

Towards Education of the Future

Teaching, research, industry collaboration, technology and campus design need to be re-imagined and digitised.

2019



Foreword

Digitisation is impacting all industries and economies in fundamental ways. It's forcing companies, institutions and governments to re-think business and operating models and re-evaluate where future competitive advantage will come from. The convening of the Digital Summits at Cisco Live 2019 in Melbourne, was recognition that while these changes manifest differently in various industry sectors, the core technology enablers are common. Secure IT networks, IoT, mobility and cloud are examples of technologies that offer both opportunities and challenges for organisations. These challenges relate to business processes, leadership, people and strategy as well as the technology itself. The purpose of the Digital Summits was to identify how organisations across a range of sectors are dealing with digitisation in its various forms and, more importantly, to learn from each other. The education track of the Digital Summit was particularly rich given that universities, technical training colleges and schools have a role to play in all industries, as well as being early adopters of technology in their own right. To this end a thriving, innovative and digitised education sector is critical to the high performance and competitiveness of the wider economy. This report, jointly produced by KPMG and Cisco, synthesises the rich discussions in the education track of the Digital Summits. It also includes practical examples of how organisations are responding to the opportunities presented by digitisation. The report is record of the key themes and insights discussed at the Summit. It is also intended to be a starting point for an ongoing collaboration and our hope is that it will be shared, debated and most importantly, disseminated widely.



Ruma Balasubramanian
Chief Transformation Officer,
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Executive Summary

With technology disrupting industries and revolutionising how we work, education institutions across the Asia Pacific region face big changes and challenges. How do they ensure students are prepared for future jobs and can meet the evolving demands of employers? How do institutions provide the digital experiences that students expect? How do they deal with the intense competition for local and overseas students and research funding?

Automation, artificial intelligence (AI), the Internet of Things (IoT), blockchain, and data analytics are key technologies driving disruption. While this change presents challenges, these technologies also offer immensely powerful tools to help institutions provide the capabilities they need to compete more effectively.

At the Digital Summit held at Cisco Live 2019 in Melbourne, education leaders and technology experts from across the Asia Pacific region and beyond discussed how digital technologies are transforming the education sector. They explored how work is changing and how institutions are evolving what and how they teach to cater for this change. The speakers also explained how institutions are applying new technologies to meet high student expectations and even change campus design.

This summary report, jointly produced by KPMG and Cisco, captures five key insights from the summit into how institutions are transforming. Speakers discussed how institutions are:

1. **Transforming education for the future of work** with innovative training solutions that can help ensure students are job-ready and capable of navigating the changing workplace of the future.
2. **Forging partnerships with industry** and other third parties to gain the capabilities and additional resources that institutions need to support new teaching and learning models.
3. **Transforming operations and education with data** to improve institutions' services, and equip students with the data literacy and other skills needed for future jobs.
4. **Mitigating cyber and other threats**—such as the increasing theft of intellectual property (IP) from research institutions—with advanced cybersecurity tools and by addressing human-related risks.
5. **Integrating digital and traditional physical infrastructure** so that networks, servers, storage, and communications platforms support evolving education models and provide the services that staff and students expect.

But how do these transformations work in practice? Institution leaders at the Digital Summit provided real-life examples of how they are driving change with digital technologies.

“We will soon have more technology than we need and can use, and, in fact, I predict that technology companies will themselves enter education and training on a large scale, so as to educate the world in using the technology they can develop.”

Professor Stephen Parker AO,
Partner, Education Sector Leader, KPMG Australia

1. Transforming Education for the Future of Work

In the face of technological advancements, the workforce is undergoing an immense transformation. Technology is taking on repetitive and, increasingly, analytical tasks. Workers need to adapt, update their skills, and even reskill for higher-value occupations.



This transformation is particularly profound for universities, which are responsible for ensuring that students are not only job-ready but also capable of navigating the changing workplace of the future.

“You can’t prepare people for tomorrow’s jobs with yesterday’s skills,” said Professor Jane den Hollander, Vice-Chancellor at Deakin University.

