

RESEARCH REPORT

# TECHNOLOGICAL CHANGES AT AIRPORTS AND THEIR IMPACT ON WORKERS



**THE INTERNATIONAL TRANSPORT WORKERS' FEDERATION (ITF) IS A GLOBAL, DEMOCRATIC, AFFILIATE-LED MOVEMENT OF 740 TRANSPORT WORKERS' UNIONS RECOGNISED AS THE WORLD'S LEADING TRANSPORT AUTHORITY. WE FIGHT PASSIONATELY TO IMPROVE WORKING LIVES; CONNECTING TRADE UNIONS AND WORKERS' NETWORKS FROM OVER 150 COUNTRIES TO SECURE RIGHTS, EQUALITY AND JUSTICE FOR THEIR MEMBERS.**

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# EXECUTIVE SUMMARY

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Across the world airports are introducing new technologies aimed at increasing efficiency, reducing costs and supplementing worker shortages. The rate of change varies across airports – dependent on passenger numbers, airport size, regulatory pressures and the stakeholders involved. Automation has increasingly been used to shift away from manual work, and now more advanced digital tools are increasingly being used to supplement processes, making them more precise and faster. This has enabled many airports to shift to a ready-to-fly model. There is huge potential for further use of AI to improve the speed and accuracy of operations.

Through in-depth interviews and focus group discussions at three airports and an online questionnaire survey to union representatives, this research set out to explore how technological change within airports is impacting workers' rights and jobs. This research found that the occupations most impacted by changes include security operations, passenger handling, and baggage handling where technology is being introduced to reduce manual processes as well as to simplify and 'streamline' work tasks.

There is huge potential for these technologies to ease workload and improve occupational health and safety. However, technology tends to be mistakenly seen as a silver bullet and introduced without consideration of the potential negative impacts of technology. Although immediate job losses were not evident from new technology being introduced, companies seem to be deliberately understaffing or relying on the natural turnover of the workforce to facilitate the introduction of new technologies. This intensifies work and has major impacts on physical and mental health and safety. Many workers are also facing increased incidents of aggression from passengers, further exacerbated by understaffing and malfunctioning technology. Technology is also increasingly being used to monitor and surveil workers, leading to more hierarchical management cultures and violations of workers' rights to privacy. There are also major concerns related to the declining quality and length of training and skills development across the industry. The industry is also facing major challenges related to declining job satisfaction and workforce recruitment and retention, exacerbated by low



pay, poor working conditions and negative consequences from the introduction of new technology.

Airports' drive for growth is expected to increase the reliance on new forms of technology replacing some jobs, whilst transforming others. In passenger-facing roles, the rate of change is also likely to be influenced by passengers' adaptability to change. The benefits that technology has to offer are dependent on the circumstances under which the technology is introduced, the quality of technology and the consideration for impacts on work, including occupational safety and health.

There is currently a lack of meaningful engagement with workers and trade unions

about technological change from airport operators and employers. Although some positive examples exist, implementable language tends to be difficult to negotiate in collective agreements. The existing challenges highlight the central importance of a collaborative approach to the introduction of new technology, including all key stakeholders within airports – particularly trade unions. It also highlights the importance of labour impact assessments, including equality impact and risk assessments before technology is introduced, commitments to job security, quality and skills development, equal access to quality technology for workers, standardisation across technology and the need for controls on monitoring and surveillance technologies and the collection and use of worker data.

# ACRONYMS AND GLOSSARY

<b>A-CDM: AIRPORT -COLLABORATIVE DECISION MAKING</b>	Real-time information and data sharing between stakeholders in the airport to improve efficiency of operations and optimise use of resources.
<b>AA2000</b>	Aeropuertos Argentina 2000
<b>ADC: AUTOMATED DOCUMENT CHECK</b>	Automated software used to digitally check details of passenger travel documents (passports, visas, health regulations) – against a digital database of international travel rules.
<b>AI</b>	Artificial Intelligence
<b>APIDS: AUTOMATED PROHIBITED ITEM DETECTION SYSTEMS</b>	Advanced AI-based algorithms integrated into security screening systems to enable detection systems to identify threatening items within baggage.
<b>ASOS</b>	Aviation Security Officers
<b>AUTOMATED STAND-BY LIST</b>	An automatic digital ‘stand-by’ list for passengers waiting to get a place on a flight.
<b>AUTONOMOUS VEHICLES</b>	Driverless vehicles able to operate and perform functions autonomously without direct human intervention.
<b>BHS: BAGGAGE HANDLING SYSTEM</b>	Automated conveyor system that transport checked luggage from ticket counters to areas where baggage can be loaded onto planes, and checked baggage coming from airplanes to baggage claim.
<b>BIG DATA</b>	Large data sets that bring together data from many different sources that grow rapidly.
<b>BIOMETRIC DATA</b>	Measurements and collection of data about unique characteristics (body measurements, iris scans, fingerprints) which can be used to authenticate identity of passengers throughout the airport.
<b>BOARDING GATE READER</b>	Electronic device equipped with barcode readers to validate boarding passes and passports to authorize passengers to board.
<b>CAA</b>	Civil Aviation Authority
<b>CCTV: CLOSED-CIRCUIT TELEVISION</b>	Television security systems in which cameras are used to capture images that are not publicly distributed but monitored for surveillance.
<b>CT: COMPUTED TOMOGRAPHY SCANNERS</b>	X-ray scanner that captures detailed 3D internal images of luggage and creates a detailed ‘tomograph’ or ‘slice’ of baggage.
<b>DIGITAL BAGGAGE TRACKING SYSTEM</b>	System using Radio Frequency Identification (RFID) – comprising tags and readers – that use radio frequencies to identify and track objects.

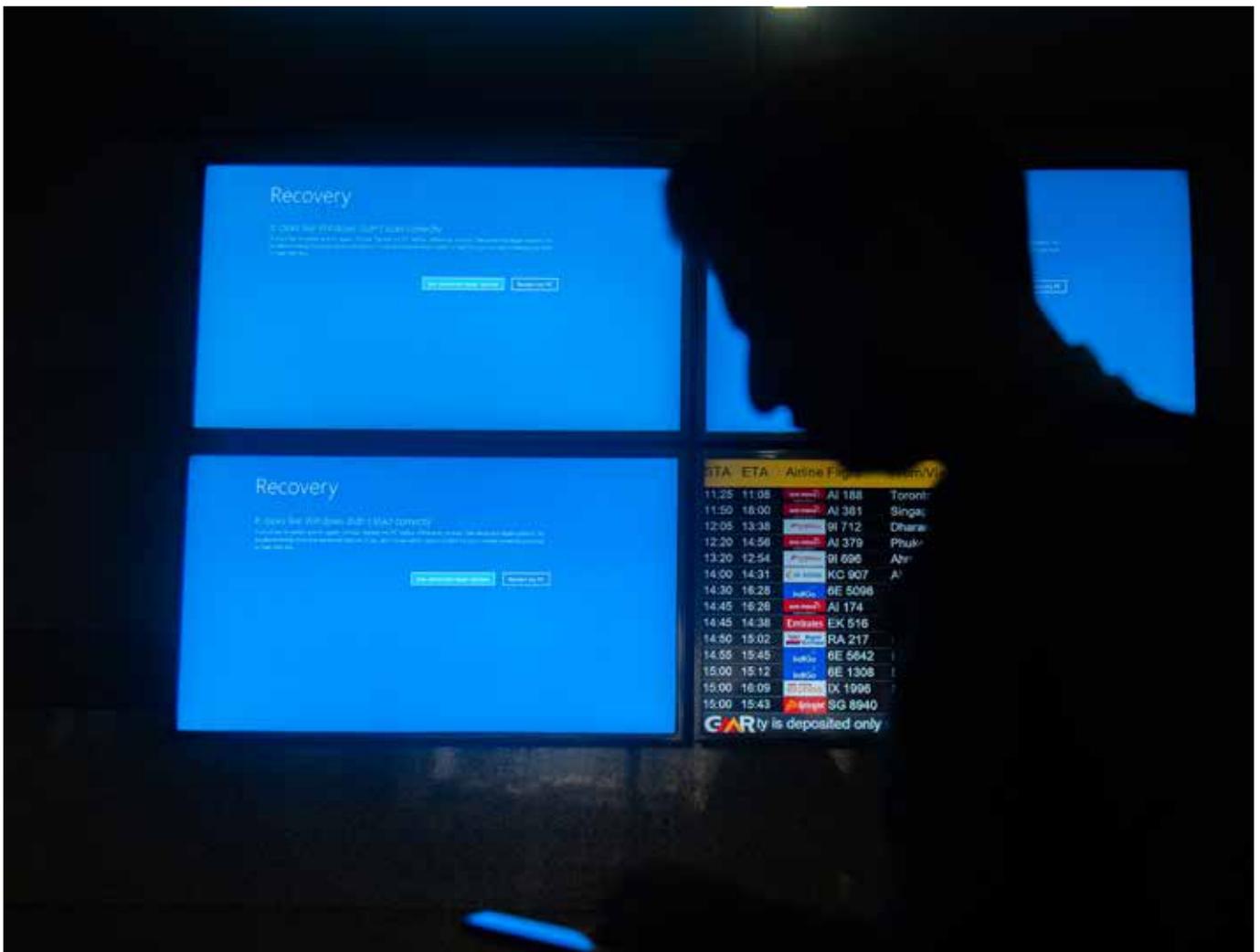
<b>DRONES</b>	Known as unmanned aerial vehicles (UAVs) or unmanned aircraft systems, a flying vehicle that can be remotely controlled or fly autonomously. It functions using sensors onboard and a global positioning system (GPS).
<b>E-LEARNING</b>	Learning delivered online through an electronic or digital device.
<b>EU</b>	European Union
<b>EZE</b>	Ezeiza International Airport
<b>GTAA</b>	Greater Toronto Airport Authority
<b>HANDHELD ELECTRONIC SCANNERS</b>	Portable electronic device used to scan and capture physical documents into digital formats.
<b>HIGH REACH EXTENDABLE TURRET</b>	Deployable arm on fire vehicles that dispenses fire extinguishing materials.
<b>HR</b>	Human Resources
<b>IOT: INTERNET OF THINGS</b>	A network of digital sensors and software used to connect real-time data across the airport – creating ‘airport-wide data hubs.’
<b>MAG</b>	Manchester Airport Group
<b>MAN</b>	Manchester Airport
<b>MAYFLY</b>	Physical document detailing daily schedule for flights.
<b>ONE-WAY SECURITY CORRIDORS</b>	Automatic access doors within a corridor that open automatically in the direction of the flow of passengers, usually from a more secure area to a less secure area and has alarms that are triggered if they are used in the wrong direction. It can also be connected via video-surveillance to a system for remote supervision within the airport.
<b>OSH</b>	Occupational Safety and Health
<b>PDA: PERSONAL DIGITAL ASSISTANT</b>	Digital hand-held mobile devices providing information storage and two-way digital communications.
<b>QR: QUICK RESPONSE CODE</b>	A barcode that is scanned by a digital device and stores information.
<b>SA</b>	Security Ambassador
<b>SELF-SERVICE BAG DROP KIOSKS</b>	Automated machines allowing passengers to weigh luggage, print bag tags and put luggage into the baggage system themselves.
<b>SELF-SERVICE CHECK IN KIOSKS</b>	Automated machines that let passengers autonomously check in for their flights without human interaction with an agent.
<b>SNAKE BELT</b>	Automated mechanical conveyor belts that aid the process of loading/unloading of baggage and cargo from the airplane.
<b>YYZ</b>	Toronto Pearson International Airport

# INTRODUCTION

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Across the world, airports are introducing new technologies aimed at increasing efficiency, reducing costs and finding new revenues. The pace of these changes appears to have increased during the pandemic as airport operators and employers sought new solutions to deal with health and safety concerns, reduce face to face contact, speed up passenger flow and adapt to a decrease in personnel. As the industry moves past the pandemic, it is expected that many of these technological changes will remain in place, with unclear impacts on airport workers. In 2022–23, many airports were also struggling to hire sufficient numbers of personnel to cope with rising demand for air travel, changing the context in which technological changes are being considered. Concerns about climate change are also increasingly spurring innovations – likely to become more necessary as air traffic volumes increase.

Although many employers often see technology as a silver bullet – an easy solution to address challenges facing airports – this research has highlighted that the benefits that technology has to offer are highly conditional, dependent on the circumstances under which the technology is introduced and the type and quality of technology that is provided. The introduction of technology also means major costs for companies which have to strike a balance between the costs of implementing the technology and the potential savings that the technology might provide. The outcomes of this research also reinforce the central importance of considerations for occupational safety and health (OSH) in the introduction of new technology and the value of a collaborative approach to the introduction of new technology – meaningful engagement between all key stakeholders, including trade unions.



This research has also revealed major workforce challenges within the industry. Challenges related to retention, spurred on by the pandemic and exacerbated by low pay and poor working conditions, have contributed to a loss of skilled and experienced workers across the industry. While technology has increasingly been introduced to ease challenges and simplify tasks required for jobs in the industry, there have been resulting negative impacts on the workforce, further exacerbating issues with retention and recruitment of workers.

Within this context this study was undertaken with the aim of:

- Assessing the level of automation, digitalisation, and technological changes at airports globally.
- Understanding the impact of technological changes and digitalisation on airport workers.

- Understand the degree to which airport technological changes impact workers' jobs and rights.

Data was collected from both primary and secondary sources including:

- Desk-based literature review of key secondary sources (industry press, publications, academic reports, media).
- In-depth interviews with airport officials.
- Online questionnaire survey to union representatives of airport workers.
- Individual interviews with airport workers, and union representatives at 3 airports.
- Focus group discussions with airport workers at 3 airports.

