

The evolution of C2: The Activu approach

This paper describes a framework of solutions that are provided to create an agile, secure, expandable and effective common operating picture in a mission critical command and control environment, paying close attention to the significant benefits of modern technology and how they can be integrated with legacy systems to improve efficiency of existing implementations. Effective Command and Control Center operations rely on efficiently collecting relevant information, assembling a common operating picture (COP), and ensuring that appropriate participants can acquire, analyze, and share that common operating picture for situational awareness (SA). Fluid operating environments require an agile solution which can quickly and flexibly evolve to engage new information sources, collaborators, and operational demands, while maintaining security and information integrity. The ability to reshape the sharing landscape, securely, by including multiple agencies, coalition partners, and other participants without requiring wholesale change in the infrastructure is a critical part of a successful command and control environment.

Compromised Common Operating Picture

Command centers, operating with multiple information security classifications and with disparate information sources, pose a unique challenge to implementers. Environments with the ability to create a common operating picture have traditionally relied on audio visual (AV) technology. View only AV technology has a track record of meeting the security concerns of its target users. The ability to deliver data unidirectionally, ensuring secured information cannot migrate to different classifications while providing the flexibility to display multiple classifications of information as a collected whole.

AV technology, however, is inflexible in that it relies on a hardware-oriented solution and hardwired AV connections to capture information. Deployed command center AV solutions accommodate a limited number of inputs and outputs (defined by hardware connections), and consequently provide a limited and restricted view of the information sources that comprise a common operating picture. This may be adequate on day one of use, but the reality is that operational environments (and the environment they are tasked with managing) are fluid and evolve over time. Participants and roles change, command structure changes, outside sources and agencies are sometimes added, and the number and type of information sources change, typically growing, as systems become tasked by doing more with less.

Distribution of information, inclusion of collaborators inside the direct organization, and the ability to share information to those outside the command center itself are often required. This advanced functionality is very difficult to implement in a pure AV solution and is nearly always managed through a custom user experience that requires significant training. The AV system that was specified and implemented day one needs to evolve as well. Unfortunately, evolving a purpose built AV design requires specific implementation expertise and the acquisition of additional hardware to accommodate design changes. All of this results in a system that becomes less and less relevant over time – eventually becoming a significant barrier to optimal decision making.

This paper describes solutions to the challenges that exist in the current government systems, described in the four use cases below:

1. Viewing information from disparate sources on a Display Wall to create an adaptive, interactive common operating picture (COP) and sharing within the Control Room
2. Expanding Situational Awareness by sharing a COP from one geographic location to another

3. Sharing visual information of an application with another location that does not have that application, other systems, and/or legacy proprietary equipment.
4. Displaying classified visual information on the COP and sharing it with other Military Branches and Coalition Partners while protecting secure information. In addressing the capabilities of an Activu system, we will explain how it works to Commanders and their staff that direct operations, control forces, coordinate operational activities, gather, process, analyze, dispatch, and disseminate planning and operational data as well as those on the staff typically assigned the task of communications and the technical aspects of a command center such as the J6, S6, G6, etc. We have provided both operational and technical descriptions of how our solution helps solve challenges identified by our military customers and partners.

Who is Activu?

Activu's innovative, intelligent visualization platform provides collaborative situational awareness in command centers and beyond. Over our thirty five year history, we have become the leading provider of enterprise-wide visualization and collaboration solutions for mission critical command and control center environments. Our software offers secure, net-centric information display solutions that allow our customers to quickly and easily share analog or digital information (video, data visualization, images, proprietary applications, etc.) across an enterprise: between users and shared display devices, regardless of their location.

The Activu solution allows customers to develop a user-defined operational picture or common operational picture (UDOP and COP, respectively), improve situational awareness (SA) and increase the speed and accuracy of decision-making. Activu software has been deployed across a broad spectrum of vertical industries and government agencies that benefit from shared collaboration and increased situational awareness. Widely accredited and authorized to operate within secure network environments the Activu software platform is used frequently in the federal and defense agencies as well as a number of public safety organizations.

