

Sphere

#44 2018

INTERNATIONAL JOURNAL OF THE
CK HUTCHISON GROUP



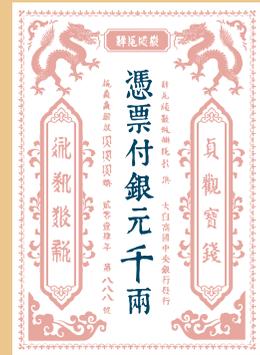
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1200 BC



300 AD



627



1736



1860s



1950s



PRESENT

MONEY: COWRIES TO COMPUTERS

Life in the Fro-Zone 1 4

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Sphere Magazine #44
March 2018

Cover Illustration
Jessica Li

Whatever you call it or however you carry it, money has always been crucial to the most modern and most primitive civilisations. The cover illustration captures its many manifestations.



The ancient becomes new again.

W E L C O M E

THE BEST OLD IS NEW

The newest, best things are sometimes the oldest things imaginable. They survive for millennia because they don't stay old. The ancient becomes new, transformed by the hand of man, again and again.

Take money. From using AlipayHK by a swipe of your mobile phone to the first-ever coin, the Lydian Lion, money is an idea on a par with the invention of the wheel for its importance to civilisation. But while the Tang dynasty's first attempts at paper money may not be visible on your smartphone today, the idea is there. Improved, evolved, revolutionised - but it's there.

One of the oldest forms of money was salt, still vital to humanity today. Only now, in Australia, Cheetham Salt capitalises on electrolysis for a completely novel use for salt: disinfecting pools, replacing nasty chlorine.

One of ancient man's great foes is still with us - absolute freezing cold. But this less than great thing has been overcome since the Inuit's forebears crossed the Bering Strait and the Sami people colonised Lapland. Now, CKHH companies from Husky Energy to 3 Sweden and Park'N Fly not only survive, but thrive in the face of killer bears, killer icicles and killer cold conditions. Ancient man and modern business have conquered the fro-zone.

While education may be a recent invention compared to money and the early uses for salt, it thrives and is much respected in the most ancient of lands. From Israel to China, this abiding respect for education makes the institutions of Technion and the Li Ka Shing Foundation natural allies in continuing to prepare their people for the future. A future that springs from their ancient past, transformed again and again. □

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(A limited liability Cayman Islands company registered and listed in Hong Kong)

Published by
CK Hutchison Holdings Limited

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And more ...



COVER STORY

MONEY, MONEY, MONEY

From heavy coins to a fortune in your pocket, money has transformed through the ages. Ancient practices gave way to high tech and AlipayHK is the next wave.



1 4

OPERATIONS FEATURE

Chilling with CKHH

For employees at 3 Sweden, Husky Energy and Park’N Fly, -40°C is just another day in the office. Come chill with CKHH’s coolest workers.



2 0

TECHNOLOGY FOCUS

Salt never tasted so sweet

Heavy liquid chlorination is the bane of swimmers everywhere – except Australia. The Land Down Under has adopted a people-friendly technology to make swimming taste sweet – by using salt.



2 2

PHILANTHROPY FOCUS

A dream comes true: GTIIT is born

The Li Ka Shing Foundation connects innovation powerhouses China and Israel through education. Now explorers and innovators come together at the new GTIIT.



CK HUTCHISON GOES INTO THE MATRIX

CKHH has joined a group of investors to invest in Matrixx Software, a fast-growing Silicon Valley firm that provides telcos with a way to upgrade their systems through their digital platform. This enables them to drive efficiency in their backend operations and has led to Matrixx Software's explosive growth.

INFRASTRUCTURE

DIVERSITY AND INCLUSION ARE TOP AT UK POWER NETWORKS

UK Power Networks has been honoured by the Association for Black and Minority Ethnic Engineers UK with a "Company Recognition Award" at their 10th anniversary awards event in London. All shortlisted firms had at least one ethnic minority individual at board level and encouraged and supported under-represented groups in the firm. The company also signed up to the Equality Works Group's Inclusive Culture Pledge 2018 to further advance the cause of inclusiveness.

HK ELECTRIC IS POWERING ELECTRIC VEHICLES IN HONG KONG

HK Electric is the official energy partner of the E-xciting Formula E Hong Kong E-Prix, an all-electric automobile global race, providing energy and technical expertise. Regular electric vehicle drivers in Hong Kong will continue to benefit from free charging until the end of 2018 to help promote the adoption of electric vehicles.



CORPORATE

A family reunion

Over 8,000 staff and families from across the CK Hutchison Group in Hong Kong spent a big night out together at Hong Kong's Ocean Park, an eco-oriented theme park. Some got up close and personal at the "Ocean Experiences of Sea Animals" while others felt the thunder with the Taiko Japanese drum performance.

