Thinks
Insight & Strategy

Connected Places Sports and Culture Sector Research

Report prepared for the Department for Science, Innovation and Technology (DSIT)

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1. Introduction

1.1 Background and objectives

To support policy development, the Secure Connected Places Team within the Department for Science, Innovation and Technology commissioned Thinks Insight & Strategy to conduct qualitative research with professionals in the sports and culture sectors who are responsible for the procurement, deployment, and management of connected places technologies.

The objective of the research was to provide insight into approaches to connected places and cyber security, specifically:

- How do professionals in sports and culture understand connected places?
- How, if at all, is connected places technology currently being deployed in sports and culture organisations?
- What are the drivers and barriers to uptake of connected places technology?
- What approaches are being taken to cyber security?
- What is the role of cyber security guidance, if any?
- Are there any future trends for connected places technology in these sectors?

This summary report forms part of a wider series of research into approaches to connected places in non-local authority sectors. Further detail can be found in the overarching thematic report, higher education sector summary report, and transport sector summary report.

1.2 Method and sample

Thinks conducted 20 x 60-minute in-depth qualitative interviews with professionals in the culture and sports sector. Following the interview, professionals completed a 5-minute survey.

All interviewees were employed by a sports or culture institution, either directly or as a consultant. All had responsibility for at least one of the following:

- Designing and procuring connected places
- Deploying and managing connected places
- Cyber security associated with connected places.

Participation in the research was on an anonymous basis, but some example job titles from the sample include: Head of Technology, Director of Estates, Head of IT, Head of Operations, and Head of Business Intelligence.

Greater detail on the methodological approach can be found in the technical report.

2. Executive summary

2.1 Typologies of organisation

"Places" within the sports and culture sector are highly heterogeneous. They range from large stadiums attracting thousands of people, to small museums. As a result, professionals' understanding, deployment and approaches to securing connected places technology is highly variable.

Our analysis shows that the **size of the organisation** is the key differentiator within the sector.

Larger organisations in both the sports and culture sector tend to have dedicated team members to manage technology and/or the estate. This means they have greater awareness of the benefits of connected places technology and are deploying it to some extent within their organisation. However, across organisations in both the sports and culture sector, deployment of connected places technology tends not to be an organisational priority.

Smaller organisations in both the sports and culture sectors do not have dedicated team members to manage technology and/or the estate. Instead, professionals tend to have expansive roles (e.g. CEO, Head of Operations) of which technology is a very small part. These professionals have low understanding of connected places technology and are only using it to a very limited extent within their organisation – often unknowingly. Knowledge and funding barriers are much greater for smaller organisations.

2.2 Understanding of connected places

- **Claimed familiarity with connected places is highly dependent on the size of the sports or culture organisation and the professionals' job role.** Those at larger organisations and with a more focused job role (e.g. on technology or estates) tend to be more familiar.
- **Professionals think about connected places technology in terms of the benefits it delivers**, rather than specific devices.
- **Professionals in the sports sector identify clear leaders in the sector:** Tottenham Stadium, Wembley Stadium and Wimbledon (The All England Lawn Tennis and Croquet Club).

2.3 Aims, facilitators and barriers to deploying connected places

- **The majority of sports and culture venues are not aiming to 'be connected'.** Instead, they're deploying the technology to meet other business needs such as **increasing revenue and visitor satisfaction**. This was the most commonly raised reason for deploying connected places

technology. They do this by using the technology to offer visitors a better experience.

- **No organisations currently have a dedicated connected places strategy**, but deployment of technology is facilitated by other strategies (e.g. growth, sustainability).
- **Low levels of knowledge and funding are the key barriers to further deployment of connected places technology**. Smaller organisations face greater barriers than larger organisations.

2.4 Operating connected places

- **Sports and culture organisations are primarily using sensors and Wi-Fi** to deliver their connected places projects.
- **In larger organisations, the responsibility for connected places technology sits with IT, technology and Estates teams.** Smaller organisations tend not to have a dedicated team.

