November 2020 and February 2021 Strategic Case Study Examination
Pre-seen

Contents

	Page
Technology Parks	3
Knowledge City Technology Park	7
KCTP's – vision, mission and values	10
KCTP's - Board of Directors	11
KCTP's - Principal risks	13
Extracts from KCTP's financial statements	14
Sypark's consolidated statements of:	
Profit & Loss	16
Changes in Equity	16
Financial position	17
KCTP's – Share price history	18
News stories	19 - 24

    1

Introduction

Knowledge City Technology Park (KCTP) is a quoted company that owns and operates a technology park, the largest in its home country. The park is located close to the campus of a leading technological university, although the park is not directly affiliated with that university. It is also located within a one-hour drive of several other major universities.

You are a senior manager in KCTP's finance function. You report directly to the Board and advise on special projects and strategic matters.

KCTP is based in Advland, a developed country that has an active and well-regulated Stock Exchange. Advland's currency is the A$. Advland requires companies to prepare their financial statements in accordance with International Financial Reporting Standards (IFRS).

Technology parks

Technology parks (sometimes referred to as "science parks") are areas established for occupation by companies that wish to conduct scientific and/or technological research and development. They generally comprise buildings that are used as science or engineering laboratories or offices used for design work or software development.

These parks usually offer buildings or offices for rent, with tenants benefitting from the flexibility of being able to move to larger premises if their needs require more space. The parks are usually designed for flexibility, occupying large plots of land, with space between buildings to ensure that tenants enjoy some privacy for their research activities. There is also scope to extend buildings if required in order to adapt them to tenants' needs.

Technology parks are located on sites that are intended to attract significant numbers of organisations that are looking for a base from which to conduct research and development. Their locations frequently reflect a number of strategic considerations:

- Technology parks are frequently located on the outskirts of major cities, where land prices are low enough to allow for large buildings and open spaces.

- Sites are generally sufficiently close to airports, mainline railway stations and motorways to permit easy access. Tenants generally enjoy the ability to interact and engage with collaborators and with clients and so good transport links are essential.

- Many technology parks are within easy driving distance from at least one major university. That is partly because many parks were established by universities, and so were located close to their host institution. There are also major advantages associated with being able to consult with leading academic researchers in particular fields and also having a workforce in the form of local graduates.

- It has always been a major factor that technology parks should form a hub for new ideas, exploit synergies and offer the potential for collaboration.

Tenants are often start-up companies whose founders are entrepreneurs who are keen to develop an idea into a commercially viable product. Such companies are generally funded by venture capital and have sufficient resources to sustain themselves throughout the design process.

Technology parks also attract tenants who are subsidiaries of major corporations who wish to draw upon expertise from local universities or give a design team the freedom to work on specific research without the distractions associated with being based at the corporation's main research and development centre.

The buildings in technology parks are generally intended for sole occupancy by individual tenants. They are generally large spaces that are designed to be equipped and adapted to meet a variety of different needs. For example, an engineering laboratory might require sufficient space to construct a full-sized prototype vehicle. Apart from size, the building might also have to be strong enough to permit the installation and safe operation of a crane or other heavy equipment.

Most tenants require a steady and reliable electrical supply that does not have the usual fluctuations in current and voltage that affect most electrical supplies. Some tenants use sensitive electronic equipment that would be damaged by any electrical "spikes", while others operate equipment that draws a significant electrical current, far in excess of that available from standard electricity supplies. Technology parks must invest heavily in infrastructure, ensuring that the technology park as a whole has sufficient electrical power and also distributing it safely across the campus. This requires more than just installing electrical cables. It is also necessary to fit and maintain equipment that prevents changes to voltage and available current when a large item of equipment located in the technology park is switched on or off.

Apart from electricity, technology parks have to take account of several key requirements in order to meet their tenants' needs:

- High-speed data links are often crucial because data may be collected from remote sources. It may also be necessary to share large files with collaborators or to organise video conferencing, accompanied by high-definition video, in order to ensure that participants can watch prototypes in operation.

- Site security is important because tenants may be working on the development of new products using designs that are commercially sensitive. In some cases, there could be wider security issues. For example, some tenants may be working on government contracts that involve concerns about national security. Tenants generally require there to be security patrols and closed-circuit television monitoring of the campus, with the security office monitoring building alarms and calling the emergency services in the event of an alarm sounding.

