprise Solution contains all the software necessary to create, view, annotate, analyze, and share 3D environments. This all-in-one solution provides a full Application Programming Interface (API) that enables you to customize your interface according to your requirements or easily build your own 3D web application based on SkylineGlobe technology. SkylineGlobe Enterprise includes TerraBuilder, TerraBuilder CityBuilder, TerraExplorer Pro, TerraGate Terrain Service, TerraGate DirectConnect, TerraGate Spatial Framework Services (SFS), SkylineGlobe Web Package, and SkylineGlobe Viewer.

SkylineGlobe Basic Solution and **SkylineGlobe Plus Solution** are alternative bundle options for use in facilities, which require a privately-hosted, 3D visualization solution but do not need some of the more advanced features of the SkylineGlobe Enterprise Solution. Both solutions provide a full Application Programming Interface (API) that enables you to customize your interface according to your requirements or easily build your own 3D web application based on SkylineGlobe technology.

- **SkylineGlobe Basic Solution** includes TerraExplorer Pro, TerraGate Terrain Service, SkylineGlobe Web Package, and SkylineGlobe Viewer.
- **SkylineGlobe Plus Solution** contains all the software of the Basic Solution **plus** the TerraGate SFS component, which enables you to stream feature layers from a remote server and provides TerraCatalog search interface for remote users.
- **SkylineGlobe Enterprise Solution** contains all the software of the Plus Solution **plus** TerraBuilder, which enables you to create 3D terrain models and TerraGate DirectConnect, which allows streaming of 3D geographic data directly from the original sources.

What's included in each of the SkylineGlobe Solutions?

	Enterprise Solution	Plus Solution	Basic Solution
TerraBuilder	✓		
TerraGate Terrain Service	✓	✓	✓
TerraGate DirectConnect	\checkmark		
TerraGate Spatial Framework Services (SFS)	✓	¥	
TerraExplorer Pro	\checkmark	\checkmark	✓
SkylineGlobe Web Package	✓	\checkmark	✓
SkylineGlobe Viewer (Internet License)	✓	√	✓

- TerraBuilder: Generates terrain and urban model databases from a wide variety of data types. The TerraBuilder terrain builder product creates 3D terrain databases from imagery and elevation data, whereas TerraBuilder CityBuilder creates fully textured urban models (3DML) from 3D mesh models and classification layers and/or from model layers.
- TerraGate: A family of tools designed to support the client-server data delivery requirements of Skyline's 3D technology. This powerful network feature and terrain server technology efficiently streams massive amounts of 3D geographic and feature data to thousands of concurrent users, giving each user uninterrupted viewing.
 - **TerraGate Component**: Delivers 3D geographic data from terrain databases (MPT) or directly from the original sources through the DirectConnect extension of the Terrain Service. This component also enables the use of extended TerraExplorer Pro API capabilities in the SkylineGlobe web application, as well as hosts TerraExplorer collaboration sessions.
 - **TerraGate Spatial Framework Services (SFS) Component**: A powerful network feature server technology that delivers feature, map, and 3DML data in OGC Web Feature Service (WFS), Web Map Service (WMS), and 3DML Service protocols and provides TerraCatalog search interface for remote users (CSW).
- TerraExplorer Pro: A powerful, easy-to-use tool for analyzing, annotating and publishing photo-realistic interactive 3D environments. Allows users to fly over and edit geo-referenced 3D terrain databases created through TerraBuilder and overlay unique information.
 - **SkylineGlobe Viewer**: A standard TerraExplorer Viewer that provides advanced API capabilities only when it is embedded in a SkylineGlobe web application. After installation, TerraExplorer Viewer can be run either as a stand-alone application, providing only standard capabilities, or from SkylineGlobe web application, using the Internet License to provide advanced API.
- SkylineGlobe Web Package: A complete out-of-the-box web application for publishing interactive 2D and 3D geospatial environments that increase understanding and improve decision making. Website users can navigate through an intuitive, virtual environment, viewing, analyzing, and annotating data in its geographical context. You can customize the application, from the included data layers to the application tools and commands, as well as create customized subsites for different user groups.