Professor den Hollander argued that despite some commentary about the decline of universities, they will continue to play a role in preparing future leaders. But she said the education universities provide and how they deliver it must evolve.

“At Deakin, we’re responding to the changing nature of the workplace by developing professional practice credentials,” she said.

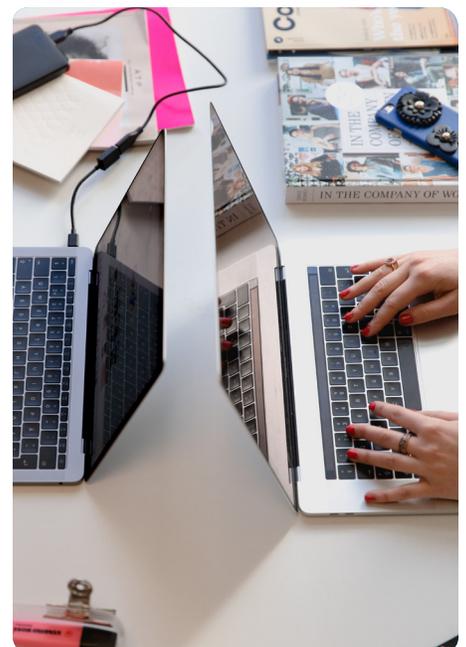
Digital training is key to this. ‘Micro-credentials’ can bridge the gap between university and employment. They can give students the choice to upskill quickly, and at times and in places that suit them.

“Just as how iTunes unbundled songs from a CD, the digital revolution enables a university degree to be disaggregated into all of its component parts.”

Professor Jill Downie, Deputy Vice-Chancellor (Academic) at Curtin University, agreed that digital literacy is essential for future employment. STEM skills (science, technology, engineering, and mathematics) and soft skills such as emotional intelligence, creativity, and entrepreneurship are also vital, she said.

“Workers will spend more time learning on the job, solving problems, and thinking critically,” Professor Downie said.

People will need an “entrepreneurial mindset” due to work environments with less management, less organisational coordination, and less teaching, she said.



To help develop this mindset, Curtin University has revolutionised its teaching to include MicroMasters, which comprise ‘stackable credentials’—short courses that can be mixed and matched to suit the individual. For example, it has developed a MicroMasters in IoT, in partnership with online education provider edX, and leveraging the Cisco platform. Coming soon are MicroMasters in Intent-Based Networking and in 5G.

“This is how we’re reimagining postgraduate innovation and being innovative in how we prepare our graduates for the workplace of the future,” Professor Downie said.



How Flinders University is collaborating with industry

Flinders University in Adelaide is taking training for the future of work seriously. It is home to the Tonsley Innovation District, a hub that includes a vocational training college, startups, and knowledge-intensive businesses.

The idea is to foster collaboration among these stakeholders for shared innovation and learning. Industries represented at Tonsley include health and medical devices, cleantech and renewable energy, mining and energy, and software and simulation.

Flinders is also looking to create a prototype ‘Factory of the Future’ at Tonsley to innovate and train people for the emerging world of Industry 4.0.

“In 2010, it was predicted that by 2060 there would be about 10 universities left in the world. The prediction of doom is overstated. We will need universities to prepare future leaders and employees, and foster scientific discovery, transmit culture, and create new knowledge and nurture human desire. Will we do it fast enough, will we do it smart enough, and will we do it affordably?”

Professor Jane den Hollander

Vice Chancellor, Deakin University

2. Forging Partnerships for New Capabilities

Another challenge for universities is finding a way to support the new teaching and learning models needed to be competitive and future-ready. Increasingly, they are turning to industry and forging partnerships to gain the new capabilities and additional resources they need.

The key is to focus on being a “connected university,” said Professor Stephen Parker, Partner and Education Sector Leader at KPMG Australia.

“We see the connected university as joining up people, processes, and technology seamlessly,” he said. “Its people connect easily with each other, and they use technology as easily as stepping into a lift.”



