IRMP 21-25 Risk Review; Technology Risk.

Contents

Executive Summary

Technology is a fundamental part of our everyday lives and the production of this Integrated Risk Management Plan (IRMP) sets out the vision for the innovative way in which we can use it in the future. This "third industrial revolution" is bringing lifestyle changes that have a Service wide impact.

The last 5-year ICT strategy has introduced significant investment in technology, and this has established a solid basis for the organisation to continue to evolve, although the risks and challenges are also constantly growing and these need to be managed to maximise on the investments made.

Shropshire is attempting to digitally catch up with other regions, as we become more reliant on technology, we must be cognisant of the County's digital capacity to meet our requirements. We must also be aware of our own capacity to develop and maintain the existing and future requirements.

The recruitment and retention of skilled staff to carry out this function will continue to be a challenge. However, opportunities for remote working may increase our capability to attract skilled staff. Future technologies may reduce the need for people to be "at the scene" or even in the same country.

Assistive technology already forms a significant part of our Partners future strategies. We can collaborate to ensure we are part of this innovation.

The technology that supports service delivery is developing at a pace. Maintenance on fire engines is becoming increasingly computer diagnostic and less spanner in

hand. The agility of the organisation both in proactive development and also in recovery or response is limited by the technological competence and capacity of our personnel. This capability is also limited by the ability we have to access external resources.

Technology will influence the security of our systems, data, information and as a result our service delivery. We are at risk of cyber-attacks from external and internal agitators. To counter this, we must have robust business continuity arrangements, consistently applied security vetting and a high level of system resilience. This can be supported by the Fire Alliance via the ICT project.

The Alliance will also need to be the vehicle of choice for scoping future firefighting technology and the associated policies.

Findings

Introduction

In 2020, the digital revolution that started back in the late 1940's is transforming our jobs and the way we live our lives, and the pace continues to accelerate. The Government and military organisations introduced computer systems during the 1950s and 1960s, but the era really started to impact during the 1980s with the introduction of the mobile phone. In 1991, analogue mobile phones made way to digital mobile phones and demand soared. The same year saw the creation of the World Wide Web, and by the end of the decade it was so popular that many businesses had a website and nearly every country on earth had a connection. By 2015, around 50% of the world had constant internet connection, and ownership rates of smartphones and tablets have nearly surpassed those of home computers.

The Digital Revolution is sometimes also called the Third Industrial Revolution. It has resulted in broad social impacts and widespread lifestyle changes by increasing the ability to communicate and find important information. Additionally, it has made globalization possible which has, in turn, resulted in more effective and efficient business productivity.

Technology is a fundamental part of our everyday lives and the production of this Integrated Risk Management Plan (IRMP) sets out the vision for the innovative way in which we can use it in the future. The last 5-year ICT strategy has introduced significant investment in technology, and this has established a solid basis for the organisation to continue to evolve, although the risks and challenges are also constantly growing and these need to be managed to maximise on the investments made.

A service priority is to embed the systematic use of technology and consolidate on benefits to improve business processes through the Service Transformation Programme.

Advances in technology will revolutionise the way we fight and prevent fires and rescue those in danger, while reducing the risk to our own personnel. SFRS is developing an "INTENTIONALLY INNOVATIVE" culture where new technologies and new data can add value providing improved services and allowing outcomes to be properly evaluated against objectives.

This innovation links to effective procurement, with a Fire Alliance workstream supplementing national and other collaborative procurement. Digital transformation of operational and support services increasing effectiveness and efficiency, as well as joining up procurement practices.[1]

Technology will allow us to share data more securely enhancing service delivery and reducing risk. This is evident in Safe and Well automated signposting systems set up with our partners in Social Care

Cyber Crime

Investment in digital brings many advantages in how we work, but as we become more dependent on technology, we become increasingly vulnerable to cyber-attacks. The Service website was attacked in 2016 along with the websites of several emergency organisations demonstrating the clear and present threat of the reputational damage caused by cyber risk.

Realistically, these risks can never be fully eliminated, and threats are constantly evolving, but it is possible to implement security solutions to protect against the most common attack vectors. There are measures implemented to mitigate against these threats of malware, viruses, email attachments with continual and increased investment in cyber security defences to prevent breaches.