Applications- Overview

Explore the Possibilities

The SkylineGlobe software platform provides users with rapid access to 3D geospatial data. SkylineGlobe's highly-efficient streaming technology enables unparalleled 3D realism while minimizing hardware and network systems requirements. The SkylineGlobe software is easy and quick to deploy in a variety of



environments. Skyline's open architecture and robust API offer system developers a rich set of capabilities to utilize in a wide range of applications and systems. Skyline's software has been approved for use in secure, mission critical systems including installation on a wide variety of secure military networks.

Uses for Skyline's Software Applications:

- For the military, intelligence services and law enforcement, Skyline aids in disseminating 3D geographic information for mission planning and execution, asset tracking, and training & simulation.
- For the civil engineer or architect, state and local governments, we provide the capability to see the impact of proposed development, visualize new projects, conduct wide scale planning and display information about an area to support economic development.
- For Utilities we offer a platform that can support the core operations with location services, the ability to visualize resources above ground, below ground or underwater, in a rich variety of devices and capabilities.
- In telecommunications our capabilities assist in deploying next generation services and provide a platform for deploying location based services.
- For the web designer and consumer markets we offer a way of increasing sales effectiveness by creating longer visits and providing localized information.

Benefits of Skyline's Software Applications:

End-to-end solution for 3D photo realistic visualization

- Easy to integrate and use
- Uses off-the-shelf PC hardware
- Quick to implement, net-based technologies

Easy to deliver

- Via standard TCP/IP networks
- On a wide variety of clients from handheld devices to desktops

Scalable server environment

- Fuse and integrate very large databases
- Efficiently handles terabytes of data
- On-the-fly data integration for maximum flexibility

3D Defense and Intelligence

As a defense-wide infrastructure, Skyline's software solutions simultaneously support mission planning, training and exercises, and command and control activities.

The ability to build, view and analyze the operational picture in a geospatial reference is critical for successful military and intelligence operations. The SkylineGlobe suite of applications provides this much needed utility to every level of the military hierarchy, from the realtime visualization of the battlespace by senior commanders, to the rapid and easy-to-use tactical analysis capabilities necessary to the warfighter.



Mission Planning, Rehearsal and Debriefing

Before a mission, SkylineGlobe can be used by mission planners to evaluate potential approaches to a target based on surrounding terrain, possible choke points and other critical information.

TerraExplorer comes equipped with both traditional terrain analysis tools and more advanced geospatial analysis abilities including: Line-of-Sight, Viewshed, 3D Viewshed and Threat Dome. These powerful analysis

CAPABILITIES

- Data Fusion
- Wide Range of Geospatial Data
- Dynamic Updates
- Accelerated Creation and Streaming of 3D Models
- Open Standards
- Dynamic Presentations
- Optimized Cache Databases
- Powerful Servers
- Federated Network
- Analysis/Measurement Tools
- Collaboration Tools



capabilities can significantly aid in providing a better geospatial understanding of the area prior to deployment.

Team leaders can generate a ground or air representation of anticipated operational situations so troops can better envision what it will be like in the field. Multi-sensor data fusion combined with robust tools for collection and management of imagery, elevation, and detailed feature layers enable you to create 3D, photo-realistic, geographically accurate visualizations of a mission site. This enables team leaders to walk troops step-by-step through a mission, avoiding the misconceptions that invariably result from depicting a 3D world in 2D. After a mission, SkylineGlobe's 3D visualizations support effective debriefing sessions. Commanders can accurately reenact the mission, evaluating each progressive step of the operation and easily updating or modifying the 3D model based on new intelligence.

Command and Control



SkylineGlobe enables you to view live updates to imagery, terrain, and assets, and friendly/ enemy forces location information, as real-time data becomes available.

