

## RAF protects UK airspace with advanced air command and control system from IBM

### Overview

#### The Challenge

To monitor UK airspace for terrorist or enemy incursions and initiate intercept actions.

#### The Solution

IBM implemented state-of-the-art air surveillance and interceptor command and control systems, developing software applications, integrating multi-radar tracking and voice systems and refurbishing entire computer facilities at two RAF bases. IBM was Prime Contractor for the five-year project.

#### The Benefits

- An advanced air surveillance and interceptor command and control system which tracks thousands of commercial and military aircraft travelling at up to twice the speed of sound.
- Full communications with radar and radio stations, military and civil flight operations and neighbouring NATO countries
- Intensive risk management
- An intuitive Human Computer Interface which boosts controller performance and reduces training requirements
- New levels of availability, 24x7 on-call support
- New levels of maintainability
- Reduced costs by using commercial off the shelf components.

Every minute of every day, thousands of aircraft are in the skies above the UK. Identifying every one of these aircraft, tracking their movements against filed flight plans, and sifting through real-time data to pinpoint potential terrorist or enemy activity falls to fighter controllers at two interlinked centres, RAF Boulmer in Northumberland and RAF Scampton in Lincolnshire. Tornado fighters are on constant alert to be scrambled to intercept and take action against unidentified aircraft.

The computer systems used to monitor UK airspace since the mid 1980s were becoming obsolete and difficult to maintain, so the Defence Procurement Agency (DPA) went out to tender to source a highly flexible, real-time, state-of-the-art, 24x7 UK air surveillance and interceptor command and control system (UCCS).

The DPA whittled the 14 companies responding to the tender down to two suppliers who produced detailed and fully-costed proposals.

“IBM won the contract on cost and the quality of its technology, system design and project management,” said Graham Richards, Project Manager within the Air Command and Control Systems Integrated Project Team. “IBM scored highly in the confidence it gave us to deliver. This has proven well-founded. The five year programme has been completed on schedule, within budget and to the high quality demanded by the RAF.”

*“The willingness to share information openly between ourselves and IBM, and to work closely together to address challenges was instrumental in delivering a solution that has exceeded the expectations of the RAF.”*

Graham Richards, Project Manager,  
Air Command and Control Systems  
Integrated Project Team

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Paddy Clayton, Air Command and Control  
Systems Team Leader.

### **Scope and Complexity**

The innovative solution designed, developed and implemented by IBM is completely new and required a radical rethink in how such systems are constructed.

IBM Global Business Services developed a real-time graphical display application to enable controllers to track thousands of commercial and military aircraft travelling at up to twice the speed of sound. It sourced and integrated a multi-radar aircraft tracking system from Saab, and implemented Frequentis voice communications with 'touch panel' access to military radios, military and civilian air traffic operators, and the chain of command leading to the highest levels of government.

Other components collated data from radar and radio systems, and integrated with civil and military flight control systems operated by the UK Civil Aviation Authority and neighbouring NATO countries.

### **Keeping Costs Down**

Despite its sophistication, the unique solution developed by IBM is based on modern Commercial Off-The-Shelf (COTS) hardware and software, including IBM DB2 database, Microsoft™ Windows™ front-end and IBM pSeries UNIX™ processors. This represents a move away from the expensive bespoke systems which underpin traditional defence procurement projects.

The approach called for great skill and agility on the part of IBM developers who had to make COTS components satisfy the stringent security and performance standards of the RAF and meet demanding requirements of fighter controllers for a clear, graphical presentation of fast-changing, real-time information.

### **Human Computer Interface**

The controllers at RAF Boulmer and RAF Scampton are involved in decisions that affect the lives of aircrew, passengers and potentially whole sections of the UK population. The design of the applications was carefully scrutinised to ensure 100 per cent accuracy and minimise the danger of aircraft movements being misinterpreted. IBM conducted intensive workshops with RAF controllers, human factor specialists and safety experts, to ensure that the graphical presentation of aircraft movements would be intuitive and satisfy the ultra-high operating standards of the fighter control room.

IBM developers used a standard Microsoft Windows interface and accelerator keys to create the intuitive user interface, reducing operator training from three weeks to less than 3 days.

“This successful implementation with IBM is a good example of honest relationships and close working with all parties involved,” said Paddy Clayton, Air Command and Control Systems Team Leader. “We have developed a system which is much simpler to operate, and which has been enthusiastically received by the user community.”

## Risk Management

Safety is paramount to the operations at RAF Boulmer and RAF Scampton.

IBM deployed dedicated safety experts on the project from start to finish. They produced extensive safety cases to prove the safety of every aspect of the operation, from automatic failover of servers and replication of processes between the two centres, to the accuracy and clarity of application software and displays. Throughout the project, safety cases passed rigorous examination by independent safety auditors.

IBM maintained a risk register which was formally reviewed with the DPA and RAF on a 4-6 week cycle. Risks were assigned and actions taken to reduce probabilities and minimise impact. The risk register was a main agenda item in joint project review meetings.

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## Advanced Control and Reporting Centres

IBM Global Business Services designed and managed a complete rebuild and refitting of control rooms at RAF Boulmer and RAF Scampton. 160 users across the two locations were equipped with graphical workstations, software applications and full communications. For the ‘back-end’ functions, servers were installed at the main sites by IBM Integrated Technology Services. PCs were installed and software developed at 20 radar and radio sites to collate and encode sensor data and transmit to Boulmer and Scampton, where parallel systems handled decoding and onward processing.

Even a decision midstream by the RAF to switch the second UKASACS centre from RAF Neatishead in Norfolk to RAF Scampton, requiring a fresh build with new equipment, infrastructure and facilities, failed to faze the IBM team.

“There was a lot going on at that time, and we had to manage the transition very carefully to ensure that the project remained on track,” said Richards. “IBM takes great credit for not being deflected by the magnitude of the change, and keeping everything moving forward under control and to schedule.”

The detail in IBM Global Business Services management extended to human aspects. The switch from Neatishead to Scampton affected some 300 RAF personnel and their families, and could have affected morale and motivation. IBM project leaders took time to visit the RAF locations, speak with affected staff and explain precisely what the change would mean.

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## Transition Management

Throughout the transition, it was essential to sustain full operational capability to protect UK airspace. IBM Global Business Services devised a scheme which enabled radar and radio feeds to be replicated on both old and new systems during the transition, ensuring that at no time was there any gap in national air defences.

IBM Global Business Services worked closely with the RAF to train some 160 personnel and carefully plan safe switchover to the new systems.

## Project Management

Many changes to the UCCS project occurred during the five year contract and keeping such a complex and demanding programme on track called for exceptional project management skills.

"It was refreshing to work with IBM. We had a very open relationship and formed a close partnership in the course of the contract," Richards commented. "IBM staff were very flexible and amenable to ideas. They shared our objective to get the job done and took the inevitable changes that occurred in their stride."

Richards concluded: "For both ourselves and IBM, it was an impressive achievement to complete such a large and complex project to the satisfaction of users, within budget and on schedule."

### For more information

To find out more about IBM Global Business Services contact your IBM sales representative or visit:

[ibm.com/services/bcs](http://ibm.com/services/bcs)

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