COOPER PEDY GOES RENEWABLE WITH ENERGY DEVELOPMENTS

The remote opal mining centre of Cooper Pedy, Australia, has gone up to 42 hours straight on purely renewable energy as it pioneers a unique blend of wind, solar, battery and diesel energy. The project is beating targets for renewable-only energy provision of 75 per cent of total energy consumption, leading the way for providing power to remote communities and mining operations.



LOAD SHARE TAKES A LOAD OFF CUSTOMERS

A first for the UK will see UK Power Networks trial a load-balancing technology that will add capacity needed to power up to 45,000 more homes without requiring installation of more cables or substations. The Load Share programme saves customers across the network from extra costs and lowers the company's carbon footprint.

WALES & WEST, WORKING THERE IS THE BEST

Wales & West Utilities won “Best In-House HR Team” and “Best Apprenticeship Scheme” in the inaugural Wales Chartered Institute of Personnel and Development Awards for employee engagement and people management.

MIDGE AND MILLIE SNIFF OUT DISASTER

Northern Gas Networks’ new stars in gas leak detection are two Springer Spaniels, Midge and Millie. They are canine experts trained to detect mercaptan, the chemical that gives gas its odour, and have cut leakage detection time and unnecessary excavations. It’s early days yet, but a project in Leeds saw them save approximately GBP85,000 on the cost of correcting a series of gas leaks.



WIRELESS SOLUTION IS FOR THE BIRDS

Switching from overhead wires to underground cables is one way UK Power Networks is working to give nature a helping hand. The GBP75,000 project will aid thousands of migrating birds passing through the Nene Washes area, providing a safe stopping place for swans, ducks, golden plovers, lapwings, snipes, Icelandic black-tailed godwits and many more.



NORTHERN GAS NETWORKS AWARDED GBP9 MILLION FOR HYDROGEN

Building on the 2016 Leeds City Gate project (see *Sphere 42*), Northern Gas Networks has been awarded GBP9 million from Britain’s energy regulator, Ofgem, to further study how the UK gas distribution network can be converted to run on 100 per cent hydrogen.



CUSTOMERS ARE ‘RAVING’!

The use of Rant & Rave’s real-time feedback platform and the exceptional response time of its Ipswich call centre has seen UK Power Networks win the “Raving Customers” award at the inaugural Ravee Awards. Of 78,500 responses in 2017, around half received a perfect 10 out of 10 from raving happy customers.

BRITAIN’S FINEST!

Northumbrian Water Group has won “Utility of the Year” at the Utility Week Awards for 2017. It was ranked number one in the UK for customer satisfaction as well as being the most trusted and ethical water company in the nation. Congratulations!



Photo credit: ©KrischerFotografie

ista Technikum brings energy-efficiency R&D together in Essen

From research to industrialisation, ista Technikum is a massive new facility in Essen, Germany, with 75 workplaces in 2,100 square metres developing new technologies for ‘the digital, energy- and cost-efficient multi-family building of the future’.





TELECOMS

3Live comes alive in Hong Kong!

3 Hong Kong's new, 5,000-square-foot flagship store for those embracing a tech-savvy lifestyle opened with a bang. eSports competitions, eSports movies and balloons for the kids welcomed people to the new destination shopping experience.

THE LARGEST WALTZ

Wind Tre celebrated its integrated network in Trieste, increasing speeds by 250 per cent, by supporting "The Largest Waltz". A total of 1,300 dancers took to the Piazza dell'Unità d'Italia in last December to the delight of over 5,000 spectators.



I AM TRI! HEAR ME SING!

3 Indonesia supports youth creativity through a range of ventures. The Road to Sound of Tri auditions saw 3 Indonesia hosting auditions across the archipelago for the 10-band album, "Sound of Tri". It is no surprise they won the "Most Experiential Brand Activation Award 2017" in the category for "The Best Brand Awareness & Education Activation" for their #Ambisiku campaign from Mix Marcomm Media Awards.

GIGABYTE'S GIGA-SIZED HUGS!

Gigabyte leapt out of the realm of online advertising and right into the arms of huggable children, with a life-sized version of 3 Austria's lovable mascot touring 3 stores in the Alpine nation.

3 Indonesia won the "Most Experiential Brand Activation Award 2017".



PAGLIACCI TO THE RESCUE!

Clown Rescue was among the four employee-nominated and elected projects that won the vote for an EUR8,000 donation from Wind Tre as part of the “Insieme Si Può” (Together We Can) programme. The clown therapy programme was one of 30 projects voted on by over 3,500 staff. Invisible Care (telemedicine and telemonitoring equipment and training for disabled and ill children), ... Now I'm Cooking! (cooking classes for people affected by Down's Syndrome) and Joy Summer Camp 2018 (a summer camp for children affected by the 2016 earthquake) rounded out the top four winners.