With SkylineGlobe's DirectConnect extension, vast amounts of imagery and elevation data can be made accessible within minutes for viewing and analysis by the Command and Control center.

Deployment plans, troop formations, and lines of attack can then all be modified to reflect the latest intelligence and tactical information. Soldiers can receive updated 3D visualizations from central command via a wireless connection.

Asset Tracking

The ability to track movement of assets and display them within a wider geographical perspective enhances situational awareness and informed decision making.

With TerraExplorer's interfaces to Blue Force tracking, "Cursor on Target", "Link-16", standard GPS feeds and specific UAV platforms, users have the means to track in real-time the movement of friendly assets.



Unit designators can be displayed as simple text labels, moving 3D models, or the traditional Mil-Std 2525b.

Intelligence Analysis



Build rich 3D visualizations by creating or importing a wide range of geospatial data. Create a terrain database "on-the-fly" using the latest satellite pictures of a target area. Projection of UAV video georeferenced onto preloaded terrain background provides operators with enhanced comprehension of 3D spatial relationships between UAV and points on

earth. Feature layers added to the 3D terrain, such as mine fields and electric lines further increase situational awareness.

Highlight specific points of interest that can then be designated and analyzed with other SkylineGlobe users via the Collaboration tools. SkylineGlobe offers a powerful and extremely efficient means of disseminating these datasets to those personnel or units that need them the most.

Public Safety and Security

SkylineGlobe's robust and comprehensive API enables development of a customized 3D geospatial, web or desktop application that increases emergency preparedness and speeds up detection and response time.

Rapid access to extensive data from multiple agencies and sources, displayed in its geographic

context helps public safety personnel protect critical assets and infrastructure and mitigate the damage caused by natural and man-made disasters.



CAPABILITIES

- Data Fusion
- Indoor Navigation
- Accelerated Creation and Streaming of 3D Models
- Video on Terrain
- Dynamic Presentations
- Optimized Cache Databases
- Powerful Servers
- Analysis/Measurement Tools
- GPS Sensor Feed

Planning and Simulation

SkylineGlobe's technology is a powerful means of identifying the vulnerabilities of a current or proposed security arrangement. Surveillance issues, such as the visual exposure of guard posts and patrol routes and the buffer zone necessary to insure defendable perimeters, can be precisely and conclusively determined using TerraExplorer's traditional terrain analysis tools and more advanced geospatial analysis abilities (including: Line-of-Sight, Viewshed Analysis and Threat Dome).



SkylineGlobe supports the use of 3D representations for offsite rehearsals of intended response plans to anticipated operational situations. Multi-sensor data fusion combined with robust tools for collection and management of imagery, elevation, and detailed feature layers enable you to create 3D, photo-realistic, geographically accurate visualizations of a potential

disaster site. Threats can be displayed in conjunction with information layers, regarding highrisk external features, such as power lines and chemical plants, as well as critical resources, infrastructure, and assets. This enables police, fire, and other rescue officers to memorize the location of safety devices or critical assets that require special attention and gain familiarization with the layout and evacuation routes of not readily accessible sites, without disrupting normal work routines.

Command and Control



With SkylineGlobe's technology, disparate security information can be integrated into a single command environment, to support rapid access to data from multiple agencies and sources.

As real-time data becomes available, imagery, terrain, asset, unit status and location, and evacuation route information can be updated on-the-fly with data from sensors with live data feeds or from first-responders on the scene. This information can be streamed within minutes to the emergency personnel's Command and Control center so that they can modify evacuation

routes and emergency personnel deployment based on the latest data.

Asset Tracking

Enhance situational awareness and informed decision making by integrating SkylineGlobe 3D visualization into operational systems to monitor the movement of assets, such as manpower and emergency vehicles, using positioning information. With data on all assets in one place, users can easily perform a spatial query to identify the closest location of a required asset. On the ground, use mobile devices to received updated 3D visualizations.



