# White paper: integrated controller working positions

## Tower automation and digitisation drive efficiency in managing growing volumes of air traffic

As civilian air traffic continues to grow, airports must increase efficiency and manage more complex operations, while improving safety and compliance. Many airports are reaching their capacity limits, and increasing capacity—for example, by adding a new runway or adding more controllers—is usually not an option.

To solve the challenge, airports need to work more intelligently and efficiently within existing limitations. This will mean increasing the density of air traffic, thereby pushing up the complexity and time-sensitivity of air traffic control (ATC) operations, which can only be achieved if safety can be guaranteed. Here, the major obstacle is the lack of integration between legacy tower systems; the typical controller working position features multiple screens and input devices, reducing efficiency and speed in operations.

By deploying an integrated controller working position solution, ATC organisations can bring all essential information and controls into a single, operator-focused interface. Choosing a modular solution will help ensure scalability from small use cases such as remote towers right up to large airports. With the availability of solutions that integrate voice communication alongside ATC-specific functions, organisations can free controllers from switching between multiple systems, helping them focus fully on safety while guiding traffic efficiently.

Air Traffic Management

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## Driving continuous growth

In civilian ATC, rising volumes of air traffic are adding to the workload for controllers, who must manage multiple workflows across distinct systems for visualisation, surveillance, flight data handling, information, control, and voice communication. As the workload rises and the number of different screens grows, it becomes more challenging for controllers to manage operations efficiently and to maintain a clear mental situation picture.

To continue increasing capacity, organisations need to provide a more tightly integrated working environment for controllers. Usability is an important related topic: controllers now entering the workforce are accustomed to intuitive and highly flexible user interfaces, and should not be required to work in out-dated environments. Controllers also now expect to be able to switch from one mission to another rapidly and seamlessly, which is typically challenging within the rigid constraints of legacy working positions.

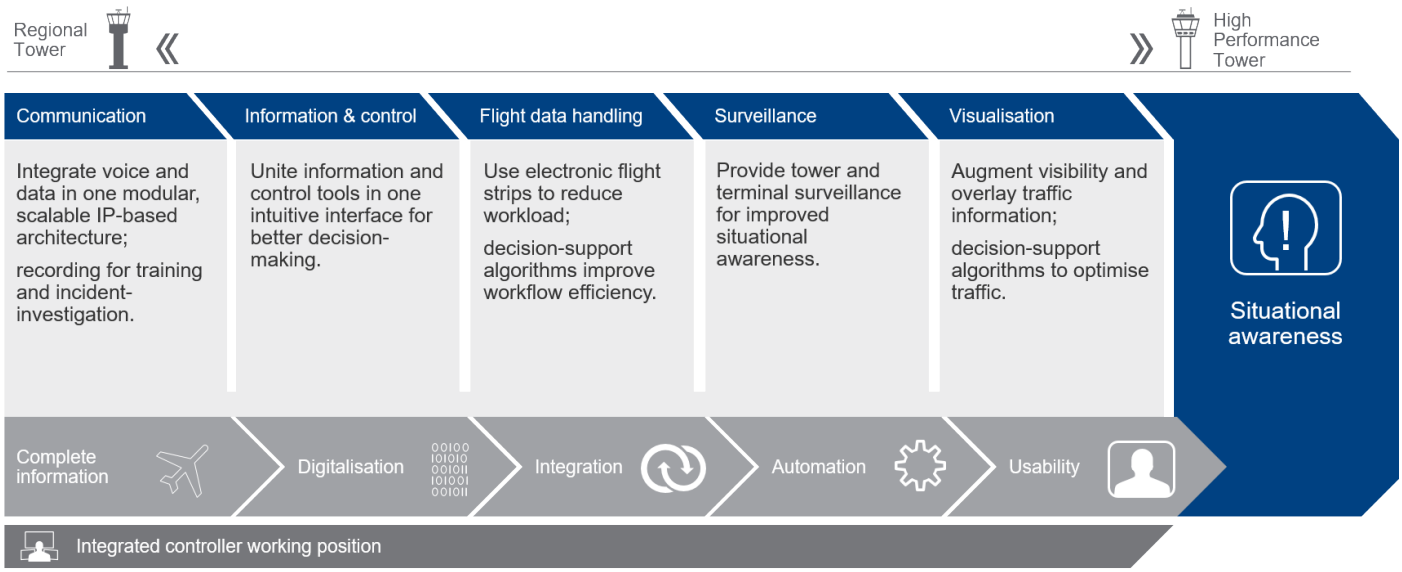
From the perspective of ATC organisations, existing control centre systems are costly and difficult to manage, and the lack of integration between them makes it hard to gain a clear overview of operational performance. Adding controllers to manage increasing traffic is not usually an option owing to cost and people constraints, nor is it economically feasible to simply rip and replace the entire control centre. The ideal future architecture will be modular and open, such that organisations can deploy a framework that integrates with existing and future third-party solutions.

