Over the past five years a system called centralized image processing (CIP) has been establishing itself at airports across Europe, offering heightened security and smoother, faster processing for passenger and cabin baggage screening by gathering x-ray screeners together in one room, away from the security checkpoint. CIP's stronghold is the UK, where Stansted, Manchester, Bristol, Edinburgh and Gatwick have all adopted the solution. Brussels, Schiphol, Reykjavík, Charles de Gaulle and Toulouse are also deploying CIP. Outside Europe, Atlanta and Calgary offer the capability but have yet to hit the switch, while a number of other airports are in the midst of trials.

"With CIP we use technology to capture images from x-ray machines in our passenger security area and transfer them to a screening room in which qualified staff review the images and make a decision," says David Feltham, director of passenger experience and operations at Edinburgh Airport. "The passenger's cabin baggage can then be routed to a 'clear' lane or a 'reject' lane. When the baggage is rejected, a member of staff at the checkpoint engages the passenger and helps them resolve the issue."

The removal of screeners to a separate location can be complemented by a technology known as matrixing or multiplexing, where the next x-ray image goes to the next available operator. This software cuts out the delays between images that occur when the screener is concerned only with their own lane. "There are various deployment models that will dictate the exact benefits an airport sees," says Guido Peetermans, head of passenger security at IATA. "Broadly, however, CIP can allow airports to make better use of their staff and equipment resources, as well as balance the flow between security lanes."

CENTRAL
reservations

Centralized image processing is a major buzz term at the moment, but what is it and can it actually improve cabin baggage security screening?

CIP advice from those in the know

David Feltham, director of passenger experience and operations at Edinburgh Airport: "It's great to embrace technology but it's important to understand the scale of the change and not to underestimate it. Ensuring as many of as possible of your staff are engaged through the process is crucial to a positive outcome. Be aware that it gives you the potential to improve throughput, reporting, productivity and compliance – but the improvements need to be carefully planned and managed."

Tom Hardiman, principal at Egremont: "Think through the operating model and change management implications. Avoid underestimating the level of engagement and support that should be provided to the security workforce when implementing the technology. CIP should also be thought of as an enabler for the adoption of other advanced screening methodologies. The next generation of checkpoint x-ray systems is now becoming available, such as new EDS standards and CT (computer tomography) machines. These advances will change how screening is performed. CIP should enable faster adoption and better leverage of these technologies' capabilities if designed with this in mind."

Belkacem Laïmouche, head of security for a branch of the French Civil Aviation Authority (DGAC): "Take your time in thinking, maturing and designing your project. Do not hesitate to contact other airports that have already jumped into CIP to hear about their experiences and advice for your particular project."

Guido Peetermans, head of passenger security at IATA: "Understand your operations and your business needs, and then select the deployment model that best suits your needs."

LEFT: London Gatwick engaged CCD to design a new remote cabin baggage screening room
BELOW: Tom Hardiman, Egremont

Avoid underestimating the level of engagement and support that should be provided to the security workforce when implementing the technology

When CIP is performed well the benefits are manifold. For passengers they include a more fluid process for security screening and a friendlier and more spacious checkpoint environment. For staff a pleasant working environment with less noise is on offer, with better lighting and greater flexibility in staffing capacity. For the airport, screening quality, productivity and passenger throughput are all enhanced, along with heightened adaptability such as a swiftness to change resource configurations, depending on demand.

According to Tom Hardiman, principal at Egremont, a leading management consultant who has advised numerous airports on CIP and supported IATA on its publication *CIP Best Practice Guide*, passenger numbers per hour per x-ray lane can rise from approximately 150 with a purely manual solution, to around 350 with the use of CIP including an automated tray return system (ATRS), parallel loading and matrixing.

"It is difficult to attribute specific improvements to CIP alone, as it is almost always implemented alongside another checkpoint innovations such as tray return systems and other lane automation, checkpoint management systems and improved passenger preparation process," says Peetermans. "However capacity improvements of 20% are very achievable, and in some cases up to 50%."