Data collected was analysed according to key thematic areas with particular focus on identifying workers' awareness of technology, major impacts on jobs and workers' rights and decision-making processes around technology. Basic quantitative analysis of survey results was also undertaken.

Data was collected from three airports: Manchester Airport (MAN), UK; Pearson International Airport (YYZ), Toronto Canada; and Ezeiza International Airport (EZE), Buenos Aires, Argentina.

Occupations included within the scope of the study were agreed upon with participating unions according to relevant technological change taking place, interview availability and other logistical considerations. Research was limited by the inability to secure focus group discussions for all airport occupations – in such cases individual worker interviews were undertaken instead.

- **Manchester Airport (MAN):** focus group discussions and individual worker interviews were undertaken with union representatives and workers in: passenger pre-boarding security; ramp agents; baggage operators; and airport fire services.
- **Pearson International Airport (YYZ):** individual worker interviews were undertaken with passenger service agents, non-passenger security, and flight attendants. A mix of individual and group interviews with 4 different union representatives and a stakeholder interview with an airport official was also undertaken.
- **Ezeiza International Airport (EZE), Buenos Aires, Argentina:** focus group discussions were undertaken with: ramp agents; 'airport service workers' which included parking attendants, passenger service agents, and maintenance mechanics; passenger service agents; and passenger service agents and duty-free workers.

#### Occupational Group Analysed Per Airport

Occupation	MAN	YYZ	EZE
Airport Security Operations	•	•	
Ramp Agents	•		
Baggage Operators	•		•
Passenger Service Agents		•	•
Flight Attendants		•	
Airport Fire Services	•		
Duty-Free Workers			•
Maintenance Mechanics			•
Parking Attendants			•

## Description of Occupations in Airports

Occupation	Description
Airport Security Operations	<p><b>Passenger pre-boarding security:</b> Workers undertaking security screening of passengers and carry-on baggage before boarding a plane to ensure no prohibited items are taken through the airport and onboard the plane. Workers are often employed directly by the airport.</p> <p><b>Non-passenger security:</b> Workers undertaking security screening on static posts, including screening of non-passengers (airport employees, airline staff, and other workers) accessing restricted areas of the airport, as well as monitoring CCTV and operating security gates. Workers often work for companies that are subcontracted by the airport to undertake security services.</p>
Ramp Agents	Workers undertaking 'under-wing' services preparing aircraft for turnaround for the next flight. Duties include loading/unloading baggage and cargo, guiding and parking aircraft, de-icing planes, basic cabin maintenance tasks.
Baggage Operators	Workers undertaking duties to support processing of baggage within the airport. Duties include loading and storing baggage, scanning baggage arriving from the check-in hall to be passed through security, and delivery to baggage store or loaded onto trailers to be delivered to the aircraft for loading. Baggage operators often work for ground handling companies.
Passenger Service Agents	Workers responsible for assisting passengers throughout the airport across both terminal and airside. Duties include providing customer service, information and assistance to passengers, check-in of passengers and baggage, tagging baggage to be sent to baggage system, assisting with boarding passengers, and checking travel documents. Workers often referred to as customer service agents, passenger services handling, air traffic assistants/supervisors, and pre-boarding agents. These workers often work for airlines, or ground handling companies contracted by the airline.
Flight Attendants	Workers responsible for ensuring safety and security of passengers on a flight. Duties include preparing passenger safety and emergency procedures, cabin preparation, passenger service and hospitality, in-flight security, post-flight cabin inspection.
Airport Fire Services	Workers undertaking rescue and firefighting services within the airport, including emergency response, mitigation, evacuation and rescue of passengers and crew of aircraft involved in aviation incidents.
Duty-Free Workers	Workers undertaking duties to provide customer service and sales assistance to customers in duty free shops as well as stocking duties in warehouse areas.
Maintenance Mechanics	Workers undertaking duties to repair and maintain airport equipment.
Parking Attendants	Workers responsible for collecting parking fees and assisting customers with payments.

22 responses from union representatives were received from the online survey representing airports in: Algeria, Brazil, Canada, Colombia, Cote d'Ivoire, France, Germany, Indonesia, Kenya, Kuwait, Morocco, Netherlands, Nigeria, Peru and United States.

# TECHNOLOGICAL CHANGE IN AIRPORTS

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Technological change is the introduction of new ideas, techniques, tools or ways of functioning, often to improve efficiency or reduce costs. Innovation through the introduction of new types of technology tends to be seen as a necessity within airports because of pressure on safety, security, efficiency and speed of operations – driven by passengers, regulatory bodies and the industry itself.<sup>1</sup> In more recent years, there has been a growing demand for global travel, growing concerns over security, and pressure to respond to environmental concerns.<sup>2</sup>

Aviation is heavily impacted by emerging disruptions and crises. Before the COVID-19 pandemic hit, the industry was in a period of growth with passenger levels on the rise.<sup>3</sup> But the pandemic had devastating impacts on the industry – a 61% decline in passengers in 2020, and a 50.3% decline in 2021, with impacts differing across regions.<sup>4</sup> The lifting of travel restrictions in 2022 was a turning point for the industry, and 2024 is expected to see passenger levels reach 9.4 billion, surpassing 2019 levels (9.2 billion passengers).<sup>5</sup> However, recovery remains uneven globally.<sup>6</sup> Persistent challenges are being faced due to a rising demand for global air travel.

Globally, commercial aviation supports around 87.7 million jobs worldwide, and before the pandemic provided 11.3 million direct jobs.<sup>7</sup> However post-pandemic, airports appear to be facing increasing difficulty in recruiting and retaining workers, with major ‘staff shortages’ reported across the industry.<sup>8</sup> Six out of ten airports reported that their staff would be under 50% of 2019 levels by the end of 2023.<sup>9</sup> In the European Union (EU), 1 in 9 vacancies is expected to remain unfilled, and these shortages are expected to remain a persistent trend into the future.<sup>10</sup>

Major job cuts took place during the pandemic and many workers have now left the industry for jobs requiring similar skills whilst offering better pay and conditions (e.g. check-in workers going to retail jobs).<sup>11</sup> At the same time, some new technology introduced within airports has reportedly resulted in declining job satisfaction.<sup>12</sup> Turnover in the airport workforce has created major knowledge gaps as experienced staff leave the industry. Many airports – in a drive for exponential growth – are increasingly turning to technology to improve costs and operational efficiency, providing new opportunities for revenue generation and improved passenger satisfaction, as



well as to respond to the growing cost, and shortages of labour. Initially introduced during the pandemic for health and safety measures (e.g. thermal-imaging cameras to detect body temperatures)<sup>13</sup> and to respond to worker shortages (e.g. increased use of online services), many technologies have remained and the shift to its use has accelerated.<sup>14</sup>

The rate of future technological change is expected to vary across regions – depending on density of air traffic (higher density tends to mean faster change), airport size (smaller airports tend to be further behind), existing

regulatory frameworks and the nature of the stakeholders operating within the airport.

In recent years, several technological shifts have been seen and even before the pandemic hit, new technology was being introduced in airports. Technological change in airports has historically focused on a shift away from manual processes – with automation introduced across the industry (e.g. robots to perform repetitive tasks) both to assist and replace physical labour. This trend has since increased rapidly and has reduced physical labour in many occupations.

## DIGITAL TOOLS ARE COMBINED WITH AUTOMATED FUNCTIONS TO ENABLE WORK TO BE UNDERTAKEN WITH GREATER PRECISION, IMPROVING EFFICIENCY OF OPERATIONS AND ENABLING AIRPORTS TO RESPOND TO ARISING NEEDS.

In cleaning services, automated robotic cleaners have been introduced in airports and aircraft; self-check in and bag drop kiosks are becoming more prevalent in passenger handling; automated baggage handling systems (electronic conveyor belts) are becoming the norm in baggage handling; and in maintenance and ground handling, autonomous automated baggage vehicles, snowploughs and automatic belt loaders (snake belts)<sup>15</sup> are now starting to be seen.<sup>16</sup> These technologies have changed the nature of many jobs, and studies suggest that huge potential exists for further automation – particularly focused on speeding up the time required for aircraft turnaround.

This has been further enabled by the integration of digital technologies ('digitalisation') into operations, enabled by digital tools (apps, cameras, sensors). Digital tools are combined with automated functions to enable work to be undertaken with greater precision, improving efficiency of operations and enabling airports to respond to arising needs. This is increasingly being supported by the increased collection and use of more complex data. In airports this has included:

- Some passenger agents are using mobile devices, connected to data received from within the airport, to assist passengers. In some airports, digital customer services enable passengers to connect with customer service agents via call, text or video-call, with information also accessible via applications. Digital screens provide real-time information to passengers.

- In baggage handling, a drive to reduce baggage mishandling has led to the use of digital tools to track and trace baggage.<sup>17</sup>
- Automated aircraft docking guidance systems and boarding bridges – in place for a long time in many airports – are now using more precise real-time data to improve precision and safety.
- More advanced 3D computed tomography (CT) scanners are being introduced in security operations to provide more detailed images of luggage.
- Data is also increasingly being used in maintenance and engineering – digital sensors send information directly to engineers and Artificial Intelligence (AI) helps to predict potential problems.<sup>18</sup>
- Studies suggests that 'Big Data' is also increasingly being used in cargo handling.<sup>19</sup>

These new technologies have enabled many airports to shift to a 'ready-to-fly' touchless model, creating a seamless experience for passengers.

Digital tools are also increasingly being used in human resources (HR). There has been a shift away from in-person HR management with scheduling software being used to plan work and mobile applications being used to communicate with workers.<sup>20</sup> This has also been accompanied by increased use of digital performance management tools.

There is huge potential for AI to further be used to improve the speed and accuracy of

airport operations. In security, the integration of AI into screening systems could enable the development of Automated Prohibited Item Detection Systems (APIDS) to identify luggage with 'threatening' items. Capture of biometric data (body measurements, iris scans, fingerprints) is expected to increasingly be used to verify identities of workers, and passengers in border control and for boarding gates.<sup>21</sup> In retail, self-service shopping is on the rise and AI is being used to predict patterns of customer consumption.<sup>22</sup> AI also has potential to be used to monitor CCTV – analytics can be used to monitor behaviour with security operators alerted to respond only when a problem is identified.

This has also opened the door for a potential shift to remote operations to improve cost/time efficiency as well as increase capacity: drones are increasingly being used for airport perimeter surveillance; there are shifts towards remote screening in security; and remote air traffic control towers are starting to be introduced (air traffic controllers physically separated from control towers).<sup>23</sup> Such technologies pose major risks of replacing jobs in the future. However the introduction of digitalisation tends largely to be as a response or solution to a specific challenge or gap to be addressed at different points across airport operations, rather than providing holistic solutions to more systemic challenges that airports are facing. The piecemeal nature of this approach is posing major challenges to overcoming structural problems facing airport operations.

Data is also increasingly being captured to move towards a 'fully connected' airport ('Airport 4.0').<sup>24</sup> Digital sensors are used to connect real-time data across the airport, creating airport-wide data hubs (or an 'Internet of Things').<sup>25</sup> Sensors capture data about the environment (e.g. passenger flows or maintenance needs) and information is communicated across the airport so that the relevant stakeholders can react and respond.

The data that is captured can later be used to help airports to improve operations, and AI-modelling can enable airport authorities to predict future challenges.<sup>26</sup>

This shift to a 'fully connected' transport system is common across other transport sectors as well. In ports, there has been an increased shift to 'smart' ports with big data, AI and automation being collected and used to connect supply chains and improve efficiency of operations. In urban transport, the use of real-time data and predictive analytics is providing urban transport authorities with the potential to forecast to allocate resources. This is therefore a challenge facing workers across many transport sectors.

Although sustainability is a key driver for technological change, literature suggests that airports are facing difficulty in responding to structural environmental concerns whilst also balancing a desire for growth.<sup>27</sup> However technologies that are being leveraged to improve sustainability include electrification of ground vehicles and equipment, and electric powered Vertical Take-off and Landing (eVTOL) aircraft. Airports have also introduced new approaches to emissions reductions in airports – generating and/or using renewables and increasing use of sustainable aviation fuel,<sup>28</sup> and incorporating sustainability into airport planning. This has included use of Airport Collaborative Decision-Making (A-CDM) – information and data is shared and exchanged within individual airports in real-time and collected digitally to improve efficiency of airport operations.<sup>29</sup>

# AIRPORT CASE STUDIES

## MANCHESTER AIRPORT (MAN), MANCHESTER UK

Manchester Airport (MAN) is the UK's third busiest airport and a global top 20 airport by passenger numbers. It employs 19,000 people directly on site and is part of Manchester Airport Group (MAG) – the largest UK-owned airport group.<sup>30</sup> The pandemic had a major impact on the airport, although recovery has reportedly been strong. In 2023, passenger numbers overtook pre-pandemic levels on a month v month level (annually it's still -1 million on 2019 levels at MAN), with the airport serving 2.6 million passengers in October 2023, compared to 2.5 million in October 2019.

Since 2015, MAG has been undertaking major investment at the airport, announcing £1.3 billion investment as part of the *Manchester Airport Transformation Programme*. Phase 1 of the programme – completed in 2021 – involved expansion and improvements to Terminal 1 and Phase 2 will entail a refurbishment of Terminal 2 to provide passengers with a seamless experience and reconfigure airfield operations to improve efficiency. Technology being introduced includes 'state-of-the-art' self-service check-in technologies, and 'next generation' security equipment in new security halls, including computed tomography (CT) scanners (x-ray scanners that capture detailed 3D images of luggage).