Professor den Hollander thinks universities must partner with each other and industry more to foster innovation and leverage technology. She views blockchain as a potential tool to facilitate this as a secure global platform that could revolutionise training, collaboration, and accreditation.

“Blockchain has the potential to change how we value and fund education, and how we reward students for the quality of their work,” she said.

Cisco is working in partnership with Australian universities including Flinders, Deakin, Melbourne, Curtin, Victoria, and La Trobe. These partnerships have technology and innovation at the core, and focus on co-creating solutions to university and industry problems.

In addition, the Cisco Networking Academy certifies students in areas such as networking, the IoT, cybersecurity, and entrepreneurship. Flinders University includes Cisco modules in its undergraduate degrees so that students can simultaneously earn a Bachelor’s degree and an industry credential.

Chitkara University, a relatively young institution in northern India, has partnerships with Cisco and other leading companies and industry groups to develop industry-relevant curricula and assist with state-of-the-art equipment. It also has partnerships with more than 150 other universities, said Pawan Kumar, Director, Information Technology at the university.

Not surprisingly, communication and collaboration were challenging, Kumar said. However, that has greatly improved through the use of Webex for conferences, lectures, and long-distance learning.

Victoria’s connected learners

The digital world is also opening up opportunities in primary and secondary schools. For example, technology is being used in Victoria to provide more equitable access to learning resources across city and regional locations, according to Elisabeth Wilson, Chief Information Officer (CIO) at the Victorian Department of Education and Training.

“It’s really about creating a superior, intuitive user experience, and an adoption program that will enable teachers to apply technology to different ways of teaching—such as program-based learning and virtual education experiences with clear linkage to delivery of curriculum,” she said.

But new technology itself is not enough. Developing teachers’ skills in delivering education with digital tools is critical, Wilson said.

“Equipment and technology do not make a digital classroom. It’s how technology and digital resources are applied that is the key.”

3. Transforming Education and Operations with Data

With data becoming integral to how organisations make decisions, institutions must consider how they equip students with the data literacy and other analytical skills needed for future jobs.

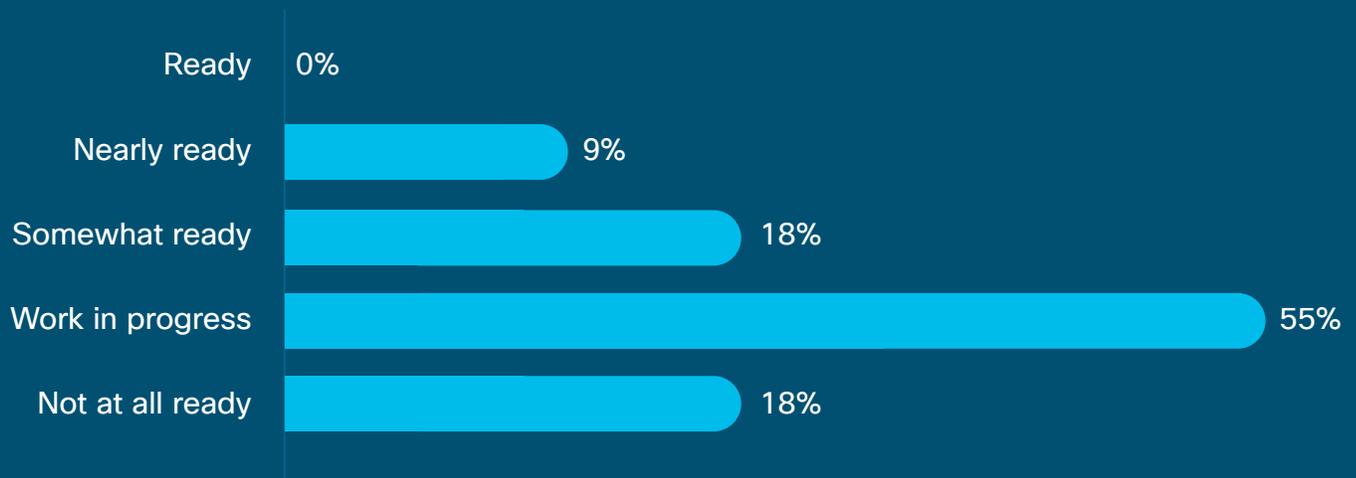
Naveen Menon, Cisco's ASEAN President, has modeled the impact of technology on the labor market in Southeast Asia. He found that of 275 million workers, 28 million fewer will be required by 2028 to produce the same economic output as today.

