CITY OPERATING SYSTEM

A smart city improves the quality of life of its citizens and the local economy through individual and joined-up programmes across transportation, energy, communications, public services, infrastructure and security. The City Operating System is Selex ES's solution for managing a smart city and can also be tailored for major events and territory control. It is an integration and management solution, designed to add intelligence and resilience to complex infrastructures.

A MODULAR URBAN INFRASTRUCTURE PLATFORM

Selex ES's modular smart city solution comprises a number of specialised city subsystems:

- **Urban security**, for increasing public security and citizens' safety through zone control
- **Intelligent Transport System,** for providing information about road networks, promoting the use of public transportation and regulating access to urban areas
- **Intermodal logistics**, for managing intermodal nodes and road/railway transport, tracking goods and fleets and providing risk management for dangerous goods
- **Smart buildings**, for governing power consumption, generating efficiency and savings while maintaining comfort and safety
- **Cyber security,** to guarantee information integrity, systems resilience and continuity within city governments and supervisory centers.

All of these can be monitored via Selex ES's **City Operating System**, which integrates all city subsystems in a single dashboard providing views, alerts and workflows for governance and control of the city environment.

A comprehensive view for taking informed decisions

The City Operating System gives users all the tools they need to manage the day-to-day operations of the city and the ability to intervene effectively during an emergency.
The system integrates and organises data generated by the sensors and other information-gathering systems in the area, including human communications, giving operators a complete strategic overview of the city's status and allowing smart communication with citizens.

KEY POINTS

The City Operating System:

- Integrates both new and legacy systems through connectors or ad-hoc interfaces
- Gathers information and data from existing systems, correlating them in order to generate new, richer information
- Provides a control room platform for event governance, with a customisable workflow for user support
- Includes a communication service platform able to connect separate communication networks and to assure interoperability with other control rooms, enhancing territory

security and quality of life (Police, Fire Brigade, Ambulance, Civil Protection...)

- Integrates a range of add-on tools including a crowd management module for detecting people's movements and behaviour
- Provides 2D and 3D views, with mapping and 3D rendering service platforms
- Supports secure interaction (open access) with users, partners or third parties with applications for citizens, companies, and organizations.

TECHNICAL DESCRIPTION

The City Operating System is a SOA (Service-Oriented Architecture) platform based on web services. Using a publisher-subscriber method, information in the system is published in a number of classes which receivers can subscribe to.

The platform consists of three functional layers:

- **Field layer:** includes all sub-systems and sensors that acquire information directly in the field. At this level, the information obtained may already be subjected to a first elaboration according to the business logic of its domain.
- **Skill layer:** it is the business logic level and it is the actual kernel of City Operating System. Here, the data and events coming from the field layer, are collected through a software infrastructure based on a bus and made available to the various processing engines, in order to "apply intelligence" to the system according to rules and algorithms oriented to specific domains. This approach allows the framework of City Operating System to be used in multiple contexts such as cities and major events, first of all, but also to be tailored for usage in airports, buildings, critical infrastructures, etc... Different business logic, different processes and different event correlation rules will be implemented for each of them within the same application framework.
- **Presentation layer:** information built in the skill layer is presented in dedicated dashboards for each user profile, with a three-dimensional view of specific areas of interest where applicable (3D rendering) and through various interfaces: web, mobile, messaging, voice, haptic, etc. Each specific user function can access the system through a customised layout.

Main modules

- **Integration** - System Integration Facility (SIF) allows the acquisition and distribution of all information to and from all layers of the system (field, skill, presentation). The events are normalised and stored in a persistent database.
- **Correlation** - Event correlator is a rule-based engine, aimed at searching for relationships between different, even apparently unconnected events, from different sub-systems, in order to generate alerts and alarms (smart alarms), identify false positives and generally provide smarter information.
- **Management support** - Workflow engine is a software engine that configures and executes automatic or semi-automatic procedures, consisting of sequences of actions and reactions which can be triggered by a pre-defined event. It has to be equipped with a graphic designer for easily programming new workflows.
- **Resources management** - The system allows operators in the control room to manage staff, vehicles, equipment and facilities out in the field.
This service is particularly useful for operations during major events and more generally for the management of security events.
- **Planning** - the planner is a module that allows the comprehensive planning and management of activities relating to scheduled events.
- **Localization and representation** - GIS & cartography services is an application for browsing and processing geo-referenced data. The service provides visualisation and query in 2D/3D maps and allows the management of metadata associated with map coordinates on multiple levels (multi-layer). The service also allows the indexing of temporal layers and manages features like geocoding and reverse geocoding.
- The **User Interface** can be structured as a web portal (City Cockpit) or be specialised for simplified/vertical interfaces (e.g. mobile, messaging). Operators, depending on their role and access rights, can monitor an integrated view of the city (situation awareness) or can be fed individual pieces of data or messages and can be guided step-by-step in taking the right decisions or implementing the correct action.