L'AQUILA AND PRATO LEAD THE WAY ON 5G

The 5G future is coming to Italy! Wind Tre, in partnership with Open Fiber and the Italian Ministry of Economic Development is testing it. The new technology means much more than faster connection speeds. It prepares the participating cities, L'Aquila and Prato, to lead on telemedicine, education, smart homes, smart cities and augmented reality.



PORTS

Port Operator of the Year still growing

Port of Felixstowe won “2017 Port Operator of the Year” at the Lloyd’s List Global Awards ceremony in London, recognised for improving safety, cutting its carbon footprint, advancing its use of technology and reducing road congestion through rail development. It continues to grow, and recently committed to developing another 13 hectares of container yard behind Berth 9.



HUTCHISON PORTS TO EXPAND IN THE MIDDLE EAST

Hutchison Ports and the Government of Umm Al Quwain have signed a concession that will see the port group manage the four berths at Ahmed Bin Rashid Port in the northern United Arab Emirates. To the northeast, Hutchison Ports celebrated the opening of Ras Al Khaimah (RAK), close to the RAK city centre and industrial parks.



THOR AND FRIENDS JOIN THE HUTCHISON PORTS

Hutchison Ports has taken a 50 per cent stake in TMA Logistics, which includes logistics and transportation distribution at Thor Amsterdam and Thor Antwerp. The deal hammered out increases Hutchison Ports’ network of ports to 52. Electrifying!

OTHERS

GAMIFICATION WINS THE DAY FOR ESDLIFE

ESD*life* won a Silver award at the Marketing Excellence Awards for “Excellence in Customer Engagement”. Gamification and instaRedeem were key features of their work for their banking client leading to this award.



ALL IN THE FAMILY

ESD*life* helped over 200 families in the “Brightest Baby Competition”. Parents are encouraged to spend more time with their children and help them to develop their potential in this day-long family event.



HEART OF GOLD

Shanghai Hutchison Pharmaceuticals won a gold medal from the China Cardiovascular Health Alliance, and were the only traditional Chinese medicine enterprise to win.



ENERGY

All aboard the Skandi Vinland!

The Norwegian built Skandi Vinland arrived in St John’s, Newfoundland, to begin a 10-year stint supporting Husky Energy’s offshore subsea operations.

RETAIL

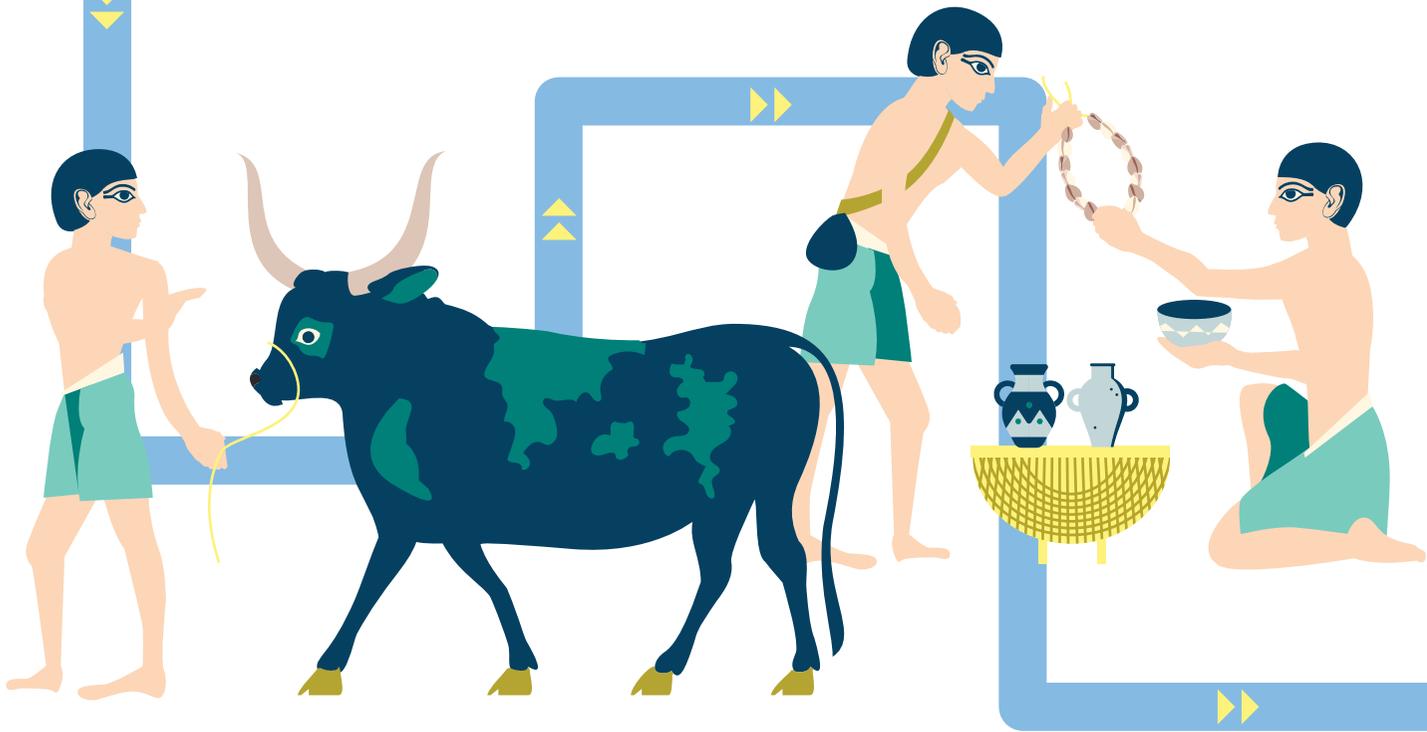
14,000 STRONG; SERVING 130 MILLION LOYAL CUSTOMERS