Unlike a traditional AV system, using software to capture content and utilizing the network to distribute the common operating picture fits naturally into existing infrastructure. The solution's implementation is managed and maintained over time by the same resources that manage the network as a whole, IT staff, who know and understand how to establish security through information assurance (IA) and to ensure availability of the solution. Expansion of the system's mandate, extension to additional operational personnel, and inclusion of new sources and destinations of visual intelligence is chiefly accomplished through installation (or activation) of additional software on an existing IT infrastructure. The migration of information from lower security classifications to higher classifications can be accomplished through a unidirectional conduit, providing growth of the system within each classification without requiring "forklift" upgrades.

Activu is certified and accredited on several U.S. military and DHS networks. To ensure operational security (OPSEC) for our clients, we do not disclose in this paper client details or accreditations that have been completed. We stay abreast of our customers' Information Assurance (IA) requirements so that we remain in compliance.

Common Operating Picture, Situational Awareness and Content Sharing

There are times when Mission Command is steady and calm. But when there is an incident or crisis, new information that is not normally part of the current COP needs to be introduced simply, quickly, and securely. It may be on a workstation within the command center or on another information source across the network.

The typical command center presents information on a number of displays that form what is often referred to as a Display Wall, or simply “the Wall”, where a COP can be displayed. The Commander or Operations Center Officer in Charge (OIC) uses the Display Wall to view information provided by the operators/staff in the command center.

The Wall also allows groups of people to view information in a larger format while eliminating the need to huddle around individual monitors. It may include significant activities reports, geospatial information, full motion video from ISR assets, operational graphics, weather information or any other relevant data that the Commander/OIC needs in order to obtain SA.

Currently, when the Commander/OIC wants to see information not currently on the Wall but on the computer screens of various staff sections and operators in the Command Center, he or she needs to move from one workstation to another. This is cumbersome and does not allow relevant information from two different sections to be viewed simultaneously for continuity of information.

With an Activu system, the Commander/OIC can switch out information on the Wall, Huddle rooms, or the Commanders/OIC desktop displays, adding or replacing new information as needed, without interrupting operators or analysts. Any visual information available on the network, whether it is being displayed on a workstation in the command center or somewhere else on the network, can be moved to the Wall allowing all staff to collaborate in real time.

Information can be shared from one operator workstation to another, to aid collaboration within, say, a group of analysts. When preparing for a briefing, or in advance of adding information to the COP, operators are able to freely share information on a peer to peer basis – with the added ability to collaborate (whiteboard, annotate, text chat) over that shared information, while still protecting its integrity. The ability to collaboratively ascertain the optimal course of action creates more effective teams and catalyzes crisp decisive action.

Effective decision-making can only be accomplished when users have agile, intuitive, and continuous access to information and the ability to quickly share and collaborate. The process of gaining insight, confirmation of understanding through collaboration, and finally the creation and sharing of situational awareness and a common operating picture genuinely requires software tools to be fully accomplished. Recognizing a situation that requires decisive action is only the first step – bringing together other parties; to confirm understanding, to help analyze data, or to effect a decision – is critical to success. Software systems such as Activu’s ActivShare® allow users to share and collaborate, with multiple individual contributors or to a larger audience in a command center, instantly and directly from the desktop containing the information.