2.5 Future trends of connected places

- All professionals feel that the **use of connected places technology will increase** within their organisation.
- Whereas professionals from **larger organisations are able to envision specific use cases, those from smaller organisations find this more challenging.**

2.6 Cyber security and connected places

- **All professionals understand deployment of connected places technology carries some security risk.** However, professionals rate the level of risk differently depending on the size and function of their organisation.
- **In this context, professionals at larger organisations – particularly in the sports sector – which attract thousands of visitors, see the technology as posing a more serious risk.** This is because they feel they're an attractive target to hackers, and that connected devices can be weaponised to affect physical safety (e.g. locking fire doors).
- On the other hand**, professionals at smaller organisations tend not to feel connected technology poses a considerable risk.** In part, this is due to lower levels of knowledge, but also there is a sense that this technology will not cause harm to visitors or staff.
- **Large organisations implement bespoke cyber security frameworks to counter the risks of connected place technology.** Professionals from smaller organisations tend to manage the risks in the same way as other technology projects, or have little awareness that extra measures are necessary.

- **Professionals across the sample tend to rely on external consultants to inform their approach to cyber security (to a greater or lesser degree).** Few professionals refer to central guidance from the NCSC to inform their approach.

3. Understanding of connected places

Key findings:

- **Claimed familiarity with connected places is highly dependent on the size of the sports or culture organisation and the professionals' job role.** Those at larger organisations and with a more focused job role (e.g. on technology or estates) tend to be more familiar.
- **Professionals think about connected places technology in terms of the benefits it delivers**, rather than specific devices.
- **Professionals in the sports sector identify clear leaders in the sector:** Tottenham Stadium, Wembley Stadium and Wimbledon (The All England Lawn Tennis and Croquet Club).

3.1 Familiarity with connected places

No professionals feel very familiar with connected places. Instead levels of claimed familiarity range from moderate to not at all familiar.

Those with higher claimed familiarity tend to:

- **Be based at larger organisations** who are deploying connected technology more than those at smaller organisations.
- **Have a job role with a narrower focus** on technology or managing the estate. On the other hand, professionals in roles with a broader focus such as operations or business intelligence are less familiar.

"Individually I feel relatively comfortable with it… the idea of buildings being smart and adaptable, and able to respond to how they're being used and how many people are using them etc. that is something I talk within my department about quite regularly."

– Consultant

3.2 Understanding of connected places

Professionals do not use the term 'connected places'.

Those who feel more familiar with the technology tend to use the prefix 'smart'. For example, a 'smart stadium' or 'smart building'. Whereas those who are less familiar do not use a collective noun to describe this category of technology.

"Connected places are really about smart devices for us, right?"

– Sports, Large

Most professionals think about connected places technology as a means to an end, rather than focusing on the specific devices.

The benefits of using the technology are much more salient than the specific devices used to deliver those benefits. For example, professionals talk about 'knowing more about how people move around the space' rather than sensors and people counting cameras.

This is particularly true for smaller organisations who are only deploying the technology in limited use cases. These professionals often lack a wide understanding of different connected devices and instead only know about their organisation's particular use cases.

Larger organisations who are deploying the technology more extensively in both the sports and culture sectors tend to primarily define connected places by any technology that 'connects people to the place'. Within that definition they include Wi-Fi, and apps that respond to where you are in the space (e.g. by sharing relevant information depending on where you are in an exhibition).

"It also allows us to understand for our commercial partners: we can go to our commercial partners and say, 'You had a stand in this location, we had this many people walk past your stand, this is how long they stayed for, this was your engagement rate.'"

- Sports, Large

Professionals in the sports sector identify Tottenham stadium, Wembley stadium and Wimbledon (tennis) as clear leaders in this space.

These are all seen to be delivering a highly connected experience for their fans. For example, an app can show fans the best transport routes and can show them a map to their seat; to bars which use dynamic pricing to manage the flow of people. Professionals feel all these use cases improve the 'fan experience'.

Whilst professionals feel Tottenham's new stadium in particular is setting the standard for future builds, they note that it is difficult to apply this technology to current stadiums due to challenges around retrofitting.

