



By James Careless

AIRPORT SCREENERS’ COMPUTER-BASED TRAINING PUSHES THE ENVELOPE

Around the world, every single day, millions of bags go through 3D X-ray scanners at airports. The human screeners who view these X-ray images must make life-and-death assessments in seconds.

Increasingly, these screeners are being readied to do their jobs using computer-based training (CBT). Because the range and types of threats that airport screeners have to detect keeps

growing, CBT for screeners is constantly pushing the envelope in its capabilities and knowledge base.

KEY TRENDS IN CBT

Dr. Diana Hardmeier is the director of CASRA (Center for Adaptive Security Research and Applications). For over 20 years, CASRA has been providing research-based, regulatory-compliant



Dr. Diana Hardmeier, CASRA

solutions for training and certifying X-ray screeners.

“Several trends are reshaping the training landscape,” said Dr. Hardmeier. “One of them is increasing passenger volumes, requiring screeners to deliver higher throughput and efficiency.

“And while this is happening, regulatory bodies such as ICAO and national authorities are continuously updating certification standards.”

At the same time, the threats confronting X-ray screening systems continue to evolve. “Screeners now face challenges such as detecting non-metallic IEDs/IIDs and prohibited items disguised in everyday objects,” Dr. Hardmeier said. “With increased automation (e.g., new shown alarms), visual cues are changing, requiring screeners to adapt their perception and decision-making processes,” she added



Dr. Nimrod Matan, e-Lectio

referring to alarms being generated automatically by the machines.

Dr. Nimrod Matan is commercial director at e-Lectio. Part of the ICTS Europe group, e-Lectio develops and delivers online training solutions for the aviation security sector worldwide.

“To address developments such as 3D-CT scanners and IIDs, we have launched a new 3D simulator as well as a dedicated IID training module,” he said. “The latter includes theoretical instruction, threat detection practice, and a tailored image library to support certification and recurrent training needs.”

Sophie Hibbin is senior technical advisor for aviation security at CAA International. Her employer has partnered with the Learning Academy at Rapiscan to deliver the Digital X-Ray Competency Test. Known as DXCT, this is an advanced X-ray screening competency test purpose-built



Sophie Hibbin, CAA International

for ICAO member states and national aviation authorities.

When it comes to CBT trends, Hibbin said that verifiable quality tops the list. “A regulator needs to make sure their national population of screeners can analyze X-ray images effectively, confidently identify potential threats, make these decisions quickly and clearly, and be able to operate in both 2D and 3D environments,” she said. To achieve such goals, a CBT program has to be built on acceptable and measurable testing standards, offer a standardized and fair testing system, support oversight and quality assurance, and be accessible in a wide range of locations.

HOW THE CBT INDUSTRY IS RESPONDING

The CBT for screeners’ industry is responding to these trends in positive and ambitious ways.

A case in point: “The industry is currently shaped by the broad transition to 3D-CT screening, requiring retraining of existing

screeners and the development of new learning pathways for newcomers,” said Dr. Hardmeier. “CASRA has updated its CBT offerings accordingly, introducing support for multiple user interfaces, expanding image databases, and tailoring training to accommodate different operational and regulatory setups. Our development is driven by both field data



Lorena de Rodriguez, AirTera

and scientific evaluation, ensuring that our solutions remain fit for purpose.”

Lorena de Rodriguez is vice president of development and delivery at AirTera, another curriculum developer of CBT for airport users. “In the last five years, we have seen a big adoption of CBT by airports wanting to automate operations, largely because that’s the best way to get information consistently to the users who need to have it,” she said. “This has led to a focus on making CBT mobile-friendly and accessible anywhere, and on any device. We’ve found that mobile training has to securely connect to a learning management system for recordkeeping and then translate those inputs into



The industry is transitioning to 3D-CT screening and CASRA says they have updated their offerings to reflect this change.