3D Urban Planning and Environmental Management

Skyline's suite of products enables fusion of massive and disparate data sources to create a common operational picture that can be visualized and analyzed in its 3D geographic context.

By overlaying a wide range of geospatial data on actual terrain, you can create easy-tounderstand 3D worlds that allow architects, urban planners, environmental managers, and

other concerned parties to easily visualize and evaluate the aesthetic, practical, and environmental impacts of a proposed project or natural event.



CAPABILITIES

- Data Fusion
- Mobile Application
- Indoor Navigation
- Accelerated Creation and Streaming of 3D Models
- Subterranean Exploration
- Dynamic Presentations
- Optimized Cache Databases
- Powerful Servers
- Open Standards
- Analysis/Measurement Tools
- Flexible Deployment Options

Design



Modeling capabilities combined with sophisticated design tools and powerful terrain analysis tools enable the creation of accurate 3D visualizations that provide critical topographical/geographical information in planning a project. Use slope maps and terrain profile tools to identify flood zones or to assess amount of grading necessary for effective drainage and sewage systems. Measure proximity to existing facilities and infrastructure such as industrial centers, schools and transportation networks.

Real-time collaboration tools enable engineers,

architects, surveyors, and other team members to explore and analyze data together, and make joint decisions over a coordinated and comprehensive 3D environment.

Gaining Public Support for a Proposal

Even before construction begins, you can provide constituents with significant access to the building process. Concerned parties will be able to interactively navigate through a photo-realistic 3D model of the planned construction, and compare it to the present condition and to alternative proposals. This allows them to independently answer their questions, before construction begins, and without the misconceptions that invariably result from



picturing a 3D form based on 2D drawings. Does a proposed design obstruct a particular view? Does the shadow of one building fall on another at specific points in time? Do the height, form and design of the building fit in with surrounding architecture? Can the proposed density of use be adequately supported by local transportation infrastructure? Local and Internet data sources can be integrated for additional information regarding these issues and others.

Environmental Management



Integrate SkylineGlobe with other applications to better manage and visualize environmental data systems. SkylineGlobe software provides a single interface for comprehensive access, visualization, and analysis of geospatial data above and below ground and underwater. Its powerful terrain analysis tools provide topographical/ geographical information that is critical for developing effective measures for dealing with natural disasters. 3D model (e.g. flood model) enables visualization of time-based data so you can see how specific areas of the city will be affected by a

natural disaster at any stage and develop effective management plans.

3D Geographic Portals

With Skyline's powerful, yet easy to use software, you can create 3D geographic portals for commercial or government use.

Using SkylineGlobe's robust and comprehensive API, you can freely design and develop a 3D web portal that provides municipal, local, and national governments with advanced visual and graphical information relating to the locality's landscape, infrastructure and facilities.

Real estate agencies can offer their customers a visual, online representation of a property in its geographic context while travel agencies can take

customers on virtual tours of desired travel destinations.



CAPABILITIES A Data Fusion

- Wide Range of Geospatial Data
- Indoor Navigation
- Accelerated Creation and Streaming of 3D Models
- Localization
- Dynamic Presentations
- Optimized Cache Databases
- Powerful Servers
- Scalability
- Analysis/Measurement Tools
- Collaboration Tools

Increase Constituency Involvement

Multi-sensor data fusion, combined with advanced modeling capabilities, enable you to provide constituents with 3D building plans that bring to life the locality's future development plan. Thousands of constituents can concurrently navigate through a photo-realistic 3D model of the planned construction, compare it to the present condition and to alternative proposals, and then vote for their favorite. SkylineGlobe technology is infinitely scalable to support as many users as required.



Promote environmental awareness and activism by displaying the specific effects of hazardous waste disposal, pesticides, pollution, industrial development, etc. on water and air quality, fish population, wildlife, soil stability and more.