"Tottenham… they've got a new stadium, they've thought really carefully about how they build in the technology from the start… they can know what's going on where they, know the capacity, where people are in the stadium, they can use it to manage what's going on."

– Consultant

"Wimbledon is excellent… the user journey. All the tickets are supplied by app… [Their] technology is hitting all, kinds of, sustainability agendas… It's showing me where I can buy food. So, I think queues and things like that, particularly at Wimbledon, they've been transformed."

– Sport, Small

4. Aims, facilitators and barriers to deploying connected places technology

Key findings:

- **The majority of sports and culture venues are not aiming to 'be connected'.** Instead, they're deploying the technology to meet other business needs such as **increasing revenue and visitor satisfaction**. This was the most commonly raised reason for deploying connected places technology. They do this by using the technology to offer visitors a better experience.
- **No organisations currently have a dedicated connected places strategy**, but deployment of technology is facilitated by other strategies (e.g. growth, sustainability).
- **Low levels of knowledge and funding are the key barriers to further deployment of connected places technology**. Smaller organisations face greater barriers than larger organisations.

4.1 Aims of deploying connected places technology

Most sports and culture organisations are not aiming to 'be connected'.

Instead, most are using connected places technology to solve certain business needs, such as counting people into their space and more efficiently managing their energy usage. This is particularly true for smaller organisations who are using the technology in a more limited way.

The exception are some larger organisations whose site is bigger and attracts a greater number of people, for example a large museum in London or a stadium. These organisations are more familiar with connected places technology and do express a future aim to do more to 'connect visitors to the space'.

"The main purpose of being a museum is to enrich the understanding of visitors about the past and present. It's not digital for digital's sake."

– Culture, Large

Sports and culture organisations are primarily using connected technology to create a better experience for visitors, in turn increasing revenue and satisfaction.

Increasing visitor satisfaction is a strategic aim for most sports and culture organisations. For private sector organisations, increased satisfaction is also a core part of maximising revenue.

Professionals feel connected places technology allows them to do two things, which in turn serves this overarching aim:

1. **Creating a better experience for visitors in real time.** For example, by offering powerful Wi-Fi so visitors can connect to the internet and apps. In addition, some culture venues are creating interactive or digitised exhibitions, which give an extra dimension to the typical visitor experience.

   "We have a good degree of interactivity with our collection as well, so how technology supports visitors to engage with the objects, maybe in more of a virtual way, but I think that interactivity has been a big thing for us... in terms of the connected places: the idea that you can go to a museum and see a 200 year old scientific object, but you could also enjoy a VR experience of Tim Peake landing on the moon [sic]."

   –Culture, Large

2. **Observing how visitors use the space to understand what is 'working well'.** For example, using people-counting cameras and dwell time monitors to understand which areas or exhibitions are more popular, and using the insights to make changes (e.g. moving an exhibition to a more prominent space in the museum, or placing a food stand close to where visitors congregate). Organisations that sell space (e.g. art galleries) or have sponsors can also use these insights to negotiate sales.

   "We basically want to build up a picture again of how people are consuming our events. So, what time do people leave? What time do they get there? Are they going to the fan village? Are they walking past and seeing our sponsor activations? […] We want to find out all these things and then we can build up recommendations and insight to help our event operations team." – Sports, Large

Secondary to improving the visitor experience, organisations use connected places technology to better manage their estate.

Sports and culture organisations are often responsible for large spaces, spanning many different rooms or areas. They therefore want to make sure they are managing occupancy safely and effectively and using energy in a 'smart way'.

Connected technology allows organisations to:

- **Manage the flow of people** around their site. This can often be for safety reasons (e.g. in a large sports venue).

  "We can understand: are there areas where there are just too many people? – Again, that helps us improve the flow of people for the following year."

  – Sports, Large

  "It's predominantly about, how do we run our stadium better? How do we make it safer? How do we serve more customers in the stadium?"

  – Sports, Large

- **Be more sustainable** by 'smartly' using energy. This has the additional benefit of saving costs. Some smaller organisations are only using connected places technology to achieve this aim.