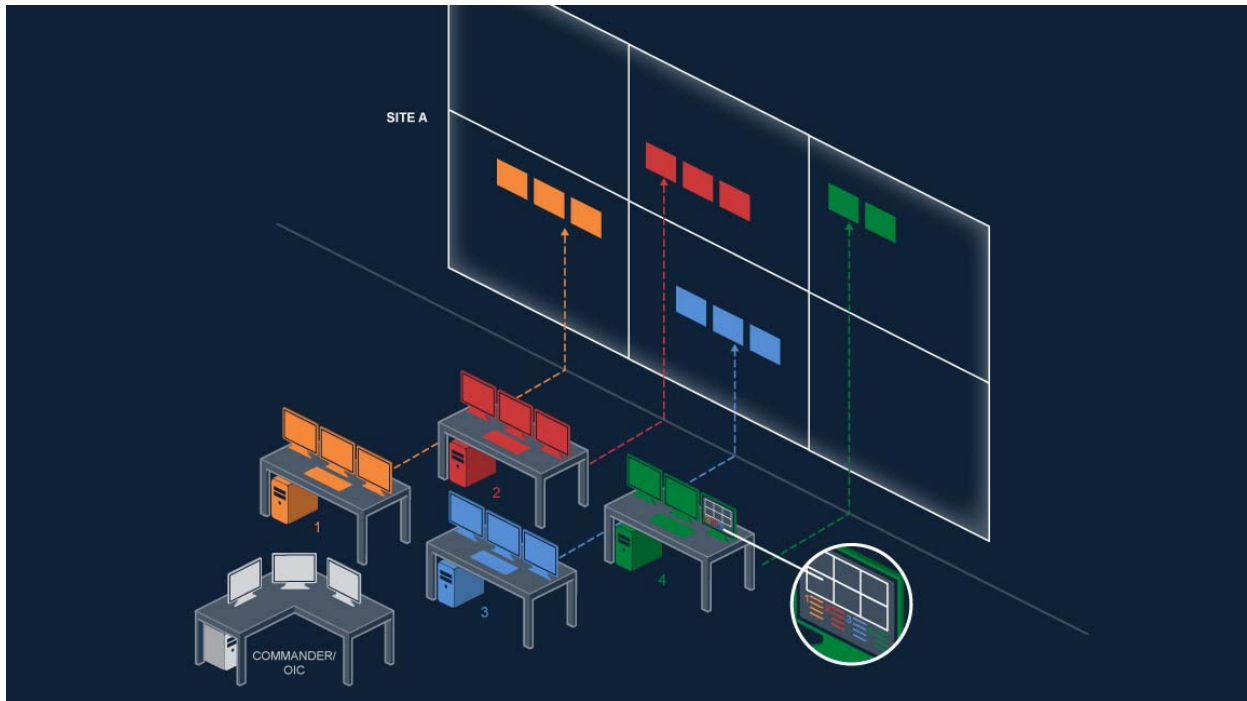


Figure 1 shows how the Activu Access Point Client allows Operator 4 to simulate and control the Command Center Site A Video Wall on their computer monitor so they can manipulate content coming from Operator 1, Operator 2 and Operator 3 on the Wall. The Activu Access Point Client can reside on any Operator's desktop that the Commander chooses.

Flexibility is critical: an operator's entire monitor, or multiple monitors, or chosen parts such as an application window, can be added anywhere on the display wall along with any information that was already being viewed, or can replace that information and be displayed across the entire wall, as necessary. Once a satisfactory COP has been established, with all relevant information placed on the Wall, Activu software can save this view for later recall.

The movement of the visual data can be controlled with a standard PC or tablet device by anyone that the Commander/OIC chooses, whether it is someone whose role is to operate the Wall or a staff officer working in the Command Center. Permissions and access are controlled and designated by the Commander/OIC or their designated representative and can be done dynamically as may be needed in a crisis. Since Activu's software is based on non-proprietary Windows-based system and software, it does not require contractor support to operate.

Driven by an Activu system, the Wall becomes the Commander/OIC's dynamic source of relevant information, and the entire network of those supplying input, analysis, intelligence, or simply operating the environment can securely share and collaborate on a peer to peer basis, or as a group with the display wall. Consumers of the COP can be located anywhere on the network and receive anything from the entire Wall to any component displayed on it.

When abnormal situations arise, as they inevitably do, that require the Commander/OIC's attention, the true operational value of an Activu-powered visualization system becomes apparent. When time is of the essence and multiple people in multiple locations need to review information and collaborate in order to solve an immediate problem, Activu makes it possible – simply, quickly, and securely. Through Activu APIs, software such as visual analytics can control visual content to the Wall, crisis rooms, or remote systems depending on how the customer programs the handling of each situation.

Common Operating Picture: A Global View

There are times when there is a need to view a COP that is located outside of the command center. There are also times when there is a need to share visual information between command centers and subordinate units, or potentially with other organizations.

The ability to share this information in real time is critical to gaining SA and achieving success. Currently, the ability to share the COP (or even share information from an operator's workstation) simultaneously with several other locations is not possible, within the constraints of hardware connected AV technology. These issues are often circumvented with crude methods, such as placing screenshots into presentations and emailing files between locations.

On an Activu system, COPs can be shared, securely and with uniquely efficient use of bandwidth, over the network so that different locations or commands can collaborate in real time, gain SA and respond quickly in critical situations. This ability to share visual information extends beyond the Wall and can include crisis room displays or the monitors of individual operators, whether in the same facility or at another location beyond the command center. By efficiently using existing secure network infrastructure, and moving information as a collective whole (for example, a complete wall display), it is possible to include external participants, while respecting the security requirements of the organization.

