aware

Mining Solution

extend your view

TERRA 4D

Management, operational efficiency, safety and protection. TERRA 4D is tailor-made to meet these requirements and offers its customers an integrated geospatial Command & Control solution.
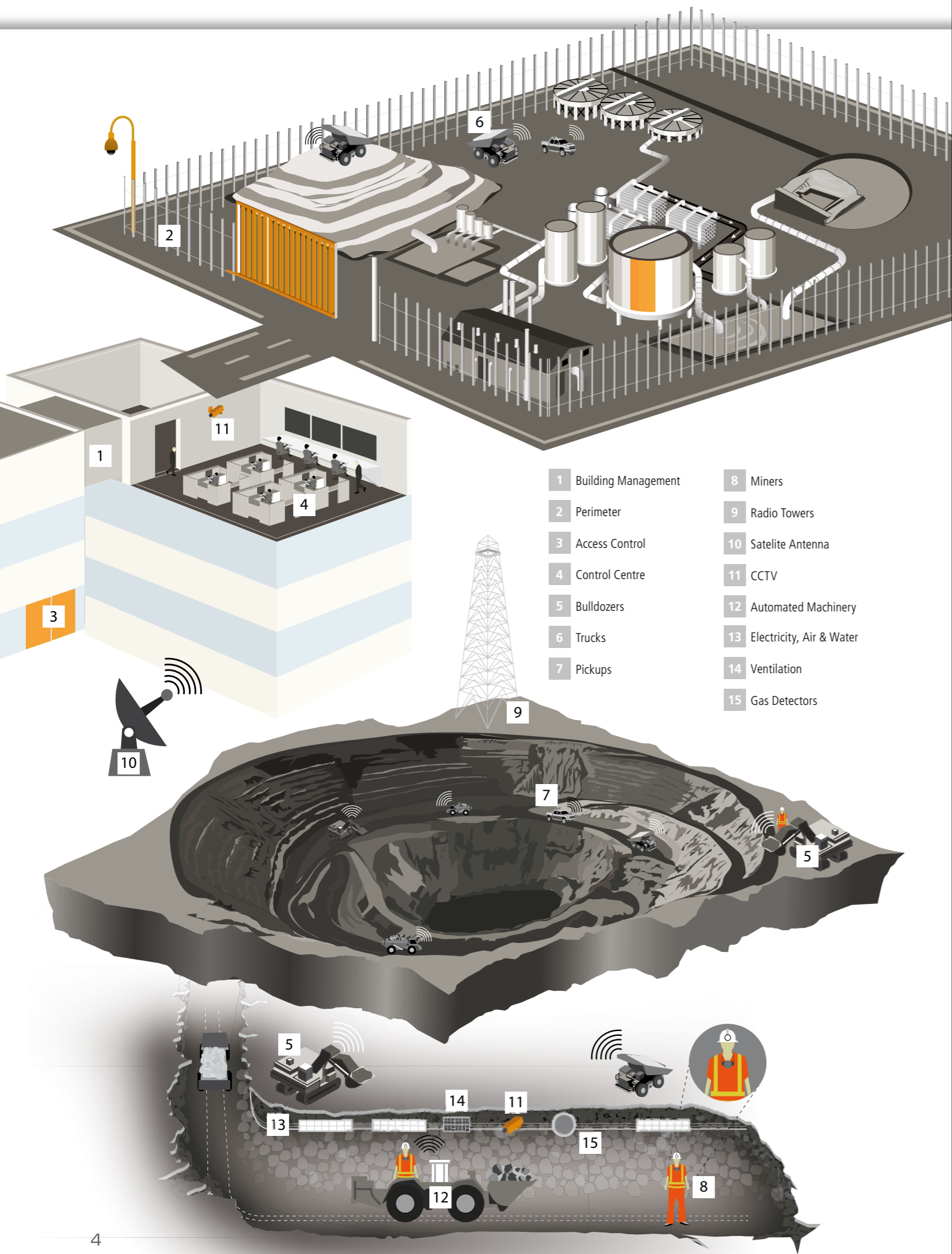
The new challenges of the mining industry have far-reaching consequences for operators, processing, transportation and distribution. To adapt to these changes, operators need a knowledge-based approach to achieve greater operational efficiency, improve environmental performance, and address security vulnerabilities. The TERRA 4D PSIM Physical Security Management platform helps mining companies:

- Integrate operations and security systems into a single management platform
- Improve incident response times and minimize risk
- Enable a common operations table allowing instant situational awareness, incident management and real time resolution
- Correlate and geo-reference data from multiple operations, security and other systems to resolve a situation
- Intuitive workflows eliminate operator errors, reduce operator stress during an incident, and ensure compliance with company guidelines

TERRA 4D mining solutions offer advanced features that support security operators to efficiently assess and resolve incidents. Features such as multi-camera object tracking, time machine, workflow, incident notification, location and dispatch are some of the many features that help operators react immediately and efficiently in security incidents. Thanks to the intuitive and field-approved GIS 3D model, it provides superior situation knowledge in every circumstance.

