

BENEFITS OF DISPLAY WALL SYSTEMS IN CONTROL ROOM APPLICATIONS



Photo Courtesy of Ottawa Paramedics

A Display Wall (also referred to as Media Wall, Video Wall, or Overview Display) is more than just the organization's show-piece or just a large, fancy display – it is much more than just “nice to have”. This document will explain how display wall systems benefit operations in control room applications and help make your control room operations run more smoothly and effectively.

The primary purpose of the display wall in a control room is to provide domain experts (operators or control room users) with true situational awareness and a common operating picture where information from real-time sources such as computers, video, networked applications, CCTV or security cameras, etc., may be simultaneously shown and shared. This enables and promotes informed decision making on a unified level which is always important for mission-critical operations, in today's fast-paced organizations and industry including:



Photo Courtesy of Amtrak Penn Station

Utilities



Photo Courtesy of Oakville Hydro

For control room display of SCADA & OMS information along with other critical data and graphics, utility control rooms require visually seamless high resolution display systems where image clarity and reliability is not only critical, but imperative for smooth operations. High resolution display of the full system on a display wall visible to all Operators enables an efficient and coordinated control room operation, complimenting dedicated Operator workstations for task based operations. High resolution graphics are displayed continuously for extended hours on the display wall, and is used not only to monitor operations, but also as a visual reference for critical communications with field operators.

Transportation

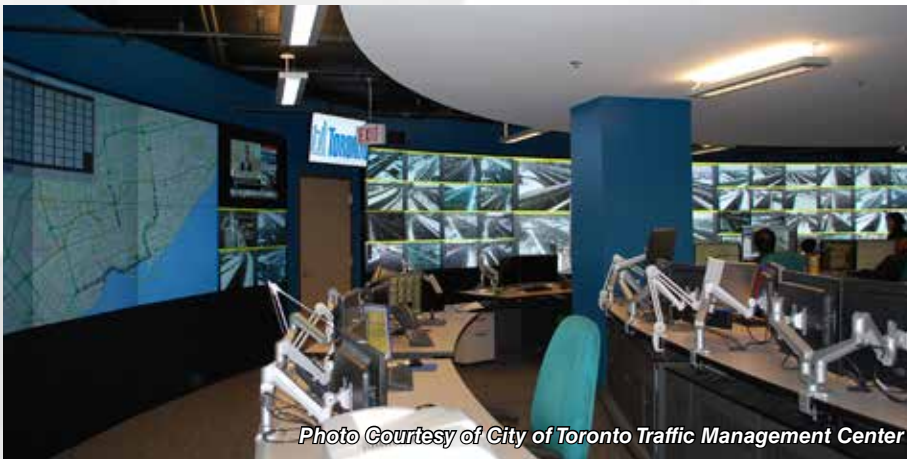


Photo Courtesy of City of Toronto Traffic Management Center

Transportation Management Centers need the capability to display high resolution graphic information from maps, multiple camera feeds, traffic management applications, etc. to ensure safe and continuous traffic flow. Operators need the ability to monitor various types of information continuously. They also need the flexibility to scale this information or images seamlessly across large areas when the requirement becomes critical. Operators need to collaborate on real-time information from video feeds and other applications for timely dispatch of much needed actions ensuring smooth operations.

Emergency Operations, Management & Response

During emergency operations, management & response teams need high resolution graphics displayed from multiple applications readily displayable to be simultaneously shared between many different users and operators. With time constraints, multiple agencies often need to get together and collaborate to make informed decisions and take the right course of action. Emergency operations can run continuously for extended hours or even days through various shifts and the uniformity and reliability of the displayed information, as well as the display wall is critical.



Photo Courtesy of Ontario Provincial Emergency Operations Center

Command & Control



When you are tasked to build a display for use in a command & control center, you are tasked with a mission-critical activity where image quality, reliability, scalability and continuous availability could make the difference between life and death in some emergency situations.