Other developments include new boarding facilities, an extended departure lounge, a refurbished arrivals hall and a modernised airfield. The investment is expected to increase the capacity of Terminal 2 by 150% – enabling Manchester to handle 45 million passenger per year, and Terminal 1 is set to close in 2025.

In recent years, MAG has also developed sustainability initiatives, including partnerships for sustainable aviation fuel and low carbon hydrogen fuel. In 2015 MAN became one of the first airports to become carbon neutral, and in 2022/2023, 100% of electricity used was procured from renewable sources.<sup>31</sup>

### Ramp Agents

Ramp agents<sup>32</sup> undertake work to prepare aircraft for turnaround for the next flight, with duties including loading/unloading baggage from the aircraft and guiding aircraft to and from gates.

Interviews with ramp agents identified that digital technologies have been introduced in the management of work. Previously, workers were given a Mayfly (a physical document detailing a daily schedule for flights) with work assigned by a person (called an 'allocator'). However, since the pandemic work has been

assigned using an electronic system and received by workers on their mobile device through a company application. This change removed the role of 'allocator' and has also had negative impacts on workers.

Workers previously had access to information about work being undertaken by all teams on a shift, but they are now only given information about their own specific tasks. This means that they are unable to work collaboratively with other teams across the airport to allocate equipment and resources as needed, as one worker highlighted: *"it has left workers with no overview of operations, other than the job that they are allocated. It has made work more individual and made the job harder..."*<sup>33</sup>

The task list is also updated digitally in real-time which means that workers have to check their mobile device frequently. This means that workers have become heavily reliant on their phone, which has increased stress on workers. The company also provides no device or financial reimbursement for workers using their own devices, despite this being frequently requested from the company by workers: *"it is just expected for people to have mobile devices to use."*<sup>34</sup> Workers are also reliant on sufficient signal and a charged device to fulfil tasks properly which, when not available, can result in mistakes being made and delays taking place. According to workers, there was no consultation with the union or workers when this was introduced.

Before the pandemic, snake belt loaders were also introduced (mechanical conveyor belts that aid with loading/unloading of baggage from airplanes).<sup>35</sup> Before the technology was introduced, loading previously required ramp agents to manually load baggage onto the aircraft, but baggage is now automatically transported directly into the aircraft hold.

There have been positive impacts on health and safety from the introduction of the snake belt. The machine can be used at different heights and raised as bags are loaded, enabling workers to slide bags into place rather than lifted from a kneeling position on the ground. This has reduced physical pressure on workers.

Although no direct job losses were identified as a result of the new technology being introduced, indirect impacts on the number of workers were identified: *"manual belt loading would usually involve 2–3 workers in the aircraft loading... but as a result of this change this has been reduced down to only 1 person being required for the job."*<sup>36</sup> Workers identified that the company has not hired as many ramp agents for the job and the workforce reductions have tended to take place through the natural turnover of workers rather than through direct redundancies: *"the company is simply not hiring as many heads for the jobs... it did not take on as many workers seasonally this time."*<sup>37</sup>

Workers have also faced difficulty with the technology due to malfunctioning sensors. This means that workers often choose not to use the snake belt as it can end up taking longer than undertaking work manually. However it was identified that this intensifies the job for workers remaining – if it fails, workers revert to the old manual system but a decrease in the number of workers available means that the workload is increased. Although workers received some training when the snake belt was introduced, it was limited to an introductory overview followed by on the job learning.

Monitoring and tracking of the workforce has also increased since the pandemic. One company introduced a new digital tool (called 'SMART'<sup>38</sup>) to undertake quality control inspections of ramp operations. The digital tool takes a digital record of how work is completed, with data collected being used for quality control as well as to monitor workers' productivity. If workers have three findings ('failings') flagged on the system within one month, a disciplinary process is automatically triggered. This is increasing pressure on workers, with reports of workers leaving the job as a result: *"this has dehumanised the role and means that you are constantly second guessing yourself... one guy is leaving because of downward pressure ramping up."*<sup>39</sup>



There has also been a shift to online training by the company. Annual training was previously run by an in-person trainer and undertaken in a training suite. However, the company has now shifted to e-learning (learning delivered online through an electronic or digital device). Workers have to complete the online course alone in a busy office environment, which can be distracting for workers. This has also raised safety concerns due to workers not properly taking in the information and lacking the necessary understanding: *“some workers simply go through the training without reading it or understanding it... it is simply a tick-box exercise and this has raised safety concerns.”*<sup>40</sup> If workers have questions about the information there is no facility online to ask questions.

There are expectations that there is potential for further automation within the job. Drones (unmanned aerial vehicles) could be introduced for physical walk-arounds of aircraft

during turnaround, and autonomous vehicles (‘driverless’ vehicles able to operate and perform functions without human intervention) could also be introduced. The introduction of such technologies have the potential to de-skill the job and or even replace work entirely. However, there is also a recognition amongst workers that many parts of the job are harder to automate due to a reliance on physical activity and due to technology not functioning effectively.<sup>41</sup>

### **Baggage Operators**

Baggage operators<sup>42</sup> work in the baggage handling hall to process baggage within the airport. Duties include scanning and tagging luggage that comes through the system and putting it into containers to be loaded onto the aircraft.

Before the pandemic, new digital technology

was introduced in the form of a hand-held electronic scanner. The system was previously manual – workers would take tickets from baggage arriving in the hall and stick them onto a card for the dispatcher – who checks the luggage and coordinates loading the baggage onto the aircraft. However, an electronic scanner is now used to scan tickets on the luggage with the information instantly shared with the dispatcher. This has decreased workload for the dispatcher who is able to use the information received digitally to check baggage: *“this sped up work for the dispatcher, cutting their workload down from an estimated 45 minutes to... now looking at a screen... in 2.5 minutes and then the job is done.”*<sup>43</sup> It has also improved the speed of the job for baggage operators.

Although workers did not identify that the scanner had directly replaced jobs, it was identified that there are insufficient numbers of personnel within the role: *“Before the pandemic, we had 7 people and now we manage with between 4–5 people... it has had an impact on how many people are needed to fulfil the role... the company tries to get by without sufficient numbers.”*<sup>44</sup>

The scanner has also increased monitoring of workers, with mixed impacts. Workers log in to the electronic scanner using a personal login which captures a record of everything that the worker has done, including any mistakes. However, it was identified that this is not necessarily negative as it improves quality control and there are also potential positive health and safety impacts – flags are raised digitally through the system where workers are inactive for a length of time, for example if a worker has had an accident.

One of the major concerns of workers is the declining quality and length of training within the job. Workers only receive 1 hour of training on the new technology. There is also an age gap in workers' comfortability with technology – older workers tend to face greater barriers to using the technology: *“...a clear age gap with technology... younger people are more willing*

*and able to learn, whereas older workers are more fearful of making a mistake with technology.”*<sup>45</sup> Increased use of technology in the employment relationship – for accessing rotas or requesting leave has also negatively impacted older workers who often require more support to access this.

## **Passenger Pre-Boarding Security**

Workers in passenger pre-boarding security<sup>46</sup> undertake security screening of passengers and carry-on baggage before boarding a plane.

In 2019, the UK Government and the Civil Aviation Authority (CAA) announced new rules requiring airports with over 1 million passengers to install new advanced 3D CT scanners which will be able to show more detailed images of hand luggage.<sup>47</sup> Unlike 2D scanners which required screeners to identify prohibited items from static 2D images, the new CT scanners enable security screeners to capture more detailed images to examine baggage in more detail.

The introduction of this new technology will increase current limits on passengers for carrying liquids.<sup>48</sup> Passengers will also no longer be required to remove liquids and large electrical items from luggage when going through security checks. The rules were originally expected to be rolled out by the end of 2022, but implementation was delayed due to the COVID-19 pandemic, with technology expected to be implemented by June 2024. There are over 1000 security officers at Manchester airport, many of whom will be impacted by the change.

Aviation Security Officers (ASOs) undertake work conducting searches of cabin luggage and passengers and operating security equipment. The new 3D scanners are expected to lead to job losses amongst ASOs. Less sensitive previous 2D scanners required more frequent bag searches, however the new technology will be able to identify items in luggage more easily, meaning that fewer bag rejects are expected with bag reject rates expected to drop from

15% to 2%. The airport will also transition to 100% use of the advanced equipment for body scanning. Fewer searches of passengers and luggage will be required, reducing the number of ASOs needed.

The changes will also impact the role of Security Ambassador (SA) – a role focused on hosting entrances to security search areas, ensuring security trays are loaded correctly and preparing passengers for security checks. Incoming 3D scanners will require fewer SAs to direct passengers. The airport operator is also planning to automate many of the tasks of SAs – instead of workers providing instructions, passengers will be directed to digital screens at load points and for queuing systems.

Anticipated delays in implementation mean that all SA roles are currently still required, but the role will be phased out when the new terminal becomes operational in 2025 and the union anticipates that 160 SA roles will be lost. Workers will be given the opportunity to be redeployed to other roles, including customer service ambassador roles. SAs will also have the opportunity to undertake a competency test to become an ASO. However, workers highlighted that the pass rate for this test has risen and so there are expectations that fewer workers might be able to obtain certification. There is also ongoing concern about where security workers could be re-deployed as the number of security jobs is on the decline and workers unable to obtain new roles will lose their jobs: *“once the changes are fully implemented... if there are no other roles then workers will likely be made redundant.”*<sup>49</sup> There are also concerns about how this might impact different groups of workers, for example older workers who might face greater barriers in obtaining the certification to become an ASO.

This has also meant that the ASO role is being restructured. Currently ASOs work across different positions – in passenger security screening and non-passenger security screening on static posts (screening cargo and airport staff). The restructuring will mean

that the role will be split – workers will either take on a role working with passengers, or in static posts. Although this is not expected to negatively impact pay, there are concerns about potential negative health and safety impacts. Workers moving to a passenger-facing role could face increased pressure and exposure to harassment from passengers. Workers are also likely to experience increased monotony from a less varied role.

There has been ongoing consultation with the union about changes but the airport operator has not yet made commitments on potential future redundancies, and the union is still in consultation on other security roles. The union is insistent on the need for skills development to enable workers to be redeployed. There is also an expectation that in the future the airport could introduce remote screening of security lines (screeners in a separate physical place to security screening taking place) and Automated Prohibited Item Detection Systems (use of AI integrated into security screening systems to enable detection of threatening items) in future system upgrades. There is also potential for AI to be introduced for screening hold baggage and in CCTV monitoring – which could reduce the numbers of security jobs as well as make work more monotonous.

### **Airport Fire Services**

Workers in airport fire services<sup>50</sup> undertake work in rescue and firefighting services within the airport. The nature of airport fire services varies across the world, however in Manchester airport the airport authority is responsible for the provision of fire services.<sup>51</sup>

The most recent new technology in fire services was introduced in 2014 when the fire service updated the vehicle fleet and introduced 6 new vehicles with high-reach extendable turrets<sup>52</sup> (deployable arm attached to the fire vehicle that dispenses fire extinguishing materials). According to the employer, the technology was introduced to improve safety, however, there have been negative impacts on work intensity.

## **THERE HAS BEEN ONGOING CONSULTATION WITH THE UNION ABOUT CHANGES BUT THE AIRPORT OPERATOR HAS NOT YET MADE COMMITMENTS ON POTENTIAL FUTURE REDUNDANCIES, AND THE UNION IS STILL IN CONSULTATION ON OTHER SECURITY ROLES.**

Previously 3 workers were required for the shift, but the new technology means that only 2 workers now tend to be needed. When it was introduced it resulted in a loss of 16 workers. It has also subsequently increased pressure on workers – some workers find the new technology challenging to use and it can sometimes be faster to manually undertake the job.

The major concern for workers now is the introduction of new technology when the current fleet of vehicles are replaced. The union previously had a 10 year new technology agreement in place, and negotiations are now taking place for renewal. The union is negotiating for a new 10-year technology agreement to be decoupled from the agreement covering other workplace conditions, to ensure that workers are protected from new technology when vehicles are replaced in the future.

Although not explored in detail, other potential areas of future technological change across

the airport were identified. In parking services where there are currently 50 traffic marshals working on car park forecourts, the potential introduction of Automatic Number Plate Recognition (ANPR)<sup>53</sup> could replace the need for traffic marshals. There is also an expectation that operational management of the airport will become increasingly centralised and data driven – digital sensors and CCTV are likely to be used to monitor traffic flow, passenger check-in, and security operations.

There tends to be little collaborative negotiation about the introduction of new technology within the airport. The union does not receive adequate information from the airport operator to develop proactive strategy to respond to potential incoming changes, and is now in negotiation with the airport to develop a new technology agreement to cover all workers impacted by new technology at the airport – a request so far dismissed by the airport.

# TORONTO PEARSON INTERNATIONAL (YYZ), TORONTO CANADA

Toronto Pearson International Airport (YYZ) is the largest airport in Canada – run by the Greater Toronto Airports Authority (GTAA). Before the COVID-19 pandemic, it was estimated that around 50,000 jobs were directly associated with operations at YYZ, with hundreds of thousands more enjoying livelihoods made possible by the airport.<sup>54</sup>

According to the GTAA, technological change is not taking place as rapidly at YYZ as elsewhere, although where it is being introduced it is mainly aimed at improving operational efficiency, strengthening security, and enabling a 'seamless' passenger experience.<sup>55</sup> GTAA has ambitions for YYZ to become a global mega-hub by 2035,<sup>56</sup> and new technology being introduced includes – increased numbers of self-service/bag drop kiosks, more advanced security scanning equipment, biometric identification for customs and border control, digital sensors to monitor the passenger journey, and increased use of AI and data throughout airport operations.<sup>57</sup> The airport is also introducing new technology to address environmental concerns – hydrogen fuelling stations, more fuel efficient aircraft, use of biofuels, and also has a Cogeneration facility<sup>58</sup> to supply power to the airport – with surplus power sold back to the grid.<sup>59</sup> The GTAA also reports increased use of Airport Collaborative Decision-Making (A-CDM) – improving sustainability in air traffic management.<sup>60</sup>

400 companies operate within the airport and there are 12 unions representing a huge diversity of workers, with a variety of employment relationships and different regulatory frameworks governing work.<sup>61</sup> Without an airport-wide collective agreement, the Toronto Airport Workers Council (TAWC) has been developed as a collective voice for workers.