"We know passengers want to clear security quickly and our feedback metrics and times are consistently strong," adds Edinburgh Airport's Feltham.

Ease of deployment

On paper, CIP should be fairly straightforward to roll out, as just a network and software change is needed. In practice, however, airports should not be surprised if, months after deployment, results are not what they had hoped for: "We have observed that integration of the subsystems of a CIP environment is not as easy as some manufacturers think or state," says Belkacem Laïmouche, head of security for a branch of the French Civil Aviation Authority (DGAC), and who back in 2015 oversaw the CIP trials at Toulouse-Blagnac, Lyon-Saint Exupéry and Paris-Charles de Gaulle. "It is therefore important for airport operators to have a technical integrator in their project responsible for fixing bugs and problems. It is also important to include staff early in the project so that they become part of the deployment and clearly understand their role in the new environment."

Other ways to improve screening security

New technologies such as EDSCB (Explosive Detection Systems for Cabin Baggage) and CT scanners are all set to heighten security and operational effectiveness, and will in turn bring into play applications such as virtual reality and machine learning. Beyond that one big question is whether risk-based differentiation in airport operations will be brought in. Examples to assess levels of risk include the use of passengers' flight data and their habits and behavior at the airport. Facial recognition, artificial intelligence and switching algorithms could all play a major role in future screening security.

"The key principle is that every airport is unique and therefore what will and won't work will depend on the regulatory environment as well as the operational, business and passenger needs," says Peetermans. "Even within a single airport, different checkpoints have different needs. The question is not whether to introduce security scanners, next-generation x-ray equipment or CIP, but how all this can be combined in the best way to create a security checkpoint that, in a given environment, delivers the best possible security with the best operational efficiency and passenger experience."

"We always come back to the screener in terms of how they are trained, motivated and managed day to day," says Hardiman. "As technology advances we must consider how the screener remains at the heart of a system where one question is likely to be: Who makes the decision – x-ray machine or agent?"

ABOVE: Dubai began testing CIP in 2018 as part of IATA's Smart Security initiative
BELOW: David Feltham of Edinburgh Airport

> We now **process more passengers per hour** than any other airport in the UK and that is partly down to CIP

Hardiman adds, "At its simplest level, it's quite easy to deploy, but being clear on the business case and the operating model helps select the right operating options. CIP also needs to be deployed within a broader change of the checkpoint's operating model. Ease of implementation depends on how advanced the airport is along the journey of implementing advanced checkpoint solutions, for example whether they already have an automated tray return system or not. When implementing CIP you need to be ready to change the standard operating procedures, staffing configurations, rosters, and how supervision and quality assurance work. A whole host of management considerations need to be worked through."

One crucial consideration is screen time. It is recommended that dedicated agents only work on a screen for a limited period. How long depends on the airport but it varies from 20 to 40 minutes, with 10 or 20 minute breaks (studies have shown levels of concentration fall away markedly after 30 minutes compared with 20). Historically this would mean a constant rotation of security staff switching between reading x-rays, tray moving, bag unpacking and other duties. With a remote location, time saved with CIP is quickly nullified if the room is not positioned next to security. The worst-case scenario is that screeners sit around doing nothing between sessions.

Success: Dubai and Edinburgh

Edinburgh Airport introduced CIP in 2014. According to Feltham, the airport's security operation has been transformed and made much more efficient, with increased throughput. This has kept queue times low, even with rapidly increasing passenger numbers.

"Our highly trained security officers are able to make screening decisions in a quiet space that is detached from the distractions and noise of a busy security hall," says Feltham. "All decisions and timings can be reviewed, analyzed and combined with other data to give us a complete picture of the process. This helps us to identify and reduce bottlenecks, as well as work with staff on improvement opportunities. We now process more passengers per hour than any other airport in the UK and that is partly down to CIP."

Dubai has been running a CIP trial since last year, overseen by Buti Qurwash, vice-president of security at Dubai Airports. "It will take some time in terms of trial and error and culture change to calibrate to the required level of service we demand, but in terms of the trial it's going very well," says Qurwash. "The security operators like it and enjoy the quieter, more focused space. They find it is resolving lots of issues for them, such as throughput, clearances and better use of staff. Now that we see the benefits we are tendering for bigger x-ray solutions," he adds.