To manage new demands within tight budgets while continuously improving safety and compliance, the industry needs to introduce more scalable approaches to ATC. By deploying highly integrated workflows across a united set of solutions for monitoring and managing traffic, ATC organisations can increase capacity and efficiency—enabling them to handle more complex operations with their existing workforce.

With an approach that builds functional modules on top of a common integration core, ATC organisations can also meet requirements for different deployment scenarios. For example, the same underlying technology can meet the comprehensive needs of a high-performance tower at a major international hub airport, but also the different needs of a virtual tower at a minor airfield.

### Figure 1: Building functional modules on a common integration core

**The same technology can meet the needs of multiple different deployment scenarios**



In the second case, the solution will have a smaller number of functional modules plugged into the integration layer, which can run in a central location to serve the needs of all operational centres, large and small. Enabling central deployment and management in this way reduces complexity and ongoing costs for ATC organisations, and also helps to future-proof the deployment, because organisations can seamlessly add new locations or further develop existing locations as their needs grow—all without changing the core solution.

## Virtual ATC centres

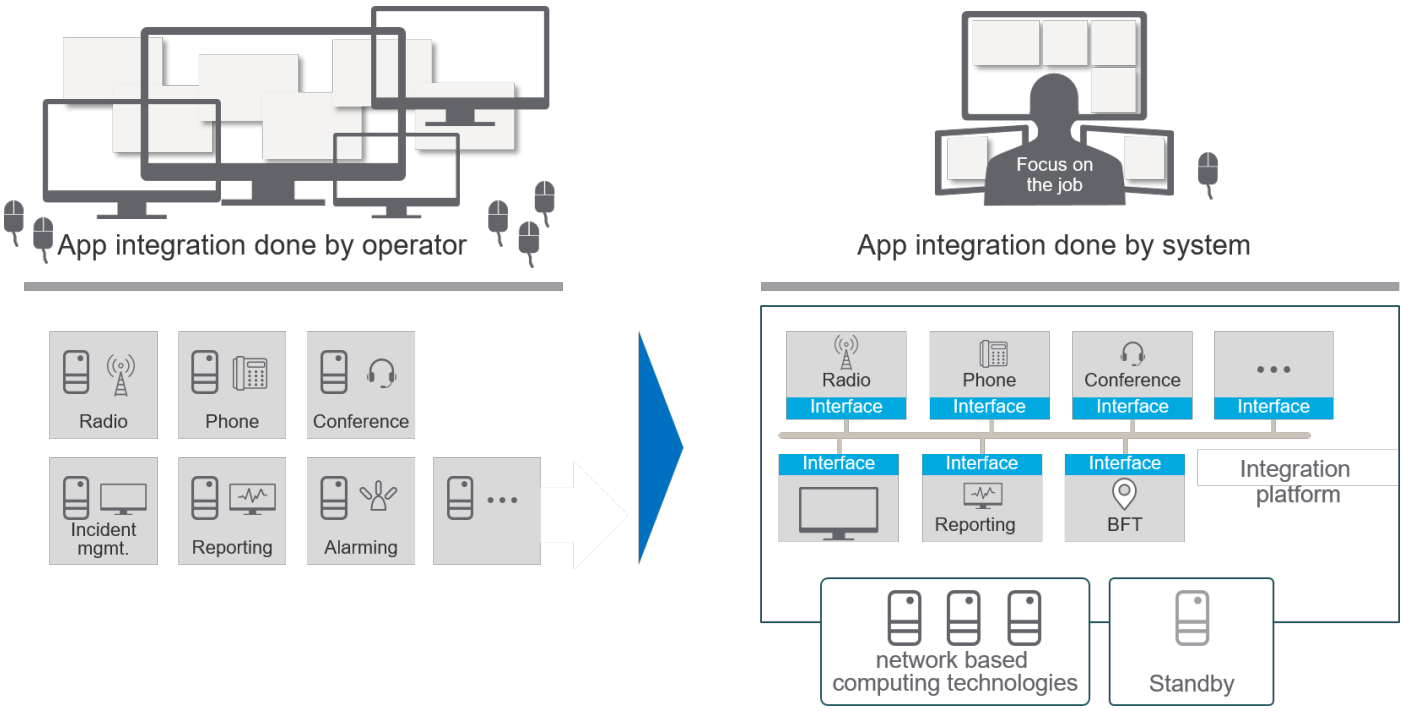
A modular approach built on a common integration layer also supports the virtual centre concept, whereby ATM Data Service Providers are decoupled from Air Traffic Service Units (ATSUs) to enable multiple ATSUs to act as a single organisation from the perspective of airspace users. In practical terms, an Air Traffic Control (ATC) organisation could deploy a single data centre now and later distribute its controller working positions across full Towers (TWRs), Approach Control Services (APPs), and Air Traffic Control Centres (ATCCs), as well as Remote Towers and Remote Virtual Towers (RVTs).