"Increased adoption of technology, coupled with continued advancements, will dramatically alter the nature of work itself," Menon said. "For example, we will all be interacting a lot more with machines and will have to routinely analyse data and take actions based on that. This will drive a greater need for skills like critical thinking and problem solving, which will be key differentiators for success in the future."

Poll: The data-driven university is still a work in progress

Summit attendees were surveyed on how advanced their institution was in harnessing data, analytics, and actionable insights. Most said that it was a work in progress or that the institution was not ready at all. They still have plenty of work to do to get to a point where they can use data to inform an experienced-based and personalised approach to learning outcomes.

Poll question: Is your institution ready to harness data, analytics, and actionable insights to develop a real-time, multi-dimensional view of the student and staff experience?



Professor Downie said Curtin University is on the journey to using data to offer a more personalised student experience.

"We have partnered with Echo360 to capture our lecture content, and everything is recorded. Around 25 percent of our recordings can be viewed live, and this is constantly increasing. The data is really driving deeper connections between the student and lecturer, even in the online environment."

The system facilitated 1.6 million streams and downloads of lecture content in 2018.

Professor Downie said the university is also using pattern recognition technology to monitor the use of classrooms and campuses. It has 24/7 monitoring of learning space usage, and the data is integrated with the timetabling system.



“The data helps us to better inform not only what we do with our students, but also our infrastructure.”

The volume of data being generated is immense—particularly in research, said University of Queensland Chief Operating Officer David Stockdale. “As a research university that has a very strong biomedical focus, we have a lot of equipment that collects a lot of data. It’s not unusual to have devices that are collecting 7 terabytes of data per day,” he said.

To keep up, the university is working with Cisco to replace its network. The first phase was to install 100 gigabits per second network infrastructure for key research facilities. As a result, each 7 terabyte data transfer has been reduced from hours to just 15 minutes—a huge time-saving for researchers, allowing them to spend more time on their work.

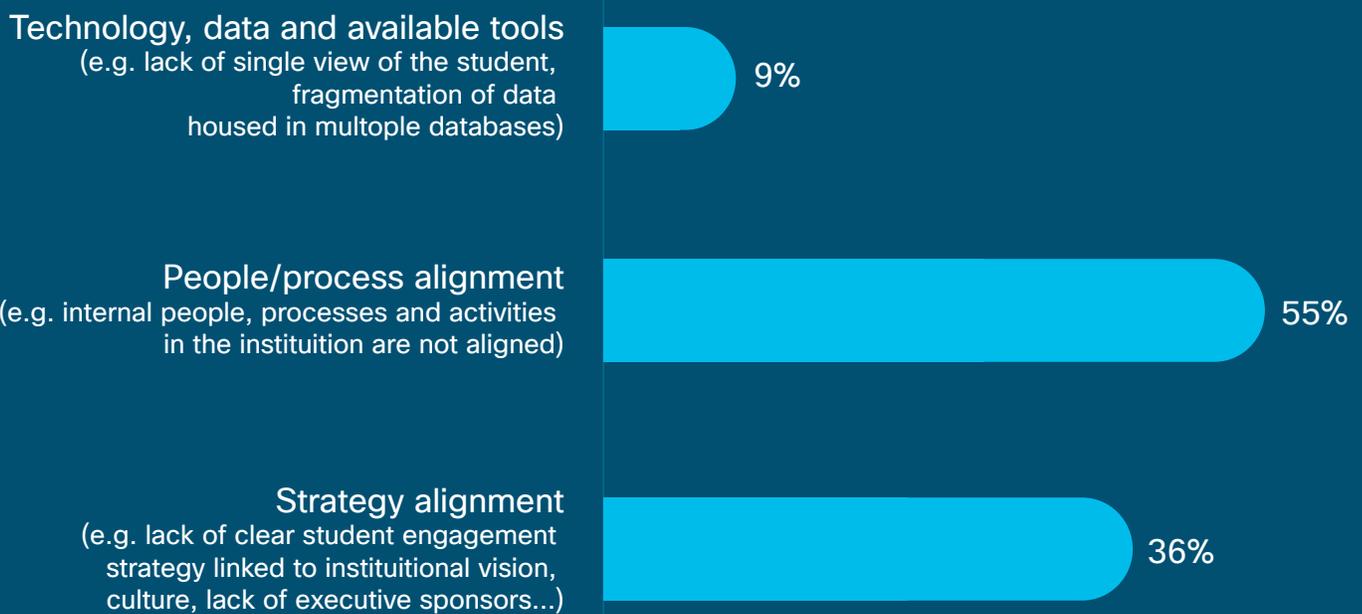
Other examples of institutions leveraging the use of data include:

- **Deakin University’s Deakin Genie:** This personal assistant app helps students 24/7 with access to learning resources, assignment due dates, referencing, support staff, timetable information, and more. The app uses machine learning, so the more data Genie collects about a student, the more effective it is at accurately meeting and predicting their needs.
- **Flinders University’s Digital Health Research Centre:** Analysis of data from sensors is being used to create safe, secure, and highly resilient Wi-Fi solutions for hospitals and other healthcare providers. The joint project with Cisco is important given the exponential growth in the volume of data—and the sensitivity of much of that data—being transferred across the plethora of devices on today’s healthcare networks.
- **University of Melbourne’s data visualisation system:** This system uses data to help university staff gain insights into foot traffic and improve student navigation around campus and within buildings.
- **Curtin University solving the group work dilemma:** Group projects are one of the hardest things for educators to monitor and assess, so the university is using a game-based platform to help solve the problem. As students progress through the game, they earn rewards and recognition for their achievements. This helps them develop and apply important skills, and it gives educators unparalleled insights into how the students are learning. It reveals effort distribution between players, collaborative interactions, and overall output.

Poll: Technology no barrier to improving student engagement

Summit attendees were asked what barriers or challenges they face in improving student engagement and experiences. Most nominated the misalignment of people, processes, and activities, while others said it was a lack of a clear student engagement strategy. It was encouraging to see that technology and data were not seen as a leading barrier.

Poll question: What barriers or challenges do you see for improving student engagement and experience in your organization?



“We have seen that implementing new technology, such as new networks and enhanced cybersecurity, is essential to protect the academic environment and students. There’s also an important secondary benefit: the new technology can generate enough data in a few months to enable academics to publish cybersecurity research in top-tier academic journals. There isn’t enough academic institution-led cybersecurity research out there and I would personally like universities get involved to analyse global cybersecurity issues. Top-quality research can, in turn, also go on to improve rankings, and therefore raise funding for the university. Improved funding can be leveraged to provide a better learning experience for students.”

Naveen Menon

President, ASEAN, Cisco

4. Mitigating Cyber and Other Risks

As technology and data become increasingly integral to their operations, institutions need to be more aware of cybersecurity issues—in particular, potential theft of intellectual property (IP), according to Professor Jill Slay, Optus Chair of Cyber Security at La Trobe University.

“Having worked in three universities in Australia, I’ve experienced these targeted approaches through malware directed to me, and malware in CVs,” she said. “This is a new situation for universities, where systems are very open to facilitate sharing. This can be seen both as a threat and a business opportunity. I think it’s a huge opportunity to uplift the security of the sector.”

Professor Slay said universities need cyber tools but must have an equally strong focus on the human-related risks managed via security policies, procedures, governance, risk awareness, and training.

