



The Knowledge Switch[®]
Event-Based Middleware

January 2009

Real Time Sensor Integration

Security, Facilities, Environmental Controls



KNOWLEDGE VECTOR™
now...you're aware

2000 CentreGreen Way
Suite 150
Cary, NC 27513

Telephone: (919) 569-5258

Introduction

Organizations are continuing to make significant investments in security systems, environmental controls, and other sensors. These investments are designed to ensure that equipment is both operating appropriately and able to help identify issues. When events occur the sensor subsystems and/or human observer recognize the events and help enable the appropriate response.

Typically, each of these systems is autonomous. They do not work well together -- each system is designed and implemented independently, and has its own set of management tools.

Adding to the problem, security and facility managers are under persistent pressures to add, change, or replace capabilities to comply with new standards of services. This may include adding new wireless cameras or video analytics; new perimeter control sensors; license plate recognition systems to speed up vehicular processing without reducing security; replacing the fire response process to new County or Federal standards; changing the access control system to accommodate biometrics and privacy rules, implementing real time provisioning; investments in "Green" initiatives; any of a seemingly limitless set of requirements and requests!

The legacy systems that the organization has in place may not yet support the new devices, may lack the ability to be retro-engineered or upgraded (in the timeframe allowed), and even if they could would result in inordinate expense and complexity.

There was no design goal to enable solution integration or common standards – indeed many vendors recognized interoperability as putting them at a competitive disadvantage!

The Knowledge Vector Knowledge Switch (KSX) is designed for organizations who want to enable their sensors, sensor subsystems, and other logical inputs to work together – whether security systems, facility management, environmental, or maintenance. The requirement is that when an event of interest occurs, the right responder is provided with the right information at the right time on the appropriate device. Period. That is our mission.

An Overview of the Knowledge Switch®

The Knowledge Switch® (KSX) Event-based Framework integrates and manages each of the sensors and sensor subsystems whether security, environmental, or operations management. Acting as a supra-set upon these “stove-pipe” applications, a KSX solution orchestrates each of them to be components within an integrated awareness solution. By creating a seamless solution, the KSX not only recognizes when an event of interest is occurring, but also automatically escalates the response should other event(s) of interest occur that are related – whether time-based (temporally), location-based (geospatial) or through some other logical relationship.

Recognizing that an event of interest is occurring would be futile unless there is some process in place that enables or supports the response. In most situations, events are relayed to the Command and Control Center where the officer in charge can immediately recognize the event, review the event within the context of the status of the related sensors, and take the appropriate action. The officer will be able to access the appropriate standard operating procedures, the available and appropriate responders, the geospatial map of the incident and available drill down, the ability to select and navigate through specific sensors and sensor subsystems to gain more focused detail.

The KSX supports Computer Aided Dispatch (“CAD”) through both KVI’s patented MicroBroadcasting solution and other CAD solutions. MicroBroadcasting ensures that the right responder, receives the right message, at the right time on the appropriate device.

MicroBroadcasting can automatically determine who should be notified. This could be a huge population in the event of a crisis, but is typically the specific assigned responders, who are currently on duty, in the right proximity, and with the appropriate credentials and line of command.

Communications may be initiated automatically or under the control of the officer in charge. MicroBroadcasting communicates with almost any device – from a radio, a pager, a telephone, a smart phone, email, to a browser. If the ideal presentation is text, the message is text, if it can include an image – like a snapshot of perpetrator, or perhaps the message will include a link to a video display showing the current intensity of the flames. The communication may also have other rules – for example, the responder may be required to confirm receipt and acceptance of the assignment within two minutes of it being sent, or the task will be re-assigned.

The Knowledge Vector Development Methodology:

The Knowledge Vector team has developed extensive understanding and experience in designing and implementing integrated security and infrastructure management solutions.