Teething problems: Bristol and Brussels

Brussels Airport introduced CIP back in 2015. The principal goal was to increase screening quality. The airport thought reduction of resources would also be possible but according to Thomas Sterken, Brussels' capacity planning and optimization manager, "We couldn't realize that because it had too much impact on the quality of the screening."

While Sterken observed that silence for the screeners aided their concentration, they lost connection to the operation and would be oblivious to large queues forming. This meant they

RIGHT: Thanks to CIP, Gatwick almost tripled its security screening throughput
BELOW: Caroline Vear, Bristol Airport

weren't aware of the need to increase their working speed. In some cases, this meant a slowing of the entire security process. Loss of human interaction was a problem.

"Whether CIP creates an advantage or a disadvantage is hard to say," says Sterken. "Since my angle is improving the process and not security I wouldn't do it again, though that is not Brussels Airport's opinion."

In a quest for improved efficiency, Bristol Airport implemented CIP in 2016, establishing 12 remotely observed lanes and running the scheme for a year. "We did it for the security benefits," says Caroline Vear, security standards manager at Bristol. "CIP means no insider threat collusion because no one knows which lane they're checking. It seemed to be the direction airports were heading."

Unfortunately things didn't pan out as planned. Vear explains, "We found that under new regulations screeners were only allowed to screen for a certain period, and because of the positioning of our remote screening room it wasn't possible to change the agents in and out of the operation. Staff would end up on a screen break and not do anything. Unfortunately we didn't have another room option. People always fight over space at an airport."

Bristol has for now dispensed with the remote room, but continues to matrix across lanes with its screeners *in situ*. "This has the same effect as remote screening," says Vear. "It has probably saved us the cost of five trained security agents. Matrixing gives you the flexibility of CIP but has them in the operation, so they can be moved about."

The future

Success or otherwise of CIP depends on myriad factors. Each implementation demands forethought, patience and the engagement of staff, with the probability of underperformance until fully established. Will it endure?

"In one form or another, without question," says Sterken. "The future is there because you have an image. Once you have images, software can help agents detect items to improve quality. Auto-rejection and auto-clear may be just around the corner. That could mean a massive reduction in workload."

"I think that as a logical extension there could be a centralization of screeners between airports," says Hardiman. "We already have airports that screen across terminals from one location. Some countries that have remote airports are thinking about whether the screeners from one of the main airports could screen x-rays at airports across the country." ■

> **"**
> CIP means **no insider threat collusion** because no one knows which lane they're checking
> **"**

A CIP leader speaks

Andy Boyd is author of the book *Optimizing Airport Security* and is a leading expert in the area of lean deployment. He is partner and founder of Result, a company specializing in security optimization. Boyd provides some key points on CIP and how it can be implemented:

• If passengers are through security in less than 10 minutes and don't get their bag pulled they are in a happy state of mind to spend money airside. After 10 minutes they begin to get irritated. It is in the interests of airport operators to get them through within this time in a structured, smooth manner. CIP can help achieve this goal. Without CIP the throughput of a security lane can be predicated on the speed of a single screener.

• Choosing whether to have a team of people dedicated to screen reading is a major decision for any airport, but simulation can be used to show the potential benefits of CIP.

• The duration of a CIP trial depends on the appetite of the airport, the demographic of the passengers, and how robust the technology and people are. A trial design document can be created so that individual duties are fully documented. Once the airport meets critical success factors it can go to roll-out.

• Screen readers on lanes can get distracted by passengers and other readers. In a dedicated room they can concentrate better, which in turn improves security and throughput. CIP allows a quick and efficient way of working. Once cultural and change management aspects are addressed, much of CIP falls into place.

• We have observed numerous airports attempt to optimize their operations. Unfortunately they apply the same old traditional thinking, which brings the same old results. They need a catalyst of change. We have seen a lot of airports fail, not just with CIP, but with plenty of other initiatives, too.