The TAWC has an agreement to work collaboratively with the airport operator to respond to major challenges arising across the airport. Through the TAWC workers can discuss issues that might go beyond the scope of collective agreement.<sup>62</sup> The TAWC meets to develop collective demands and takes these demands to the GTAA for discussion – which takes place regularly. The space has previously been useful for discussing issues related to health and safety, particularly during the pandemic when strong communication enabled the development of community-wide initiatives.<sup>63</sup> The TAWC provides an important potential tool through which anticipated changes can be discussed with the airport operator – often a key driving force behind new technology being introduced.

According to the airport operator, the specific types of new technology to be introduced in the future are yet to be decided, however future changes will focus on improving efficiency of structural operations and an increased shift to self-service technology.<sup>64</sup> The airport is also planning to introduce changes to security screening of employees – from 100% randomised security screening to 100% screening of all airport staff. In airside operations, it is also anticipated that autonomous vehicles could be introduced.

## **Passenger Service Agents<sup>65</sup>**

Passenger service agents undertake work assisting passengers across both terminal and airside within the airport. Duties include providing customer service, information, and assistance to passengers, check-in of passengers and baggage, tagging baggage to be sent to the baggage system, assisting with boarding passengers, and checking travel documents.

Self-service check-in kiosks<sup>66</sup> (automated machines that let passengers autonomously check in for flights without human interaction) were first introduced many years ago, but there has been a rapid increase in the number in more recent years. This has also now been accompanied by bag-drop kiosks (automated machines allowing passengers to weigh luggage, print tags and drop bags off without interacting with an agent).

The new kiosks have meant that some passenger service agents have transitioned to a monitoring role in their job, only stepping in to support passengers when assistance is required. Although some workers report that this has reduced pressure on workers by decreasing workload: *“less pressure on workers around check-in areas... has helped to make work easier”*<sup>67</sup> others report that the role has become more tedious as a result. In some cases, the kiosks have also increased pressure on workers and left them feeling *“overwhelmed”*<sup>68</sup> There tend to be a small number of workers monitoring a large number of kiosks, and there has been increased aggression from passengers who feel frustrated with machines. Workers also report back pain due to the design of the kiosks – some check-in kiosks are low down and workers have to bend down to assist customers.

When kiosks were first introduced there was fear about potential job losses, but on the whole jobs have not been replaced by kiosks. Older passengers and those with language barriers do not find the kiosks user-friendly, and the machines tend not to be able to deal with changes to traveller rules and visa requirements. As a result workers do not think that there will be a complete shift to the use of the kiosks, and believe that in-person services are expected to continue to be needed: *“Toronto is a very diverse airport and English is often not the first language and so many people need or want to see somebody... I don't think that there will ever be a complete shift to technology instead of people.”*<sup>69</sup> However it was identified that if

kiosks become more effective and passengers become more comfortable, there is a risk of job losses: *“if it was working properly... then the cost of labour would be too high, so there is a risk of jobs being removed.”*<sup>70</sup> Increased use of self-service technology within the check-in area has also reportedly had knock-on impacts on other roles in the airport. Tasks such as tagging bags and upgrading seats are increasingly undertaken at the boarding gate, increasing the workload of those working to board passengers onto aircraft.

A digital baggage tracking system has also been introduced through the introduction of Radio Frequency Identification (RFID)<sup>71</sup> (a system comprising tags and readers that uses radio frequencies to identify and track objects). As the face of the company, passenger service agents previously received aggression from passengers if bags were lost, but the new system has enabled agents to easily locate bags and has reduced passenger aggression: *“passenger agents are the face of the airline so we are the ones that get abuse if something goes wrong... but tracking actually helps to make the job easier as we have more information and connectivity.”*<sup>72</sup>

Although some technology has been beneficial in reducing aggression from passengers, where it has been accompanied by reduced numbers of staffing levels and inadequate technology, passenger aggression tends to be greater.

Passenger agents have also seen increased use of digital tools such as the Automated Document Check (ADC) system<sup>73</sup> (automated software used to digitally check passengers' details against travel rules). This technology has removed the previous lengthy manual verification process, in turn increasing the speed of work and reducing worker frustration and stress: *“when they brought in ADC it enabled them to eliminate about 10% of the work on document checks... because it is so quick and it took away frustration from the workers.”*<sup>74</sup> Not all passenger agents – particularly those working for ground



handling companies – are provided with this software which makes the task much slower for these workers. However, it was noted that the introduction of the ADC system has also intensified workload in other parts of the job, with passenger service agents now required to process more passengers per worker.

Software has also been introduced to create an automated stand-by list (passengers are automatically put on a digital 'stand-by' waiting for a flight). Workers would previously have to manually identify seats for passengers, but now passengers can access the list directly through an app on their smartphone. This speeds up the process for passenger service agents, and reduces workload.

Workers also reported a shift away from a 'key-based' to a 'point-and-click' mouse-based system on the computer system. According to passenger service agents, this has de-skilled the job as well as made the job slower. Workers report difficulty using the new system, which is less user-friendly for workers when problems occur within the software: *"We are now years into the system and workers are still struggling... it is not particularly user-friendly... the tools provided by the company are not sufficient."*<sup>75</sup> Workers also report concerns

about eye strain from the blue light background and font size on the computer.

Radios were previously used for workplace communication, but since the pandemic passenger service agents working for ground handling companies have had to increasingly use their own mobile devices. This has negatively impacted workers' mental health, with many workers finding that they are unable to switch off from work and are always accessible to the company: *"I have to turn my phone off otherwise we will always be contactable and reachable by work."*<sup>76</sup> Despite requests from workers, the company is resistant to providing workers with radios and does not pay for workers' use of mobile devices: *"sometimes we have to use our own 3G... our own cell phones for internal communications... the company does not pay."*<sup>77</sup> Mobile devices are also often used to send personal details of passengers with many workers concerned that they are breaching data privacy laws.

Passenger service agents working for airlines also report increased use of Personal Digital Assistants (PDAs)<sup>78</sup> (digital hand-held mobile devices providing information storage and two-way digital communications) instead of in-person direction to assign work. This

has increased pressure and discipline of workers: *“management is done through the PDA and gives management more control and surveillance... if workers get a direction on the PDA and they do not acknowledge it then they get reprimanded.”*<sup>79</sup> This has created a culture of fear and increased stress for workers. PDA technology often fails due to signal issue, meaning that workers often get their workload late or not at all.

Biometric self-boarding<sup>80</sup> (collection of biometric data through use of facial recognition forward to authenticate the identity of passengers during boarding) has not yet been introduced but is likely to be incoming.<sup>81</sup> Workers expect that there will be fewer roles and de-skilling of remaining roles as a consequence of the introduction of this technology, with the jobs expected to be least impacted by future technological changes include those focused on passenger accessibility and customer-service.

### **Non-Passenger Security**

Non-passenger security<sup>82</sup> workers undertake security screening of non-passengers (airport employees, airline staff, and other workers) accessing restricted areas of the airport, as well as monitoring CCTV, and operating security gates.

Security guards monitoring doors and undertaking non-passenger screening have seen the introduction of hand held digital scanners (portable electronic devices used to scan and capture documents or badges into a digital format) where the job previously required a pass card to be used.

Previously, two guards were required for the post – one guard would monitor the door to scan passes and one guard would check temporary passes on the computer. However, the introduction of the scanners means that passes are now scanned directly on the hand-held device. As a result, the company reduced the post to one security guard. At the same

time, security guards also have to monitor checking of biometric data of staff accessing the airport. To gain access, employees have to use a fingerprint scan and wait for a green (pass) or red (fail) sign. If it appears as red, workers have to contact operations to check that the individual can pass through. In the meantime, the guard also has to undertake other tasks including checking visitor passes and deliveries. This has intensified the workload for the remaining guard. This workload is exacerbated due to biometric technology not always functioning effectively which means that manual scanning often has to take place, further increasing the workload of the guard: *“one guard left and that one guard had to do about 10 jobs... this increased the amount of work that one person had to do.”*<sup>83</sup>

‘One-way security corridors’ have also been introduced across the airport<sup>84</sup> (automated access doors within a corridor that open in the direction of passenger flow, usually from a more secure area to less secure area with alarms triggered if used in the wrong direction). Previously two guards would monitor and direct passengers to ensure that no passengers went back into the restricted area (airside). However now only one security is required to monitor the doors. This has also increased frustration from passengers when they turn back in the wrong direction.

Software has also been introduced for providing passes to visitors accessing the airport.<sup>85</sup> Previously, the security guard would fill in sheets for visitor passes manually, but now the digital tool automatically creates digital passes for visitors with self-guided visitor sign-in kiosks and software controlled from a central dashboard. Workers no longer have to fill in information manually and only check that the information provided is correct. Although this has reduced the time required for the task – from 15 to 5 minutes – there is concern that this could replace jobs in the future: *“the machine might replace me and anyone can come and do their own passes and they will not need me anymore.”*<sup>86</sup>

Across other security operations, automatic access control systems<sup>87</sup> have been introduced. These systems use electronic badges and digital information sharing to monitor and control access for different individuals across the airport. There has also been increased reliance on CCTV cameras rather than in-person operations for monitoring purpose. This has reduced the number of security guards required across airport operations, and workers also highlighted that cameras are not as effective as in-person monitoring for security purposes.

Cost-cutting across the company has led to declining numbers of workers being hired across security operations. However workers highlighted that technology frequently malfunctions which puts greater pressure on the remaining security workers: *“they always put more work on us and the money is still the same... they try to put the least amount of security people on to save money... this creates major health and safety concerns”*<sup>88</sup> Security workers also report increased covert monitoring and surveillance of workers, with examples highlighted of the company recording workers without consent in vehicles – a clear breach of privacy rights of workers.

### Flight Attendants

Flight attendants<sup>89</sup> undertake work to ensure the safety and security of passengers on a flight. Duties include preparing passenger safety and emergency procedures, cabin preparation, passenger service and hospitality, in-flight security, post-flight cabin inspection.

Although flight attendants do not directly

work within the airport and most paid working time is spent on the aircraft during the flight, interviews with flight attendants revealed that introduction of new technology in the airport had knock-on impacts on their jobs, in particular increased aggression from passengers: *“there is a trickle-down effect... once they board the plane they are frustrated... pressure has been put on them throughout the airport due to new technology... frustration of passengers is often big and we have to be... supportive for them.”*<sup>90</sup>

Much like workers across other airport occupations, flight attendants have also seen negative impacts of increased use of technology within the employment relationship. Many airlines companies have developed applications which are used for communication as well as to provide information about work schedules. However, accessing information is often reliant on workers having their own devices and systems can be difficult to navigate – particularly for older workers who tend to be less comfortable with technology. This has also increased pressure on workers as more work is shifted onto them: *“...it has pushed a lot of work onto workers who have to handle everything.”*<sup>91</sup>

Flight attendants are also increasingly reliant on the use of their mobile devices during work, particularly to check-in for the flight on which they are working. Although some workers found that this has made ‘clocking-in’ for work much easier, it has also meant that airlines have greater ability to track workers within the airport. Airlines are able to digitally monitor when flight attendants arrive at the airport and therefore alter their work schedules at the last minute.

**MANY AIRLINES COMPANIES HAVE DEVELOPED APPLICATIONS WHICH ARE USED FOR COMMUNICATION AS WELL AS TO PROVIDE INFORMATION ABOUT WORK SCHEDULES. HOWEVER, ACCESSING INFORMATION IS OFTEN RELIANT ON WORKERS HAVING THEIR OWN DEVICES AND SYSTEMS CAN BE DIFFICULT TO NAVIGATE.**

# EZEIZA INTERNATIONAL AIRPORT (EZE), BUENOS AIRES ARGENTINA

Ezeiza International Airport (EZE) – is the most important airport in Argentina. It is run by Aeropuertos Argentina 2000 (AA2000) which also operates 35 other airports in Argentina. In April 2023, following \$USD230 million investment, a new departure terminal was opened. Designed to improve efficiency, create a ‘seamless’ passenger journey and strengthen sustainability, the terminal has become the most technologically modern in Latin America.

Investment in technology has included 68 new self-service check-in kiosks, 24 self-service bag drop/baggage handling stations, a new ‘self-guided’ five-level car park, new technology in immigration – including eGates (biometric identification), a baggage handling system with state-of-the-art scanners, increased length of luggage conveyor belts and carousels and touchless technology in bathrooms. The airport has also introduced free Wi-Fi, charging areas, a passenger flow system predicting immigration and security processing times, and has developed the ‘Wayfinder’ app – providing passengers with directions through the terminal. It is reported that the new terminal is powered entirely by renewable energy sources, resulting in a 60% reduction in energy consumption and a 90% reduction in carbon emissions.<sup>92</sup>

## Baggage Operators

Baggage operators<sup>93</sup> undertake duties to support processing of baggage within the airport. In Ezeiza, workers interviewed worked on the last section of the baggage conveyor belt – acting as a link between the baggage conveyor belt and those loading baggage onto aircraft.