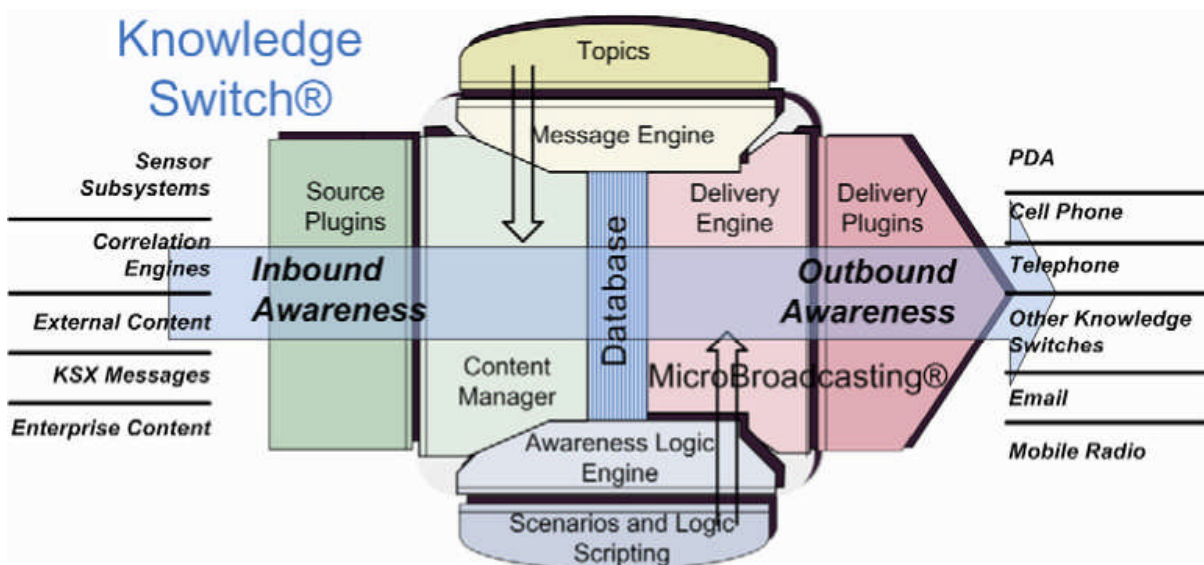
The first phase in this process is the development of a base line analysis – which may be variously described as the “Needs Analysis” or “Risk/Vulnerability Analysis”. The

completed analysis is provided as a written document, a blueprint, enabling the phased introduction of the complete solution, with a realistic expectation of both the project timeline and budget.

Since the entire implementation is achieved using standard, commercial off the shelf (COTS) products, the implementation is both low risk and surprisingly affordable.

KSX Architecture:

The KSX architecture is very powerful. At first glance, the richness of the architecture's capability may appear daunting. However, the model is really quite simple. It is a framework that enables the collection, understanding, and response to events. The system's flexibility and extensibility is achieved through its use of a plug-in architecture.



Sensor plug-ins transform sensor events into “knowledge items”. Knowledge items are processed by scenarios to look for interesting event patterns. When these patterns occur, messages are delivered via delivery plug-ins.

Plug-ins: Events come in many forms. They come from physical or logical sensors, databases, people and other sources. Events can be temporal or geospatial in nature, or not. They can be real time or batched.

A deployed KSX may have any number of plug-ins. Any time a new event source is identified, a plug-in can be added to support that event type.

Scenarios: Scenarios are the rules that result in an event of interest. They can be very simple: “If the temperature of the thermostat in the server room goes above 70 degrees Fahrenheit then send an email to the administrators.’, or complex: “**If** within two minutes of one another the video analytics sends an event that someone is approaching a secure area, **and** the ground radar system also has an object in that region, **and** the fence motion system is registering movement, **then** send the video of the event to the security dispatch center.”

Facility Operations Automation:

The daily operations of any facility -- whether offices, manufacturing, a petroleum refinery or a university campus -- have a myriad of moment-to-moment monitoring, security and communications requirements. What is common is having a well understood, documented and managed set of processes and procedures that define the step-wise procedures to follow for known events internal or external to that facility.

These procedures are frequently managed manually, even when there exists a large number of sensor subsystems deployed to monitor everything from manufacturing plant floors to access control to perimeter security. Each of these systems are typically owned and managed by different departments and there is little communication much less collaboration or fusion of these subsystems and policies.