  "If we were looking at adopting new approaches in this area it would be from an environmental standpoint and also a financial one. We'd be looking to reduce cost spent on utilities and we'd be looking to reduce impact."

  – Culture, Small

4.2 Facilitators to deploying connected places technology

No organisations interviewed currently have a dedicated connected place strategy.

Instead, the adoption of connected places projects is on an ad-hoc basis to meet business needs as and when they arise.

Some organisations span different sites, all with their own technology and processes, and feel this therefore makes it challenging to have a single overarching connected places strategy in place.

"In the majority, it's more organic… one of the factors is that we didn't build our museums and start out as a group… Different museums have bought different technology at different times, and they won't all replace or replenish themselves at the same point."

– Culture, Large

For some organisations, their use of connected places technology is facilitated by other strategic priorities.

These most commonly include:

- **Growth or revenue generation,** especially for larger organisations who believe that technology is a necessary part of delivering these strategies.

> *"Things like fan engagement, generating revenue, maximising revenue. They're the themes. Having the best modern workplace. And connected and smart technology almost runs through all of those."*
>
> – Sports, Large

> *"We have a strategic objective to be more resilient and generate more value from our estate. At a more granular level, we've got objectives within the estate to be more sustainable, to have higher quality spaces for our visitors, and for them to be as safe and as well maintained as we can afford for them to be. So some of those individual objectives can only be delivered with technology."*
>
> – Culture, Large

- **Sustainability** and, for some smaller culture organisations, a requirement to report energy usage into the Arts Council.

> *"If we were looking at adopting new approaches in this area it would be from an environmental standpoint. […] partly because just people that are working in arts and culture tend to be quite connected to things that are happening in the world. So, you know, there is that personal values-driven side. But also it's a hugely important part of the Arts Council's agenda."*
>
> – Culture, Small

As part of growth strategies, some professionals feel the use of connected places technology will be facilitated by wanting to appear innovative.

Depending on the organisation and the nature of their visitors, this can include:

- **Wanting to appeal to younger audiences** who have higher expectations of venue technology.

> *"We're targeting that youth audience, and we know that we can't access them without technology. So, one of the drivers behind that connectivity is that youth segment that we really want to attract."*
>
> – Sports, Small

- **Wanting to attract sponsors** who want to put their name behind an innovative organisation.

> *"There was a big shift towards technology sponsors who were saying, 'Look. We're sponsoring you and you need to be a bit more ambitious in this space."*
>
> – Sports, Large

- **Wanting to reflect their values as an organisation.** For example, culture venues who want to promote innovative projects.

> *"Where it's maybe a little bit greyer on the edges is because we're a science group. There's an example I'll give you around buildings, where we'd entered into a pilot to benefit from AI input into our building management... we're doing that, yes, because there's a benefit to the way we manage our buildings, but also, as a science group, it's exactly the type of endeavour we should be trying to support."*
>
> – Culture, Large

Across the sample, in certain cases, suppliers facilitate the deployment of connected places technology.

Many professionals work in small teams within their organisation. For some at smaller organisations, their job role is extremely expansive. This can make it challenging to keep abreast of the latest updates in connected places technology.

As a result, many hear about certain cases via trusted suppliers. This is often in the context of suppliers designing a new space for the organisation (e.g. an exhibition) or 'adding on' to existing services. Similarly, some other organisations hear about connected places opportunities via their sponsors or funders.

"A supplier has encouraged us to take a step… the mechanical engineer might just specify [CO2 sensors], because that's good industry practice to use that technology, and it's more efficient. So we're passive."

– Culture, Large

A handful of organisations who expect to move site in the near future feel they would implement connected places technology by design.

In these situations, professionals feel they will be unencumbered by common barriers such as funding and the difficulties of retrofitting technology.

"Within our very high-level plans of a potential re-development of stadium or a new stadium, there's smart first mentality. So, that's coming from the architects and… it is coming from the consultancies."

– Sports, Large

4.3 Barriers to deploying connected places technology

The primary barrier to deploying connected places technology is a lack of internal skills and expertise. This is particularly true for smaller organisations.