A new automated baggage handling system

(BHS)<sup>94</sup> has been introduced in baggage operations (automated conveyor system that transports checked baggage from ticket counters to areas where baggage can be loaded onto planes). Checked baggage is now automatically transported from check-in counters to carousels and to the baggage storage area where operators manually load them into containers or trolleys that are taken to the aircraft.

Despite the introduction of the automated BHS, some of the work continues to be physical and workers still manually load bags from the carousels into containers. However the new infrastructure has meant a change in the height of the platform around the carousel where operators unload baggage into containers. This has made the job more comfortable for workers – the new platform is levelled to waist height which means that workers move less when moving bags, decreasing pressure on the spine as well as increasing the speed of work. Workers report that this has increased work speed and reduced pressure on workers: *“it made the work more comfortable... in terms of carrying, I find it more comfortable”*<sup>95</sup> and: *“You also feel it in your body, in your waist, in your knees... you do not have to bend down or make an effort.”*<sup>96</sup> The union participated in the discussion defining the height of the new platform and the speed of the carousel.

Four 3D CT scanning machines have also been introduced, increasing the speed of operations and allowing over 1,000 bags per hour to be inspected. It also eliminates the need for previous 2D X-ray machines. Baggage already checked by CT scanners is automatically given a tag that identifies its destination. This allows the baggage to be directly loaded onto



containers, where it previously had to go through scanner control. This more equally distributes work amongst workers, meaning a more streamlined operation.

However, technological malfunctioning – when the system makes a mistake – can cause major problems for workers, disrupting work and increasing workload. Broader infrastructure changes within the baggage system have also had some knock-on negative impacts. Delays have been reported due to bags becoming stuck or jammed on the new belt. This can be frustrating for workers and there tends to be a lack of staff to deal with problems as they arise.

Workers identified that new technology had not replaced jobs, however there are expectations of huge growth in air travel through the airport and insufficient numbers of workers to deal with this growth. This is creating concerns about future intensification of work. The

union has requested an increase in staff to accommodate growth, but there has been no response from Aerolíneas Argentina yet.

Workers identified that ‘snake belt’ technology might be introduced in the future – which would reduce load/unload times from aircraft and physical strain on workers, whilst also potentially leading to a reduction in jobs.

### **Passenger Service Agents**

Passenger service agents<sup>97</sup> undertake work assisting passengers across both terminal and airside within the airport. Duties include providing customer service, information and assistance to passengers, check-in of passengers and baggage, tagging baggage to be sent to baggage system, assisting with boarding passengers, and checking travel documents.

The biggest technological change for workers

has been the introduction of 68 new self-service check in kiosks, introduced to reduce waiting times. Although check-in kiosks were already in place before the new terminal was opened, kiosks have since been installed in greater numbers, accompanied now also by 24 self-service bag drop kiosks<sup>98</sup> – to enable passengers to weigh luggage, print labels to tag bags and drop bags off themselves.

All of these tasks are now undertaken by passengers without direct interaction with passenger service agents. Although workers have not yet identified a reduction in the workforce due to the new technology, workers report that this is mainly due to passengers being unable to use new kiosks, as well as kiosks not working properly. Malfunctioning machines has increased pressure on workers who are then required to check-in passengers using the kiosks – which workers describe as a ‘tedious’ task.

However, the malfunctioning of the kiosks has also slowed a shift to the total use of self-check in technology. Workers also identified passenger reluctance to using kiosks due to a lack of understanding, particularly due to cultural differences and age gaps. Workers have to compensate for the fact that passengers are reluctant to use the kiosks because they are slow, and passengers are not used to using them: *“(the process) does not speed up because the public does not get used to it; they do not want to use it. They also want someone to take care of them. When they are in front of the machine, it takes them a thousand hours because they do not know where to press.”*<sup>99</sup>

In addition, the kiosks do not address all needs – such as to confirm that passengers have filled in the correct identity documents. As a result, workers believe that there is likely to be a continued need for in-person attention for a long time, particularly when problems arise: *“thanks to the inefficiency of many systems and problems, we are still keeping our jobs.”*<sup>100</sup>

Although workers have been resisting the use

of the new technology, with the opening of the new terminal these machines are now in the centre of the terminal, and one airline has introduced a monthly metric goal for using self-service check-in kiosks. No training was received on this new technology.

There has also been increased use of personal mobile devices for work communication since the pandemic – WhatsApp groups are used to organise work shifts with managers and supervisors often participate in groups. The dynamic nature of work in the sector means that constant communication is necessary and personal devices are used to distribute information and assign work. Workers did not identify any particular impacts due to this and the use of mobile devices is also not mandatory.

### **Duty-Free Workers**

Duty-free workers<sup>101</sup> undertake duties to provide customer service and sales assistance to customers in duty free shops as well as stocking and supply duties in warehouse areas.

Around 8–9 years ago, hand-held barcode scanners<sup>102</sup> were introduced for workers in sales and supply areas. Automating a previously manual task, the new technology was generally perceived positively, reducing workload, speeding up work processes and improving accuracy. However, one worker did identify that the use of the scanners – particularly within the warehouse supply area – has increased monitoring of workers. The scanners capture a personalised record of each workers’ performance, including information about how many products are picked up, as well as time spent on lunch and in the bathroom.

More recently, new online check-out technology has been introduced to give passengers a web-based shopping system through which they can reserve products to buy, pay, and collect at the duty-free shop. However, there is no major concern about



this leading to job replacement. The company had previously attempted to introduce tablets in the duty-free shop for passengers to buy products, however this was not fully implemented – the union fought against it and customers had a preference for personalised services. As a result, workers think it is unlikely that fully digital or automated services will be introduced in duty-free – there is a need for customer service for sale of particular products (eg perfume). There was a lack of awareness about company training initiatives on new technology, however workers reported that previous training had been inadequate.

### **Parking Attendants**

Parking attendants<sup>103</sup> undertake work collecting parking fees and assisting customers with payments.

In the new car park, automatic payment machines have been installed at entrances and passengers are also now able to pay for parking using a QR code.<sup>104</sup> However, automatic payment systems frequently malfunction and QR code payments also tend to be inefficient, impractical and long-winded for passengers.

This means that in-person service from parking cashiers is still required. The malfunctioning of the machines also often causes delays which increases pressure on parking cashiers, with impacts exacerbated due to insufficient numbers of staff to deal with problems. Although, this new technology has not currently led to job losses, there is a possibility that the automated payment services could replace the personalised service booths monitored by workers in the future when passengers adapt to technology, and when technology begins to function correctly.

Despite major technological change taking place across many occupations within the airport, no current job losses were identified, largely due to malfunctioning technology and passenger resistance. Neither workers nor the union tend to be involved in major decisions about technology, reinforcing the need for a collaborative approach to the introduction of new technology that includes trade unions. According to workers, much of the introduction of new technology is implemented according to international recommendations and regulations.

# KEY FINDINGS

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Technological change and ‘innovation’ have always been important for the aviation industry however the pandemic has clearly sped up the transition to the use of more technology, whilst also removing checks on testing of new technology.<sup>105</sup>

The survey found that the primary reason given by airports and/or employers for introducing new technology in airports was to increase or improve profits and efficiency (30.6%). While initial investments for new technologies can be significant, potential savings are often made through increased accuracy, improved staff productivity and greater efficiency of resource use.<sup>106</sup> This was echoed in interviews and focus groups – workers tend to see technology as enabling employers and airports to cut costs, make savings and increase profits. Increased downward pressure on costs of airport operations has created a race to the bottom for the many different companies operating within airports. Security workers in Toronto Pearson, for example, identified an endless drive to reduce costs due to companies not wanting to lose contracts from the airport operator.<sup>107</sup>

Many airports are also in a drive to become global hubs and are aiming to improve operational efficiency and passenger experience – which was also identified in the survey as a key motivator for technological change (22.6%). Although worker shortages were not identified as a key factor within survey results, interviews and focus groups revealed major workforce challenges across the industry – driven by redundancies during the pandemic, recruitment challenges and ongoing high turnover of the workforce as a result of low pay and poor conditions. In Manchester, for example, few workers stay in security jobs for more than a few years, driven out by low wages and difficult shift schedules.<sup>108</sup> In ramp operations, one worker reported that 80% of the workforce has less than 2 years of experience in aviation, and frequent contract flipping means workers move between companies as pay fluctuates.<sup>109</sup> Although technologies have increasingly been introduced to ease challenges and simplify tasks required for the job, technology change has also had major negative impacts on workforce retention across the industry.



The main types of technology identified that have been, or are expected to be introduced include:<sup>110</sup>

- Digital information screens
- Digital customer services and automated call centres
- Online check-in
- Check-in/bag tag kiosks
- Biometric data collection
- CT (3D) security scanners
- Automated baggage handling systems
- Electronic hand-held scanners
- Drones, and Remotely Piloted Aircraft System (RPAS) – remotely controlled flying vehicles
- CCTV, including AI-monitoring of CCTV
- Automated gates with electronic barcode scanners used in lounges and for self-boarding of passengers
- Baggage tracking software, including Radio Frequency Identification (RFID)
- Automated belt loaders ('snake belts')
- Automated wheelchairs
- Automatic document check software
- Online purchasing in retail
- Autonomous vehicles for towing aircraft
- Company applications
- Use of mobile devices
- Workforce management and monitoring software
- One-way security corridors
- Automatic visual docking guidance systems – electronic displays above aircraft parking systems providing real-time information to pilots as they park/ depart
- Exoskeletons in cargo handling – external support suits used to ease pressure on the body during heavy lifting/repetitive movements
- Digital tools for forecast planning
- Automatic jet bridges – automatic boarding bridge docking systems
- Automatic payment machines in car parks
- Automated barriers in car parks.

Around 40.9% of respondents reported that the airport had not introduced new technology to address climate change concerns (31.8% unaware of such technologies). Technologies that were identified across this research included – investment in solar panels and other renewable energy sources, electrification of ground equipment including e-vehicles, use of sustainable aviation fuels and sensors on lights/taps to reduce energy/water consumption.

# IMPACTS OF TECHNOLOGY ON WORK

Although some workers reported that there were few impacts of new technology on work, the discussion of findings focuses on the major impacts – both positive and negative – of technology relevant to key thematic areas identified including intensification of work, health and safety, performance management, monitoring and surveillance, organisation of work and number of jobs.

Survey results revealed that 45.5% of union representatives identified some positive impacts of new technology, however these impacts tended to be focused on benefits to the employer or airport operator. Key benefits identified included minimising costs through reduction in personnel, improving competitiveness of the airport in the global market, increased security and safety, and improving passenger experience by meeting their expectations for *“efficiency, safety and convenience.”*<sup>111</sup>

Although 94.5% of survey respondents thought that some groups of workers were more impacted by technological change, interviews and focus groups identified a general lack of awareness about potential differing impacts on workers, emphasising need for further research into this. Some workers did identify that more senior workers and those facing language barriers (older workers and those who had been in the job for a long time) faced greater barriers in adapting to new technology.

## Intensification of Work

The most prominent theme that was identified across this research was the intensification of work as a result of the introduction of new technology.

Across airports globally, passenger volumes are growing which is increasing workload.

In Toronto Pearson, despite the number of workers across the airport remaining largely the same, workers and union representatives reported that workload and demand on workers has increased: *“there are not fewer jobs but the growth of the airport means that there are more flights and there is a need for more people...”*<sup>112</sup> However, this is not coinciding with an increase in the size of the workforce and technology is increasingly being used to ‘fill’ the gap created by this increase in workload.

Across the airports included within this study, employers are not hiring sufficient numbers of workers to undertake jobs due to an over-reliance on technology. However, this research has found that technology is failing to fill this gap – the quality of technology is rarely sufficient and workers frequently report issues related to technology malfunctioning. Companies tend to lack a back-up plan and are no longer able to rely on additional staff when technology fails, as one security worker in Toronto highlighted: *“there are not fewer airside workers because the system has not worked effectively and so there is still a dependence on people. When it does not work it puts greater pressure on workers.”*<sup>113</sup> A drive for cutting costs means that companies tend to buy *“inadequate equipment.”*<sup>114</sup>

For example, in Manchester airport, although a snake belt loader was introduced to decrease workload, when it malfunctions and ramp agents have to revert back to manual functions there are fewer workers to undertake work. Similar problems were seen amongst ramp agents and parking attendants in Ezeiza airport. This was echoed within the survey results – system failures mean that traffic personnel face a double workload,<sup>115</sup> and some employers are deliberately understaffing to make it easier to introduce new technologies.<sup>116</sup> This has increased pressure on workers, which is expected to intensify in the future as airports continue to grow in size.