The KSX is responsible for fusing the sensor subsystems, managing interactions between the sensors, and automating and facilitating the communications necessary in the case of the detection of an event or alarm. By bringing together the procedures and policies relating to emergency management – including process control, access control, security, asset tracking, asset management, targeted and broadcast communications -- large scale facilities are able to improve the breadth of their awareness, and much more tightly integrate all aspects of previously “stove-piped” operations.



- Communicate to all students with classes in Hall-A that power was lost and morning classes cancelled.
- Communicate to packing and shipping that manufacturing line 5 has been stopped, all trucks should be held and night shift should be doubled.
- John Smith is at entry five with seven uncleared, RFID-tagged articles awaiting clearance.
 - Send security
 - Call supervisor
 - Keep door locked until level 3 clearance is received-documented.

The Value of the Knowledge Switch

The value in the KSX is the tight integration of an exceptionally **flexible, extensible, scalable** and **distributable** framework for the collection and analysis of events, integrally tied with a powerful, **recipient-specific**, content dissemination engine which utilizes both static and interactive pull and push delivery. The KSX is:

Flexible

- Fits into existing operational facilities without requiring significant change to process or infrastructure
- Highly managed delivery of targeted alert messages in a time-critical fashion to the right people / place, utilizing preferred communications paths, with preferred navigation methodologies
- User-defined, profile-based, pull access to content formatted for consumption and navigation using the interface methodology (communications device) of their choosing.
- Tightly integrated sub-component of a solution (such as a perimeter security solution), a service (such as MicroBroadcasting), or a product (Perimeter Security)
- Able to provision a very complex solution in a modular, logical and understandable way, such that someone familiar with KSX provisioning would be able to quickly make sense of the details of the provisioning at any deployment
- Delivers historical forensics of what occurred over a period of time, as well as forward looking simulations for planning and training

Extensible

- Easily adapts to the variety of sensors, communication / interface devices, analytical needs and operations procedures existing at operational facilities without requiring any change to process or infrastructure
- Powerful and extensible toolset of analytical methodologies (which Knowledge Vector may or may not be responsible for creating) that can be applied to a broad number of data types across a wide variety of problems
- The core framework of the KSX may be forwarded functionally in parallel (but separate from) the adapters (plug-ins) that allow the KSX to be configured and provisioned as a part of an overall solution for an installation
- Utilizes external operations databases to avoid user duplication of efforts (for example not having to maintain a profile within Outlook and within the Knowledge Switch)

Scalable

- Affordably and effectively manages small-scale installations (a single room, a home, or a demonstration system) up to very large-scale deployments (intercommunicating National Awareness Web) utilizing the same core collection-analysis-dissemination architecture
- Embeds a very small footprint version of the KSX on systems hardware (such as a thermostat, camera or subsystem).

Distributable

- The KSX operates modularly, intercommunicating across a network with a very small footprint, specifically tasked nodes (i.e. predominantly collection, analysis or delivery)
- Enables distributed provisioning and administration to occur from a central location
- Provides operational redundancy and graceful failover during runtime

Conclusion

Given the dynamic nature installations within the security and safety industries and the persistent trend toward security convergence, the logical central component to enable communication and analysis across a wide range of subsystems is an extensible, flexible Event-Based Middleware solution.

KVI has designed its KSX system to empower subsystems to perform as they have never yet been able to — to work to their full potential and combine their detections for richer, more meaningful information. KVI helps enterprises derive value from existing installations and empowers new system components to deliver on their promises.

About Knowledge Vector International, LLC.

Knowledge Vector's landmark security convergence software is the essential event monitoring, management and response system that transforms data from disparate logical and physical assets into the clarity required to best drive immediate decisions and actions.

The company's rules-based technology incorporates best practices and standard operating procedures, deftly handling event complexity and velocity. Knowledge Vector's pivotal software identifies dynamic emerging situations, anticipates their impact, notifies decision-makers and co-manages cascading events in real time.

Government entities, critical infrastructure such as airports, seaports, utilities and rail systems, and financial services firms trust Knowledge Vector to save lives and protect

property while enhancing operational effectiveness and efficiency. Knowledge Vector's technology fully leverages existing systems and policies to deliver complete safety, security and compliance awareness.

Knowledge Vector International, LLC
2000 CentreGreen Way Suite 150
Cary NC 27513

Tel: 919 569-5258

www.knowledgevector.com