A S Watson Group (ASW) outlets passed the 14,000 mark, serving a huge client base across Asia and Europe. Among those happy customers are 130 million enrolled in loyalty programmes.



VOLUNTEERS OF ASW, UNITE!

ASW’s seventh Global Volunteer Day by the numbers: 23,000 volunteers across 30 business units spent 67,000 hours to bring the love to 51,000 beneficiaries in Europe and Asia!



ADVANCEMENT

MONEY, MONEY, MONEY

Money is the invisible glue that holds societies together. *Sphere* takes a walk through the history of money and onwards to the new Ant Financial-CKHH joint venture, AlipayHK.

Money. There is nothing like it. It is as necessary to civilisation as the invention of the wheel and fire, and yet is a completely imaginary construct. Someone, somewhere, came up with the idea that one thing could be used to represent the value of everything, freeing us from the constraints of barter. That person then got others to buy into that vision, and money was born.

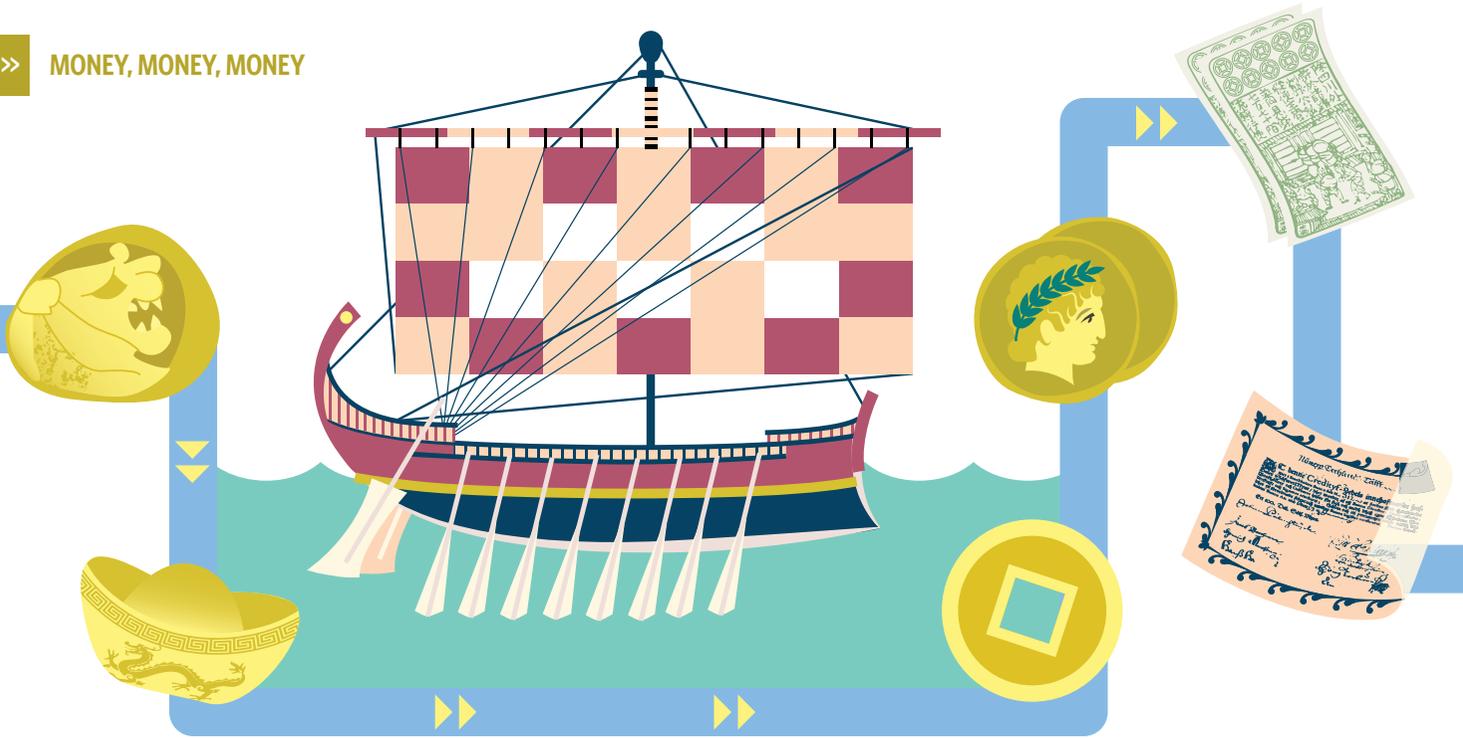
From cowrie shells to digital payment, money has moved with the times. *Sphere* takes a walk through the history of money and takes a peek into its future.