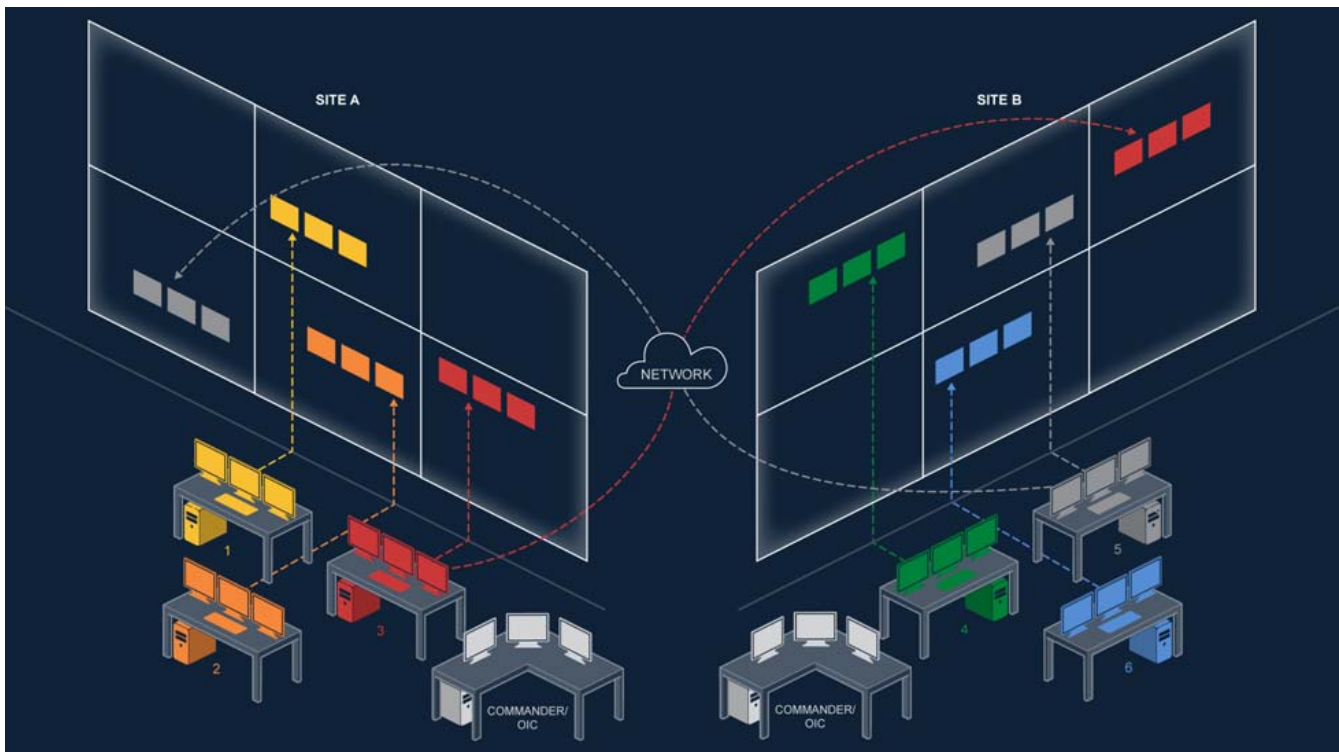


Figure 2 multiple sites sharing information between Command Center Site A and the subordinate units. Command Center information is shared on the Wall of subordinate Site B. Note that operators at this site are not responsible for the information that is coming from the Command Center Site A.



Figure 3 Command Center Site A can dynamically draw their screen using “whiteboard” functionality of the Activu System Software. This functionality allows each operator to annotate, highlight areas of interest and clarify points.

Sharing Intelligence without Boundaries

There are times when SA is hindered because different facilities have capabilities to visualize information that may not be available to other commands where the information or data format is critical. The lack of a software application or access to data for an application should not be a boundary to SA or collaboration.

Activu allows the visual output of any computer, and the software application(s) to be displayed at other locations using the Activu Agent, whether that program is running on a physical workstation in the command center or in a virtual machine somewhere in a datacenter. The Activu Agent securely transmits the visual output to the Wall or any other networked and authorized display surface or computer. The Activu Agent allows the dissemination of that visual information to many display end points, simultaneously. Essentially, the Activu Agent software, as part of the Activu Enterprise platform allows application presentation and interaction to occur anywhere on the network, so our clients are free to securely share visual information across the network without requiring software applications to be installed at the locations where their visual output is needed.