The virtual centre concept can improve interoperability across national and regional boundaries, allow organisations to centralise expertise while providing full geographic coverage, and cut costs while improving service levels.

## Controller-centric philosophy

To help controllers focus on the right elements at the right time, the integrated controller working position of the future should provide all required systems, including voice communication, within a compact, highly visual interface that promotes a "clean desk" philosophy. The operator's precise role should determine which modules are made available to them—rather than taking a one-size-fits-all approach, it should be possible to reduce complexity by giving users the precise functionality they need. Users should be able to rearrange interface elements to fit their preferred ways of working, creating an intuitive environment across just one or two screens that promotes greater situational awareness and safer, more efficient operations.

### Figure 2: Adopting a controller-centric philosophy



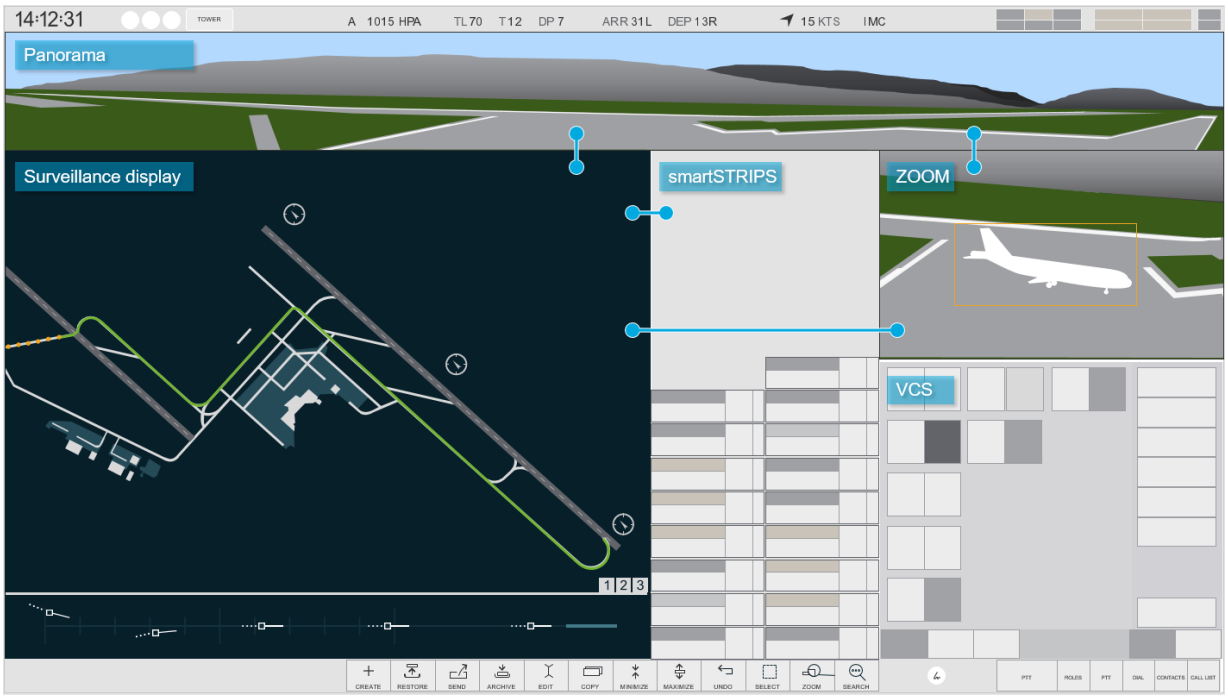
In the typical ATC tower today, users must navigate between multiple disconnected solutions, rekeying data and manually stepping through the stages of complex memorised workflows. Instead, ATC organisations should plug all functional elements into an integration layer, enabling the creation of fully or semi-automated workflows that support the controller in determining the next action. By helping controllers to maintain a clear mental picture of the current situation at all times, this integrated approach supports them in working more efficiently and effectively. When controllers can focus on what they want to achieve rather than on executing different processes in disparate interfaces, they can fully exploit their skills and experience.

