Future present

The Emirate of Dubai's transportation network is experiencing rapid growth and implementing cutting-edge technologies – both of which are bringing challenges and opportunities to Amair Saleem CFIRM, director of its Safety, Risk, Regulation and Planning Department

BY ARTHUR PIPER

In September 2017, the world caught a glimpse of the future in the Emirate of Dubai. Amair Saleem, Director, Safety, Risk, Regulation and Planning Department at the Roads and Transport Authority (RTA) of Dubai, watched with excitement from the ground as the public demonstration of the organisation's air taxi project got underway.

"While the demonstration was an outstanding success, there was significant effort from the organisation to get it to the point of flight," says Saleem. Those challenges included the system integration of a new type of aircraft, making sure the vehicle adapted to the location in which it would be operating and getting certification from the aviation authorities.

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Definition

Definition was also a problem – just what is the Volocopter? The insectoid Volocopter is an autonomous aerial vehicle. It has a small capsule for a couple of passengers that sits beneath a large spoked wheel adorned with 18 mini

helicopter-style propellers. Powered by battery, it can fly for about 30 minutes and has a top speed of about 60 miles an hour. On the morning in question, the drone glided effortlessly over the sand against the backdrop of Dubai's modernist skyline.

"They are not a traditional aircraft – they don't have flaps or wings, and they don't generate lift," he says. "The project was also a lot more involved from an engineering software approach."

Saleem dealt with the air regulator by coordinating a discussion with the German-based supplier to come up with a risk-based submission that could demonstrate that the aircraft could fly safely within operational parameters. It took a while, but they achieved air-readiness approval that made the test flight possible – and even got a licence for the vehicle, which is the equivalent of a number plate for aircraft. "Personal use is a longer-term project," he says, "but we are looking for a commercial application for the project by 2022."

Safety first

Behind the scenes, RTA leadership stressed from the outset that the ground-breaking initiative had to be driven by a safety-first ethos. Saleem says that this approach meant that all of the critical assessment points for the project had to be risk based.

That has put his team at the centre of the initiative from the beginning. For example, there are a surprising number of businesses operating in this field, so selecting a suitable craft was not straightforward. For each candidate air taxi, Saleem needed to conduct separate risk assessments covering system, project and safety elements. These assessments formed the basis for selecting which vehicle would have the best likelihood of success given the safety requirements, the short timeframe and performance levels specified by RTA.

Even after selection, the risk assessments of the system and its integration into RTA's operational environment continued, and they were also the basis on which the organisation engaged with the Civil Aviation Authorities to give them structured reports on the risk levels that the air taxi could potentially

pose. Finally, the assessments became the drivers for the flight test programme where focus switched to effective risk mitigation.

"Ultimately, we ended up with the equivalent of a safety data file which was used by the Civil Aviation Authorities to make a final determination of the safety levels achieved by the aircraft in order to receive an authorisation for the final demonstration flight," Saleem explains. "This approach provided complete transparency, as we worked through the project timescale, allowing the concerned parties to make informed decisions. Without risk being a leading discipline in the project, it is questionable we would have ever even have started a flight test programme."

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Rapid growth

RTA is an interesting place to work as Dubai is an expanding city state. Its population rocketed by 700,000 to 2.7 million in the five years to 2016. Public transport usage is increasing rapidly putting pressure on infrastructure, which needs to constantly expand and adapt to the needs of the growing city.

The authorities are keen on meeting high customer expectations, investing in new technologies and improving the image of the city itself. Given the apparently daunting rates of growth, RTA often works in what Saleem describes as an "accelerated manner". By 2009, it had built a driverless, autonomous metro system – with 76km of track and 47 stations – in just five years. The kilometres of roads in the emirate increased from 11,756km in 2011 to 16,806km in 2017.

"Opportunities arise due to the clear, supported and structured transportation strategy, particularly when seeking the introduction of new technologies and innovative approaches," Saleem says.

For example, the 10.6km Dubai Tram line, which opened in 2014, chose a power supply that did not depend on overhead lines. The trams draw power from charging points spaced along the track. "We decided to go with an aesthetic power supply system, although at the time this was a relatively new technology and the first application in the Middle East," he says. "It offered operational advantages as well as being in keeping with the image of the city."

Scale and complexity

Not surprisingly, the risk management function faces challenges of scale and complexity. As well as having

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to rapidly implement large-scale heavy infrastructure projects safely, new technologies are making the interaction between the diverse elements within those services and between other networks necessary.

"All transportation systems are becoming more complex in the functions that they provide," says Saleem. "The interfaces to and dependencies on other systems become more complex, making the impact of business disruption and our response to those incidents more difficult to analyse and understand from a risk perspective."

Take the kind of automated ticketing system that most customers in modern cities take for granted – Oyster in London, Nol in Dubai. They are super simple to use because a passenger can jump on a tram at one stop, take the marine taxi at another – then a train – all by using one card. The Nol card system is centralised, but the card readers are distributed over several transportation systems. If the central business system fails, there could be chaos throughout the network.