- Some tenants require administrative and other business service support, so that they can focus their attention on research and development work. For example, many technology parks have centralised telephone answering services, with operators who pick up calls to tenants' numbers, giving the tenants' business names and transferring calls or taking messages as necessary.

- Tenants are also generally keen to ensure that their staff find it convenient to work on the site. One major issue is the availability of sufficient car parking to ensure that staff can park easily, regardless of the time of day. It is also helpful if there are facilities to secure bicycles and frequent bus services from the technology park to local public transport hubs and airports.

Many technology parks offer small and medium-sized spaces that can be adapted and configured to meet the needs of tenants who do not require sole occupancy of laboratory buildings. These smaller spaces are popular with companies that create designs using software, testing the results using computer simulation.

Many technology parks create smaller workspaces by subdividing one or more of their buildings into separate units, offering a convenient location and good physical security. These spaces are often popular with start-ups, who can design products using computer-aided design. If necessary, they can use secure electronic communications to send their files to fabricators who can build their prototypes using 3D printing technology.

Technology parks generally attract a wide range of tenants, with different areas of interest:

Technology parks - tenants' areas of interest
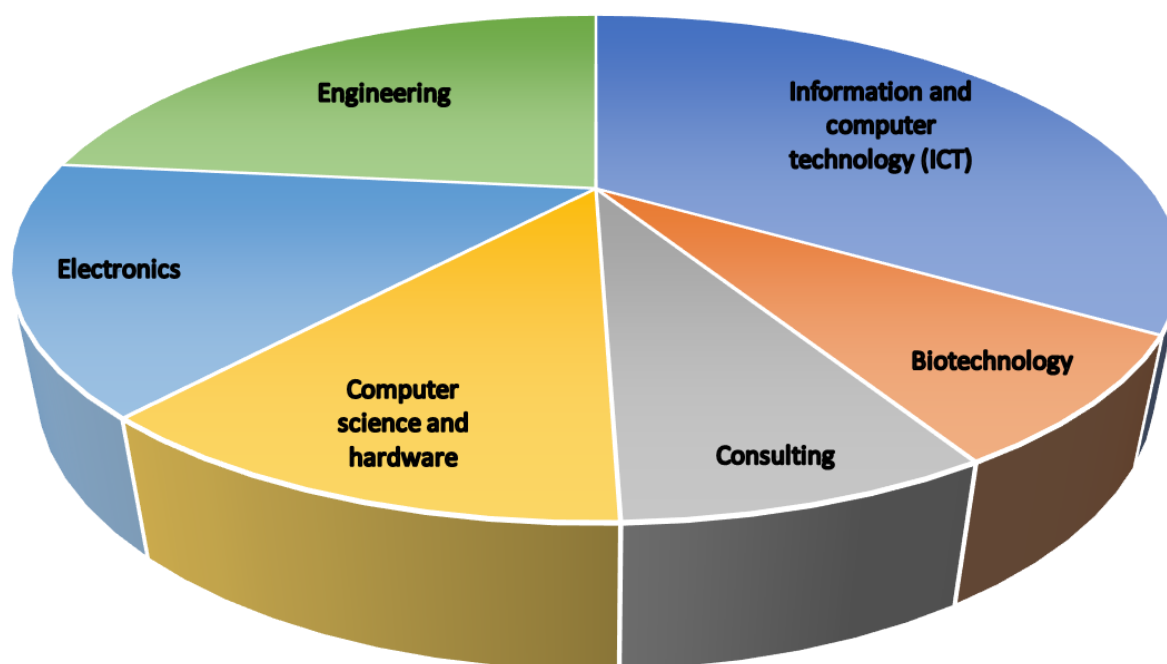
(Note: 'consulting' refers to tenants who are located on the technology park in order to sell services to third parties rather than conduct their own research and development. They do not necessarily aim to work for their fellow tenants, although the large number of nearby businesses with an interest in research may create a useful local market.)

Some tenants' activities can go beyond research and development, for example limited manufacture and sale of parts and components is possible. An electronics company might have a "clean room" in its building that is used to manufacture limited quantities of products for sale to third parties. The rents charged by technology parks mean that it is not cost-effective to conduct mass-manufacturing there, but the infrastructure and availability of expertise might encourage the tenants to offer fabrication and prototyping services.