Information from many different types of sources including computers, video and networked applications, need to be displayed on multiple screens and shared between multiple operators to stay in control and make for efficient management of emergencies.

Security & Surveillance



Security has become central to ensuring that society is kept free from the threat of terrorism and the worries of cyber or physical attacks, anti-social or criminal behavior. These worries permeate our lives as never before. Control rooms providing situational awareness on a large common operating picture, are core to achieving this state of affairs in an efficient way. As such the technology for this endeavor is rapidly evolving. The continuous availability of shared information on large displays is becoming an operational necessity in keeping all members of society safe and free from these unwanted threats.

Telecommunications & Network Operations

Vast amounts of information and activity need to be continuously monitored for smooth operations in the telecommunications and network operations industry. Data, graphics and even videos are continuously monitored with the operators needing high resolution and clear images that can be viewed and managed with ease. Displays for this information needs to be flexible and highly reliable to ensure continuous system availability.





Photo Courtesy of Oakville Transit Control Center

The Display Wall is also a central communications hub and show piece of an organization and is often used to demonstrate operational efficiency and capabilities to the stakeholders of the organization.

In control rooms, the design of information presented to the operator is often distanced from the real-world process that it should represent. It becomes important for this information to be presented in a way that gives operators the correct and optimal feeling for the process and its current status. The display should continuously support and update the operator's mental and tacit model of the ongoing real life process.

When a process is going well, there is no need for information to be shared on a common display. But when something starts to go wrong (and it often does in real life), an early warning should show up with all relevant information required to diagnose the problem and take corrective actions to fix the problem. There may also be a need for new types of data and information and more advanced types of graphics. Operators and users may be required to zoom in visually on an issue when a fault is detected.

This is where large-scale overview displays become invaluable.

It is a risk to put too high a degree of emphasis on local desktop displays. The desktop should provide detailed information which is often a subset of the common operating picture. Frequently an operator works with several desktop displays in parallel with the main control room display and it is important that different displays represent different modalities.

We often hear of businesses reporting the losses they have incurred due to operator neglect and error. Any unplanned downtime can amount to billions of dollars every year. Similarly, in public service entities such as

transport, dispatch, emergency services and command & control, time lost through error and misdirection can be costly and sometimes fatal.

Research has proven that the majority of such downtime is preventable and more than half is due to operator error caused mainly by poor monitoring and/or visualization. This could be due to dramatic increases in sedentary work with little or no need for physical activity, possibly because of the technological advances in the tools used at work. Strain injuries from back-ache, RSI and E-thrombosis to headache, mental fatigue and eye-fatigue or strain, and even sheer boredom caused by staring at small screens for extended hours of operation may occur.

Designing and building a good control room with better display and visualization tools create a work environment that promotes high levels of vigilance and situational awareness. Operators are more vigilant when they are alert and prepared to act. They have a high level of situation awareness when they have an accurate perception of the current condition of the entire process and related equipment, and an accurate understanding of various key performance indicators.

A large display wall when used in conjunction with local desktop monitors provides such an environment where multiple operators can collaborate effectively with common information to jointly make informed decisions and to take proper action.

A display wall helps create the optimal visual connection between the operators and the system, process, business and organization. It helps promote operator alertness and helps minimize fatigue & distraction from reading information on smaller desktop displays, effectively enabling readiness and proactive action promoted by a combination of the large overview display and local desktop monitors.



Photo Courtesy of Folsom CA-ISO

When deciding whether to use a display wall in the control room or not, various factors must be considered:

1. Economic consideration:

Economics is often the major driving factor in choosing whether using a display wall in a control room is possible or not. It is all about maximizing the return of investment in the equipment and facilities without compromising performance and objectives. A key consideration is the expected lifetime of the control room and adapting the equipment to optimize the working environment for staff to perform at their very best.