Professionals at smaller organisations tend to have a more expansive job role, for example, Chief Executive Officer or Head of Operations. This means:

- Their list of responsibilities is much wider than focusing on technology or the estate.
- Due to their extensive responsibilities, they have less capacity to dedicate to thinking about how connected places technology could be used within their organisation.

As a result, most of these professionals feel they lack the awareness (and time) to push forward the deployment of connected places technology within their organisation.

"Our scale of venue, we're not so much in a position to pilot that [connected places technology] particularly easily and we're a relatively small team. So there are 14 of us... even discovering schemes that we might be able to get on, all of this takes time to research, all of this takes time to be able to have that meeting,

find that person... we don't have a staff member on site who has a particular focus on that area."

– Culture, Small

On the other hand, professionals at larger organisations tend to (but not always) have a more focused job role and therefore a greater awareness of what connected places technology can offer.

- This is particularly true in the sports sector, which has standout leaders that organisations and venues can look to replicate.
- However, some in the culture sector still feel a lack of confidence in their knowledge of, and therefore their ability to 'sell', connected places projects internally.

"If we've got someone within the group that's knowledgeable about a certain type of technology or connectivity, there's generally a sponsor for it then... when that isn't there, it's just never going to get the same airtime"

– Culture, Large

"Getting the right team with the right skills and capability to coherently develop a digital strategy. Can we pay the right level to get that capability into the museum?"

– Culture, Large

Beyond knowledge and expertise, professionals note that limited funds also restrict the deployment of connected places technology.

Professionals across both the sports and culture sector feel under considerable funding pressure. The funding barrier is threefold:

1. **Organisations want to prioritise funding their core purpose** e.g. free-to-access exhibitions or showcasing sports. This can mean there are limited funds for new projects which are perceived as 'nice to have'.

"Let's say there was a project that came along and it meant that we needed to invest money to deliver that and it would make one of our places better connected, however if we did that, we wouldn't afford to put a particular object on display. You could argue that we're not fulfilling our core purpose by pursuing that technological change."

– Culture, Large

2. **There is a lack of clarity about the benefits of connected places projects,** which means it is difficult to make them a funding priority. This is closely tied to low levels of knowledge and understanding and therefore is more readily associated with smaller organisations.

"When clubs are on limited budgets and let's face it, they're more interested in paying players than they are thinking of anything else that goes with it... in the economy we're in, you've got to really know what the return on investment is going to be before you can start looking at doing anything in this area."

– Sports, Small

"I think there would be hesitation in investing too heavily in something again without really understanding the benefits of it."

– Culture, Small

"I was going to say one of the barriers can be some of the benefits can seem slightly abstract and grandiose but actually for us, I think we're in a place now where we understand pragmatically the benefits."

– Sports, Large

3. **The cost of retrofitting** both an older physical space and/or legacy technological systems which may not be compatible with each other.

"If we wanted to make our heating or air con systems smart across the stadium, that's a big bet. Because quite often difficult to retrofit some of this technology, so quite often the smart element ends up being the smallest cost."

– Sports, Large

5. Operating connected places technology

Key findings:

- **Sports and culture organisations are primarily using sensors, and Wi-Fi** to deliver their connected places projects.
- **In larger organisations the responsibility for connected places technology sits with IT, technology and Estates teams.** Smaller organisations tend not to have a dedicated team.

Professionals are aware of a range of technologies used within their organisation to deliver connected places projects. These include:

Used more often	People counting cameras Sensors (CO2 monitors, motion) Wi-Fi Bluetooth Apps
Used less often	5G

However, professionals tend to focus on how the technology is being used, rather than on the specific devices.

Professionals, particularly in smaller organisations, tend not to be in technologically focused roles and therefore the specific devices and components associated with their project are less front of mind.

Even professionals at larger organisations who have a greater focus on technology think more about what the project delivers (i.e. the use case) rather than devices.

Across the sample, common use cases include:

- The use of sensors and/or people counting cameras to monitor the movement of people around the place.
- The use of sensors to monitor occupancy to appropriately heat and light a given space.
- Using a combination of devices to create a more immersive experience for visitors (e.g. by allowing them to interact with collections).