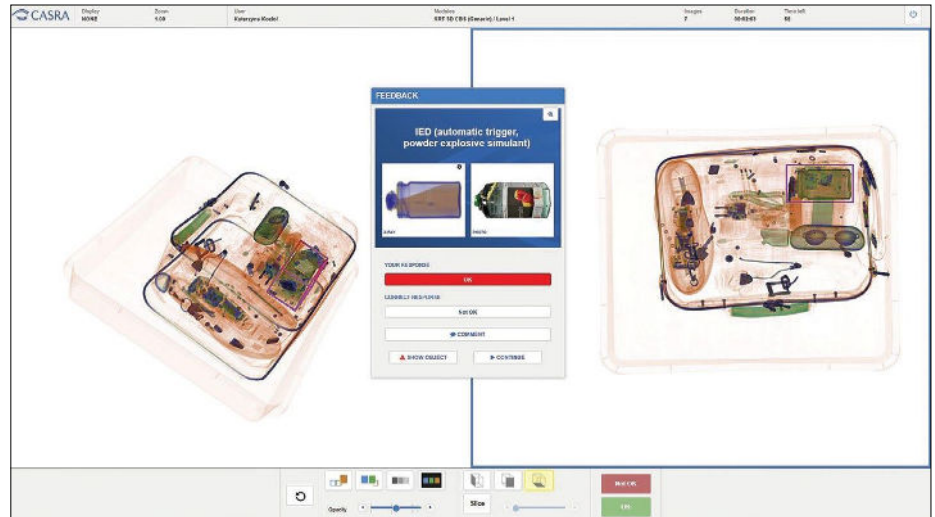
student files and reports.”

As mentioned above, e-Lectio has created a next-generation 3D simulator. This unit comes “with a library of over 6,000 images for CBD, HBS and cargo,” said Matan. “For IID detection, the company has developed a comprehensive module combining theory, hands-on detection practice, and a dedicated image library to support both certification and recurrent training.”

For its part, CAA International’s efforts have been addressing “the significant change to the relevant provisions in EU 2015/1998 around screener certification and recurrent training and testing,” Hibbin said. “The aviation security system of today is complex, sitting within the context of advanced technology, defined processes and procedures, and challenging operational environments. This complexity has grown in recent times, both from a technological perspective and from the way the system is governed and regulated. The human element remains a key component of aviation security, with the operator of an X-ray machine — the human reviewer — relied upon to make critical and final decisions in respect of potential threats. It is clear that we need to be able to assess the competency of this human reviewer in a robust and consistent manner.”

This is where computer-based training, testing, and especially certification come into play. “Screener certification offers us a route to assure that the standard of screening is maintained via an assessment of all the required competencies that our human reviewer needs to be able to do their job,” said Hibbin. “A mature certification process facilitates quality assurance, highlights potential vulnerabilities and strengths in the security system, validates training processes, and even provides motivation and drive for the screeners themselves.”

According to Hibbin, an image-based interpretation test is one element of an overall certification process for screeners. “It can be considered a summative assessment, confirming that the relevant competencies are in place,” she said. At the same time, certification under



CASRA says their combination of validated training outcomes and flexible, regulation-sensitive tools is key to meeting the evolving needs of their customers. CASRA image.

ICAO Annex 17 is a combination of the evaluation of on-the-job training, practical assessment, theoretical assessment, and the image-based interpretation test for screeners. “The full certification process of a screener will therefore include numerous assessments,” said Hibbin.

WHAT CUSTOMERS EXPECT FROM CBT

When it comes to X-ray screening education, the real clients for CBT are not the screeners themselves, but the companies that employ them. These clients expect “convenience, consistency, and compliance,” de Rodriguez said. “They want to have a convenient way of delivering training, meaning that they need it to be hosted on a cloud server where they can access it securely. They also want the CBT’s teaching approach and the content to be consistent throughout, and all of it to be compliant with the relevant regulations.”