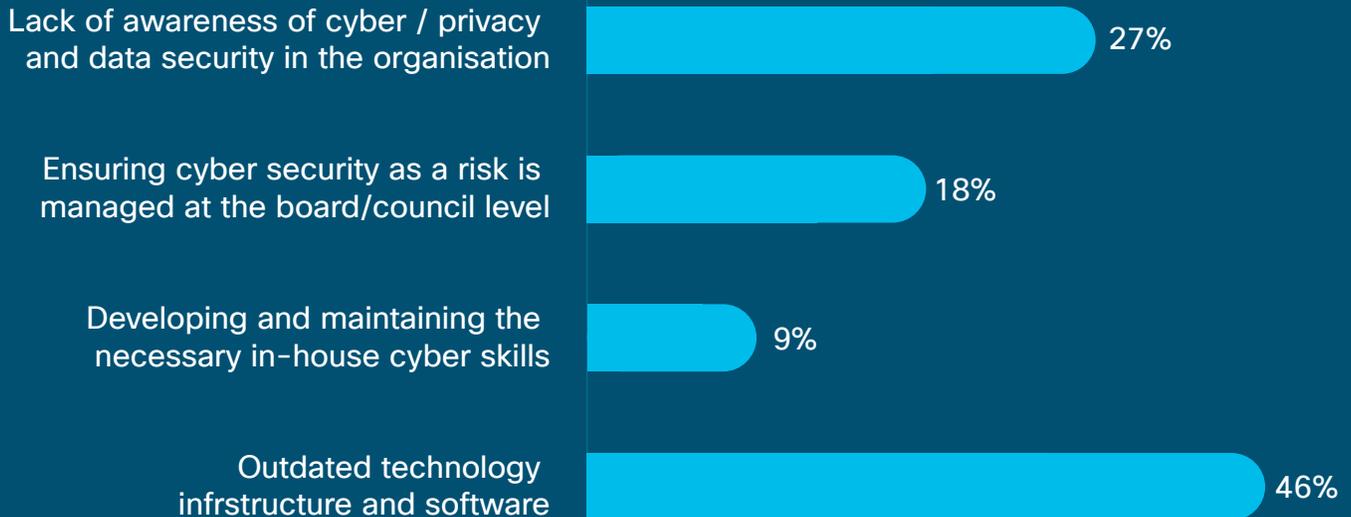
“We need to think carefully about how we are going to train practitioners for this aspect of cybersecurity, because we’re not going to all be there with our hand on the network,” she said.

Organisations can no longer assume they will never get breached. This makes it essential to adopt techniques such as network segmentation for additional security layers inside the network. A key part of the University of Queensland’s upgrade is segmenting its network to “allow us to apply security at the right level,” said Pete Keeffe, Manager, Networks and Data Centres at the university.

Poll: Universities at risk from outdated technology

Summit attendees were asked what they see as the most critical challenge to improving cybersecurity in their organisation. Most cited outdated technology infrastructure and software, while others said it was a lack of awareness of cybersecurity.

Poll question: What do you see as the most critical challenge to improving cyber security in your organization?