Advland has 27 technology parks, spread across the country. These vary in size, some being little more than large converted office blocks that offer small- to medium-sized spaces for software development and small laboratories and workshops. Others are built on large campus spaces, with several major units for rent and the infrastructure required to support a range of large-scale activities.

Prospective tenants are often attracted by the possibility of collaborating with other tenants based on the technology park. Such collaboration can take many different forms, including the direct provision of paid services. There can also be natural synergies, such as a tenant who is engaged in the development of batteries for electric vehicles hoping to collaborate with other tenants who are engaged in related areas of vehicle design. Even when commercial confidence makes it difficult to collaborate directly, tenants often benefit from being associated with a location that is attractive to potentially interested parties such as corporate designers, job applicants or other professional contacts.

Knowledge City Technology Park

Knowledge City Technology Park (KCTP) was founded in 1986 by Advland's Capital City University. KCTP owns a site comprising 24 hectares of land and 18 buildings, with a total of 320,000 square metres of floor space, making KCTP the largest technology park in Advland.

Capital City University floated KCTP in 1999. The university retains a 20% shareholding in the company, with the remainder of the shares being freely traded on the Advland Stock Exchange. The flotation was motivated by the university's desire to raise funds and also to free KCTP to provide a sustainable commercial boost to the country's technology sector. Since the floatation, KCTP has significantly improved its infrastructure, enabling it to achieve a very high occupancy rate. The university has developed good links to many of KCTP's tenants, which has led to commercial funding of university research projects. A large number of work experience opportunities for undergraduate and postgraduate students have arisen as well as employment opportunities for graduates.

KCTP's campus is located within a 30-minute drive from Capital City University. It has its own subsidised bus service, linking KCTP's campus to the university and Capital City's business district.

The campus is 3 miles from Capital City International Airport, which is a major hub offering global connections and enabling KCTP's tenants to maintain close contact with business contacts and colleagues from around the world. KCTP has a minibus and driver that can be booked to take tenants and their visitors to and from the airport.

There are several large hotels within a short distance of KCTP. Tenants use these to accommodate visitors, including colleagues and potential clients. They also provide convenient venues for meetings and conferences, some of which are hosted by KCTP. Several universities host academic conferences at those hotels, partly in order to attract participants from KCTP's tenants and so develop mutually beneficial contacts.

KCTP still has a close working relationship with Capital City University. The university has an international reputation for excellence in a number of key areas including biotechnology and engineering materials. Some of KCTP's tenants decided to base themselves there in order to develop contact with leading academics at Capital City University. Others were previously academics there themselves but left in order to conduct more applied research with a clear commercial direction.

There are several other universities within a comfortable travelling distance of KCTP. KCTP's Board is keen to develop as many potentially useful academic links as possible. There have been many successful collaborations between KCTP tenants and universities other than Capital City University.

KCTP's campus

The campus comprises 18 buildings set in pleasant landscaped grounds. These vary in size from 17,000 to 18,500 square metres.

KCTP maintains the grounds to a high standard and insists that tenants keep the exteriors of their buildings and their surrounding areas clean and tidy.

Fifteen of the buildings on campus are large units intended for sole occupancy for rental to individual tenants. Each building has all the necessary cabling and connections to ensure that utilities such as electricity, data, telephone and water can be made available in any part of the building. Tenants are free to adapt and change the interior of the building as they wish. For example, some tenants install interior partition walls to provide separate spaces. Most install specialised equipment, ranging from special air filters to small furnaces.

Tenants are required to restore their buildings to their original condition at the end of their tenancy. They must also inform KCTP's Health and Safety Department of all equipment that will be used and permit regular safety inspections to be carried out. KCTP reserves the right to refuse installations and modifications. For example, one tenant recently installed an industrial laser for research purposes, but was initially refused permission to proceed with that until the workspace in which it was to be located was fitted with safety locks to prevent any unauthorised entry while the laser is in operation. Another tenant wished to replace a furnace used to create alloys with a larger model but was refused because the additional electrical current required by the larger furnace would have caused "brownouts" (a drop in voltage) in the electricity supply to other buildings, which could have massively inconvenienced other tenants.

