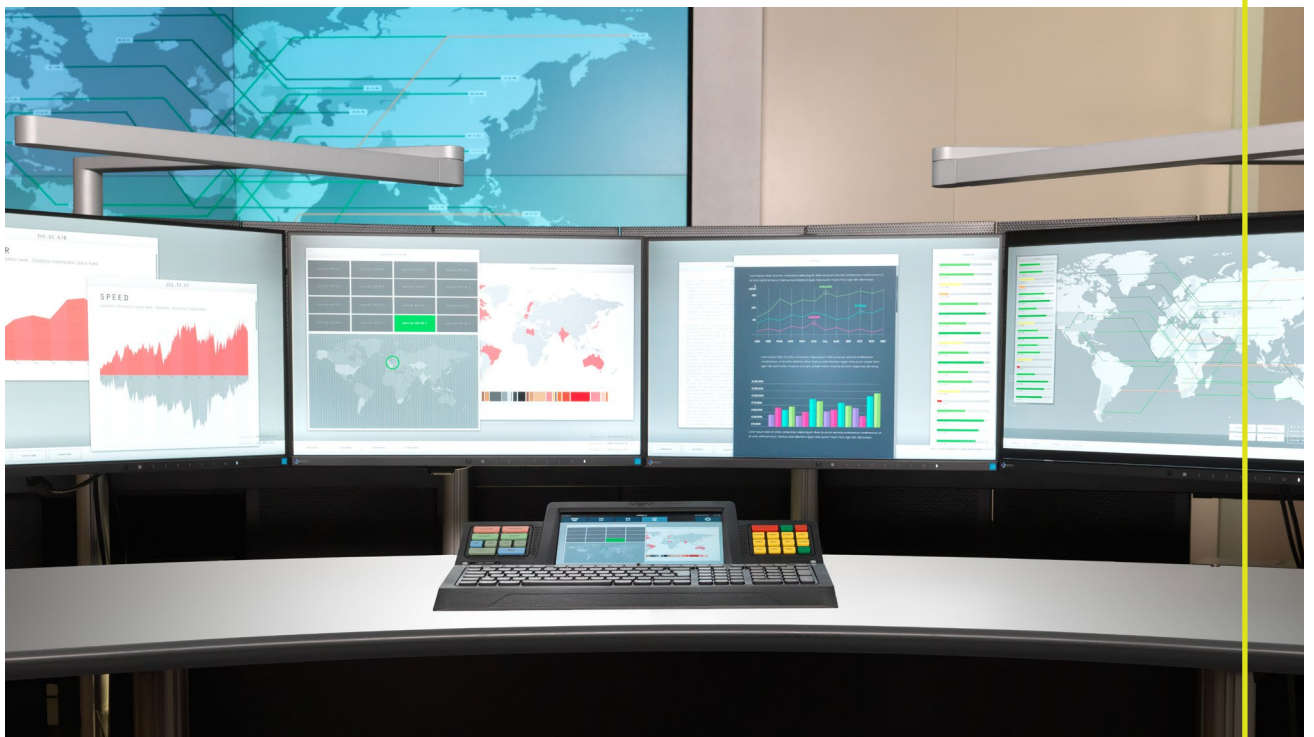


Whitepaper

FUTURE TRENDS IN CONTROL ROOM DESIGN

WEYTEC and CGM, a member of the ABB Group





The global market for command and control room technologies is projected to reach \$7 billion by 2019.¹ Public and private organizations are poised to spend millions on the next generation of control rooms, especially in the three largest vertical markets: public safety, transportation and utilities. Whether for expansion, refurbishment or consolidation, control room technology will account for most of the spend. However, great opportunities also exist to enhance the UX (user experience) and the effectiveness of human-machine interfaces (HMI) in control rooms.

Focusing on Operator-Centric Design

Maximizing the productivity of control room operators leverages technology investments to increase operational excellence. The quality of their daily decision-making directly affects the quality of services provided (e.g. for public safety and transportation control rooms) and can maximise return on plant assets (e.g. for utilities and process-driven industries).

Generation Z

Operators are highly trained and educated individuals who are held personally accountable for critical operational and asset management decisions. A new “Generation Z” of operators will soon enter the workforce. These young people have come to maturity in the gaming environment and by some estimates, have spent up to 10,000 hours gaming prior to taking up jobs.² Thus, they are well accustomed to live-data, digital-streaming environments, and well suited for high-stress, high-performance, high-technology workplaces. At the same time, it is also important to remember that it is the older generation of operators who have accumulated invaluable experience with existing processes and legacy systems. Although they may be less IT-savvy than their younger colleagues, it is essential to make the UX intuitive for their working efficiency.

Operator fatigue is a serious problem in the control room; at best, it causes wasteful mistakes, and at worst, it costs lives. In process-driven industry control rooms, boredom is also a factor, because operators tend to be under stimulated when nothing happens, and then panicky and overwhelmed when an emergency occurs. Designing control rooms to keep operators alert during monotony and calm in emergencies is not a luxury but a means of increasing operator effectiveness so that they make smarter, faster decisions. Further, there is convincing evidence that shift work, as prevalent in 24/7 control rooms, causes a number of serious health problems, such as cardiovascular disease, diabetes, obesity, ulcers and sleep disturbances.³ Paying attention to human factors in the design of the control room helps to attract and retain operators, minimize operator fatigue, enhance alertness and reduce work related, health issue absenteeism.