Barter got the job done for primitive societies, but was hugely limiting. What was bartered had to be transported, making large-scale barter impractical.

Goods like tools, weapons and animal skins may have been exchanged, but lacked most of money's principal benefits as:

- a medium of exchange
- a unit of accounting, allowing us to put a price on something and measure our access to resources
- a store of value - that is, it persists over time.

Proto-currencies with some form of standard measure included things like cattle and salt, but these lacked the full benefits of money per se. Early currencies based on pre-existing objects (that is, not produced to be money) included shells, like cowrie shells, that could be threaded together on string. From Africa to China,



The first round coins are believed to have been minted by King Alyattes in Lydia, now part of Turkey, circa 600 BC.

shells were a medium of exchange for hundreds of years, even into the 19th century, and were an important part of the slave trade in Africa.

The Chinese were among the first to use objects manufactured to represent value, probably during the Shang dynasty, when bronzed shells – bronze copies of cowrie shells – were used to represent real cowrie shells as early as 900 BC. Later, bronze objects were created in different shapes – ranging from miniature shovels to spears – to represent different values.

The first round coins, however, are believed to have been minted by King Alyattes in Lydia, now part of Turkey, circa 600 BC. They were made of a silver-gold alloy stamped with the head of a lion. Numismatic experts (scholars of coins) consider an official mark to be a key characteristic distinguishing a coin from other representations of value, and the Lydian Lion is the mark of the king, making this, in their eyes, a true coin.

Empires around the world soon started using this form of currency. Their control of it also enabled them to profit from its manufacture and, sometimes, its debasement.

TRUST ME

Governments have traditionally been the defender of the privilege of manufacturing official currency. Taxes, in particular, had to be paid in the official coin. When coins were made of valuable metals, the amount of metal and its purity needed to be maintained so people could trust the

currency. Governments have, however, debased their coinage for different reasons at different times.

An Athenian loss to Sparta in 407 BC saw 20,000 silver-mine slaves released, causing a silver shortage. The Athenians resorted to creating bronze coins with a thin exterior plating of silver. This drove people to hoard the valuable silver coins and to use the cheaper bronze coins instead so as to get rid of them.

More commonly, individuals would try to shave valuable metals off coins and then pass them on, keeping the shavings for recasting. This practice, from ancient times to the nineteenth century, was punishable by harsh penalties, even death. However, monarchs were not above the practice, from Roman Emperor Nero and his successors to King Henry VIII in England. Succeeding rulers, such as Queen Elizabeth I, often had to clean up the fiscal mess of their forebears by establishing new, trusted coinage of the realm.

PAPER IT OVER

Promissory notes used by merchants in Sichuan in the Tang dynasty (~AD 800) became so popular that the government decided to issue its own paper notes. This ‘flying money’ as it was called, wasn’t exactly money in that each document was unique (not standardised), but merchants would exchange them among themselves. The early Song dynasty saw the issue of genuine paper money (~AD 1024). This was backed by an equivalent amount of coin held by the



government, and counterfeiting was illegal.

European paper money had its origins in Sweden where the Bank of Stockholm produced paper money, in collaboration with the royal government, in 1661. It was backed by valuable metals – but not enough of them. Mismanagement saw the bank collapse in 1668, and its founder, Johan Palmstruch, was sent to jail.

BACK IT UP!

As European banks took up banknotes, they were always backed by a valuable metal held by the banks. For centuries, silver had been the standard metal, in particular Spanish ‘pieces of eight’, a silver currency that emerged as the world standard rather than similar European contemporaries. One of those contemporary currencies was the German ‘Joachimsthaler’ which became ‘thaler’ and then, in English, ‘dollar’.

Isaac Newton, of gravity fame, was master of the Royal Mint (of the UK) when he introduced a mixed silver-gold standard, but the UK became a gold-only backed currency by 1821. The United States was also on a bimetallic standard until silver shortages forced it, like many countries, to belatedly go for gold in 1900. The new country of Germany chose gold in 1871, and France, and Japan and others followed.

EVERYONE'S TALKING MONEY!

During the 1900s, people took on a greater understanding of how money could impact their lives, and it began to appear in pop culture. The book,

The Wonderful Wizard of Oz (published in 1900), predated the movie by around 40 years. In the original, Dorothy wore silver shoes and walked on the Yellow Brick Road, allegories for the silver and gold standards being debated in the US at that time.