Two of KCTP's buildings have been subdivided into smaller workspaces and are rented out to entities whose needs are more modest than those requiring sole occupancy. Many of those smaller entities are at an early stage of development and may not yet have secured funding. Others are engaged in activities that do not require a large space or heavy equipment but wish to be associated with KCTP for reputational reasons or in order to make contacts.

One building is occupied by KCTP itself. It is located beside the visitors' entrance and car park. It has a reception desk that is staffed on a 24-hour basis and a telephone switchboard that enables operators to answer calls on behalf of tenants. The building has offices and workspaces for administrative and facilities staff, including a sophisticated security operations room that monitors the grounds remotely and communicates with security patrols. The building has executive offices and a boardroom that can be hired by tenants when it is not being used by KCTP.

KCTP's campus was purpose built, with excellent connections to utilities such as water, electricity and data services. These could, in principle, meet the needs of a small town and so there is ample provision for tenants' foreseeable needs. There is also scope for utilities to be upgraded if the need arises.

KCTP offers access to a campus computer network facility that is linked to a secure server with off-site hot back-up. Tenants are free to make their own arrangements for data storage and communication, but many appreciate the fact that KCTP can provide this service, albeit at a fee.

Staffing

KCTP employs 970 staff directly in the operation and management of the campus. They are engaged in a variety of roles, including:

- Health and Safety (24-hour)
- Security (24-hour)
- Maintenance (including 24-hour emergency cover)
- Information Technology (24-hour)
- Reception and Telephony (24-hour)
- Administration and Legal

- Marketing
- Internal Audit
- Landscaping and Gardening
- KCTP Business Services.

KCTP Business Services offers a flexible range of services to tenants, many of which are start-ups that are managed by technologists who have little interest in the administrative aspects of running their businesses. Tenants can, if they wish to, pay to subcontract aspects of their business including bookkeeping, preparing tax returns and human resource management.

Given the confidential nature of the work undertaken by many tenants, KCTP has to undertake detailed background checks on all of its staff. These include insisting on extensive pre-employment checks, including references from previous employers and full employment histories, supported by documentary evidence. The security department has a section that conducts detailed background checks on new staff and also staff who are being promoted into particularly sensitive roles.

KCTP's security department also employs two specialists in cybersecurity to oversee and manage the security issues associated with managing the company's IT systems.

Tenancy agreements

New tenants are vetted carefully, including rigorous financial checks. Rental agreements are generally based on 12-month contracts that can be rolled forward indefinitely from year to year, with tenants being required to indicate their intentions six months before their present agreements end. Tenants are required to make a substantial cash deposit before taking possession of their building or workspace, which is returned at the conclusion of the tenancy, after settlement of all receivables and the restoration of the building or workspace to its original condition.

Most tenants remain at KCTP for at least 2 years, although some tenants have occupied buildings for more than 10 years.

KCTP's Marketing department exists to maintain the company's profile amongst potential tenants. The department also liaises with existing tenants to ensure that their needs are known and understood in the hope that they will renew their contracts. The marketing department comprises an experienced manager and an administrative assistant.

KCTP's vision, mission and values

Vision

To contribute to innovation in business.

Mission

KCTP's mission is to offer an open, strategic platform for the development of innovation, technology and enterprise.

Values

KCTP's values are:

1. **Innovation** – we are always finding new ways to help businesses to grow.
2. **Community** – we seek to forge links between business and academic institutions.
3. **Integrity** – we apply a high level of professional ethics to everything that we do.
4. **Flexibility** – we work with stakeholders to create workable solutions.
5. **Responsiveness** – we aim to meet our stakeholders' needs.

KCTP's vision, mission and values

KCTP's Board of Directors

Jules Malano, Non-Executive Chair Jules is a retired finance director. Previously, she worked for one of Advland's longest-established technology parks until she retired in 2018.

Jules has held senior positions in a number of technology companies during her successful career.

Jules was appointed to KCTP's Board in 2019.

Sanjay Gupta, Chief Executive Officer

Sanjay was the Director of Innovation in a major quoted technology company before joining KCTP. He has a reputation for providing excellent strategic leadership. Sanjay had previously held senior roles in a succession of three successful IT companies.

He joined KCTP's Board in 2017.

Bill McDougall, Director of Operations

Bill, is an IT specialist. In recent years he developed an interest in cyber security and was a senior IT manager in KCPT for 5 years before becoming a director. He worked for 14 years in IT companies in Advland before joining KCPT.