Case study | Larger organisation (Sports)

This large organisation regularly runs sport events for thousands of visitors. As a fan and consumer driven organisation, they try to create a better experience for them. They have introduced a connected places project that currently consists of two key technologies: equipping players with **GPS technology** allowing fans and experts to analyse performance; and equipping the stadium with over 1,000 **wireless access points** so fans, staff and journalists can stay connected and post about their experience in real time.

With a dedicated technology and cyber security team, this organisation is aware of a range of opportunities that connected places technology offers. In the near future, they are planning to use **sensors to measure footfall**, prevent areas from overcrowding through **flexible pricing** at hospitality stalls, and to **regulate light and temperature**.

"Well, we had 100 wireless access points, we've now got 1,600. It's a huge investment. And similarly, 5G and 4G connectivity was terrible. You know, you're talking about a concrete bowl. So, we just invested a significant amount in our own digital antennae systems."

Case study | Smaller organisation (Culture)

This small art gallery wants to measure football to find out what is most popular with visitors. Therefore, a former **staff member contracted an external supplier to install and operate people-counting cameras.**

The absence of a digital strategy and expert staff made it difficult to effectively operate this technology when this person left the organisation. A newly appointed staff member who is responsible for the digital development is now assessing how this technology can be used effectively. They are liaising with the supplier to interpret the data and translate it into actionable measures for the art gallery.

Still unsure how they best make use of the technology in place, they are not planning on additional connected places technology anytime soon. They are currently working on a digital strategy to think about the current and future role of connected place technology.

"I can't see anything other than the people counting part of it. Oh, and dwell time. So particularly in our bigger spaces I think there would be value in understanding how long people spent looking at specific art installations to really understand what people are finding interesting."

At this stage, connected places use cases tend to be deployed in isolation and do not ladder up to what professionals would consider to be a 'smart place'. However, some organisations have plans to do this in the future.

Currently, organisations are deploying connected places technology in a piecemeal way: often to a meet a certain business need or to improve the visitor experience in some way. They feel projects lack overall connectedness, for example, whilst a museum may make one exhibition more connected, this doesn't translate to the whole museum.

There are a handful of organisations within the sample who are planning to move site in the near future (next 5-years). These organisations aim to build in connected places technology by design and expect this will take a joined-up approach and be delivered at scale.

In most organisations, there is no dedicated department responsible for the management of connected places technology.

At larger organisations responsibility tends to sit within a combination of IT, technology or estates teams. IT and technology teams are often responsible for managing the digital aspects (including cyber security), whereas Estate teams are responsible for managing the physical aspects.

At smaller organisations, lines of responsibility tend to be less clear. Some professionals feel that whilst they can speak to how the technology is operated within their organisation, there is no single person 'in charge' of its operation. This likely because they're only using it to a limited extent.

> *"We don't have a staff member on site who has a particular focus on that area. Pretty much everything we've talked about is held by myself and my general manager and neither of us come from a technology-digital-infrastructure-type background."*
>
> - Culture, Small

Procurement of connected places technology is dependent on the size of the organisation and whether it is privately or publicly funded.

Larger organisations and those which are publicly funded run a formal procurement process. This involves:

- Stipulating a set of requirements for the technology, of which adherence to, and level of, security standards play a key part.
- Receiving several quotations and selecting which best meets their needs.

Some organisations will pilot technology with a supplier to check it delivers on their business needs, before rolling it out to the wider organisation.

"There is a very clear set of requirements, a very clear tender process, legal go through it, finance go through it, my IT technology cyber security function goes through it. There's some, kind of, very robust contracts and MSAs written up, and we go from there."

– Sports, Large

"We're bound by public procurement. So dependent on the level of expenditure, we might obtain a number of quotations. If it's a bit more, we might run a full public tender exercise to secure a provider."

– Culture, Large

On the other hand, smaller organisations usually do not have a formal procurement process in place. Whilst some may set up contracts with providers (security forming a key part of these), others will buy the devices themselves e.g. from Amazon.

"For these small sort of things, we just buy them ourselves, but that's never a problem. If it's building-wide, we tend to do things quite well, so there's usually a tender process and usually an external contractor."