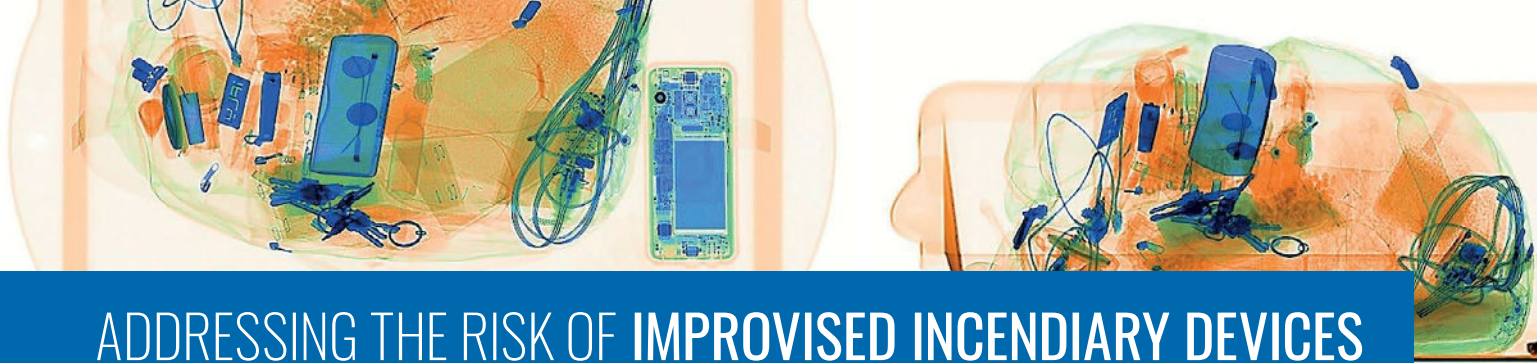
“Our customers expect proven training effectiveness, validated by multiple peer-reviewed studies and demonstrated through improved screener performance,” said Dr. Hardmeier. “This is why CASRA focuses on robust research aligned with operational demands to ensure our solutions consistently meet the highest standards.”

Of course, as technology advances and security threats evolve, X-ray screening training and certification requirements

change as well. “To support this, our CBT products offer individualized and comprehensive yet intuitive tracking features — allowing authorities and training providers to monitor indicators such as training times and performance progress with precision,” Dr. Hardmeier said. “This combination of validated training outcomes and flexible, regulation-sensitive tools is key to meeting the evolving needs of our global customer base.”

The same is true for e-Lectio’s CBT for screeners’ products. “Our customers expect rapid adaptation to regulatory and technological changes,” said Matan. “They also expect web-based accessibility through standard browsers, and image libraries based on real-life scans rather than artificially generated images. We consistently deliver on these expectations by updating our modules in line with regulatory requirements, ensuring seamless online access, and continuously expanding our real-image libraries to provide authentic training experiences.”

Keeping CBT for screeners’ clients satisfied comes down to four key requirements, Hibbin said. First, it is vital “that the system is built on educational principles such as fair and valid assessments, and follows best practice from evidenced pedagogical approaches,” she said. “The system must also meet regulatory requirements, which is probably the most crucial point for



ADDRESSING THE RISK OF IMPROVISED INCENDIARY DEVICES

As aviation grows, so do the risks. Recent incidents have shown that certain dangerous goods and flammable substances can be used to construct improvised incendiary devices (IIDs), creating new challenges for aviation security.

To address these challenges and risks, regulations on training of persons operating X-ray and EDS equipment (screeners) have been updated.

CASRA SOLUTION

To help aviation stakeholders, we have developed a new, dedicated computer-based training package focused on IIDs and related threats. This training package not only supports aviation stakeholders in building awareness and preparedness in security operations but also helps ensuring compliance with new regulatory requirements.

IMPROVISED INCENDIARY DEVICES TRAINING PACKAGE

All modules are delivered through an intuitive, user-friendly interface, designed to support effective learning and assessments. The training can be made available through your existing online or local version of X-Ray Tutor.