Conducting a cost-of-ownership study will help evaluate what is available, prioritizing the investment and making right choices for the system. Improving the working environment can lead to greater productivity – better concentration levels, better vigilance, better motivation. An investment in the display wall, control room interiors, lighting, ventilation and furniture, etc. helps control room designers achieve an optimal environment that ensures maximize return through effective and efficient operations going forward.

Organizations today face tremendous pressure to run leaner operations in order to reduce costs and overhead without compromising effectiveness. It becomes important to use the right technology that helps enhance performance and is based on how people work. Display walls in control rooms help organizations streamline operations to enable effective decision making, thereby improving processes and reducing costs and overhead by minimizing or eliminating redundancy and operator errors or neglect.

2. Consolidation:

Organizations that once operated multiple sites with a small control room in each site are seeing how they can consolidate and operate more efficiently with fewer but larger control rooms. Often, this trend is driven by economic considerations

and the need to reduce costs. Consolidation has a number of other consequences, such as the impact on teamwork and the retention of local knowledge. Designers need to create systems that provide operators with better contextual information. New display wall technology that allows photo realistic mapping helps in such situations.

For example, where operators control a large complex facility in different regions, the use of detailed, intuitive mapping, Geographical Information Systems (GIS) and SCADA systems can prove effective.

Technology has automated many processes, changing the role of the operator from hands-on, minute-by-minute control of processes to a supervisory function with intervention when and where necessary. This generates the need for a large screen displaying a common operating picture to support and maintain operational awareness at all times.

Display walls also help with reducing individual workloads and increasing overall efficiency. Managers need to think carefully about what operators do when an event occurs. What are they doing at the time? What information will they already have at their disposal? What new information will they have to absorb very quickly? What do they need to know to make the right decisions and fashion the right response?

For example, with the increase in use of CCTV cameras, hundreds of images can create an overload for the operator which could hinder rather than help him do his job. Sharing the images between multiple operators reduces individual operator overload and improves overall efficiency in the control room.

3. Creating a balance:

Conversely, too little information when something happens, means that the same operators are not in a position to quickly assess the situation and make the appropriate decisions. The danger of technology is creating a work pattern that is mainly 'underload' rich with rare peaks of overload.

Other benefits of the display wall are its inherent characteristics and intuitive nature – making it safer, more efficient, with lower training costs for operators. The dynamic nature of a display wall gives added potential for shared controls and productive collaborative work.

The challenge is to maximize the potential benefits a display wall offers and not merely because it looks good.

4. People-centric control rooms:

The overriding element that draws this all together is the need to put people at the center of the design of control rooms and systems to realize the dual benefits of increased efficiency and cost savings.

Designers must champion the needs of users through a better understanding of how human ergonomics can reduce error while streamlining operations. The benefits of user-centered

working environments are greater satisfaction, better safety and improved effectiveness.

By putting people – the operators – at the heart of control room design, designers can achieve the two objectives of lower cost and better efficiency.

The goal in designing a control room is to create a work environment that promotes high levels of vigilance and situational awareness. Operators are vigilant when they are alert and prepared to act. They have a high level of situational awareness when they have a true perception of the current condition of the process and equipment, and an accurate understanding of the meaning of various trends and key performance indicators.

Well-designed display wall systems provide such situational awareness.

In summary, when designed properly, a display wall system can benefit an organization tremendously, promoting informed collaborative decision-making, real-time situational awareness, improved operational efficiency and visibility with low cost-of-ownership over the life of the system. It is also very often the show-piece of the organization.

REPORT INFORMATION:

This report has been created by Mitsubishi Electric US Visual & Imaging Systems Division (www.me-vis.com) and Mitsubishi Electric Sales Canada (www.mitsubishielectric.ca)

Mitsubishi Electric is the global leader for command and control display wall products, with a wide variety of rear-projection DLP display wall cubes and LCD display wall panels.

This report has been created agnostically to compare different sizes of HD resolution DLP cubes and for certain specifications, and it is based on Mitsubishi Electric products.

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