– Culture, Small

"I'm going to take this really simple one actually, if we were looking at getting something installed on the door that counted visitors coming in, I think it would genuinely be myself or my general manager doing a bit of research online, costing things up, getting some quotes."

– Culture, Small

6. Future of connected places

Key findings:

- All professionals feel that the **use of connected places technology will increase** within their organisation.
- Whereas professionals from **larger organisations are able to envision specific use cases, those from smaller organisations find this more challenging.**

Professionals feel the deployment of connected places projects will increase within their organisation in the next five years.

Professionals in large organisations, particularly in the sports sector, expect a surge in connected places projects and easily envisage how this will be used. These professionals believe that newer venues will deploy connected technology as part of their design.

"I think in 5 years' time, it will be pervasive everywhere right… whether it's in our training ground or in our refurbed stadium, we'll have one of the smartest stadiums… we'll have smart digital signage in and around the stadium. We'll have smart experiences for fans… recognise you as you walk past and it'll say, 'Hang on you're going the wrong way!'…dynamic pricing, dynamic directions… I think things like our CCTV will be powered by AI as well as expert advisors."

– Sports, Large

Whilst most professionals in smaller organisations also expect the overall use of connected places technology to increase, they struggle to envisage specific use cases. Their expectations are mainly based on assumptions that the use of technology in general will increase, but their lack of knowledge and focus on funding challenges makes it difficult for them to think about future scenarios.

Those with more knowledge are able to see how things will change.

In particular, they envisage:

- Delivering more connected experiences for visitors and fans (e.g. using a combination of sensors and virtual reality technology), including those who are not actually 'in' the venue.
- Dynamic pricing at concession stands in sports grounds to help control volumes of people in different areas.

- Greater use of facial recognition technology to deliver more personalised directions for visitors around the space.

> *"I think we'll see a lot more virtual reality in games and simulation of games. I do think we'll see stadia that are made more safe through the use of AI, for sure, given some of the challenges that countries face. And I would like to think that we're going to turbo-boost sustainability."*
>
> – Sports, Small

7. Cyber security and connected places

Key findings:

- **All professionals understand deployment of connected places technology carries some security risk.** However, professionals rate the level of risk differently depending on the size and function of their organisation.
- **In this context, professionals at larger organisations – particularly in the sports sector – which attract thousands of visitors, see the technology as posing a more serious risk.** This is because they feel they're an attractive target to hackers, and that connected devices can be weaponised to affect physical safety (e.g. locking fire doors).
- On the other hand**, professionals at smaller organisations tend not to feel connected technology poses a considerable risk.** In part, this is due to lower levels of knowledge, but also there is a sense that this technology will not cause harm to visitors or staff.
- **Large organisations implement bespoke cyber security frameworks to counter the risks of connected place technology.** Professionals from smaller organisations tend to manage the risks in the same way as other technology projects or have little awareness that extra measures are necessary.
- **Professionals across the sample tend to rely on external consultants to inform their approach to cyber security (to a greater or lesser degree).** Few professionals refer to central guidance from the NCSC to inform their approach.

Professionals' understanding and management of the risks of connected places technology is highly dependent on their size.

Professionals at larger organisations are most likely to be aware that increased use of technology comes with increased risk.

In particular, they are aware that extending the network surface increases the potential for vulnerabilities. That said, most do not feel the devices themselves are particularly risky and believe that security risks increase with greater use of any technology.

> *"Firstly, there's the leak of data, right. So, they're capturing data, they're capturing information, and we don't want that to go beyond our perimeter. Second risk for us is remote control of those devices. So, they're designed to make decisions, someone can make the wrong decisions. The third thing is that they're*

used as some kind of Trojan horse into the wider technology landscape."

– Sports, Large

"The private layer being connected to the public facing layer is through things like vulnerabilities to attack, you know, hackers, ransomware, people causing havoc because they've managed to access part of the system that they shouldn't be in."

- Culture, Large

Some professionals at larger organisations' have a heightened sense of risk, as they feel they are an appealing target to hackers. For sports organisations in particular, this raises physical safety concerns.