Where downsizing of the workforce has taken place due to the introduction of new technology, jobs tend not to be removed entirely but the remaining jobs tend to be intensified. Increasing numbers of tasks are piled onto the existing workload of a fewer number of individuals, often without an increase in pay. Security workers at Toronto airport reported job cuts leading to more work being piled onto fewer security guards, requiring workers to multitask.<sup>117</sup> This has also meant that task saturation has taken place with tasks reassigned to workers in different areas of the airport. For example a shift to decreased in-person interaction in check-in areas has resulted in more work being shifted onto agents working on boarding gates: *“you lose that human touch like the person explaining the rules or weighing your bags... this has a trickle-down effect once the passenger gets to the gate... there is a task saturation.”*<sup>118</sup> This was also clear within the survey, with additional workloads frequently shifted onto remaining workers: *“they have greatly reduced the number of employees in each sector, so the increase and accumulation of activities is inhuman.”*<sup>119</sup>

Despite often being framed as ‘supporting’ for workers, where workload has been shifted onto passengers workers report that their work is still intensified. Passengers often lack understanding and comfort in using technologies and so require additional support from workers, which can be difficult for workers who are not given adequate training on using technology. In Ezeiza airport, pressure on workers increases when passengers are unable to use the machine and the company is also pressuring workers to encourage the use of kiosks. This has also resulted in increased aggression from passengers, with passenger service agents at Toronto Pearson airport reporting passenger frustration and aggression due to technology failing to work properly, as one worker highlighted: *“they keep making everything automatic but there is huge amounts of pressure on workers when there is a failure.”*<sup>120</sup>

An increased shift to the use of digital tools (e.g. communication, scheduling) for managing work has also increased the workload on both workers and union representatives. Although some workers reported either little impact or increased ease of having online access to information about work, others – particularly older workers – have found new systems difficult to use. This has also decreased communication with the company.

## Health and Safety

Intensification of work has been accompanied by greater pressure from employers on efficiency and speed of operations, which has increased workers’ exposure to health and safety risks. Survey results identified that worsened health and safety outcomes (10.6%) had been found across airports due to new technology.

Physical exhaustion (12.8%) was identified as a major impact of technological change. In France, for example the union identified that declining numbers of staff due to new technology had been accompanied by increasing time pressure on efficiency. Workers have to work fast with little time for rest, contributing to workplace accidents; and some new automated systems – such as in baggage handling – are accident prone.<sup>121</sup> Increased use of screens increases eye strain, and there are also concerns about potential radiation from new equipment.<sup>122</sup> In some cases, increased automation and reliance on digital tools has also had the opposite effect – creating a sedentary work life, with workers staying in one place monitoring a machine rather than moving around, with negative impacts on workers’ health.<sup>123</sup> One survey respondent also reported an increased risk of repetitive strain injury (RSI) for workers in static standing positions during work.<sup>124</sup>

There have also been major negative impacts on mental health. Reductions in the workforce and an increase in workload has increased stress levels – the most significant reported consequence of new technology (27.7%), and



has also increased worker fatigue and the incidence of other psychosocial issues, such as insomnia.<sup>125</sup> This has been exacerbated by technology failing to work properly, as well as an increased reliance on mobile devices and PDAs for work direction. This means that workers are unable to switch off from work, have work tasks altered during shifts and face increased job insecurity and anxiety about the future.<sup>126</sup> The introduction of inadequate and malfunctioning technology has also been found to increase passenger aggression, which has become a major driver pushing workers out of the industry.

Some workers are also experiencing increased boredom and monotony at work due to a simplification of tasks, as one worker highlighted: *“all we do as workers is process the information... this does mean that the job is much easier than before and we can process people much faster... but increases boredom in the job.”*<sup>127</sup> Although some workers have found this simplification helpful in easing workload, others identified concerns that their role was becoming de-skilled: *“roles have changed –*

*instead of monitoring human activity; we are now monitoring machines that monitor human activities.”*<sup>128</sup> Consequently, many workers report not feeling enjoyment at work anymore.

This points to a broader challenge related to workforce retention across the industry. Whilst providing the material resources needed to ensure livelihoods, work also provides essential opportunities for social fulfilment as well as learning. The social aspect of work is also important to positive mental health. However, declining job satisfaction – caused by declining quality of work and downward pressure on wages and conditions which is increasingly driven by the uptake of new technology and changes in the organisation of work, is becoming a major problem, as one security worker: *“We do not enjoy the job anymore... the money we are getting is minimal... even they can bring more technology but we are tired from the increase in workload.”*<sup>129</sup> This has also created more difficult working cultures: *“Stress factor impacts morale and also results in finger pointing with workers blaming each other a lot.”*<sup>130</sup>

Although initially introduced – at least in part – as a response to widespread worker shortages across the industry, technology itself is also contributing to an increase in absenteeism and high turnover of the workforce, as one worker highlighted: *“Morale is at an all-time low, particularly for more experienced workers... it is no longer considered to be a long-term career.”*<sup>131</sup> This raises serious questions for employers about how to respond to the loss of experience across the industry and to ensure long-term workforce sustainability.

This has been accompanied by a declining health and safety culture within airports. Workers and union representatives in both Toronto Pearson and Manchester airports highlighted a shift to a ‘reactive’ health and safety culture whereby issues are only dealt with when things go wrong. Although not directly identified amongst survey results, it is evident that the failure to undertake feasibility studies or impact assessments to understand how new technology might *“fit into current airport operations”*<sup>132</sup> or respond to health and safety concerns accompanies the shift to a more reactive health and safety culture. This clearly evidences the need for a more proactive and collaborative-worker centric approach to resolve systemic issues.

The negative impacts of technological change on workers’ health are expected to continue – survey results identified expectations for ongoing negative health and safety impacts into the future due to new technology including increased stress (29.1%), worsened health and safety outcomes (20%), physical exhaustion (14.5%), and more accidents and injuries (10.9%).

It is important to note that some workers did identify positive impacts of new technology. The survey found that making jobs easier or safer was reported to be a key reason given by airports and/or employers for introducing new technologies, and an interview with the airport authority at Toronto Pearson reinforced this. More advanced safety systems, more ergonomic work equipment and monitoring

devices have also helped to prevent accident and injuries.<sup>133</sup> Automation in baggage handling and ramp operation has reduced physical exertion of workers, and simplification of work processes (e.g. electronic hand-held scanners) and reduction of repetitive or time-consuming tasks (e.g. automated document check processes) has reduced reducing stress and increased rest time. However, the greatest potential for positive impacts on health and safety come when trade unions and workers are involved in decision-making processes and when risk and impact assessments for the introduction of new technology are used.

### **Performance Management and Management Culture**

Literature about the introduction of new technology in workplaces often emphasises the value of technology in empowering workers to develop new skills and improving communication, collaboration, trust and teamwork – including enabling a shift away from hierarchical structures. However, this research has identified that the opposite is actually true.

The vast majority (72.7%) of responses to the survey identified that the airport or employer had introduced new technology for monitoring the workforce. According to survey results, data collected on workers is mainly expected to be used for creating performance tables and implementing discipline measures (20.8%) and monitoring worker performance (23.6%). There has been a growing shift to the use of data-driven digital tools for tracking workers’ performance using metrics – including the introduction of target/performance plans (often decided by algorithms) which are monitored and tracked using internal digital monitoring/quality control systems.

This has intensified pressure on workers to hit targets and make no mistakes, with one worker reporting that work was *“becoming like a factory.”*<sup>134</sup> Use of electronic hand-held scanners, for example – in retail work and



baggage handling, has increased tracking of mistakes and productivity. Increased use of CCTV has enabled companies to exert informal discipline and intimidation – workers feel like they are being watched at all times and are increasingly facing disciplinaries for minor infractions, where issues first used to be dealt with informally. Workers report being in fear of making mistakes and second-guessing their own decisions – creating a vicious cycle by piling on more stress and increasing the risk of accidents occurring. Survey results also identified increased stress (25%) as the primary impact of new monitoring technologies on workers. This shift has further exacerbated challenges related to declining job satisfaction.

The increased use of technology, particularly related to performance management, has resulted in a cultural shift away from the ‘collective’ team or community to a more hierarchical culture: “...downward pressure and going straight to disciplinary processes... there is a general sense of a lack of trust for workers... and a shift to them and us now

*versus a team*”<sup>135</sup> and an increased focus on the individual: “*technology has allowed little cells to grow and people to have fiefdoms about what they control... we have actually lost connectivity at the airport.*”<sup>136</sup> This has resulted in a culture of fear and declining worker morale:<sup>137</sup> “*People are more scared about getting into trouble than addressing the issue. Nobody tells the company and agents never say anything because they are scared. The company does not do detailed work anymore to check how things went.*”<sup>138</sup>

### **Monitoring and Surveillance**

Digital tools are also increasingly being used to track workers’ movements. 81.8% of survey respondents reported that workers needed to provide biometric data to the airport or employer to clock in to work, and this has been in place for a long time. This was also common across Toronto Pearson and Manchester airport, although to a lesser extent in Ezeiza airport. Increased numbers of CCTV cameras have also been seen – in Ezeiza workers identified the number of cameras had

## GENERALLY THERE IS MIXED AWARENESS ABOUT TRACKING TECHNOLOGIES AND WORKERS TEND NOT TO IMMEDIATELY CONSIDER THESE AS NEGATIVE OR AT RISK OF INVADING THEIR PRIVACY, BUT INSTEAD IMPROVING SAFETY AND SECURITY.

increased with the construction of the new departure terminal, and in Manchester airport CCTV has been introduced in offices and rest rooms. Badge systems have also been in place for a long time at airports, providing workers with access to secure areas.

Generally there is mixed awareness about tracking technologies and workers tend not to immediately consider these as negative or at risk of invading their privacy, but instead improving safety and security. However, within survey results a loss of privacy (20.8%) was the second most frequently reported impact of monitoring technologies being introduced and it is clear from the evidence gathered in this research that rights violations related to privacy are taking place across the industry.

Some workers highlighted concerns about how data collected could be used to track and discipline workers – biometric data about the time staff clock in,<sup>139</sup> video footage showing interactions with passengers or staff, or monitoring of time spent on breaks or using the bathroom could all be used to reprimand staff or lead to dismissal.<sup>140</sup> In one airport, workers use employer-provided tablets, which enable tracking location of workers and workers are punished if they are in the wrong place at the wrong time.<sup>141</sup> In Toronto Pearson, passenger agents reported being reprimanded for not immediately responding to directions over PDAs, and in Toronto and Manchester airports, workers in security and ramp operations reported that microphones and cameras fitted in vehicles had been used to monitor staff. In the case of Manchester,

data collected had resulted in disciplinaries.<sup>142</sup> In Toronto, a worker reported that this had created a 'toxic work environment' and increased stress levels have become a serious health and safety issue. In Toronto Pearson, the union has fought against the use of data collected on CCTV in disciplinaries, and now the airport operator does not hand over CCTV footage unless there is a formal order to do so.<sup>143</sup>

There is also growing concern about company monitoring of workers through social media, with several workers reporting this to be the case. There were examples given of workers losing security passes or facing disciplinary action due to social media posts being deemed inappropriate:<sup>144</sup> *"there have been incidents where workers have lost their restricted area identity card because of something reported on social media that has happened outside of the workplace... employers increasingly track on social media."*<sup>145</sup> Such actions from companies have major implications for labour rights.

Employers tend to use security as a rationale for increased introduction of data collection, and workers tend to have few rights related to data collection<sup>146</sup> however, in general this research has found widespread violations of the rights of workers to privacy. The reliance of workers on their own mobile devices for tasks related to work also raises broader questions around the security of data that is captured and collected on personal mobile devices, exposing workers to potential risks of breaching data privacy laws.

## Organisation of Work

Survey results also evidenced a change in tasks required in roles (20.5%) and a change in the way work is organised (21.7%) as some of the most frequently reported impacts of new technology on work. Union representatives reported that workers remaining in their jobs reported a change in work responsibilities and tasks, with job descriptions often modified as a result – security officers often have to learn new skills to use more advanced security scanning equipment, and automated loading systems have changed the nature of work for baggage handlers, some of whom have taken on a decision-making role.

For many passenger service agents, there has been an increased focus on customer service: *“Workers are more focused on assisting passengers, particularly for example with accessibility issues.”*<sup>147</sup> In one airline in Toronto Pearson airport passenger agents used to have one particular role that they would undertake – often based on the workers’ interest – and now workers tend to have less choice and have a wider variety of tasks that they might undertake as the needs arise: *“work used to be seniority based and now there is less training and workers have to do more roles in different occupations.”*<sup>148</sup> This was echoed in the survey results, with reports of workers being moved to other areas of the company. In Manchester airport, restructuring of security operations means that workers will have a less varied role. Although changes to working hours were not frequently reported, some workers expect that schedules are likely change in the future, adjusted to meet changing needs of the airport and *“different operational patterns.”*<sup>149</sup> There is also huge potential for future offshoring or outsourcing of work – remote screening in pre-board security and remote operation of other types of security, including CCTV.

## Job Losses

A direct correlation between the introduction of new technology and job losses (i.e.

technology replacing jobs) tends to be difficult to identify. As new technology is introduced in one part of an airport, expansion of capacity might take place elsewhere. At the same time, employers or airport operators rarely point to the introduction of new technology as the reason when jobs are cut – instead a “downturn in the industry” is often the reason given.<sup>150</sup>

However, the survey found that decreased numbers of jobs (25.3%) was the primary impact of technological change on airport jobs. Survey responses highlighted examples where technology had replaced workers, particularly impacting work in check-in, baggage handling and security where automation of tasks and increased use of digital tools has enabled work to become more efficient and precise. The introduction of an automated baggage system sorting process and self-service check-in kiosks in passenger areas has replaced the need for a large workforce. There are also expectations that future introduction of fully automated security lines are expected to further reduce the need for security staff.<sup>151</sup> Survey results identified that where job losses had been the result of technology being introduced, jobs tended not to be created elsewhere to compensate.<sup>152</sup>

Interviews and focus groups also identified potential future job losses due to the introduction of new technology. In passenger security screening at Manchester airport, the incoming introduction of more advanced security scanners for luggage and body scanning, digital screens providing information to passengers, and potential future use of AI in screening hold baggage are expected to replace many of the functions previously undertaken by security staff – in effect replacing work. Ramp agents identified no immediate threats to jobs, but the likely incoming use of drones and autonomous vehicles could also remove jobs. Some of these impacts are already being seen in Toronto Pearson airport, with increased reliance on CCTV and use of drones for

surveillance. In Toronto, security work is increasingly being replaced by digital technologies – increased CCTV, hand-held electronic scanners, biometrics, one-way security corridors and digital software. In the Netherlands, union representatives also identified the introduction of new security operations – more automation is being applied to passenger screening processes which could lead to a reduction of the number of security agents (fewer workers required to operate more equipment).<sup>153</sup> Focus groups in Manchester also highlighted increasing use of AI in airport operations as a major concern for future job replacement – increased use of AI in work means that workers are, in effect, using their own knowledge and experience to train up new technology to replace them highlighting the need to protect the intellectual property of workers' knowledge: *“with the introduction of this new technology in security operations, workers are in effect teaching the machine and making their own jobs redundant in the process.”*<sup>154</sup>

Although no immediate job losses were identified at Ezeiza airport, there is clearly huge potential for future job replacement among passenger agents (self-service kiosks) and parking cashiers (payment machines) – although the extent and speed of this change is highly reliant on advances in technology to improve functionality and the comfort of passengers in using technology. Some workers are expected to still be required to provide support for passengers or solve problems with technology.<sup>155</sup> Although not explored in detail, a shift to digital communications and software-scheduling of work has contributed to a loss of HR jobs in Manchester and Toronto Pearson airports.