Bill was appointed Director of Operations in 2017.

Shereen Peros, Finance Director

Shereen has held senior finance positions in major engineering companies. She enjoys working in a fast-moving, stimulating environment and was delighted to join KCTP's Board in 2018.

Chloe Reynolds, Human Resources Director

Chloe trained as a human resources manager in a large production company before joining KCTP in 2015. She was promoted to her current role in 2019.

Jody Peret, Independent Non-Executive Director

Jody is a qualified engineer who was a director of one of Advland's largest engineering companies.

Jody was appointed to KCTP's Board in 2019.

Rick Adamson, Independent Non-Executive Director

Rick is a qualified lawyer. He specialises in commercial property law and ran a very successful legal company in Advland. He retired in 2014 and was appointed to KCTP's Board in 2016.

Rio Chang, Independent Non-Executive Director

Rio was a senior manager in a public relations company. He is interested in business start-ups and had experience working in a business incubator at a university. Rio was appointed to KCTP's Board in 2018.

Professor Helga Kress, Non-Executive Director

Helga had a successful academic career at the Capital City University. She was Dean of the university's Engineering Faculty when she retired in 2017. Helga sits on KCTP's Board as a non-executive director, representing the interests of the university. Her directorship is the only link between the university and KCTP's management, although the university holds 20% of KCTP's equity.

Board structure

Sanjay Gupta Chief Executive Officer		
Bill McDougall Director of Operations	Shereen Peros Finance Director	Chloe Reynolds Human Resources Director
• Information Technology • Maintenance • Health and Safety • Landscaping and Gardening • Marketing	• Accounting and Finance • Administration and Legal • KCTP Business Services	• Staff recruitment, training and retention

Board committees

	Board committees			
	Audit	Risk	Remuneration	Nomination
Jules Malano Non-Executive Chair	♦	♦	♦	♦
Jody Peret Independent Non-Executive Director		♦		♦
Rick Adamson Independent Non-Executive Director	♦	♦		
Rio Chang Independent Non-Executive Director	♦		♦	
Professor Helga Kress Non-Executive Director			♦	♦

KCTP's principal risks

Risk theme	Risk impact	Risk mitigation
Security	Technology parks may be targets for theft and vandalism	Strong security presence 24 hours a day.
	Technology parks may be a target for industrial espionage, with tenants' competitors wishing to know what products are being developed.	KCTP vets all staff carefully to ensure they are not likely to pose security risks. KCTP has comprehensive insurance cover for both injury and property damage.
Tenant turnover	Many tenants are new companies. There is a risk that these companies will not survive long.	KCTP aims to have a mixture of tenants to ensure the turnover of tenants is manageable and cash flow is not affected too badly by voids.
Health and Safety	Some of the processes and practices used by tenants may be hazardous.	All tenants must inform KCTP about their activities so that suitable safety procedures can be put in place.
IT	KCTP's operations are heavily dependent upon the availability of its servers.	The servers are backed up to a remote hot back-up site that can take over in the event of the main site becoming unavailable.
Cyber security	KCTP's tenants file confidential information concerning their new products and processes.	KCTP ensures that its servers are secure. KCTP has strong cyber security designed to prevent hackers. All staff are vetted before they are granted access to the IT system in order to prevent attempts at accessing tenants' data.

KCTP's principal risks

Extracts from KCTP's financial statements

KCTP

Consolidated statement of profit or loss

for the year ended 31 December	2019	2018
	A$ million	A$ million
Revenue	479	449
Cost of property management, technology support centres and communal facilities	(111)	(98)
Marketing expenses	(14)	(12)
Administration expenses	(115)	(114)
Operating profit	239	225
Financial expense	(50)	(42)
Profit before tax	189	183
Tax	(43)	(42)
Profit for the year	146	141

KCTP

Consolidated statement of changes in equity

for the year ended 31 December 2019

	Share capital	Revaluation reserve	Retained earnings	Total
	A$ million	A$ million	A$ million	A$ million
Opening balance	5,000	320	241	5,561
Gain on revaluation		300		300
Profit for year			146	146
Dividend			(74)	(74)
Closing balance	5,000	620	313	5,933