Even the James Bond movie, *Goldfinger*, had monetary theory at its heart as the supervillain planned to irradiate Fort Knox, where the US gold reserve was held, thereby destroying the American currency base and making his own gold holdings even more valuable.

MODERN MONEY

While the gold standard may have become a thing of the past, fiat currency – or money by decree – hasn't lost its hold on our imagination or our lives. Musicians query our relationship with it in song, from Money, Money, Money (ABBA), Money (Pink Floyd), to Mo Money Mo Problems (The Notorious B.I.G.).

Technology has also changed how we relate to money. Credit – and access to it – has again accelerated the velocity of transactions. At one time, all extension of credit was between two parties – lender and borrower. Credit cards changed that.

GIVE ME SOME CREDIT

Stores had been extending credit to customers through a variety of means, but the credit card was different. The invention of the credit card is credited to a Brooklyn bank manager John C Biggins, but his ‘Charg-It’ card was only available to local residents. Other banks followed

The German ‘Joachimsthaler’ which became ‘thaler’ and then, in English, ‘dollar’.

and in 1950, the Diners Club card was born, starting with 27 restaurants and 200 members. American Express followed in 1958, and credit cards took off.

The 1960s saw another innovation now familiar to people worldwide. Those excited by the possibilities offered by today's ‘fintech’ (finance + technology) are reminded by old-timers that automated teller machines (known as ATMs in most places) were a big deal when they were introduced. They became widespread and saved consumers from the tyranny of banking hours.

THE FUTURE IS HERE

Recent years have seen another wave of technological innovation as the finance world catches up to the Internet revolution. Fintech, in the modern sense, is the brightest star in the financial world, with new business models changing people's access to money and credit, even enabling them to become small bankers themselves, all through a device in their pocket.



Now, in many parts of urban China, citizens go weeks without using cash or carrying a wallet. Even beggars will take mobile payment via a phone.

Peer-to-peer (P2P) models enable people to make money from money, like bankers. They allow people to borrow and lend to each other directly, but supported by technology that enables people to build credit records through reputation, like ratings on eBay. P2P equity crowdfunding turns people into miniature venture capitalists, allowing them to commit small amounts of equity to new projects.

Mobile technology has also eased the problems for societies where credit cards, for whatever reason, never caught on. Only a decade ago, luxury cars and houses in China were being paid for using duffel bags full of cash, as credit cards were not widely used and banking was cumbersome. Now, in many parts of urban China, citizens go weeks without using cash or carrying a wallet. Even beggars will take mobile payment via a phone.

In places like Kenya, mobile payments mean farmers who have never had bank accounts are researching distant market prices and cutting deals on their mobile phones. Globally, whole banks are opening that have no tellers and no physical locations.

Money itself is changing too. New electronic currencies are trying to do much more than just be a medium of exchange, a store of value or a unit of accounting. Token-based currencies incorporate 'smart contracts'. Not only can you 'spend' the tokens to gain access to a service, but the token itself is a piece of software, encoding

information and instructions critical to accessing the service. This is the first time since the Lydian Lion that the essential nature of money has changed to incorporate a new function.



MONEY: MORE THAN PAYMENT

The idea that money can be good for more than its main three benefits is also changing. When combined with a wide array of other services, a payment system can become the lynchpin of a whole 'super lifestyle mobile experience', delivered through an app (mobile phone application).

Nowhere is this more true than in China. While mobile payment apps in some places have been 'a credit card in a phone' - bringing a higher degree of convenience - in China, it is much more. Most Chinese cities seem to have gone cashless.

Major fintech companies like Ant Financial have incorporated technology into the financial sector, using their diverse expertise to transform relationships with money through their innovative fintech platform, Alipay. This has become a total lifestyle manager, encompassing almost

the entirety of life's commercial transactions from utilities to groceries to insurance and daily necessity purchases.

Now it has come to Hong Kong in partnership with CKHH in the form of AlipayHK (see next page). With over 1,000,000 people signed up in its first 10 months, it is quickly becoming as pervasive in Hong Kong as in urban China. The next phase in our relationship with money has arrived, with all our funds and the world of purchases at our fingertips.

From Lydian Lions to AlipayHK, money is the lynchpin of civilisation that has gone from a lump in our pocket to bits and bytes. While it has become less physically real and is hidden in our phones, it has become more accessible and usable in ways the stampers and shavers of coins could never have imagined. Innovators will continue to make money and credit more accessible, accelerating the pace of progress. The Notorious B.I.G. might have said "Mo[re] money mo[re] problems" but without it, we would be without the civilisation we take for granted every day. So bring on the "Money, Money, Money!" □

AlipayHK: The lifestyle game changer

China is a global leader in mobile payments and in China, Alipay is the leading e-wallet. It has now exploded in Hong Kong. Since May 2017, over 1,000,000 users have signed up to the Hong Kong version, AlipayHK, and can access 10,000 different merchant payment points. The numbers are rising quickly, and a closer look shows why.