Overall, in the short-term it appears that job losses are generally indirect – occurring through companies not replacing workers and instead relying on the 'natural' turnover of the workforce. However in the medium to longer-term redundancy-based job losses appear to be widely expected.

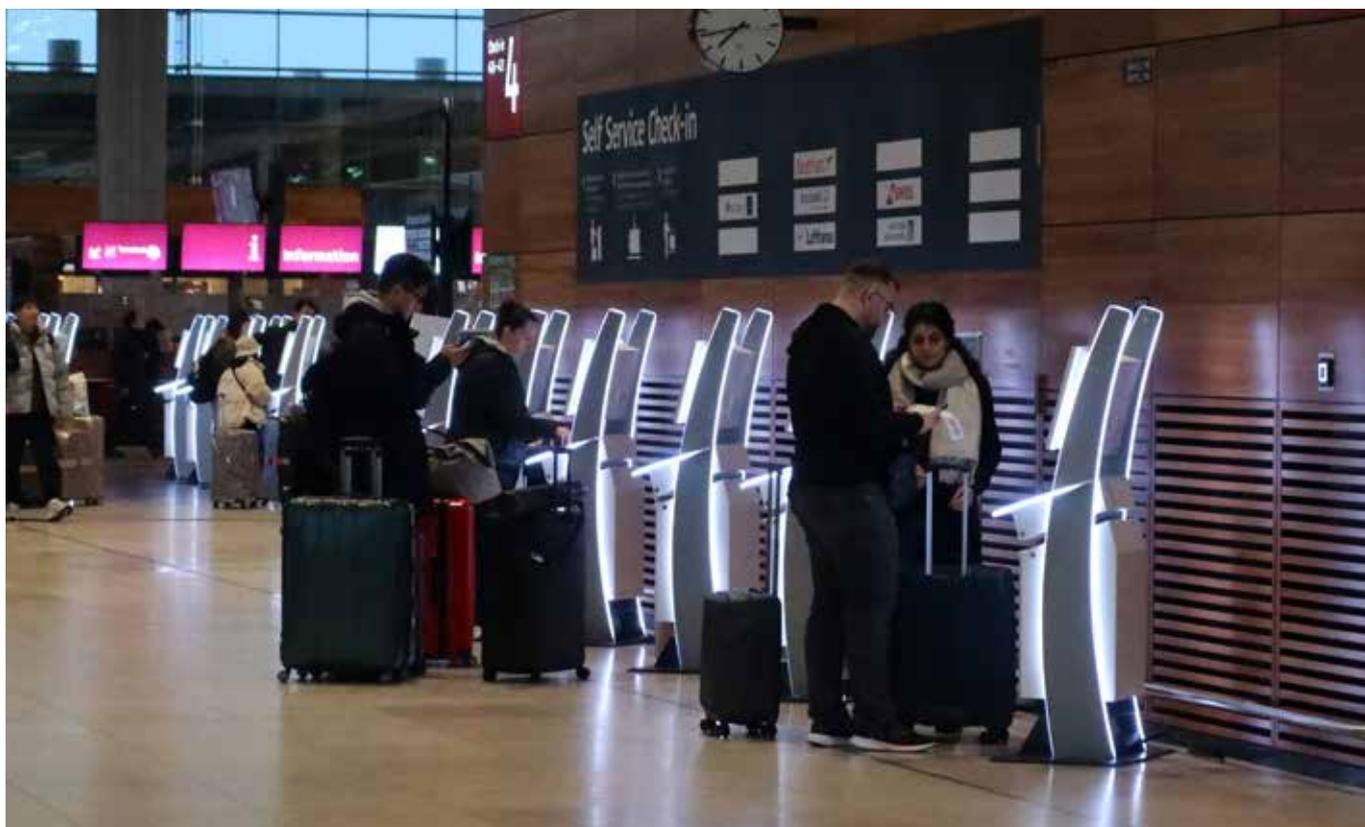
## Declining Quality of Training

Although the majority of survey respondents (63.6%) reported that the employer did provide training or skills development on new technology, declining quality of training and skills development was a major concern frequently raised across this research.

High levels of regulation, dangerous working environments and frequent technology updates due to the dynamic nature of the industry mean that employers are often required to undertake a minimum standard of training. However, training tends to be inadequate and in more recent years, employers have reduced the length and quality of training courses, although the quality differs across companies. Several workers highlighted a shift to a 'sink or swim' attitude, with no continuous development for workers. One airline passenger services agent for example, reported: *“a reduction from a 5-week training course just for the basic information, reduced down to a 26 day training in person, then online learning from then on.”*<sup>156</sup> There also tends to be no continuous training.

It appears that skills development for workers tends largely to come from the day to day experience of doing the job, rather than from training courses. Training also sometimes happens on the job (called a 'shadowing' method). This has increased stress on workers as they have to train one another, as one worker highlighted: *“they expect you to train yourselves... we only have shadow training... someone shadows you and you train them.”*<sup>157</sup>

In many companies, training has also been shifted online to 'solitary learning' – a trend that has increased since the pandemic. Workers tend to see this as insufficient, because of the need for practical learning and in-person support as well as due to some workers lacking the digital equipment needed to access training. This has contributed to declining levels of safety across the industry, as one worker highlighted: *“there is a downward effect on general safety because*



*people are not as good at the job as they used to be... because of the way that the job is taught..."<sup>158</sup>*

Although most training tends to be undertaken during working hours, there were some examples of workers having to undertake unpaid training on off-days or at home in their spare time. This has increased with the shift to use of online learning: *"we have more work that we have to do online by ourselves... not necessarily paid for, because it is all done online."*<sup>159</sup>

### **Existing and Potential Impacts of New Technologies on Work**

Technological change is taking place across airports globally and occupations that seem to be most impacted are security operations, passenger handling and baggage handling. This was also identified within survey results – passenger handling (24%), baggage handling (18.66%) and security (18.66%) were identified as the occupations most impacted by technological change. Major changes within these occupations have generally

focused on the introduction of automated technologies to transition manual tasks to focus more on decision-making and problem-solving, and the simplification of work tasks through use of digital tools.

Where technology functions effectively, it has the potential to reduce physical and mental pressure on workers and improve work. However, technology tends to be seen as a silver bullet, and is often introduced using a piecemeal approach rather than collaboratively and holistically – considering the broader impact that different types of technology can have on airport operations and workers.

Although major immediate job losses were not identified, this has largely been as result of companies tending to rely on 'natural' turnover of workers to remove jobs and new technology being introduced to fill the gap remaining. In occupations such as baggage handling and passenger handling, employers seem to be deliberately understaffing to make introduction of new technologies easier. However, this has meant that remaining jobs are intensified as more tasks are loaded onto a smaller number of workers. This is

further exacerbated as technology often fails to fulfil expected functions or malfunctions. Workers are also facing greater pressure due to increased use of metrics to monitor work. This has also increased passenger aggression against workers, and had negative impacts on health and safety and job satisfaction due to increased pressure and monotony at work. This is exacerbating existing problems of workforce retention.

Technologies are also being used for monitoring and surveillance – often introduced under the guise of quality control or safety and security – and workers tend to lack awareness or the rights to data that is collected about them. Increased reliance on personal mobile devices and PDAs for communication makes workers more isolated in their jobs and also raises concerns about violations of rights to data privacy. These challenges are all exacerbated by the declining quality and length of training. Employers and airport operators also face major negative impacts as a result of new technology being introduced poorly – which can contribute to reduced productivity, safety and a loss of experienced workers.

In the longer term, there are major expectations for more direct redundancy-based job losses, particularly as airports continue to focus on growth. It is expected that passenger handling, baggage handling, and security jobs are most likely to be impacted. There is also potential for changes to customs/ border control roles with increased use of self-service technology and biometric data. Airports are likely to continue cost-cutting and introducing productivity-raising technologies, but uncertainty exists about the pace of this change – both due to investment as well as

slow-down from technological failures and passenger resistance.

As passengers become more comfortable with using technologies, as employers enforce the use of technologies through metrics, and as technologies become more advanced – particularly through increased use of AI alongside automation of tasks – it is expected that major job replacement could be seen in the future. Jobs expected to be least impacted by future technological changes include those focused on passenger accessibility and customer-service, and it is likely that there will be a growth in these types of roles, although this comes with new health and safety risks. Although not yet widely introduced, the introduction of remote operations is also expected. More data/digital skills are also expected to be needed in the future and work is expected to become more polarised.

Although not specifically identified amongst interviews or focus groups, new technology is likely to have major discriminatory impacts on different groups of workers – particularly those face greater job insecurity (such as women and young workers). Women tend to dominate passenger-facing roles and so are likely to see restructuring and de-skilling of work, while jobs in ground handling – more male dominated – are likely to experience increased automation with major potential for job replacement. Digital performance assessment systems also often apply a ‘one size fits all’ model that largely takes little account of difference related to factors such as age or gender. This means that some workers have to work harder to reach benchmarks for success. It is expected that data collection is likely to continue to be used and expanded to support complex decision-making within airports.

# DECISION-MAKING ABOUT NEW TECHNOLOGY

Employers generally do not engage meaningfully with unions about the introduction of new technology – 72.7% of survey respondents reported that employers do not engage with unions on the issue. Evidence from across this research highlighted that engagement with unions or workers tends to be limited. Workers feel unable to resist the imposition of technology – mostly introduced top-down with little collaborative discussion or negotiation taking place about why certain types of technology are being introduced.

Where unions are involved, employers tend to simply update unions on changes. Survey results revealed that union representatives perceive the groups with the most influence over the introduction and use of new technology as: employers – such as airlines and retailers (35.3%), airport owners/operators (25.5%), and technology providers (21.6%).

Some workers and union representatives have reported active engagement – one survey respondent highlighted that the union had been a driving force behind electrification and automation in ground handling,<sup>160</sup> and in Toronto Pearson, unions representing flight attendants engage with airlines through ‘joint committees’ around scheduling of work.

Where union density is high there tends to be greater success in negotiating new technology, however a major challenge for trade unions has been a decline in the activist base since the pandemic. Trade unions are also often unable to proactively address incoming technology within collective bargaining due to time spent ‘firefighting’ issues elsewhere. This is exacerbated by a low awareness of workers about the introduction of new technology – the survey identified workers are either not aware (31.8%) or somewhat aware (31.8%) about the introduction of new technology.



There have been some examples of language on new technology being implemented in collective bargaining agreements (in Toronto a clause about new technology has been included in some airline agreements since 1998).<sup>161</sup> However meaningful and implementable language tends to be difficult to negotiate, as one union representative highlighted: “*you will never be able to prove that somebody has lost their job because of technological change.*”<sup>162</sup>

Discussing issues around technological change through the frame of health and safety has – in some cases – proven to be a more effective tool in collective bargaining. However, perhaps the most effective decision-making processes have been those that have taken a collaborative approach, involving all key stakeholders, including trade unions. The failure of the introduction of new technology and clear negative consequences identified across this research further highlight the value of a collaborative approach to the introduction of new technology.

# PRINCIPLES FOR INTRODUCING NEW TECHNOLOGY

Results of this research highlighted some key issues to be considered in decision-making about the introduction of new technology within airports:

**Impact Assessments:** Before new technology is introduced, labour impact assessments, including equality impact and risk assessments should be undertaken to identify potential impacts of technological change on jobs, including health and safety impacts as well as potential impacts on workers' labour rights. Any changes should be based on the realities of workers. This could be supported by broader analysis of the economy to identify potential consequences on indirect jobs supported by economic activity within the airport.

**Job Security and Quality:** Language about new technology should be entrenched into collective agreements with safeguards to ensure mitigation of negative impacts, including recognition of the impacts on workers' intellectual property. New technology should not reduce overall number of jobs, working time, pay or conditions, or lead to job intensification without an increase in pay. Where introduced, technology should improve working conditions or reduce workload. Workers should also have the right to share in the benefits of new technology, either through increase in pay or reduction of working time. Health and safety concerns around the introduction of new technology reinforces the need for stronger union engagement with employers.

Where jobs are replaced by technology, there should be opportunities for redeployment to other roles with assurances of equal or better pay and conditions. Ongoing review of job descriptions can identify ongoing changes in work. Additional responsibilities should also be recognised through increases in pay and job

titles. Some workers will face greater impacts from changes and so measures must be taken to ensure that new technology does not disproportionately impact particular workers. Challenges in recruitment and retention mean that improvements to pay, conditions, benefits and working environment are needed.