KCTP

Consolidated statement of financial position

as at 31 December	**2019**	**2018**
	A$ million	A$ million
Non-current assets		
Property, plant and equipment	6,600	6,140
Intangible assets	330	330
	6,930	6,470
Current assets		
Accounts receivable, prepayments and other receivables	67	54
Cash and cash equivalents	264	244
	331	298
Total assets	7,261	6,768
Equity		
Share capital	5,000	5,000
Revaluation reserve	620	320
Retained earnings	313	241
	5,933	5,561
Non-current liabilities		
Loans	960	940
	960	940
Current liabilities		
Trade payables and tenants' deposits	327	228
Current tax	41	39
	368	267
Total equity and liabilities	7,261	6,768

Major competitor

KCTP is the largest technology park in Advland. It has several major competitors, including Sypark, which has a campus of similar size, located approximately 15 miles from KCTP.

Sypark
Consolidated statement of profit or loss

| for the year ended 31 December	2019	2018
	A$ million	A$ million
Revenue	417	370
Cost of property management, technology support centres and communal facilities	(101)	(88)
Marketing expenses	(12)	(10)
Administration expenses	(107)	(104)
Operating profit	197	168
Financial expense	(44)	(38)
Profit before tax	153	130
Tax	(35)	(30)
Profit for the year	118	100

Sypark

Consolidated statement of changes in equity

for the year ended 31 December 2019

	Share capital	Revaluation reserve	Retained earnings	Total
	A$ million	A$ million	A$ million	A$ million
Opening balance	4,500	280	175	4,955
Gain on revaluation		120		120
Profit for year			118	118
Dividend			(5)	(5)
Closing balance	4,500	400	288	5,188

Sypark
Consolidated statement of financial position

as at 31 December	**2019**	**2018**
	A$ million	A$ million
Non-current assets		
Property, plant and equipment	5,900	5,640
Intangible assets	250	250
	6,150	5,890
Current assets		
Accounts receivable, prepayments, deposits and other receivables	62	51
Cash and cash equivalents	217	198
	279	249
Total assets	6,429	6,139
Equity		
Share capital	4,500	4,500
Revaluation reserve	400	280
Retained earnings	288	175
	5,188	4,955
Non-current liabilities		
Loans	900	880
	900	880
Current liabilities		
Trade payables and tenants' deposits	305	272
Current tax	36	32
	341	304
Total equity and liabilities	6,429	6,139

KCTP's share price history

KCTP's beta is 0.9.