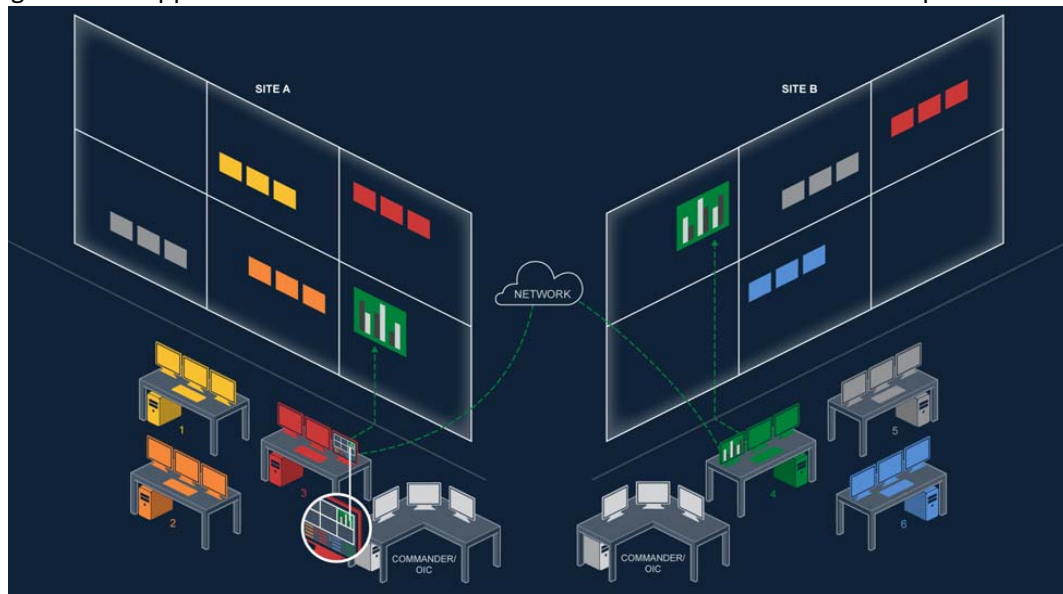


Figure 4 Operator 4 at the Subordinate Site B is sharing an application from his desktop with the Command Center Site A. This application is not in use at Site A Command Center but they can see it via the Activu Advanced Agent Client when Operator 4 shares the application with them.

Collaboration: Sharing at the command (Wall)

There are times when the COP needs to display classified visual information. Additionally, there is a need to share visual information that is part of a COP with either a Coalition Partner or another U.S. non-DoD Agency that is working with the U.S. DoD. However, due to the security classification of the visual information these external entities are only authorized to see certain parts of that COP.

Non-networked technology does not facilitate the sharing of COPs between locations. While they may have access to an be viewing a common data set, there is no assurance that booth sites are viewing the information in a common format. There may be visual information within the COP that, because of the classification of the information, cannot be shared with all partners and agencies. As a result, the COP cannot be shared at all, or must be scrubbed of classified information prior to sharing, creating inefficiencies and slowing operations.

With an Activu system, information can be shared while upholding security standards, both on a centralized command center display wall, and at the desktop level among analysts, locally and across different locations.

