

Modern Control Room Design Considerations

Overview of the control room

When we think about a control room, it is easy to envisage a hi-tech environment populated by individuals with nerves of steel all with their gaze fixed on a giant video screen. Whilst there is some accuracy in such Hollywood depictions, control rooms nowadays come in a variety of formats depending on their purpose, and they are increasingly common.

The best way to understand what a control room is and why such a thing exists, is to think of it as one component in a complex system. People and equipment converge at that point to control and monitor the system. Typically, the system could be a power plant, a transport network, or an emergency service. However, an organisation doesn't need to have an obvious "mission critical" element for it to warrant a control room.

As businesses become ever more reliant on timely and accurate data, the systems needed to manage that data effectively must grow in complexity. In such cases, the control room is the central point where data is managed. It may be a climate-controlled environment which houses all of a company's data storage equipment. For instance, in a business that uses KVM technology, the computers can be stored securely in the control room. This can increase the lifespan of the computer while freeing up desk space. In a situation where an operator controls several computers and other sources, it's clear to see how such a measure can improve the operator's environment.

Ergonomics

Although the modern control room depends on a variety of hardware and software, another important aspect is the comfort of control room operatives. These people may have to spend extended hours at their consoles, so ensuring they are comfortable will help keep them alert and efficient for long periods.

When designing a control room, it is best to take a user-centered approach. A control room operative may have one or several responsibilities. They may work alone or as part of a team. Shift patterns and health and safety considerations also come into play when designing a control room with the user in mind.

The layout should be carefully planned to avoid distractions such as conversations in other parts of the room. Lighting and temperature are also important when it comes to providing the best working environment for control room staff. When lights are too bright or too dim, and when the room is too warm or too cold, you risk staff becoming distracted, uncomfortable, and potentially unwell.

Consideration of ergonomics goes further than comfort. It is also vital to provide staff with technology that works efficiently. Control room staff, especially those working in mission-critical environments should not have to endure the frustration of outdated technologies, poor interoperability, or anything that takes their attention from the task in hand.

Future Challenges

The projected growth of the market is exciting, but it presents integrators with some interesting challenges.

Huge Data transfers

As we create ever more data, the modern control room needs to work harder to manage it. Sources such as mobile devices, social media, industrial sensors, and network equipment are giving control rooms far more data to manage than ever before. Without appropriate technologies all working seamlessly together, it is almost impossible to make the best use of that data.

In addition, the internet of things (IoT) and its cousin the industrial internet of things (IIoT) is generating huge amounts of data by the second.

Artificial Intelligence

Artificial intelligence (AI) and machine learning (ML) are already demonstrating that it is possible for computers to not only analyze information but also make appropriate decisions in double-quick time. ML can make predictions based on what it has learned from past events and can prevent information overload by only offering operators information as and when it is required. As a result, in a control room setting, AI and ML can ease the burden by being used as a leading hand, letting final decisions rest with a human.

Seamless Data Sharing

Control room operatives often need to be able to share data with colleagues at the click of a button. Individual members of staff may be tasked with concentrating on specific parts of a system and do so using displays at their workstations. However, there may be times when they need to share their displays with other individuals such as a supervisor, or even to the whole room via the video wall. The ability to share data seamlessly and efficiently is rapidly becoming a standard feature of control rooms.

Flexible Display Capability

Tying in with seamless data sharing is the idea of being able to manipulate and interact with AV sources. A good system will allow the user to share feeds with one or multiple displays, and to the whole primary display or just part of it. An increasing number of control room staff are asking for this level of flexibility.

Management software

The latest control room management software provides operators with the ability to view, share, and manage content on video walls and desktop monitors whether their own or those of colleagues.

The software also offers remote management of systems and ensures that staff can collaborate whether in different offices, different sites, or different countries.

Visual Clarity

When selecting appropriate visual displays for a control room, it is important to consider what level of detail the user requires. If a person needs to read labels and interpret symbols from the other side of the control room, a 1080p resolution may be the minimum acceptable resolution. Moreover, if you want to stay ahead of the trend, going straight to 4K could be the sensible option.

LED displays

There is a rising demand to replace rear projection or LCD displays with LED, although application is limited because of the necessary pixel pitch is not yet available. The launch of 0.7-millimetre pixel pitch LED, will open new opportunities.

Minimal Downtime

In a world of rapid technological advancement, customers seek products that can be serviced and upgraded quickly and without fuss. This is especially true of video walls which, in mission-critical settings may be operating constantly day and night. The addition of equipment such as redundant power supplies means that customers can be assured of uninterrupted operation.

AV over IP

Now well-established in a variety of settings, AVoIP is bringing enormous benefits to the control room. One of the reasons for this is the ease with which AVoIP allows networks to be reconfigured, expanded, or otherwise enhanced. Traditionally, such changes might demand new cable runs, additional hardware, and long shutdowns to implement. On the other hand, a control room based on AVoIP can easily be changed by adjustments to software.

From an operator's points of view, AVoIP provides opportunities for seamless data-sharing and unsurpassed flexibility. In addition, AVoIP in this context is ideal for KVM extension and enables streaming of information beyond the control room.

Multi-room and multi-location

For a range of reasons, decentralising the control room is a sensible move. Decentralisation offers custom design configurations and easier access to data sources which, in turn, gives operators better opportunities for decision making and more control of back-up and redundancy.

In addition, it's important to recognise the possibility that certain circumstances may necessitate the evacuation of the main control room. So, the ability to connect with other rooms or even with other sites is crucial. AVoIP makes this especially easy so if, for example, a control room setup includes a war room, it should be possible to share sources or even sections of a videowall with the war room.

Security

The list of products used in control rooms is growing and includes things like content management systems, software, hardware, and access points. At the same time, the need for network access grows, as does the need for increase network capacity and bandwidth, and crucially, cybersecurity.

The threat of cyber-attack is real and constant. As such, nothing short of round-the-clock monitoring and analysis of activity across networks, endpoint, servers, and databases is vital. In addition, operators need to be equipped with all the tools necessary to help them detect and resist such threats quickly.

Enhanced cybersecurity

Operators will be able to identify and counter threats early on if they have the necessary tools. Intuitive graphical user interfaces, artificial intelligence, and the Internet of Things are all shoring up cyber protection.

The control room market is growing as more businesses discover the advantages of managing their networks from a central point. Control rooms should be designed and equipped to manage large

amounts of data that will only increase. They need to offer the ability to share that data quickly and seamlessly within and beyond the room.

Control rooms need to be operator centric, with ergonomic designs to let staff remain alert for long hours in comfort and without distraction and should include technology to assist in decision-making. In all cases, increased cybersecurity will need to be at the heart of any design considerations.

The control room market

As more businesses discover the benefits of control rooms, the market for them is on the increase. In fact, according to Transparency Market Research, “the growing use of control room solutions across a variety of applications will invite considerable growth. The ongoing research and development activities to upgrade the solutions will help in increasing the growth rate of the control room solutions market. Furthermore, the use of connected technologies will propel the growth of the control room solutions market to a considerable extent.” The report also states that the control room solutions market will grow significantly over the forecast period of 2020-2030.

These findings are supported by Omdia research, which show that global market growth is ahead of expectations at 9.6% whereas previous predictions expected growth of 5.7%.