Delving into the Alipay app, one finds a great deal more than just payment. A whole life could be lived using it – ordering food (including groceries), paying for public transit and utilities, and even gifting Chinese red packets (money gifts given at Chinese New Year). Loans, insurance, targeted coupons and government services are all available and payable through the app.

LOCAL EXPERTISE

Widespread adoption in one market doesn't mean that bringing it to a new market can be done without serious consideration. Every market has its own characteristics and Hong Kong and

of the differences between Alipay's home market and that of AlipayHK. "For example, the use of QR codes is ubiquitous in China. In Hong Kong, they haven't caught on in the same way. But as people realise their convenience and usefulness, they are using them more and more."

The Hong Kong version of the app will tie into CKHH companies – for example, providing an extra 20 per cent bonus on ASW's MoneyBack programme, discounts on electricity bills and extra data on phone plans paid through AlipayHK.

A SMART CHOICE

Since its introduction, AlipayHK has become a smash hit in Hong Kong. Ms Tan explains why the e-wallet service is a SMART choice for consumers, "SMART represents five major elements: Secure, Multiple Use Cases, Anywhere, Reward and Technology. We believe these five elements allow people to use their electronic wallet worry-free."

'Worry-free' is important as any new mobile technology raises concerns about security and privacy. Regarding data security, AlipayHK will maintain strict divisions between datasets and their analysis to ensure that merchant partners can feel secure that their data is kept private.

"We collect the absolute minimum amount of data required to complete the transaction. While the metadata provides insights, customer-specific spending information is held only by the merchant," says Ms Tan.

Ant Financial brings its technologies and other expertise to the new partnership, and CKHH brings management expertise, cultural knowledge and deep experience in the Hong Kong market. The joint venture is on track to make the Hong Kong version of Alipay more like the original – a lifestyle super app offering a wider and wider array of services – making it a perfect match for the Hong Kong consumer.



China are no different in this respect. Each has its own consumer behaviour patterns and CKHH's local expertise has been vital in helping create a local version of Alipay – AlipayHK.

Canning Fok, Group Co-Managing Director of CK Hutchison says, "Through our many years of business experience, we hope to work together and make AlipayHK more widely adopted, bringing benefits and cheer to consumers and creating value for shareholders."

CKHH's deep understanding of consumer behaviour, through A S Watson Group (ASW), 3 Hong Kong and HK Electric, gives them perspective and insight into how Hong Kong consumers think and behave.

Jennifer Tan, CEO of Alipay Payment Services (HK) Limited, explains some



Canning Fok, CKHH Group Co-Managing Director (left), Eric Jing, Ant Financial CEO (right), and Jennifer Tan, CEO of AlipayHK (middle), celebrate the 1,000,000th subscriber milestone at the kick-off ceremony.



EXTREME ADAPTABILITY

CHILLING

WITH CKHH

For employees at Husky Energy and Park’N Fly in Canada and their CKHH cousins at 3 Sweden, extreme cold is just part of the job. But they show up prepared, with the equipment and training needed to survive bears, ‘growlers’ and falling icicles.



When roads are frozen, the skies are clear. Helicopters are a wintertime must for 3 Sweden.

If you were told at the job interview, that for a few months of the year, you would be expected to go out and get your job done in sub-zero temperatures, would you take the job? Don't worry – you get a hat. You'll be fine.

In fact, employees of the CKHH family get a lot more than a hat. There is special training, special equipment, extraordinary modes of transport and custom-designed infrastructure that not only makes business possible, but also protects staff who put their hands up for cold weather duty. Recruits in these countries have normally – but not always – grown up with the cold, and living with it is in their blood.

But there is a huge difference between living in a Toronto or Stockholm suburb

CKHH's coolest employees show up ready to get the job done under the most extreme conditions.

and surviving a trip to the local Tim Hortons doughnut shop or Ikea warehouse and working on a North Sea supply ship dodging icebergs, or climbing ice-shrouded cell phone tower masts near the Kebnekaise mountain. CKHH's coolest employees show up ready to get the job done under the most extreme conditions.

"THERE IS NO BAD WEATHER, ONLY BAD CLOTHES"

So goes an old Swedish saying. According to Maria Jonsson, Head of Networks, 3 Sweden, staying indoors for the winter is not an option for the Swedes. 3 Sweden field technicians serving base stations, according to Ms Jonsson, "always need to be ready to go out and secure service for our customers," and ensure Swedes are connected everywhere, all the time. Modern Swedes, in contrast to their forebears, have access to weather apps – with the data coming via the 3 network – and see them as a daily necessity.