"To avoid this, we use risk management as a key analytical tool to understand the consequences and impact of potential failures of the system," Saleem says. Each risk assessment is implemented over the full life cycle of the system from inception to operation. Risk management techniques probe potential weaknesses in systems hardware and software, in the business continuity strategies and disaster management approaches, and in cyber security resilience and many other areas. "In this way, risk management fully supports critical transportation infrastructure to achieve optimal availability and effectiveness," he concludes.

ERM plus

Saleem says that the risk function has adopted a classical Enterprise Risk Management (ERM) approach, which has been augmented to cope with the scope of RTA's business. Saleem has seven managers that are formally under him. One of those is specifically responsible for ERM, but the others are spread throughout the business in specific risk areas.

"One of the advantages of our approach is that you put all of the risks under one roof, rather than having it spread out in the different business silos," he says. "We don't want to restrict ourselves to looking at just the key business areas; we want to make sure that we are looking proactively at where those business areas cross and intersect too."

Saleem says he takes a similar perspective to the ISO standards on risk management. For him, that means that everything at its core is perceived from a risk-based perspective – as the recent assessment and implementation of the air taxi illustrates.

"We regard transportation systems as extremely integrated systems where poor performance in any area will have a ripple effect through the business and impact our service commitment to our customers," he says.

In real life, if Saleem's team does not adequately identify risks during a project delivery phase – from planning and design to manufacture and implementation – those problems will surface after the initiative has gone live. "What we have found is that we can enlarge the conventional coverage of the ERM system to act as a central engine to cover and integrate risk-based functions. In this way we have achieved a form of seamless risk assimilation across multiple management systems, strategies and projects," he says.

Finally, he says, the risk team continues to learn from and adapt to changing operational circumstances – and from other functions in the business, such as health and safety, accident investigation, security management, asset management, crisis management and business continuity.

Analytics and beyond

Given the highly automated nature of many of RTA's transportation systems, it is not surprising that the risk function uses data analytics to a significant degree in its methodology. He anticipates using artificial intelligence (AI) systems to mine big data sets in the organisation – and to provide more value to the business.

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RTA already deploys AI systems in its Enterprise Command & Control Centre – EC^3 – the biggest integrated transport command centre in the world, which went live in 2017. Saleem was the operations project manager on the initiative. It currently receives over 75 million records a day, and the system contractor has set up an AI system to flag up incidents that could be a cause for alarm. Put simply, the AI scans historical data sets, such as those in traffic flows at specific hours, and can activate an alarm to the system operators if an incident is occurring that sits outside of the sensitivity margins that have been set.

"This function supports us in managing risk as we get an early indication from the system telling us that an incident or abnormality has occurred," he says. "By getting an early indication of the potential event, we can control the risk response and mitigation measures and try and avoid escalation. We can also feed back into the risk registers and business continuity plans information on the adequacy of our response."

He views the extension of such advanced technology initiatives as innovation projects because for the risk team they carry too many unknown variables in real-life situations to be depended on today. For risk professionals, AI and other advances are likely to provide significant aids for risk analysis with big data sets and broader reach.

"I am somewhat sceptical that these automation technologies will replace risk experience in the short to medium term," he says. "You will always need people that challenge the given state and what I call, 'ask the stupid question'. The stupid question often transpires into a new perspective and understanding – it was just never raised before."

While embracing new technologies for what they can bring to the table, Saleem also sees them as posing a big danger for risk managers who allow themselves to become too dependent on their results. He values risk professionals who can join the dots and think of novel ideas, especially where data may be weak or non-existent.

"In the absence of this way of working, you get very static risk registers which are not truly horizon scanning and are exposed to unconventional real-world events," he says. "We must recognise that the world and the environment around us is changing and changing very rapidly – the risk registers must be equally dynamic. In short, we can choose to be reactive to the changes or predictive; I would still wager on risk professionals and not the technology at this time to accomplish this task."

Recognising experience

Saleem has recently gone through the senior executive fellow route to IRM certification – a scheme designed specifically for experienced risk professionals who wish to have their skills and knowledge in ERM officially acknowledged. It is aimed at those with at least eight years' experience and comes with the CFIRM designation, which is the highest internationally recognised accreditation available to risk management practitioners.

"If you consider yourself a true and excellent risk professional at a senior level then it's not a choice: you have to go for the qualification," Saleem says. "Your self-assessment is meaningless – let a professional society such as the IRM verify and validate your standing through a transparent and independent process. If you achieve the qualification then you know, your management knows, the risk community knows and accepts your professional status."

The process requires commitment. He advises those who go through it to thoroughly review their experience and knowledge, ideally with support from a peer to act as a sounding board and devil's advocate. "The IRM application must be treated very seriously with appropriate time and response weighed," he says. "Don't make an application if it's a half-hearted effort – wait till you believe you can address the IRM criteria and obtain the recognition. In more simple risk terms, if you are a risk expert then mitigate the failure scenarios in your application."