There is a non-technical strategy used by cyber attackers, called social engineering, that relies heavily on human interaction by tricking people to enable attackers to gain legitimate, authorised access. In addition to the technical solutions that are put in place, staff have an important role and must be vigilant against the increasingly sophisticated manipulation methods used by hackers. To reduce this risk there is continual communication and training to raise awareness and educate staff so they recognise the wide array of tactics that are used. In addition to this, SFRS has assigned some of the apprenticeship levy for degree level qualification in cyber security for developing the specialist skills within the ICT team.

The Government has recognised and highlighted the importance of system and data security by introducing legislation to ensure the handling and management of sensitive information is stored and shared securely. This is evident in Safe and Well automated signposting systems set up with our partners in Social Care. It is particularly prevalent to the management of operational risk information, where the current and future needs for interoperability and mutual aid between neighbouring Fire and Rescue Services and other Category 1 responders must be taken into account. The HMICFRS state of

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[1] LGA; Fire Vision 2024

the nation report gave examples of FRS who routinely use fax machines and stated that there must be a plan for appropriate technology taking in to account the expertise and training of staff.

Cyber-crime is a clear and present threat, the attack in 2016 took control of the front page of websites of several emergency service organisations.

Business continuity planning for such events is embedded throughout the organisation. The testing of plans both in house and with partners is crucial. This is also highlighted by the National Risk Register and the Community Risk Register.[2]

The risk of malware attached to email or messenger services is increasing as the volume of interactions increases. More and more staff have greater access and reliance on ICT infra-structure.

Staff can become dis-enfranchised, if they have the knowledge and intent, they can pose a significant risk to ICT. To mitigate this risk, we need to have appropriate vetting processes for staff directly involved in critical areas of the Service.

Security of Data

The Government has recognised and highlighted the importance of system and data security. This recognises the sensitive information we store and share. The technology that supports this must be secure as must the management.

7.1 Security of information is a much wider subject than the provision and use of operational risk information. There is a range of legislation this is relevant to the gathering, dissemination, storage and protection of information. Fire and Rescue Authorities and their Fire and Rescue Services will need to ensure that security policies, protocols, procedures and systems are in place in relation to operational and other information and compliance with the appropriate legislation

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*5.11 The management of operational risk information must also take into account the existing and future needs for interoperability and mutual aid between neighbouring Fire and Rescue Services and other Category 1 responders, together with an assessment of the financial, human and other resources specific to operations, **including a plan for appropriate technology** that takes into account the future functionality requirements and the appropriate expertise and training of staff.[3]*

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[2]West Mercia Local Resilience Forum/ National Risk Register
[3] Fire and Rescue Service Operational guidance /Operational Risk Information

Physical and Digital infrastructure

Technology challenges in Shropshire include not only infrastructure but also utilities, particularly the availability of power and opportunities for increased capacity to support business growth. Digital connectivity is limited yet crucial for strategically important sites. If these issues are addressed Shropshire might increase its economic output. However due to sparsity Shropshire is often restricted by the digital challenge.

Technology in Shropshire

Shropshire is the largest inland county and being one of England's most rural and sparsely populated counties it has issues with online connection speeds and reliability compared to urban areas because it does not offer sufficient returns on investment. Ofcom's priority is working towards comprehensive mobile broadband coverage across the UK and while Shropshire is attempting to digitally catch up with other regions, we must be cognisant of the County's digital capacity to meet our requirements. To address these requirements, as we become more reliant on technology, all of the appliances in the fleet have been fitted with low profile, roof mounted antennas and 4G WIFI routers to significantly improve connectivity on the move and to provide our staff with their own high-speed WIFI hotspot, not just in the vehicle, but around it too.

Smart, flexible and clean energy technologies are being studied at the University Centre Shrewsbury – Centre for Research into Environmental Science and Technology (CREST). Shropshire Council is attempting to supporting the development of low carbon innovations through supporting the delivery of projects such as Built Environmental Climate Change Innovations. Supply chain activities including low carbon within housing.

Robotics and artificial intelligence (AI): Agri-tech – use of drones and AI Harper Adams University – innovative research and development in robotics to support agricultural systems and processes.

Leading edge healthcare: Robert Jones and Agnes Hunt Hospital Centre of Excellence, Oswestry. The Council recognises the opportunity for the centre to become a powerful destination for medical and life sciences, biosciences and digital healthcare.