Encourage Tourism



Why not allow prospective visitors to preview their next vacation destination and taste all its features from their home or office? With the SkylineGlobe environment, you can create virtual cities including hotels, restaurants, features and points of interest. Tourists (or citizens) can enjoy virtual tours of key attractions and historical sites, or fly around the area, clicking on spots of interest to obtain more information.

The entire user interface can be easily translated into your local language. All information about a destination (text, images, etc.) can be seamlessly linked to the SkylineGlobe environment to provide a realistic online experience.

Share Data

Your 3D environment can serve as a userfriendly and inviting repository of comprehensive data about your locality. You can add information layers about any subject your constituents are interested in, including weather, population density, and live traffic cameras. Visitors to your 3D geographic portal can toggle information layers on and off, according to their particular interests.



Offer Visual Online Tours



coordinated and comprehensive 3D environment.

Skyline's software enables agents to display properties for sale or tourist attractions in conjunction with geographic data, such as bus routes, schools, restaurants, stores, and parks. Users can easily visualize and measure the distance between locations and navigate the shortest route. Real-time collaboration tools enable users to explore and analyze data together, and make joint decisions over a

Seamlessly Link to Other Databases

Use SkylineGlobe technology to link displayed services to information layers with real-time data. With SkylineGlobe's powerful server applications, optimized data structures, dynamic update and native data streaming capabilities, massive quantities of geospatial data can be updated and published quickly to thousands of concurrent users.



3D Geospatial Solutions for Mining, Oil, and Gas

Skyline's suite of products enables fusion of massive and disparate data sources to create a common operational picture that can be visualized and analyzed in its 3D geographic context.

Natural resource extraction requires the integration of extensive geographic, geological and

geochemical information. The SkylineGlobe 3D solution increases efficiency, saves money, as well as enhances safety in all phases of the mining, oil, and gas operations by providing a seamless, real-time visualization of all relevant geospatial information.



CAPABILITIES

- Catalog Database
- Wide Range of Geospatial Data
- Subterranean Navigation
- Accelerated Creation and Streaming of 3D Models
- Advanced Drawing Tools
- GPS Sensor Feed
- Optimized Cache Databases
- Powerful Servers
- Mobile Application
- Analysis/Measurement Tools
- Video on Terrain

Exploration

The SkylineGlobe software platform provides users with rapid access to geospatial data, drawing together information from aerial & satellite images, elevation models, geophysical maps, geographic datasets, and sensor data.

In evaluating a potential mining or drilling site's economic feasibility, planners must consider a host of factors such as geology and seismic data, as well as geographic constraints, including distance to public roads and processing facilities. SkylineGlobe software



provides a single interface for comprehensive access, visualization, and analysis of data above and below ground and underwater.

Design



Modeling capabilities combined with sophisticated design tools, and interoperability with other systems, allow users to create strikingly accurate 3D visualizations of the extraction site and of design options.

Powerful terrain analysis tools for measuring distance, area, volume, and slope provide critical topographical/ geographical information. Calculate the volume of the overburden that will be removed to determine required size of waste dumps, and suitability for use in backfilling earlier mine out pits or constructing mine facilities. Determine appropriate

locations of roads and airstrips. SkylineGlobe even provides a flood modeling tool for assessing the required construction height of roads above the terrain for effective flood immunity.

Sharing and Collaboration

With SkylineGlobe's powerful server applications and open standards, massive quantities of up-to-date geospatial data can be rapidly published, providing a common operational picture that gives concerned parties an accurate representation of a project's aesthetic and environmental impact before work begins. Real-time collaboration tools enable users to explore and analyze data together, and make joint decisions over a coordinated and comprehensive 3D environment.



Safety



Avoid common causes of mining accidents by providing a centralized geospatial monitoring system that synthesizes the signals produced by multiple tracking and monitoring systems in one visual framework.

Use the power of Skyline 3D visualization and analysis tools for early detection of significant dangers and for most effective management during a crisis. Skyline software can be used to support rescue operations and simulations,

visually displaying threats in conjunction with geographic data, such as evacuation routes, fire sprinkler systems, and ventilation shafts.

