



Designing PSIM Software for the Enterprise Market

Creating a platform to meet the unique challenges of today's highly distributed organization

Traditionally, physical security information management (PSIM) systems have been designed to meet the needs of the large critical infrastructure sector, such as energy, transportation, water, oil and gas. These projects are typically characterized by a single large location, integrating with highly customized systems unique to an industry, with large capital budgets, generous timescales and funding often subsidized through government initiatives. Implementing PSIM systems for these projects was undertaken to improve the security of a location, not to deliver a specific return on investment (ROI).

In meeting these requirements, a client/server system design has usually been successful. However, this architecture has been far less successful in addressing the needs of enterprise organizations, where a cloud-based architecture better fits the operational, networking and IT strategies in place. Many organizations now have their own secure private cloud infrastructure and look for applications and systems designed to take advantage of that capability.

Designing and deploying a modern PSIM system is a costly and constantly evolving process. The system must integrate with a wide variety of different subsystems and provide centralized situational awareness for the security professionals responsible for coordinating a response to any perceived threat. This paper examines the ways in which the basic architecture of the software can heavily influence the successful deployment and operational success of the system and through design, better meet the needs of an enterprise organization.

The Enterprise Defined

Enterprise organizations come in many shapes and sizes, but they share a common set of challenges as security becomes a C-level agenda item, and risk management demands that the scope of security is widened beyond just premises security, to that of the entire business. Primarily enterprise organizations are thought of as profit-making commercial businesses and while true, cities, counties, universities and healthcare facilities also face many of the challenges of enterprise organizations, including:

- Widely distributed facilities across geographic boundaries – even globally – that need to be linked together.
- Disparate systems that need to be integrated into a single, consolidated operations solution.

- Completely distributed network topologies.
- A number of smaller security operations centers in place. Even if they operate centrally today, they don't want the system they run to be limit them to that organizational structure going forward.

These organizations seek to solve a number of requirements for a new product solution, including a need for consolidated operations, greater situational awareness, enforceable standard operating procedures, reliable reporting capabilities and more efficient security operations. Above all, a clear ROI for all capital expenditures is central to delivering in this market sector, and ROI is driven by the speed of deployment and a low cost of ownership, including ongoing maintenance and support.

These market characteristics present a unique challenge when designing security software: It needs to be agile, robust, scalable, extensible, and simple to deploy and use operationally. To address these issues and adhere to the needs of the enterprise customer, the Immix CC (Command Center) platform by SureView Systems was built, creating a platform capable of meeting all of these demands and system requirements for operations centers.

Building a Unique Architecture

A lot of the same characteristics in Immix CC can be found in other products in the security marketplace from Axis, Lenel, Brivo, Genetec, Milestone, Avigilon and more. Beyond the security market, these same characteristics are seen in enterprise-grade cloud solutions ranging from Google Apps for business, Microsoft Office 365 and Azure, to Salesforce.com. This isn't coincidental, but a reflection of manufacturers evolving their products to meet developments in organizational structures, as well as the IT and networking technologies that support them.

Architecture creates the basis for the eventual success of the system, as these characteristics are not features and functions that can simply be bolted on to an existing system. To deliver a performance-based and maintainable system, these architectural characteristics need to be part of the system's basic DNA. These are design matters from inception, and they have to be right from the beginning.

For SureView, the fundamental design principles that are critical to meeting the challenges of enterprise organizations and achieving ROI include: scalability, extensibility, agility and operational elegance.

Scalability

Scalability is the ability for the application to grow and adapt to the needs of customers both large and small. In the world of enterprise applications, this means the system must provide redundancy to protect from system failures, as well as the ability to extend capacity as growth demands.

Building a platform that is scalable starts with a technology choice. Immix CC was built using industry-standard server and database technology from Microsoft. The platform runs on

Microsoft servers, uses the Microsoft SQL database and uses Windows network technology for load balancing and scaling. The platform was also put through a strict UL 1981 certification to ensure its resilience for enterprise security monitoring.

The database also was designed to run in the cloud. This meant the development of a database structure that supports a multi-tenant framework, allowing data separation to be enforced throughout the system. In practice, this provides the flexibility for separate divisions/groups within an organization to run their own independent system, while still leveraging the common server infrastructure of the main platform.

To achieve the ability to scale the system onto any number of load-balanced servers in a server farm or a cloud, the system's architecture was designed into logical tiers. Each tier handles a key component of the system, database, devices and the application. Within each tier, any number of load-balanced servers can handle requests and share load across the tier. This tiered architecture achieves three key requirements for an application to be easily scalable, allowing the user to:

- Simplify adding capacity to specific areas of the platform. If an organization needs more capacity to connect to devices, they can simply add another server.
- Provide the flexibility to host tiers within different areas of the network. The database tier can be set up inside the company LAN while the application tier is installed in a DMZ.
- Spread the load across the application. Intensive video processing can be separated from the database so neither operation affects the performance of the other.