KCTP's share price history
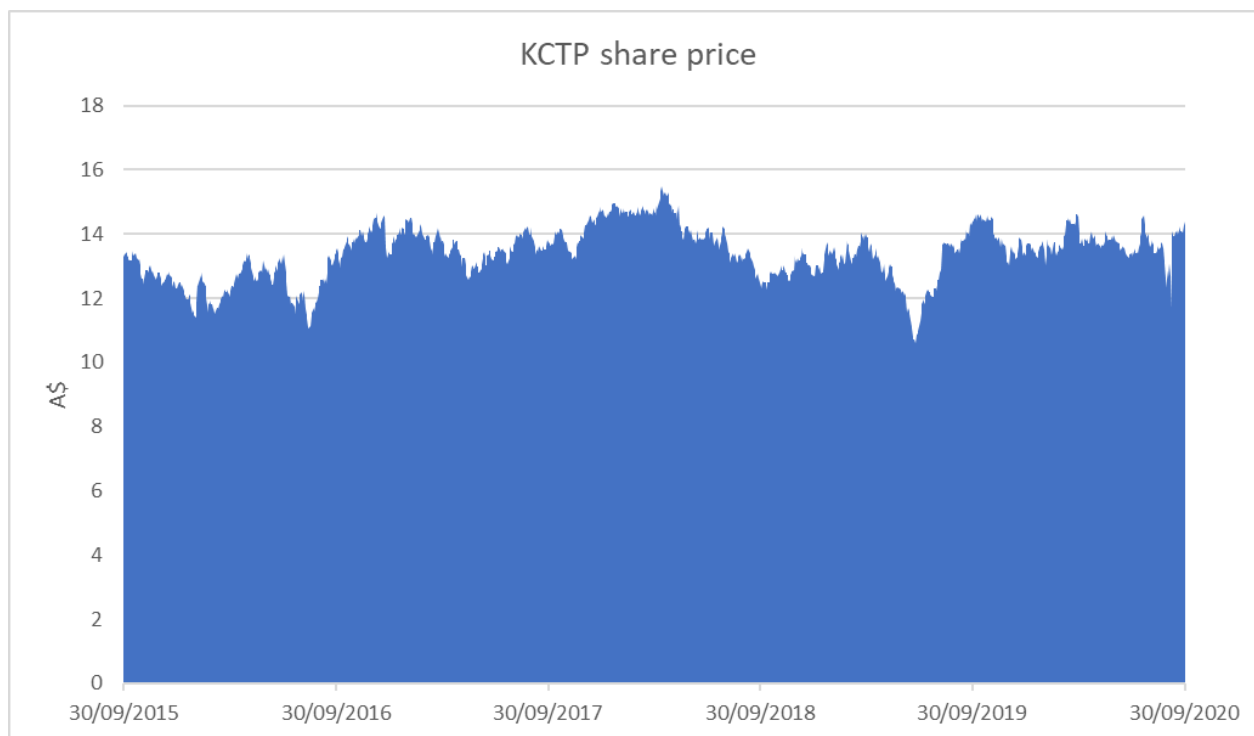
News stories

Advland Telegraph

Universities focus on "knowledge exchange"

Universities used to be evaluated on the strength of their teaching and research, but both are becoming increasingly overshadowed by the need to demonstrate relevance to the so-called "real world". That has created the concept of knowledge exchange, which involves transferring the results from research studies to business and other areas of activity.

University promotion boards are no longer content to count the number of learned papers written by an applicant for a coveted senior lectureship or professorship. At least some of the findings of those papers must have a demonstrable application to the real world, perhaps through the provision of consultancy work or the sale of a patent to a commercial organisation.

Most major universities have established knowledge exchange or knowledge transfer partnership teams, whose role is to approach potential external contacts in order to pitch ways in which a mutually advantageous relationship can be developed.

Advland Daily News

Top scientists can't build their own inventions

Movies often portray research as a glamorous process, with scientists toiling in hi-tech laboratories packed with sophisticated equipment. They always succeed in making major breakthroughs, just in time to save the world from a major disaster. Those same movies rarely portray the process of taking a research finding from the laboratory to a real-world product. Many leading scientists are happy to admit that they would not know how to operate the equipment in the factories that they supply with inventions.

For example, scientists involved in DNA sequencing might spend months in a laboratory working on the science associated with developing a gene that will improve, say, yields from grain crops. The difficult science then gives way to a process that is closer to cooking than to scientific research and is more suited to a factory setting than a laboratory.

It is a similar story with other areas of technology. In real life, the white-coated engineers in spy thrillers would probably have to email their designs to a local electronics factory to have them assembled before the hero could be issued with the latest technological marvel.

IT Monthly

Simulation takes off

IT professionals have noted a marked increase in demand for programmers who can help in the development of computer simulations. This is becoming an increasingly lucrative field.

Previously, engineers would build scale models of their designs and would test them to destruction in an engineering laboratory. For example, an aeroplane wing would be mocked up and its efficiency tested in a wind tunnel. If the wing passed those tests, it would then be twisted and bent to see whether it could stand up to the stresses and strains of flight. Eventually, a full-scale wing would be tested on a real aeroplane in flight.

Now, the same tests are often conducted using a virtual model. The design is developed using software and then tested by running the computer model through many different simulations that mimic the tests that would have been conducted in a laboratory setting. That has the advantage of permitting the design to be adapted and retested very quickly and at little additional cost.

The design team can then be satisfied that everything will work properly by the time the final design is ready for testing in the physical world.