These professionals note that they attract thousands of visitors and process a significant volume of financial transactions, which means that they are an attractive target.

Professionals based at large sports organisations readily refer to scenarios where connected places technology could be hacked, causing detriment to fans and visitors e.g. lock exits, switch off lights or using visitors' financial data to make fraudulent purchases. They feel this would carry a serious reputational risk.

"Once you're in, you've potentially got access to the payment systems within the stadium, you've got access to open and close the turnstiles, you've got access to turn on and off the flood lights. You've got access to basically keep everybody hostage and steal a load of money at the same time."

- Sports, Large

As a result, larger organisations take managing cyber security seriously. Most feel confident in their ability to do so because of:

- **A dedicated in-house cyber and information security team** that is responsible for overseeing the day-to-day management, security of the network and assessing if the commission of external expertise is necessary.
- **External cyber security consultants** that audit the security system in place, help implement any updates and train the staff.
- **Robust safety protocols and procurement processes** which ensure that new suppliers have the necessary cyber security credentials.

"We have questionnaires and cyber security professionals internally that do those assessments. But we also rely on contractual obligations. Yes. So, we tend to use organisations of scale. We tend to make sure that they've got the right insurance in place, and we tend to write in obligations"

– Sports, Large

On the other hand, professionals at smaller organisations tend not to feel that connected places technology poses a considerable risk to their organisation.

This is due to:

- **Lower understanding of the types of risks**. Most smaller organisations think about cyber security in terms of transmission of personal data, rather than vulnerability to being hacked. As they often use technology in a limited way (e.g. to manage heating) which does not transmit personal data, they do not feel the technology is particularly risky.

"The biggest cyber security risk is people that we have: people choosing terrible passwords."

– Culture, Small

- **Low sense of threat from bad actors.** Regardless of knowledge of the specific risks of connected places technology, most smaller organisations feel their size means they wouldn't be an appealing target to hackers.
- **Less time to dedicate to thinking about risks.** In smaller organisations, responsibility for cyber security is often a small part of one person's role. This means they tend to understand the 'basics' (often about processing personal data) rather than anything more sophisticated.

Low levels of knowledge about risk means smaller organisations do not take an active approach in managing their cyber security.

Instead, professionals assume management of the risks will be covered by their 'business as usual' approaches to managing cyber security within their organisations.

- For some, this is the responsibility of an internal team member who is responsible for disseminating training materials to staff.
- Others employ an external consultant, who is often responsible for assessing processes, as well as the training of staff.

Most do not have formal procurement processes or see the need to assess specific technology projects before they're implemented.

> *"If we can do it cheap and relatively unsecure but we think it's low risk we might decide to go with that rather than expensive and, you know, belt and braces. I guess that's the thing. You know, as a museum, yes, there's risks to objects and data but we're not a bank."*
>
> – Culture, Small

> *"Not expressly [responsible for cyber security] but it would probably sit between myself and the head of HR."*
>
> – Culture, Small

Professionals in sports organisations tend not to look to Government guidance to inform their cyber security approaches.

As well as having a dedicated team internally, large organisations actively seek the advice of external advisors and use them as their main source of information for cyber security developments.

> *"They'll rely on our partners and read up more widely in some journals and publications. People like Microsoft publish stuff all the time, partners share information with us. We've got a SOC, security operating centre, and a partner that runs it for us. So, again, they're horizon scanning …very little comes from Government."*
>
> – Sports, Large

Whilst public-funded, cultural organisations do nod to Government guidance, most smaller organisations defer to external consultants.

Some of the larger culture organisations cite 'Cyber Essentials' and guidance from NCSC as setting a benchmark for the cyber security standards.

However, smaller culture organisations are less aware of specific information sources. Instead they:

- Rely on external consultants and/or suppliers to create and adhere to cyber security frameworks.
- Do not seek information on cyber security.

"As part of our government arrangement with DCMS have signed up to a scheme called Cyber Essentials. So, we have a number of standards that we need to adhere to in order to remain compliant with that scheme."

– Culture, Large