The TERRA 4D platform brings together operating, security and subsystem systems seamlessly. The integration and unification of all subsystems allows the collection and analysis of all information as a central entity enabling comprehensive and effective protection.

TERRA 4D facilitates the detection of operational and security incidents, the location and presentation of information in geographical context, thus providing superior situation awareness.

1	Building Management	8	Miners
2	Perimeter	9	Radio Towers
3	Access Control	10	Satelite Antenna
4	Control Centre	11	CCTV
5	Bulldozers	12	Automated Machinery
6	Trucks	13	Electricity, Air & Water
7	Pickups	14	Ventilation
		15	Gas Detectors

See to Believe

Sensors including cameras and video surveillance avatars, representing known and unknown people and objects, detected by any available method, are displayed in real-time geospatial context, in a 3D GIS model.

Fly through time and space

Pause real-time viewing, rewind and replay history showing synchronized video, camera orientation, object positions and their historical traces in the 3D model. Find out where any object actually came from!

System intelligence

TERRA 4D correlates information from access control, fire detection, intrusion detection, CCTV systems, radar, automation systems, building management, operations and others in real time. Continuous, real time analysis of all data using standard rules generates an alarm if any abnormal situation occurs.
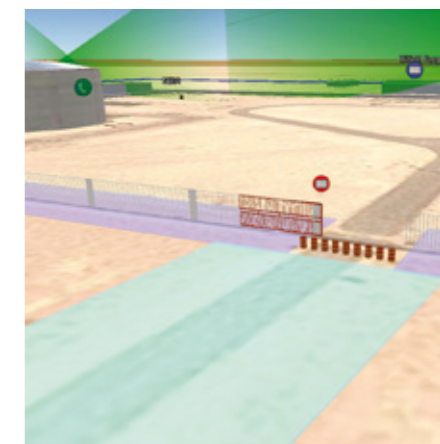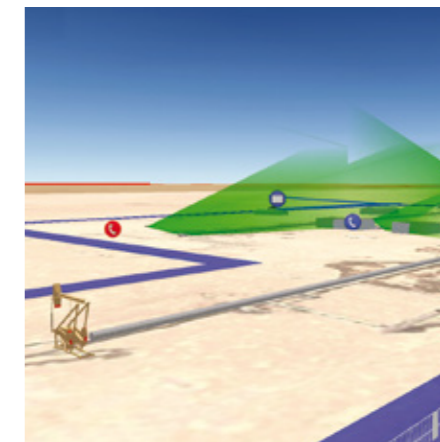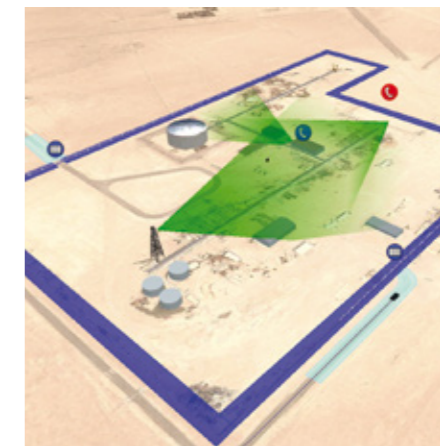
Selective intelligence communication

TERRA 4D ensures that everyone in the operational chain is adequately informed and knows the appropriate action to take. Intelligence can be accessed and shared, subject to relevant authorization levels and information privileges.