Workplace navigation



Individualized workplaces

¹ IHS “Global command and control room/PSAP market to reach \$7 billion by 2019”, Alexander Richardson, July 08, 2015.

² Karon Graham, Edutake “What’s different about Gen Z”, March 31, 2011, http://karongraham-edutake.blogspot.ch/2011/03/whats-different-about-gen-z_31.html

³ Dr. Frank Sheer, Harvard Medical School and Brigham and Women’s Hospital in Boston <http://www.webmd.com/sleep-disorders/excessive-sleepiness-10/shift-work>



Workplace Navigation

The amount of information available in the control room continues to increase significantly and operators must cope with an abundance of streamed real-time data as well as knowledge databases, archives and tools. Complexity also increases in times of consolidation because fewer operators are responsible for more interconnected processes. Operators are called upon to multi-task more and more, e.g. crisis intervention, providing customer service, monitoring processes, interfacing with outside organizations, managing 3rd party vendors.

A configurable dashboard for each operator is an essential element of an efficient cockpit design and a fundamental way to simplify the complexity. Reducing the HMI to a single input device greatly improves the UX. WEYTEC's smartTOUCH keyboard with an interactive touchscreen features customizable keypads and soft keys, and context sensitive software that automatically aligns the function keys to the active application. An intuitive UX ensures quick, direct access to primary screens and applications, and minimal keystrokes to secondary systems and screens. The snap-in key panel means that operators bring their personal keys with them for each shift, promoting desk sharing, free seating and hygiene in 24/7 environments.

Individualized Workplaces

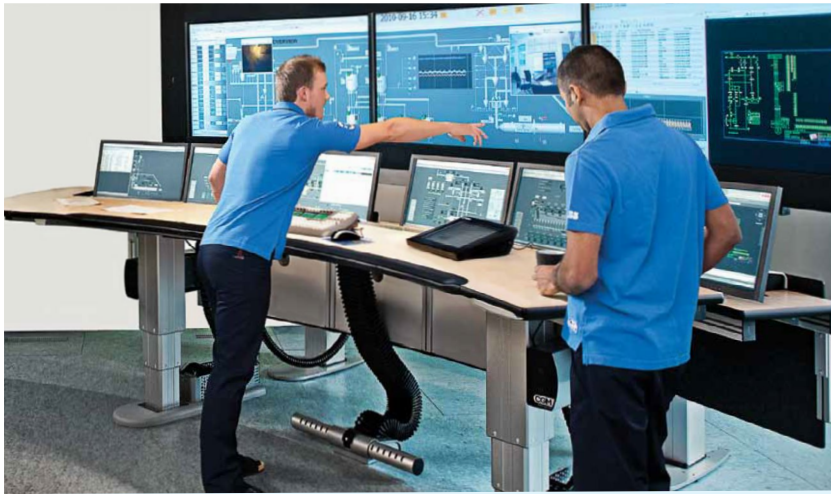
The next step to provide an ergonomic environment for today's operator is the creation of the fully customizable workplace. This includes; motorized adjustable desk height (sitting or standing), dimmable personal lighting (simulating natural light and eliminating glare), directional sound systems (differentiating between broadcast alarms and private sound showers), adjustable screens (height, depth and angle), individual microclimate control and a plethora of pre-sets to accommodate desk-sharing workers. State-of-the-art services which include e-skin and other health monitoring devices warn about risks (light, air quality, health KPIs), make individual health related suggestions (time to stand up every 2 hours) and generally assist the operator in utilizing the ergonomic workplace features.

Visual Landscapes

The control room of the future will feature a variety of visual landscapes, with multiple LCD flat screens at the operator desks, one or two so-called "close large interactive overview" screens, and longer distance videowalls to share the overview with all on-duty operators. Operators use their WEYTEC's smartTOUCH keyboard to drag & drop any image from one screen to another.

Collaborative Environments

Creating environments conducive to collaboration is key to control rooms of the future. Team structures are becoming less hierarchical as roles become more multi-disciplinary (operators, subject matter experts, supervisors, management, communicators, first responders, field technicians). Experts are not all on site at the same time, and operators must increasingly cooperate with, communicate with and even hand-over shifts to colleagues at distant locations – sometimes in another time or language zone. Thus, control room infrastructure must assure that everyone has full access to all data at all times (in accordance with authorization levels). Where operators actually sit and what teams they belong to can change from event to event and from day to day. A modular IP network such as the WEYTEC distributionPLATFORM (WDP) provides the backbone necessary to connect all systems, sources, cameras and tools to all operator workplaces – regardless of physical location. The WDP is also platform and operating system independent, ideally suited for connecting and integrating future, present and legacy systems to the network.



Collaborative Environments

Potential for Cost Savings

Expenditure on control room technology notwithstanding, clients can pursue significant cost savings in control room infrastructure. Here are some options: The WEYTEC distributionPLATFORM's modular architecture assures linear investments in switching technology, adding additional racks as one adds systems, workplaces or locations; Free Seating completely eliminates costly Moves, Adds and Changes normally associated with dynamic workplace assignments and team restructures; Designing flexible, collaborative work environments (dynamic team stations, crisis room, meeting room, visitor area, relaxation room, etc.) can reduce the real estate needed for a control room; Individualized ergonomic workplaces save energy (lighting, heating, air conditioning) and reduce employee "churn and burn". Finally, properly designed command and control rooms cater to a healthy, high-performance, motivated and alert generation of operators, facilitating the quality and speed of their decisions.