University Centre Shrewsbury is supporting the development of health and innovation hub with a focus on digital health.

The Modern Workforce

The demand for technical talent will continue to outpace supply for the foreseeable future so recruiting and retaining such talent in the context of a general ICT skills shortage presents a significant challenge and risk to the organisation. With the skills gap widening between the public and private sector it is becoming increasingly more difficult to attract the specialist skills that are needed. The cities of Birmingham and Manchester are commutable distances away offering better opportunities and salaries.

The Service has adopted a longer-term sustainable strategy in response to the challenges it faces for recruiting and retaining ICT staff by growing and nurturing talent from schools and colleges. This approach requires significant coaching and mentoring, and while it can be a gamble when it works, it reaps rewards by improving cultural fit and building loyalty with employees.

The use of low-code and hyper-converged platforms is being utilised so that the technology removes the burden of menial tasks from staff. The benefits of this approach are improved productivity, easier maintenance and development, and less reliance on specialist skills.

There is also the challenge of building a digital-ready workforce by bridging the skills gap with all staff. This requires training to help employees adapt to the changing requirements as digital skills become integral to their roles. The demand on all individuals to adopt new skills will continue to grow and the success of transforming services depends on their willingness to adapt. This can be more acute for generation X, the generation born after the baby boomers in the 1960's and 1970s, who do not fully appreciate the benefits of changing the way they have always carried out their duties.

In contrast, Millennials are very conversant with mobile and digital tools and their use of technology in their personal lives drives their expectation of corporate service where they are comfortable, providing feedback in real-time and expect responses in a similar time frame. As Generation Z, the first fully digital generation join the workplace their expectations are changing. This generation of employees want to believe that their work matters; they want to be part of a culture that fits their values; and they want to be engaged and inspired by their jobs.

Flexible working continues to be a feature of most millennials working lives according to The Deloitte Millennial annual survey. The investment that SFRS has made in its' infrastructure enables working from other locations other than the Headquarters building. Technology makes virtual teams more practical and potentially lessen the urban-rural divide. So, it follows that in the future there will be more emphasis on managing geographically dispersed workforce.

Assistive Technology

Both local authorities recognise that assistive technology will be at the forefront of service provision. This is especially so in adult social care.

Assistive Technology is a range of equipment and sensors that support disabled, vulnerable and older people to gain independence and also provide peace of mind to the user and to their loved ones that help is at hand.

On the high street you will see the ever-increasing popularity of SMART home devices – these are gadgets that can interact to help you run your home automatically. For example, controlling the kettle or washing machine via an app on your mobile phone.[4]

The most common SMART device that many of us use is a Voice activated Speaker (such as the Alexa or Google Assistant). These are popular gadgets that help people at home to get up to date information such as the time, weather or news. But they can also help people to remember things throughout the day such as taking medication or having a drink of water. They can also help us to control our environment for example turning lights on and off. SMART technology is being utilised more and more, Shropshire Council have a partnership with Samsung where this technology will provide much more vulnerability data and support.

We can also join this revolution and utilise such technology through collaboration with partners. This will support the precision targeting of risk that is crucial in maintaining a flat risk profile.

Systems and Information Technology

To support the effective deployment of our fleet, we ensure that technology is embraced and utilised, such as mobile data terminals (MDT's) which contain software that is able to relay critical safety information and considerations to our people when attending an incident, therefore increasing both firefighter and public safety, through pre identification and familiarisation of risk by operational staff. The challenge remains to maintain and develop the technology that supports the sharing of risk.

This technology is supported by robust systems, processes and information to further support our people when faced with incidents. Examples of this include our risk management system and our alignment to national operational guidance, which provides consistency in the way all FRS's approach similar incident types. Will future reliance on technology leave the Service vulnerable? Is the pace of technology outstripping the organisations capacity to maintain and develop service delivery? The Fire Alliance has been designed to enhance capacity and resilience with ICT one of the key initial work streams.

Future Firefighting

The Service recognises that innovation will continue to change how we develop and evolve to keep firefighters and the community safe. This might appear almost science fiction but the landscape changes quickly. We can say with some certainty that in 10 years' time the fire service will be operating or utilising technology to meet a need that we don't even know exists at this moment in time.