A picture is worth a thousand words

Continuous positioning of machines and trucks is controlled based on GPS and geofences. If a course deviation or a manual "silent alarm" is detected, a satellite and/or camera search is initiated, and the live coordinates and images are transmitted to the Control Center.
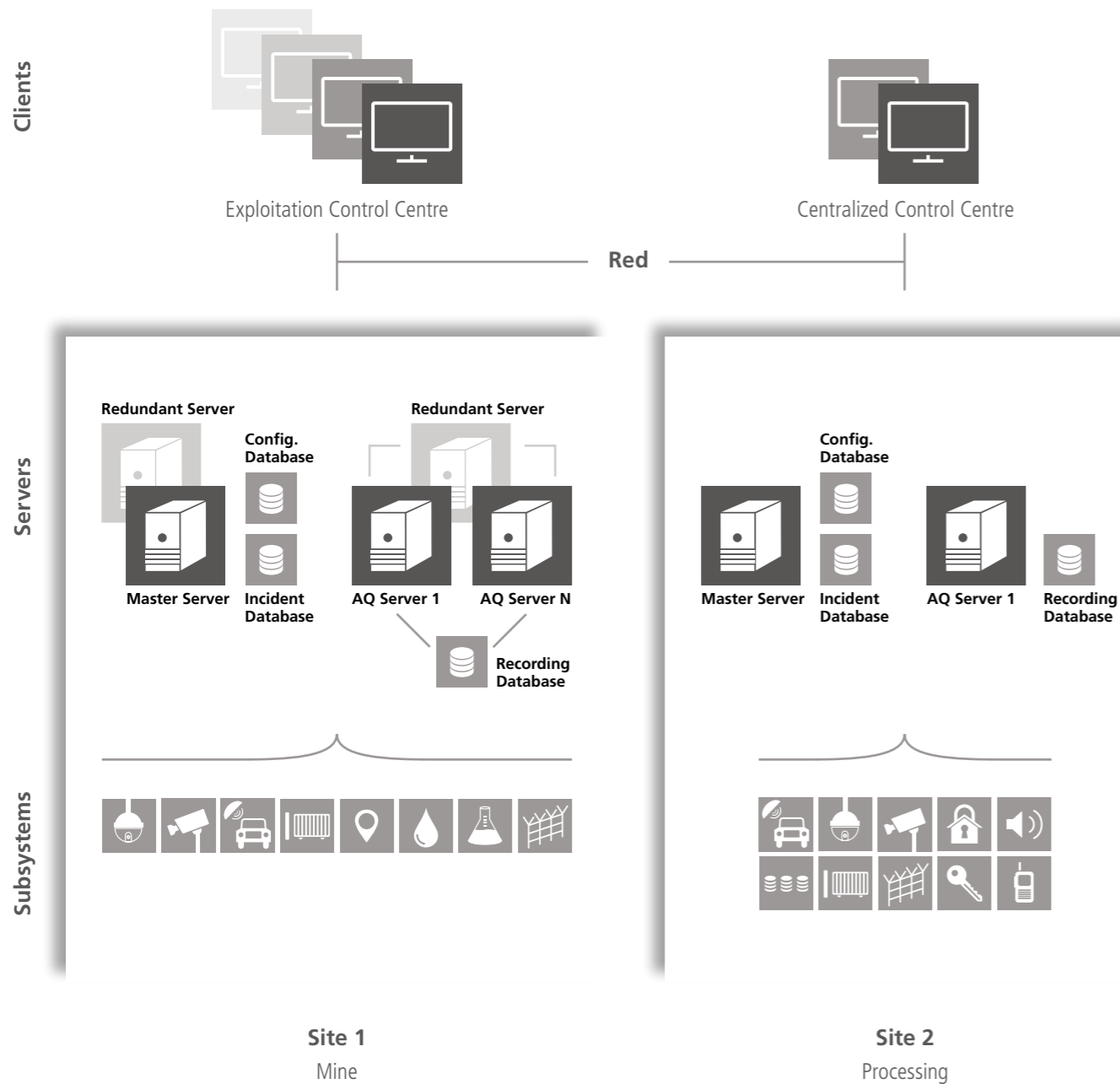
Multiple sensors

By combining multiple sensors into an intuitive business snapshot, operators can identify and track objects and events, whilst maintaining a global view of the entire site, rather than watching video screens from each of the cameras. Operators have selective access to live video from a multitude of CCTV cameras, giving operators a "point of view" from the scene of the incident.

TERRA 4D screen shots

An example of a mine system architecture

Clients

Exploitation Control Centre   Centralized Control Centre

Red

Servers

Redundant Server   **Redundant Server**

Config.
Database

Config.
Database

Master Server   Incident   AQ Server 1   AQ Server N
                Database

Master Server   Incident   AQ Server 1   Recording
                Database   Database

Recording
Database

Subsystems

Site 1
Mine

Site 2
Processing

Distributed architecture

Mining facilities are usually distributed in remote, large areas and are divided into different sectors, exploitation, processing, transportation and distribution. In the TERRA 4D PSIM all processing plant types and facilities are inseparably linked to each other. The integration and unification of all subsystems in the TERRA 4D platform enables the collection and analysis of all information as a central entity that facilitates a quick and accurate response to any incident, while maintaining total protection.

Exploitation

Exploitation activities are moving more and more to remote and hostile places, thus justifying the need for comprehensive protection and security measures. TERRA 4D offers this solution with a common control interface for intrusion alarm, access control, fire and gas detection, building management, production and automation control, security and protection systems. Access to sensitive areas must be closely monitored and controlled to ensure safety, while allowing company staff free movement in daily operations. By simplifying the analysis of situation data and corresponding responses, TERRA 4D PSIM delivers significant benefits to the organization, increasing overall operational efficiency.