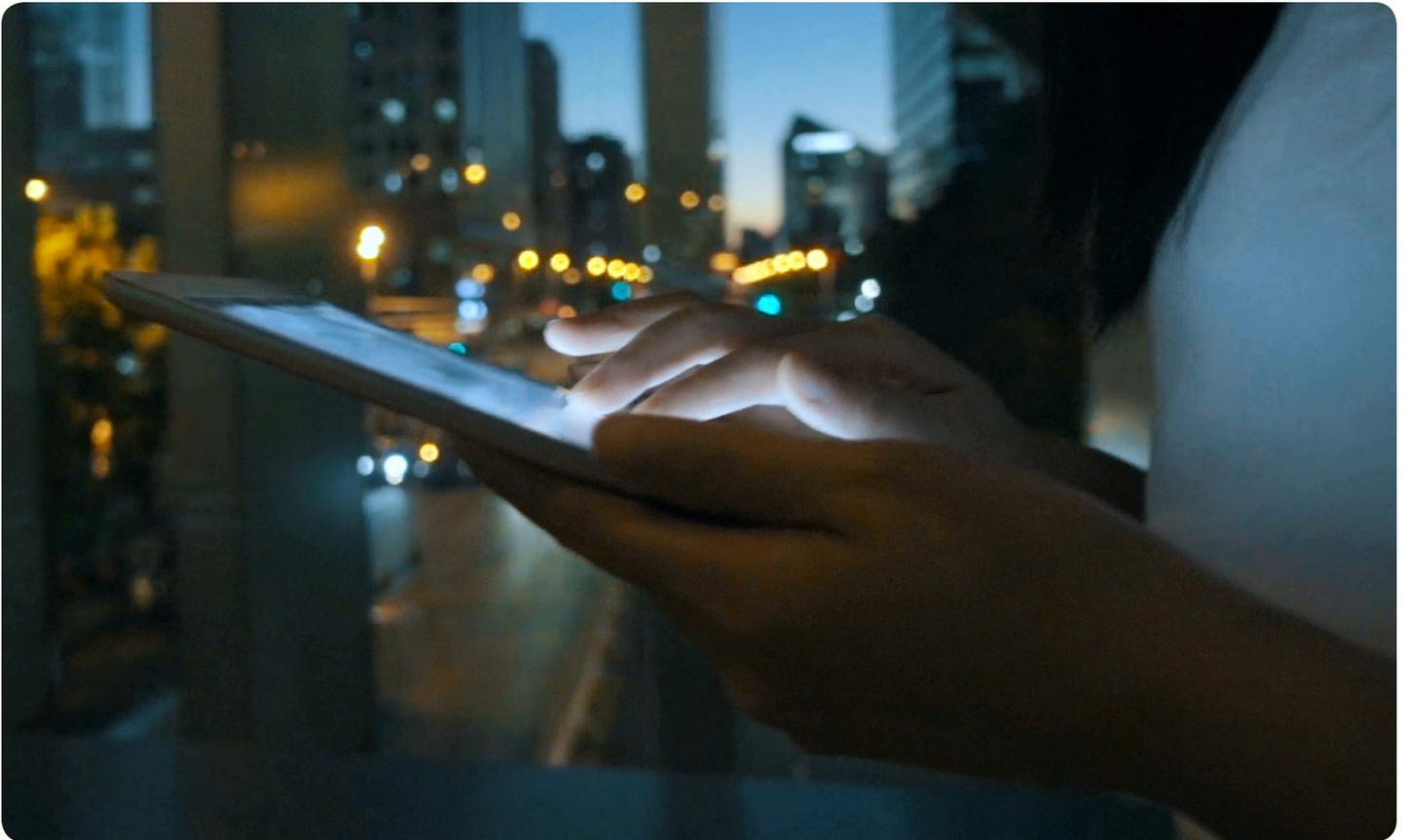


While preventive approaches are still important, detection is now vital, according to Benny Ketelslegers, Senior Threat Researcher at Cisco Talos, Cisco's threat and security research organisation.

"I've been tracking a lot of hacking groups," he said. "I've seen that some of these groups have been targeting universities, because a lot of these universities have innovation centers and researchers that work with commercial companies, working on new technologies. They're going after the IP, and the easy way to get that is by targeting the universities rather than the companies."

Institutions also need to consider the security of infrastructure hardware, which he said can get released to the market with "very little default security setting."

"With IoT, there is increased connectivity, and we need more effort in software development and engineering to secure them out of the box," Ketelslegers said.



"We have gone exponentially forward in computing power, and with hardware comes software. With software comes complexity and security issues. Everything is becoming interconnected, and with that, more security issues will arise. The challenge for software is ensuring a secure design, without security vulnerabilities."