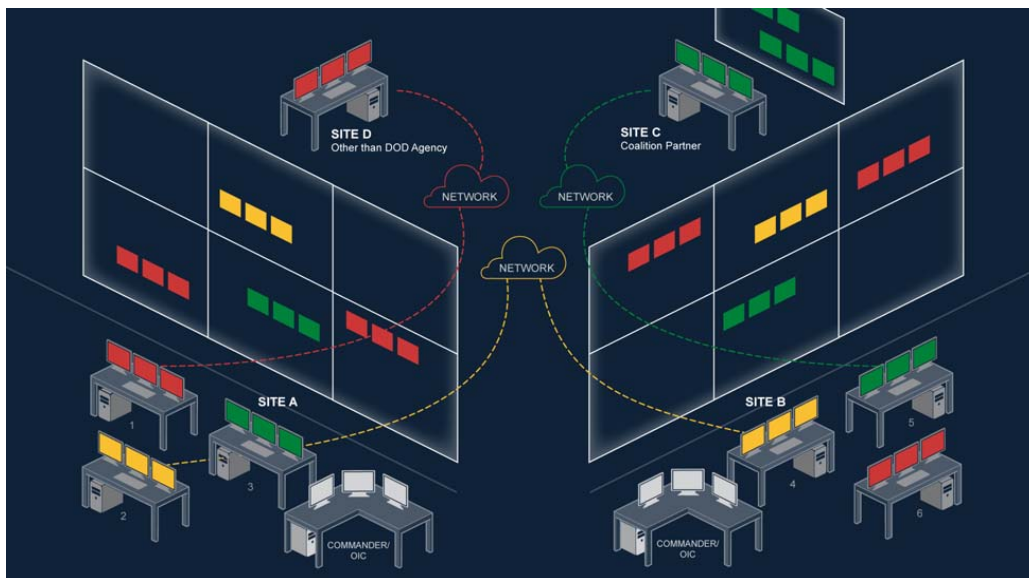


Figure 5 The Activu software platform allows sharing information while ensuring that only authorized entities have access. Integration with existing network security protocols ensures the access to information is possible by authenticated entities.

On a command center wall, visual information of different classifications can be shown on the COP with individual sources of each classification being interchangeably placed on specific sections of a Wall. This allows decision makers to view the information of different classification levels side-by-side, or to switch them out from one classification to the next. For example, NIPR, SIPR and JWICS visual information can be shown on a single COP consisting of visual information from each network placed on separate sections of the Wall. By dynamically allocating the display area of the wall per classification the area can be shared by different classifications or dedicated to a single level maximizing effectiveness for that missions requirements. maintaining both the appropriate isolation of classified information and the flexibility of the system. Within each classification, the Activu platform continues to be able to evolve flexibly as needs arise.

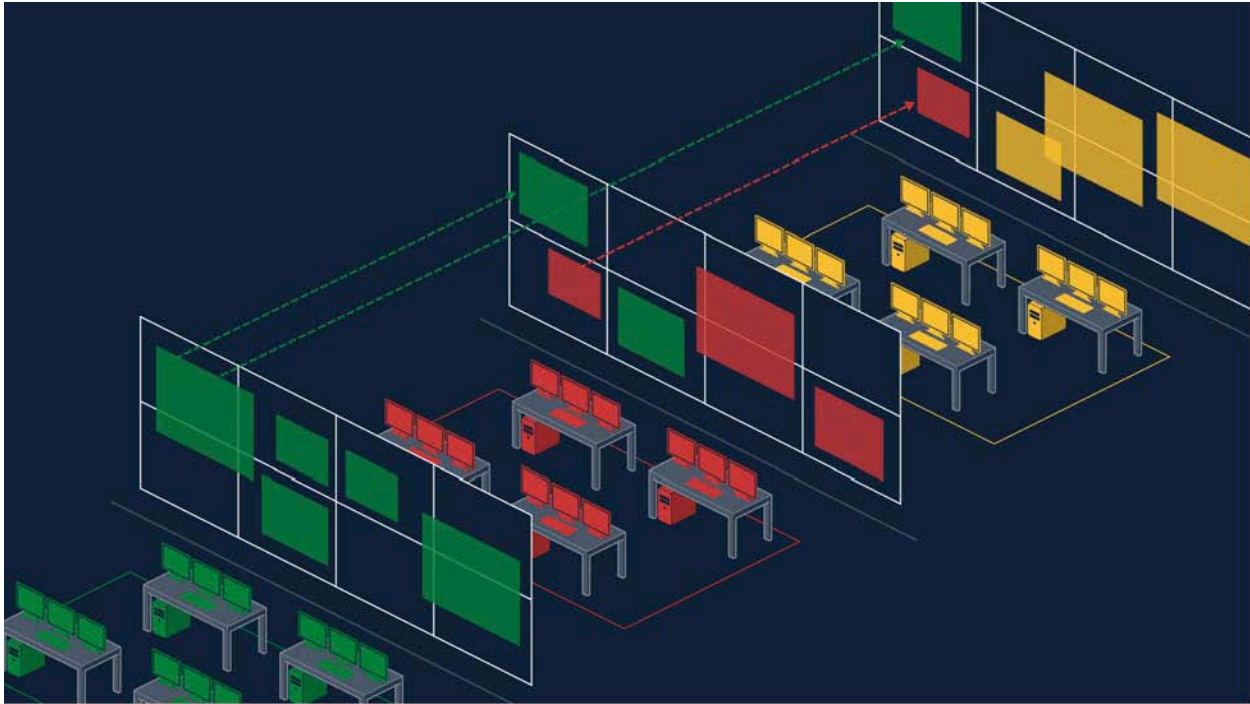


Figure 6 Strategic use of display allocation allows multiple classifications of while maintaining strict isolation of networks. Using existing AV technology allows the Activu system to upgrade existing systems without requiring “forklift” upgrades.