The user interface of the future should intelligently highlight essential information and enable rapid data input through a single device for all functions. It should also provide intelligent, context-sensitive menus that promote the most likely commands depending on the situation, helping to guide controllers along the path of organisational best practices. Going one step further to integrate voice communication alongside control centre solutions within an intuitive graphical interface will further reduce delay and the need to switch between different systems to accomplish operational objectives.

Bringing together voice communication and ATC applications on a common integration layer has the potential to increase efficiency, speed and accuracy for controllers, helping them make rapid and effective decisions in high-pressure situations. As towers gear up to manage higher traffic density, reducing the workload for controllers through a more efficient integrated working position will help ATC organisations maintain safety and compliance.

An integrated controller working position is likely to include an interaction layer on a touchscreen tablet, with one or more information layers on a monitor—all user-configurable and all featuring common switching of missions across functional modules. By using automation to simplify and accelerate process flows, organisations can ensure that controllers are free to focus on the task at hand rather than constantly thinking about the next steps. Context-sensitive menus can be adapted to each organisation's workflows to help ensure compliance with best practices and safety regulations.

## Figure 3: Example of the user interface for an integrated controller working position



With all essential information and controls delivered through an operator-focused interface, the integrated controller working position of the future will help boost situational awareness and release controllers from the work of handling inter-system integration for themselves. Such a solution will increase operational efficiency and support better decision-making by concentrating and promoting important information. With a reduced physical footprint and centralised deployment model, a modular solution based on a common integration core can also cut costs and IT complexity for organisations, facilitating ongoing expansion.

## The Frequentis solution

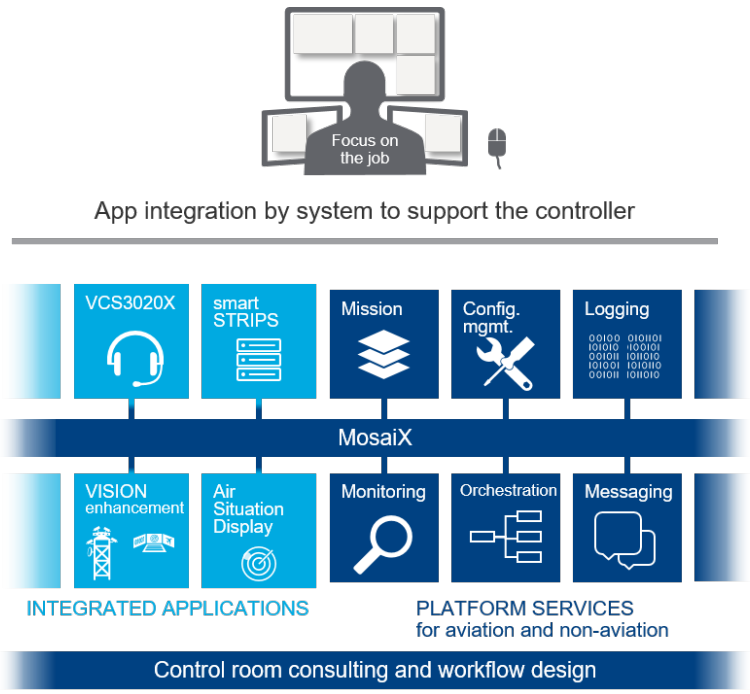
The Frequentis Integrated Controller Working Position (iCWP®) solution delivers a unified front-end for the controller that provides all of the information necessary to carry out ATC operations. It covers all civilian ATC requirements across visualisation, surveillance, flight data handling, information and control.

Airports can choose to combine existing and future third-party applications with Frequentis modules, all relying on the new MosaiX® platform to provide tight integration and cross-functional workflows, taking advantage of digitisation to increase automation and to decrease manual work efforts. With its highly integrated, intuitive and flexible interface, iCWP® helps controllers to maintain a clear mental picture of the airspace they are managing.

Uniquely, MosaiX® integrates voice communication with control centre applications. With voice integration new features will be possible, such as the inclusion of an ATM-grade "squelch" function that uses incoming voice communications to trigger visual alerts on-screen that show the operator which site they relate to. This facilitates the management of multiple remote air traffic management tower locations by a single operator at a central location.

By enabling operators to work faster and more efficiently, Frequentis iCWP® can help airports stretch their capacity limits, optimising runway throughput while simultaneously improving safety levels. To help organisations implement the solution, Frequentis offers a comprehensive suite of consulting services spanning the full chain from development to deployment, including specialist consulting on the human-machine interface.

### Figure 4: The Frequentis Integrated Controller Working Position solution



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