Management and Security

A common operational picture of all aboveground, subsurface and below sea level structures and facilities enables effective implementation of security and management protocols.

Integrate SkylineGlobe into operational and production systems to manage assets such as manpower, trucks and tankers, and monitor their movement using your company's positioning information. In the field, updated 3D visualizations can be received on users' mobile devices With data



on all assets in one place, spatial queries can easily be performed to identify the closest location of a required asset.

3D Utilities and Transportation

The SkylineGlobe 3D solution increases efficiency, reduces cost, and enhances safety in all aspects of utility and transportation system management by creating a common operational picture that can be visualized in its 3D geographic context.

The ability to evaluate and analyze all relevant information in a seamless, real-time visualization supports day-to-day infrastructure and asset management, as well as rapid detection and response, in the event of an outage or breakdown.



CAPABILITIES

- Data Fusion
- Wide Range of Geospatial Data
- Subterranean Exploration
- GPS Sensor Feed
- Mobile Application
- Advanced Drawing Tools (e.g. pipelines and power lines)
- Accelerated Creation and Streaming of 3D Models
- Scalability
- Analysis/Measurement Tools
- Advanced Spatial and Attribute Queries

Exploration and Design

Modeling capabilities combined with sophisticated design tools and powerful terrain analysis tools provide critical topographical and geographical information for evaluating proposed sites for utility pipelines and transmission towers or for planning transportation routes and stops.

Use slope maps and terrain profile tools to design pipeline routes which conform to recommended maximum and minimum grades. Measure bus stops' proximity to passenger crosswalks, curb ramps, and



transfer buses as well as to major trip generators to determine where new bus stops should be located.

Operational Management



The visual presentation of crucial operational information in conjunction with geographic data facilitates efficient infrastructure and asset management. With SkylineGlobe, managers can visually monitor the real-time location and movement of assets such as vehicles, mobile teams and repair crews. They can then make effective management decisions which take this data into account, such as rerouting

buses because of road closures, or automatically holding a vehicle at a transfer stop, until the arrival of a vehicle with transfer passengers.

The TerraExplorer Mobile App for tablet devices enables workers in the field to view real-time updates made to the COP by tapping into live data streams. With multi-touch gestures and a mobile-optimized user interface, the TerraExplorer Mobile App can be used in online mode reading data from SkylineGlobe's TerraGate and other OGC compliant servers, or offline, loading a local project created by the TerraExplorer Pro Publishing tool.

Maintenance

With support for indoor and subterranean 3D exploration, SkylineGlobe helps utility managers better understand their service area needs and their resources for meeting those needs. Visual display of relevant properties (such as work orders for inspections, and required frequency of inspection) for every segment of a utility's infrastructure makes it easier to keep track



of maintenance tasks, deploy field crew efficiently, and plan transportation routes. All information layers are seamlessly linked with the SkylineGlobe 3D environment.

Skyline software can be used in conjunction with tools for gathering real-time information such as traffic conditions from sensors with live data feeds, or electrical parameters readings, in electrical utilities, allowing asset defects to be promptly identified and repaired.

Customer Service



Transportation services can easily create a SkylineGlobe web page that displays routes and stops, and prominent buildings and other landmarks overlaid on a street map, along with dynamic information on traffic jams and construction zones. Utility companies can create 3D maps showing the precise location of planned power outages or water stoppages. The SkylineGlobe implementation can be

designed to convey the same look and feel as the company's own site, displaying their logo, brand colors, fonts and styles.

With SkylineGlobe's support for a wide range of geospatial data and interface to standard GPS feeds, information layers can be added with real-time data regarding a bus or train's actual present location, route detours, and estimated arrival times. Advanced measurement tools can be created, using SkylineGlobe's powerful API, to provide customers with trip planning services, generating for them recommended routes based on shortest walking distance, most comfortable foot route, fewest transfers, and proximity to connecting transportation.

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