IT Monthly

3D printers take off (literally)
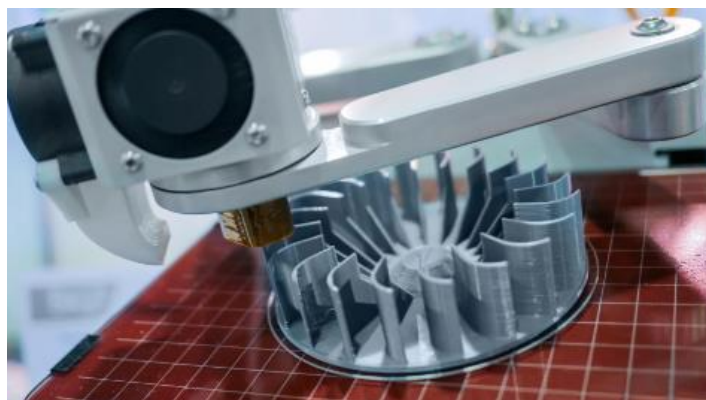
Companies are making increasing use of 3D printing technology to assist in the design and prototyping of their products. Design engineers make heavy use of industry-standard computer assisted design (CAD) packages to draw individual parts that can be assembled into a finished product. In the past, the drawings produced on CAD packages were generally passed on to a fabricator in order to create a physical object based on the image on the screen. The fabrication process is becoming increasingly dependent upon 3D printing, which uses machinery to create an exact physical representation of the design.

When it was first introduced, 3D printing was of limited use because the early machines could build only small items out of relatively soft plastics. Modern machines can create relatively large objects and they can use a growing range of materials, including carbon fibre and even metal.

The versatility of 3D printing is also changing the way some items are manufactured. For example, aircraft manufacturers might not hold inventories of many spare parts provided they are suitable for 3D printing. If an aircraft has, say, a broken switch then the CAD files for the parts can be sent to a suitable printer that could be on the other side of the world. The part can then be created and taken to the airport in order to get the plane back in the air.

Advland Daily News

There's nothing as practical as a good theory

Digital computers work on the basis that data can be stored and processed using switches that are "binary". In other words, they are either "on" or "off". That works well in most computer applications, such as banks storing their customers' records, because they are intended to apply logical and consistent rules where the correct outcome is not in doubt. Computers do, however, struggle with tasks where the models are uncertain and thus difficult to simulate, such as weather forecasting.

Quantum mechanics is a field of science that draws on the complex phenomena that occur at a molecular level. Those complexities make it possible to model uncertainties that cannot be addressed using conventional means. For example, a digital computer can decode encrypted data by working methodically through the various possible keys to the code, until the correct key is discovered by so-called brute force. However, with high levels of encryption it might take even the fastest computers hundreds of years to try every key until the code is broken. In contrast, a quantum computer, programmed with the logic of quantum mechanics, would try every possible key at once and open the file instantly.

Quantum mechanics, and the quantum computers that will use their logic, will support the development of many new products, including more effective pharmaceuticals and stronger and lighter materials.

Advland Telegraph

How green is the cloud?
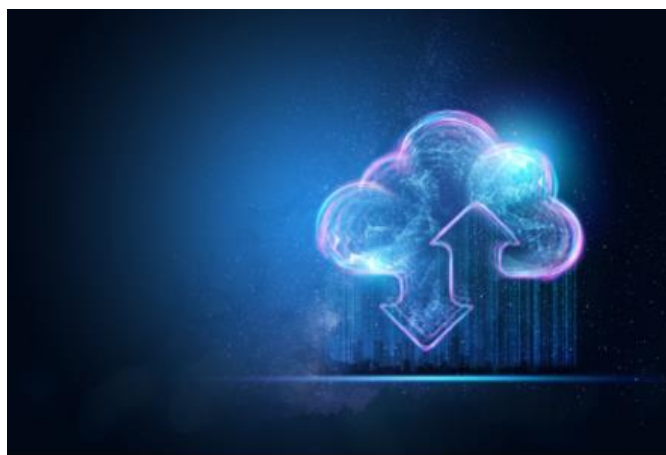
Researchers at Capital City University have discovered that many computer users underestimate the electrical power required by cloud-based computing services. Cloud computing is a broad term used to describe the storage, and sometimes the processing, of data at a remote site. Cloud services can be public, meaning that they are accessed over the internet, or private, meaning that they are hosted behind a firewall that restricts access to specific users, such as employees who are accessing a corporate cloud.

The researchers concluded that the data centres that are used to host cloud-based services are generally far more efficient than running individual computers in homes and offices. However, the data has to be transported between the data centre and the user's device and that can consume a considerable amount of energy. In some cases, data transportation uses more electricity than data processing and storage.

The researchers do not argue that the cloud is inefficient. But the energy savings associated with using cloud-based services are often overstated. Disclosures of corporate carbon footprints may also exclude the impact of energy consumed by third-party cloud service providers working on the corporation's behalf.