Display allocation and software control allows for instances when there are visitors to the command center who do not have the same authorized clearance to view certain classified information. In this example, the Wall can be quickly cleared of the information not in the visitor’s clearance authorization. Furthermore, using the Activu Interface Server, this can be done automatically (when the non-secure indicator is activated. For instance, the access card reader can be linked to Activu so that when a person of a certain type (visitor with lower clearance) enters the room, Activu’s software instantly and automatically changes the content or both.

Collaboration: At the Desktop

There are times when portions of the COP need to be shared among analyst, often at multiple locations. Non-networked technology does not facilitate the collaboration of visual information between analyst and locations. While they may have access to and be viewing a common data set, there is no assurance that both analyst are viewing the exact same information creating inconsistencies and confusion.

At the analyst desktop level, when there is a need to share visual information among analyst, information can be shared while upholding security standards by using tools in the Activu Collaboration Suite. Analysts can share a virtual wall using TeamShare® or share specific applications of interest using ActivShare®. When an analyst has a need to share their complete desktop, Sources from the wall, or applications with, by example, a subject matter expert (SME), they can use the tools of Activu Collaboration. A session *profile* establishes what sources others can and cannot see. Through permissions and access control, the Activu software restricts who can see what visual sources. The visual sources will pass through the profile, which will determine what is seen by the SME. Those sources not authorized to be viewed will appear as a gray box on the other screen, while others will pass through. *Useful to note, with active collaboration tools, the analyst view being shared can also be moved to the video wall.*

Summary

As previously stated, the purpose of this paper was to provide an understanding, and examples, of how an Activu system can be used by command centers to perform Mission Command more effectively and leverage existing technology and infrastructure.

As this paper explains, an Activu visualization system is dynamic, allowing users to share visual information and collaborate within a command center as well as with other locations, allows users to share visual information, allows users to share visual information while adhering to strict security standards. And delivers all these capabilities in a user-friendly open software platform.

Security and Accreditation

A software platform, like Activu Enterprise Software Suite, cannot be implemented or used without the appropriate authorization and accreditation by appropriate entities. Activu has, in collaboration with its customers, gained the ability to operate its software throughout the US government and military, here is a partial list of clients:

- Central Intelligence Agency (CIA)
- Defense Information System Agency (DISA)
- Defense Logistics Agency (DLA)
- Defense Threat Reduction Agency (DTRA)
- U.S. Army
- U.S. Air Force
- U.S. Marine Corps
- U.S. Navy
- U.S. Coast Guard (USCG)
- U.S. Strategic Command (USSTRATCOM)
- Pentagon Force Protection Agency U.S.
- Customs & Border Protection (US-CBP)
- U.S. Department of State (DoS)
- U.S. Secret Service
- Department of Homeland Security (DHS)
- Department of Interior, Bureau of Reclamation
- Federal Aviation Administration (FAA)
- Federal Bureau of Investigation (FBI)
- Federal Emergency Management Agency (FEMA)
- Federal Reserve Bank
- Future Combat Systems (FCS) Program
- Joint Improvised Explosive Device Defeat Organization (JIEDDO)
- Massachusetts Institute of Technology (MIT)
- Lincoln Laboratory
- National Defense University
- Transportation Security Administration (TSA)
- Lawrence Livermore National Laboratory

Activu's current certifications and accreditations include:

- Army Certificate of Networkiness
- DISA SIPRNet Accreditation
- Site Accreditation ATOs: NIPR, SIPR & JWICS
- DHS ATO: LAN-A, LAN-B, LAN-C
- All Servers are DISA/NSA STIG Compliant
- USAF ATC SIPRNet
- NERC, FERC Compliant
- Air Force Approved Product List

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