**Skills Development:** Technological changes often mean workers are redeployed or skills required within roles change which means that opportunities for re-skilling/upskilling are essential. Training should not just be functional (i.e. how to use new equipment) but should also help workers to adapt to changes in responsibilities and structures of work. New skills should be recognised with pay increases. Training should be high quality and ideally take place in-person. Workers also need equal access to training.

**Equal Access to Quality Technology:** If technology is introduced it needs to function effectively. Use of cheap, inadequate technology makes work harder, and contributes to passenger aggression and high turnover of the workforce. Employers should maintain the quality of technology. Employers should also supply the technology to be used and pay for the cost of using it, including mobile devices.

**Standardisation of Technology:** A lack of standardisation across technological systems and software used within airports makes work harder. Companies operating within airports should work collaboratively, including with manufacturers of technology, to ensure greater standardisation of technology and software used and the data that is collected and used.

**Data, Monitoring and Surveillance:** This research found that workers' rights to data privacy are being violated. The collection and use of data within airport operations should be:

- **Transparent and explainable:** Employers should be transparent about the collection and use of data and algorithms in making or informing decisions made about work.

- **Negotiated:** Workers should be consulted about the collection and use of worker data and should be able to challenge decisions based on worker data. Monitoring or surveillance technologies should only be introduced after negotiation and agreement with the union.
- **Only used for specific purposes:** Data collected should only be used for safety and security purposes and should not be used for uses that could potentially violate workers' fundamental rights, affect key decisions of employers (hiring, firing, disciplinaries) or used for 'emotional recognition'. Collection and use of biometric data should be clearly defined and workers should have control over their data.
- **Standardisation:** There should be greater standardisation across the collection and use of data within the industry.
- **Impact Assessments:** Collection and use of data should be risk and impact assessed and any potential negative or discriminatory impacts mitigated and compensated.

**Social Media Data:** Employers should not collect or use data collected from workers' social media.

Other key issues raised included:

**'Stakeholder' Collaboration:** There are a wide range of 'stakeholders' involved in airport operations. Airports operators/owners tend to have the most power in driving change within the airport. Employers (retailers, airlines) also determine priorities for investment – particularly related to costs and often put pressure on sub-contractors (eg ground handlers) to reduce costs which can lead to uptake of technology. Passengers are also key stakeholders – passengers' acceptance and adaptability to new technology often informs the rate of change. Although not discussed in detail in this research, developers, manufacturers and suppliers of technology

were also highlighted as an important stakeholder.

Introduction, use and control of technology should be undertaken with meaningful consultation of workers and unions. An absence of spaces to discuss issues related to new technology highlights the urgent need for a collaborative approach to decision-making about technological change. Recognising that workers have the knowledge about their work, workers should be able to provide input about new technology. There is also a need for greater information sharing from airport operators and employers about technologies deployed across the airport. Trade unions also have an important role to play in collaborating with employers/airport operators to identify skills gaps or provide information to members about new technologies. Coordination amongst unions is also needed to enable different groups of workers to share information and – where possible – negotiate collectively about technological change.

**Regulation:** There are growing concerns about data and privacy rights, highlighting the need for stronger regulatory frameworks. Regulation can also help enable informed and holistic decision-making – whether for redeployment or skills development of workers, or to ensure transparency in data collection.

**Education and Awareness Raising:**

Although some workers are aware about new technology, there tends to be a lack of detailed awareness about technological change. Trade unions need to develop comprehensive education and training strategies about new technology and potential impacts.<sup>163</sup>

# RECOMMENDATIONS FOR FURTHER RESEARCH

Several areas were identified where gaps existed requiring further research, including:

- Mapping of airports globally to identify factors affecting the rate of change and nature of technological change taking place, including mapping of key stakeholders to identify pressure points. For example, the ownership of airport operators provides potential opportunities for exerting public pressure.
- Greater detail about the equality impact of technological change on different groups of workers – include changes to work and the use of algorithms in performance management.
- Identification of key skills gaps needed to enable redeployment in future occupations.
- Existing regulatory frameworks and potential opportunities for regulatory oversight to ensure sustainable, equitable change and address concerns related to data rights, including the intellectual property of workers.
- Potential for future technology to be introduced in response to climate change.
- Further research into the declining quality and length of training across airport occupations, including the impact of the shift away from collective in-person training/ learning to online solitary learning.

# END NOTES

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19. Ibid.
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32. Based on individual worker interviews held 9/4/24-10/4/24
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34. Manchester individual worker interview 10/4/24
35. Examples of key manufacturers of 'snake belts' include Mallaghan GSE, Beumer Group, Vanderlande, Flexco, TLD Group, Habasit.
36. Manchester individual worker interview 10/4/24
37. Manchester individual worker interview 10/4/24
38. Digital tool developed by ground handling company Menzies.
39. Manchester individual worker interview 10/4/24
40. Manchester individual worker interview 10/4/24
41. The airport also trialled a robotic pushback tug but the trial ended because it was too slow.
42. Based on individual worker interviews held 10/4/24
43. Manchester individual worker interview 10/4/24
44. Manchester individual worker interview 10/4/24
45. Manchester individual worker interview 10/4/24
46. Based on focus group discussions held 14/12/23 & 27/2/24
47. Examples of key manufacturers of this technology include Rohde & Schwarz, Smiths Detection, Analogic, Leidos, Nuctech,
48. Limits will increase from 100ml to 2 litres per passenger.
49. Focus group discussion, 14/12/23
50. Based on focus group discussion held 27/2/24
51. This differs across countries and arrangements can include the airport authority being responsible for provision of fire services and workers directly employed by the airport, government bodies providing fire services through public sector employment, or local voluntary fire brigades provide services to airports. In the UK, Airport fire services have to adhere to Civil Aviation Authority guidelines and national firefighter operational standards.
52. Examples of manufacturers include Rosenbaum.
53. Technology in cameras to automatically read vehicle registration plates which is computer-processed against a database.
54. GTAA. 2017. International Airport Master Plan 2017-2037 – Growing Responsibly.
55. Toronto Stakeholder Interview, 5/2/24
56. GTAA. 2016. Toronto Pearson International Airport – Growing Canada with a Mega Hub Airport.
57. GTAA. 2017. International Airport Master Plan 2017-2037 – Growing Responsibly.
58. Combined cycle natural gas and steam
59. Other technology includes de-icing technology, with the airport collecting waste/run-off is collected to ensure environmentally conscious collection of waste.
60. Toronto Stakeholder Interview, 5/2/24
61. GTAA. 2019. Understanding the Pearson Workforce.
62. Christopher Gray, P & House, J. 2020. Toronto Airport Workers' Council: Renewing Workplace Organizing and Socialist Labour Education.
63. Smith, S. 2020. Cabin Fever: Hope on the Edge of Despair at YYZ.
64. Toronto Stakeholder Interview, 5/2/24
65. Based on individual worker and union representative interviews held 5-9/2/24
66. Examples of key companies providing self-check in and bag drop kiosks include Bollere SA, Fujitsu Limited, Diebold Nixdorf, Embross Group, Toshiba Corporation, NCR Corporation, Rockwell Colins, SITA SA, and Materna IPS.
67. Toronto Individual Worker Interview 7/2/24
68. Toronto Individual Worker Interview 6/2/24
69. Toronto Individual Worker Interview 8/2/24
70. Toronto Individual Worker Interview 9/2/24
71. Examples of key developers of digital baggage tracking systems include Imping, Lyngsoe Systems, Delta Airlines, TRACE ME Luggage Tracker, SITA, Beumer Group, Aeroflot, TrackIT, Amadeus IT Group, Siemens AG.
72. Toronto Individual Worker Interview 9/2/24
73. Software called Timatic developed by specialist aviation software company Amadeus IT Group. Examples of other key airport software companies include Dev Technosys, Boeing Digital Solutions, Honeywell Aerospace, Lufthansa Systems, SITA, GE Aviation, AeroSimple, Rockwell Collins, SITA, IBM Corporation, Siemens AG.

74. Toronto Union Representative Interview, 23/2/24
75. Toronto Individual Worker Interview, 6/2/24
76. Toronto Individual Worker Interview, 6/2/24
77. Toronto Individual Worker Interview, 6/2/24
78. Example of manufacturer includes TAV Technologies.
79. Toronto Individual Worker Interview, 6/2/24
80. Examples of key software developers include Amadeus, Materna, SITA, TAV Technologies.
81. Automated wheelchairs were previously trialled by one airline, and the airport operator has pushed for their introduction, but they have not been introduced due to union resistance and because the technology is not passenger friendly.
82. Based on individual worker and union representative interviews held 5-9/2/24
83. Toronto Individual Worker Interview, 8/2/24
84. Examples of key manufacturers include JLC Group, Dormakaba, Cambaum, Manusa,
85. Software provided by company called iLobby.
86. Toronto Individual Worker Interview, 8/2/24
87. Examples of key companies include JLC Group, Dormakaba.
88. Toronto Individual Worker Interview, 9/2/24
89. Based on individual worker and union representative interviews held 5-9/2/24 & 4/3/24
90. Toronto Individual Worker Interview, 4/3/24
91. Focus group discussion, 8/2/24
92. Ambito. 2023. Nueva Terminal de Partidas de Ezeiza podría empezar a operar "en dos meses. Perfil. 2023. El nuevo aeropuerto de Ezeiza se inaugura tras millonaria inversion. Clarin. 2023. La nueva terminal que convertirá al Aeropuerto de Ezeiza en el más moderno de Latinoamérica será inaugurada tras la temporada de Verano. Ambito. 2022. Reanudaron las obras en la nueva Terminal de Partidas de Ezeiza. International Airport Review. 2023. Putting passengers first at Ezeiza International Airport.
93. Based on focus group discussion held 8/2/24
94. Examples of key manufacturers of baggage handling and baggage supply detection systems include Smiths Detection, Beumer Group, MATREX, Daifuku Co. Ltd, Siemens, SITA, Vanderlande Industries, Pteris Global Limited, Fives, Babcock International Group Plc, G&S Airport Conveyor, Alstef Group, Ulma Group.
95. Buenos Aires Individual Worker Interview, 8/2/24
96. Buenos Aires Individual Worker Interview, 8/2/24
97. Based on focus group discussions held 6/3/24 and 8/2/24
98. Examples of key companies include Amadeus, Materna IPS, Daifuku, Beumer Group, Vanderlande, CCM, Rockwell collins, Alstef Group, SITA.
99. Buenos Aires Individual Worker Interview, 8/2/24
100. Buenos Aires Individual Worker Interview, 6/3/24
101. Based on focus group discussion held 8/2/24
102. Examples of key manufacturers include Socket Mobile-EMEA, Datalogic, Honeywell, Zebra, GSM Barcoding, Zebra Technologies.
103. Based on focus group discussion held 6/3/24
104. Payment is made through the Mercado Pago application – largest online payment platform in Mexico.
105. Based on findings from individual interviews, focus groups and online survey. Where specific issues or quotations not previously included within case studies or from online survey results are identified, the source has been noted.
106. Online survey
107. Toronto Individual Worker Interview, 9/2/24
108. Manchester Focus Group Discussion, 27/2/24
109. Manchester Individual Worker Interview, 10//4/24
110. Examples of key airport software companies include Dev Technosys, Boeing Digital Solutions, Honeywell Aerospace, Lufthansa Systems, Amadeus IT Group, SITA, GE Aviation, AeroSimple, Rockwell Collins, SITA, IBM Corporation, Siemens AG.
111. Online survey
112. Toronto Union Representative Interview, 8/2/24
113. Toronto Individual Worker Interview, 9/2/24

114. Toronto Union Representative Interview, 23/2/24
115. Online survey
116. Online survey
117. Toronto Individual Worker Interviews, 8-9/2/24
118. Toronto Individual Worker Interview, 7/3/24
119. Online survey
120. Toronto Individual Worker Interview, 8/2/24
121. Online survey
122. Online survey
123. Online survey
124. Online survey
125. Online survey
126. Online survey
127. Toronto Individual Worker Interview, 7/2/24
128. Online survey
129. Toronto Individual Worker Interview, 8/2/24
130. Toronto Individual Worker Interview, 6/2/24
131. Toronto Individual Worker Interview, 8/2/24
132. Online survey
133. Online survey
134. Manchester Focus Group Discussion, 27/2/24
135. Manchester Individual Worker Interview, 10/4/24
136. Toronto Union Representative Interview, 23/2/24
137. Based on Individual Worker Interviews – Manchester (10/4/24) & Toronto (5-7/2/24)
138. Toronto Individual Worker Interview, 7/2/24
139. Online survey
140. Online survey
141. Online survey
142. Manchester Individual Worker Interview, 10/2/24
143. Toronto Union Representative Interview, 23/2/24
144. Toronto Union Representative Interview, 23/2/24 and Individual Worker Interview, 6/2/24
145. Toronto Union Representative Interview, 23/2/24
146. Online survey
147. Toronto Individual Worker Interview, 6/2/24
148. Toronto Individual Worker Interview, 6/2/24
149. Online survey
150. Toronto Union Representative Interview, 23/2/24
151. Online survey
152. Online survey
153. Online survey
154. Manchester Focus Group Discussion, 27/2/24
155. Online survey
156. Toronto Individual Worker Interview, 6/2/24
157. Toronto Individual Worker Interview, 6/2/24
158. Manchester Individual Worker Interview, 10/4/24
159. Toronto Focus Group Discussion 8/2/24
160. Online survey
161. Toronto Union Representative Interview, 27/2/24
162. Toronto Union Representative Interview, 27/2/24
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