Benny Ketelslegers

Senior Threat Researcher, Cisco Talos

5. Integrating Digital and Traditional Infrastructure

The importance of digital services in institutions is being reflected at a fundamental level with the convergence of digital and traditional infrastructure. Networks, servers, storage, cybersecurity, and communications have become as important as buildings and other traditional physical facilities.

Chief technology officers (CTOs) and CIOs are being brought into campus planning much earlier in the process, said Byron Collins, Executive Director and CTO at the University of Melbourne.

“Increasingly, we’re being involved right up front in the actual framing of the master plan—being asked to gather data from the Wi-Fi network, from physical tracking such as cameras in lecture theatres, to start looking at where students are going and where staff are moving around the place. We can start to optimise retail offerings, start to congregate 24/7 spaces, that we can make secure,” Collins said.

Digital infrastructure needs to be flexible, scalable, and robust, so that it can support evolving teaching and learning models—both on and off campus—and provide the personalised digital services that students now expect. This is a big challenge, but one that’s made easier by the new breed of technologies, such as software-defined networking, that can self-diagnose and are capable of responding to changing conditions automatically.

These technologies are essential for creating a seamless experience for staff and students. For the New York University (NYU) Shanghai, that means ensuring that students receive the same digital experience at any campus they attend, said Director of IT, Pan Chang.

“If a student closes a laptop in New York [at NYU] and then they come to [NYU] Shanghai and open the laptop, they must connect to the same network, the same experience,” he said.

Integrating and implementing these tools often require collaborating with partners, such as technology companies and even architects.

Campuses, and their digital extensions, are becoming a “learning laboratory” for architects and planners, said Rob McGauran, Founder and Director at MGS Architects.

“We want students to come to the campus in a different way, we want them to engage across disciplines,” he said. “We want our buildings to be used more effectively, to generate more benefit. We want to know that we are investing in things that deliver that benefit over time. We want to know that our ecological footprint is diminishing. And when you think about all of those measures—so many of those are best brought together through digital platforms.”

Another focus is using technology to foster “serendipitous social engagement” among students, he said. “Students are becoming a manifest part of master plans—how do we create these peer-to-peer social spaces that are digitally rich inside and outside on campus?”

For Collins, catering for the ever-growing need to capture and use data is top of mind.

“You need to think about building a backbone, and making sure that your ability to capture data is two or three times beyond what it is at present. But beyond that none of us have the ability to predict what the world will look like in 10 years’ time. The best we can do is to put the right infrastructure in place and allow people to work out how to use that infrastructure in lots of different ways.”

“There is no doubt ... that the digital experiences of students are influencing the physical campus in ways which I think are quite profound.”

Rob McGauran

Founder and Director, MGS Architects

Conclusion



The five key areas of insights from the summit are just some of the challenges—and opportunities—facing education institutions.

The overarching message is that to be a competitive, future-ready institution, it is vital to rethink processes, systems, behaviors, and mindsets—and to act without delay.

However, as summit facilitator Brad Davies, Founder and Managing Director at Vector Consulting, cautioned: “It’s not about institutions going out and buying technology and suddenly change happens and outcomes improve. It must be driven by strategy, by leadership, and ruthless prioritisation.”

The rewards of getting it right are significant. With the right digital foundations, an institution can revolutionise the teaching, learning, and research experience. It can offer insights into student engagement and prepare them for the jobs of the future. It can open up new business opportunities with new teaching models and personalised learning experiences, attracting students from new markets around the world. It can help foster collaboration and enhance the overall learning experience—on campus and far beyond.

Most importantly, institutions can develop learners that are digitally savvy, adaptable, entrepreneurial, globally minded—and prepared for the changing workplace of the future.

Find out more

Presentations and videos from the summit:

<https://www.cisco.com/c/m/digital/apj/digitalsummit.html>

Cisco Education solutions:

https://www.cisco.com/c/en_au/solutions/industries/education.html

KPMG Education sector insights

<http://www.kpmg.com/au/educationfuture>

KPMG Talking Tertiary – a higher education podcast series

<http://www.kpmg.com/au/talkingtertiary>

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