The Response Capability Programme Board (RCPB) manages the existing list of future projects that will need to encompass changing technology. Representation from HWFRS is also utilised to ensure the Alliance is considered.

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[4] Telford and Wrekin/assistive technology 2019

The list below identifies some of the work streams covered within the RCPB.

- Restricted Access provision □
- Water provision □
- Firefighting technologies □
- Rescue capability □
- Working at Height □
- National assets and associated equipment □
- Future PPE □

Future Fire Control

The Fire Alliance has a key workstream that is scoping out how a Fire Control function can provide the necessary service across SFRS and HWFRS. A future Fire Control will embrace and effectively use the latest technology, encourage mutual support to ensure the most resilient call handling arrangements, and to engage and implement the forthcoming improvements to the 999/112 infrastructure.

As the global IT ecosystem changes dramatically, due in large part to the spread of 5G networks, there will be a whole new suite of cutting-edge mobile services that support futuristic endeavours. This will include live view, smart cars, robotics, smart cities, and drones, and other things previously seen only in science-fiction. It will provide access to real-time data for quick and effective decision making.

There is a range of virtual reality and augmented reality solutions beginning to emerge giving an indication of how technology is starting to radically change the traditional approaches to firefighting and incident ground communications.

Future Fire Technology

Industrial designer Jiazhen Chen was inspired to make a difference after a 2010 Shanghai fire killed 58 people in a high-rise apartment building. His solution was to slim things down for firefighters so they can move faster with the **Advanced Firefighting Apparatus exoskeleton suit[5].**

The suits strap on over a firefighter's PPE and transfer the load directly to the ground, improving their walking and carrying ability. The firefighter can operate for up to two hours at a time with the suit, which is also equipped with a movable joystick and a water gun system.[6]

Water Jetpacks. Firefighting jetpacks aren't just a fantasy for Dubai, they're the real deal. The **water-propelled jetpacks[7]** were purchased by the United Arab Emirates in 2015 as a way to avoid traffic by turning to the sea.

With what is now being called "the Dolphin" method, firefighters ride a jet ski and use the water pressure from it to power the jetpack and fire hose. This way, the firefighter

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[5] www.techy.com.au

[6] www.firerescue1.com

[7] independent newspaper

has more access to boat, road and shoreline fires, and an endless supply of water. Could this be seen on the River Severn?

SONIC FIRE EXTINGUISHERS[8]

Sonic Fire Extinguishers. Two George Mason University engineering students invented the sonic fire extinguisher to prove sound could be a way of fighting fire.

The student's creation uses low frequency soundwaves that remove oxygen from air molecules, allowing the fire to be eliminated. They discovered that high-pitched frequencies have no effect on fire, but the 30-60 Hz frequencies featured in deep bass often used in hip-hop tunes worked successfully.

ELECTRIC WAVE 'BLASTERS'[9]

Harvard University have found that they can harness the power of electricity to extinguish fires.

The team of researchers found that they could use a 600-watt amplifier connected to a wand-like probe to shoot electric beams and almost immediately snuff out flames that stood over a foot tall.

Researcher Ludovico Cademartiri said the science behind the invention is complex, but he and his team believe the carbon soot strongly responds to electric fields once it is hit with an electric charge. The combustion reaction is then shaken loose when the flames are hit with the beam.

The technology could be used in sprinkler systems and to fight fires in enclosed quarters, such as airplanes and submarines.

ROBOTS[10]

Artificial intelligence. The TAF20 and the TAF35[11] are robots designed to keep firefighters safe by taking on the some of the work themselves.

The robots are extinguishing turbines that are placed on a crawler and outfitted with a nozzle ring that atomizes water and foam to make a fine mist powerful enough to travel 60 to 90 feet. Despite the power, the mist is still fine enough to not harm firefighters if they get sprayed.

Firefighters can even take staying out of harm's way a step further by controlling the robots remotely from a distance of up to 1,640 feet to do things such as easily move vehicles and remove smoke from a building.

New South Wales firefighters began using the robots in 2015, and NSW Emergency Services Minister David Elliot said they have been a game-changer.[12]

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[8] interestingengineering.com

[9] www.eurekalert.org

[10] www.alphr.com

[11] emicontron.com

[12] www.firerescue1.com