THEORETICAL PART

- › Overview of recent incidents including those involving incendiary substances or devices, and how they pose a threat
- › Insight into the specifics of different materials and how they can be assembled also in comparison to other threats
- › Visual examples of IID and threat components in reality and in X-ray images
- › Guidance how existing security screeners handle risks caused by incendiary substances
- › Knowledge test in a multiple-choice format

PRACTICAL PART

- › Screeners can train their X-ray image interpretation skills
- › They can choose the appropriate modules – cabin baggage, hold baggage, cargo and supplies screening

STANDARDISED IMAGE INTERPRETATION TEST

- › For assessing the X-ray image interpretation competency after screeners conducted the computer-based training
- › The image interpretation test contains target present and target absent images to mirror real screening environment
- › Target present images include a variety of threat objects

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operators. Thirdly, the CBT system must have adaptability and flexibility, suit a range of governance models and diverse aviation entities and their logistical, national layout. Finally, the CBT system must demonstrate proven success."

THE FUTURE OF CBT

So far, we have seen what CBT for screeners programs are offering today. So, what is on the horizon for tomorrow?

"The future of CBT lies in modularity, adaptability, and integration," said Dr. Hardmeier. To this end, CASRA is working on area-specific training modules, including complementary theoretical content; a stronger focus on 3D image interpretation; and further integration of automated detection system features such as machine alarms. "Ongoing systematic threat assessment to ensure timely integration of emerging

threats, such as IIDs, is being added into our training programs," she said. "We are also working on a holistic learning ecosystem with configurable interfaces, KPIs, and reporting dashboards. Collectively, these developments aim to provide scientifically-based, more individualized and operationally relevant training not only for today's challenges, but also for the dynamic security landscape of tomorrow."

AirTera is adding 3D gaming graphics, 3D scenario design and interactivity to its CBT courses. "In fact, we've got that concept already started," said de Rodriguez. "We've done a few introductory proof-of-concept conversations with clients and potential clients, and they're extremely interested. Our approach goes back to the way that students learn today. They grew up on video games, and so it makes sense to use a gaming approach to teach them

more effectively."

According to e-Lectio's Matan, the integration of AI into image interpretation is the next major step in aviation security technology. "As automated detection becomes more prevalent, the role of the human screener will evolve — requiring greater expertise to manage alarm resolution in complex cases, handle situations where technology cannot reach a conclusive decision, and apply judgment in areas requiring regulatory oversight," he said. "This shift means training will need to become more specialized, advanced, and aligned with the new challenges posed by incorporating AI into the screening process."

As for CAA International's view of the CBT for screeners' future? "Through my experience as a screener, and then working on certification as a regulator, and now as a provider, what becomes apparent are three base components

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SIMFOX

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The advertisement features three computer monitors displaying the SIMFOX software interface. The left monitor shows a 3D scan of a vehicle with a red and yellow heat map overlay. The middle monitor shows a 3D scan of a container with various colored markers and labels. The right monitor shows a 3D scan of a container with a blue and green overlay. The background is a dark red with a white geometric pattern of interconnected lines.

that interplay with what can be defined as “successful screener training,” said Hibbin. “For a training program to be successful, it needs to be built on expert educational principles, needs to meet the appropriate security standards, and it needs to be embedded in a positive culture, so that training becomes a tool for driving improvement.

Additionally, as we see a move toward more outcome-focused regulation and assessment, with CBT slotting into risk-based and performance-based oversight regimes (such as the U.K.’s Quality Assurance Framework for Aviation Security Training), where training regulation becomes less prescriptive, the certification system must become more robust, such that regulators and operators can assure themselves that the defined standard has been achieved.”

In conclusion, the current state of CBT for screeners is robust and up to date, and the future of this training approach promises

CASRA has added training to teach screeners about emerging threats such as IIDs. CASRA image.

to harness technological advances as soon as they occur. Given the life-and-death responsibilities of airport screeners, this is welcome news. 

Simply send your enquiry at: sales@sti-training.com
We look forward to hearing from you.

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