Server and application tiering is key to delivering flexibility within a single database or cloud, but in today's global organizations, operations are often spread over multiple geographic regions and data centers. To support this type of network architecture, the Immix CC platform was designed to also be federated, allowing multiple server tiers to be deployed to different regions to support local resources. In practice, this allows an organization to deploy server capacity physically adjacent to operations without losing centralized management of the database. In global operations with monitoring stations on different continents, servers can be structured to leverage local server capacity eliminating high network latency that may exist when sending data back and forth across the globe.

The architecture of Immix CC is focused on providing enterprise organizations with the flexibility to deploy the platform in a way that fits their operational structure today, while allowing the system the ability to adapt as these organizations continue to develop and grow.

Extensibility

Beyond the server room, the next focus is designing a system that is extensible, allowing customers to expand and customize the use of their system as they grow. Extensibility is important for a number of reasons, it allows:

- Customers the flexibility to begin with a pilot deployment and later develop a plan to roll out the system across a large, widely distributed organization.
- Support for a range of different systems that go beyond typical physical security systems, including situational awareness platforms such as NC4, IDV and Anvil, along with building management systems.
- Customization of the system without creating a once-off version, which is disproportionately expensive to support and maintain. The use of Immix-published application program interfaces (API's) ensures customizations are supported as an integral part of the overall system.

To support true application extensibility, the design seeks to expose both the application layer and interface layer through published APIs. Additionally, when the platform was designed, the APIs were developed first and then were used to build the product. This is a fundamental requirement when offering an extensible product; not an after thought or add on to the existing system. The API for the application layer is a Web-services API that provides customers the power to access any component of the platform. Typically, this is used to develop custom user interfaces that are tailored to the operation of the company. Utilizing this API is not required in any way for a basic deployment, but it affords a way for advanced customers to customize their system by leveraging a published and maintainable API.

The interface layer, or device API, provides a mechanism to interact with any system that can send alarms/alerts, stream video, sync, and exchange data or trigger input/output actions. In practical terms, SureView's manufacturer partners, customers and development team use this API to build the plugin integrations to the platform. This API provides the instructions to integrate a wide range of systems from traditional physical security systems, to situational awareness platforms, incident management and even "home grown" systems customers have developed specifically for their businesses.

Agility

To further enhance the operational benefit of a scalable and extensible architecture, it's also important to have a system that is agile. When one thinks of agility, it creates an image of a system that is quick and easy to deploy, maintain and adapt. The obvious choice to achieve these goals is to develop a completely Web-based system, which eliminates the high IT cost to deploy and maintain client systems, especially in complex organizations. These systems allow for the centralized management of all updates. As new features, functions and integrations are added to the system, all users, no matter where they are located, have access to the latest version.

Secure, Web-based user access also is far more flexible in supporting the modification and customization described in APIs, which can be done through the Web without the need to modify a client application and then go through the costly exercise to deploy this to the user community. This cost alone can be the determining factor in a large enterprise on whether or not to deploy a particular system. By standardizing everything to the Web, the management of the system is simplified and provides another level of flexibility in controlling access to the system. It

no longer has to be solely operators in the command center who have the client application installed on their machine; logins can be created for management, key vendors such as integrators, field security offices and law enforcement. This wider adoption and easy access to the system becomes critical when coordinating the response to an event or managing a crisis. The cost of maintenance is also sharply reduced.

Operational Elegance

Finally, the design of the Immix CC delivers all of this with a high level of operational elegance, meaning that the system is operationally easy to use and maintain. It builds upon a simple user interface that meets two goals:

- **Simple to use.** With a minimal amount of training, any user can login and begin using the system.
- **Roles-based.** A method of exposing only the information that is relevant to the user based on their job role. The information presented to an operator is very different than that presented to a manager, or the information presented to a law enforcement officer. This greatly reduces the training burden on individuals, while increasing the adoption and collaboration of the system across multiple business roles.

However, operational elegance goes beyond just a simple-to-use interface. It also embraces how the system interfaces with other systems and how complex tasks are automated to eliminate time-consuming manual operations. Operationally, this involves building mechanisms into the API that communicate with integrated systems to synchronize data between platforms, simplifying initial system commissioning, eliminating manual data entry tasks and reducing ongoing maintenance. It also focuses on developing tools with heuristic capabilities to automate the learning of complex associations between disparate systems.

Core of the Enterprise

These key design principles are not just an afterthought; they make up the very foundation of the architecture for the enterprise product. They were not designed in a vacuum; rather they were developed alongside customers with a close eye on the broader trends in application design and cloud technology. To provide software to enterprise organizations, manufacturers cannot shoehorn new design needs into yesterday's technology, but rather need to design applications from the outset to be flexible if they are to adapt to the ever-changing world of the enterprise organization.

At its core, a PSIM platform must still deliver the ability to integrate with a vast array of different systems and provide centralized situational awareness. Crucially though, being able to deliver an ROI in months, have the system operational in weeks and adopt a walk/jog/run approach to commissioning that sets Immix CC apart from a client/server system. A cloud-based system running on the infrastructures organizations have in place today is simply a better fit, mapping logically and easily. In these environments, it can deliver where a client/server-based system cannot. Essentially the networks and IT structures used by enterprise organizations today have

evolved to deliver greater flexibility, security, efficiency and cost benefits, and systems to support changing security operations need to develop in line with this fundamental ideal.