Transport and distribution

The TERRA 4D transport module allows the tracking of trucks and vessels based on systems installed on satellite platforms. The system is sabotage resistant as no tracking device is installed. Geo-fence, travel observation, silent alarm and designated tracking are incorporated into our system. Any abnormalities, such as inactive AIS, delayed truck, predefined route bypass, or silent alarm result in automatic vehicle tracking. Nearby satellites will capture images of the vessel/truck whenever possible and send them to the ground station. A drone/UAV (Unmanned Aerial Vehicle) surveillance solution is available.

Processing

Advanced Physical Security Information Management Software, TERRA 4D PSIM, addresses all specific challenges in a comprehensive way, dramatically improving safety and production operations through the unification of all systems in a single functioning three-dimensional image. TERRA 4D PSIM facilitates situation planning, response and analysis of production, protection and emergency safety incidents where the risk of human error can lead to financial loss, damage and loss of confidence.

Use case

TERRA 4D helps detect any operational or security incidents and prevents it from becoming a major threat:

- TERRA 4D translates incident information into real-world coordinates (GPS) and shows the location in the 3D GIS
- The operator is assisted by Guided Workflows and incident location
- In case of an alarm the nearest available intervention staff receives the alarm message by terrestrial radio, mobile phone or any other available communication method. Simultaneously the operator can shut down machines, close valves, close doors or cut water etc. as the first immediate response.
- Based on multiple sensor analysis, the nearest available cameras are directed to the location of the incident. The operator can initiate observation with a UAV where the aircraft is sent to the incident location on a predefined flight path to transmit the live video to the control room.

Command and Control

Video wall	Support of video walls and multiple screens per desk.
Time machine	Navigate through space and time and see all recorded data (video, tracked objects, PTZ positions,…) time-synchronized.
Flexible GUI layouts	GUI layouts changing automatically or driven by operator. User and situation specific layouts are possible.
Chat messenger	Operators exchange information quick and simple.

Geospatial Data Management

Geospatial rules engine	Define rules and methods to auto-respond to incidents.
Geospatial data correlation	Any sensor can be used to control other sensors. Alarm verification utilizing multiple sensors.
Geo fencing	Define geographical alarm or warning zones to receive alarms when tracked objects enter or leave such zones.

Event and Alarm Management

Workflow automation	Intuitive workflows remove operator randomness and reduce stress.
Incident reporting	Support of interactive incident forms. Videos, map views and resources can be linked. Customized design supported via HTML forms.
Escalation and delegation	Escalate alarms to super visor user groups or delegate alarms to other operators for work balancing.
Procedure enforcement	Workflows enforce company's or legal compliance guidelines.
Audit trail	Logging of all user actions for every workflow step for later analysis
Alarm notifications	Sends alarm notifications to remote systems via SMS or Email
Operator alarm	Operator can select alarm templates and fire alarms at specific locations on the map or directly in the video

3D Visualization

Multi Layer GIS with real-time rendering engine	Digital Terrain Model (DTM), Ortho imagery (aerial or satellite images), Street map, 3D buildings.
Geocoder	Address search, Forward: type address and GIS shows location, Backward: show address for any clicked location in GIS model.
Indoor visualization	3D indoor building structures with floors and rooms. 2D CAD floor plans can be imported to visualize indoor environments in 3D.
Geospatial document library	Organization of the document library (document is placed at geographical location) and access according to user privileges.
Object track visualization	Trace object's movement including historical track in 3D GIS model.
Video wall	Live or playback video is "projected" on virtual video walls in 3D GIS model. Camera orientation and view area is shown.
Avatar	Represents a detected object and its class in the 3D space.
AIS, ADS-B, GPS meta data	Shows meta data attached to an Avatar.

Video

Video unification platform	Seamless integrated video streams from one or many different video sub-systems (live and playback).
Supported cameras	Analog (with encoder), IP, fixed, PTZ, 360, mobile or airborne.
Position dependent salvo	Shows closest cameras to a static or dynamic object location.
Direct PTZ control	Video latency compensating method to control any PTZ camera.
PTZ auto presets	Automatic configuration of all interesting locations in PTZ camera's field of view as PTZ preset positions.
Geo-referenced video	Determine object location (latitude, longitude, height), speed, direction and size directly from video image.
Meta data recording	PTZ head data are recorded.
Multi camera tracking	Follow a moving object even in crowded environments using one or more fix or PTZ cameras simultaneously.
Augmented reality	Augmented reality layer on top of video image display including context sensitive interactions.

Mobile Unit Dispatching

Android and iOS app	GPS tracker and target intervention application. Target waypoint navigation, instant messaging and alarm handling.
Dispatching	Get current positions of all units in the field, send units to target coordinates, keep track of ongoing interventions.