In northern climes, spending extended periods outdoors is not taken lightly. People from these countries are surprised that terms like 'frostbite' have to be explained to people from the tropics, as it is second nature to them. With this condition, your extremities (fingers, toes, tip of the nose or ears) can literally freeze, resulting in masses of blackened dead cells that normally require amputation. In extreme cases, it can proceed up the limbs, proving fatal.

Swedes know how to dress for the weather, but gloves present a special difficulty as keeping hands warm yet unencumbered enough to do technical work is always a challenge. The same is true for the Swedes' cold-weather compatriots in Canada. Park'N Fly, Inc, the airport parking service in 12 locations serving seven airports, provides cold weather clothing for a wide range of employees who have principally outdoor duties to deal with in winter, such as snow removal teams. Canadians have a range of vocabulary for cold weather wear that they don't even realise is unknown to the rest of the world. Ask any non-Canadian what a toque (or tuque) is and you'll get a blank look (it's a woollen hat, often with a pom-pom on top).

Husky Energy Inc deals with some of the most extreme temperatures with operations in Canada's Far North, including the Arctic Ocean and North Sea. Temperatures as low as -40°C (which is also -40°F, the only place the two are the same on the thermometer) are not uncommon in the winter. This effective temperature is even lower when the wind chill factor is considered. More expensive full thermal, cold winter wear is provided for all employees. Boots must not be just warm, but are specified for safe working at -40°C. Sphere 39 covered some of the special uniforms made for workers on offshore platforms – see QR code below. They include flight suits with cold weather protection for travelling to and from the SeaRose FPSO by helicopter in case a trip over water goes awry. Full immersion suits will hopefully never be used, as they would only be required in the event of a full evacuation into the icy North Atlantic waters.



These flight suits offer more than stylish orange — they're designed for safe passage by helicopter over chilly Arctic seas.



You're going to need more than a spare credit card to dig these cars out in the Canadian winter.

TAKE CARE OF YOUR PEOPLE

Enduring the cold with frosty bravado is not seen as a virtue. All three companies recognise that cold weather environments take a toll on people undertaking work in these conditions, causing higher levels of fatigue. Work schedules allow for complex tasks to take longer in cold conditions. Adherence is rigorous. "Strict policies and procedures focused on reducing the risk of injury, slips and/or falls attributed to snow or ice exist," explains Frank De Cesare, Vice President of Marketing and Sales, Park'N Fly.

For example, Park'N Fly knows that demand goes up for valet service in the winter as people prefer not to dig their own cars out from under perhaps weeks of persistent snowfall. "Park'N Fly is there to help and ensure the customer is taken care of," explains Mr De Cesare. While also protecting employees, that is.

Staff do the heavy lifting and need regular rest to ensure safety. They also lay salt - over 900 tonnes of it at the Toronto operations alone each winter - and provide electricity for clients who pay to have their car plugged into a heater to protect the battery during cold spells.

Husky Energy has similar "Fatigue management" and "Cold weather management" systems in place to ensure heavy indoor rotation for those working outdoors in especially extreme conditions. It also ensures that its systems and equipment are used by its contractors, not just its direct employees.

Whether it's rain, sleet or snow, nothing will keep 3 Sweden from their rounds!



Salt: over 900 tons of it at the Park'N Fly Toronto operations alone each winter.

3 Sweden has another challenge. Much of their technical work is done high up at the top of a cell phone tower. All year round, for safety reasons, the company forbids climbing in the dark. However, in the winter, the days are very short. From November to February, there may only be a handful of working hours each day. Combined with the extra time taken to get to inaccessible facilities in the snow and ice and the extra time taken to fix problems, winter is a special challenge. Accordingly, much of the routine maintenance work is done during the extra-long summer days, with winter reserved for keeping the service in top form.

BEWARE FALLING ICE

Those employees face other challenges approaching cell phone towers and working at height in the winter, including the threat of killer icicles.

While this may seem preposterous to some, a sharp, heavy knife plunging down from a great height is no joke. In the particularly harsh winter of 2010, five people were killed and 150 were injured in St Petersburg, Russia. The danger is very real, especially when the thaw comes at the end of a long winter, and those climbing tall structures are at high risk. 3 Sweden mounts special ice-protection structures on all link antennas to prevent damage. Especially tall masts will have special armour plating to protect climbers and parking spots close to the tower (to shorten equipment transport) with extra armour plating provided to protect parked cars and snowmobiles and their passengers.

The equipment itself is normally manufactured for all weather conditions. Only rarely has 3 Sweden had to replace equipment that wasn't up to the cold. However, replacing faulty equipment can be problematic if persistent ice has formed



“3 Sweden field technicians serving base stations always need to be ready to go out and secure service for our customers.”

Maria Jonsson
Head of Networks
3 Sweden

Frozen doesn't mean immobile. Falling icicle is a mortal threat.

over a mast. The only solution is to mount a second unit alongside the faulty one and wait until the spring thaw to swap the original out.

In addition to ice on the masts, ground frost in the winter prevents digging operations, especially in the north. Often cable is laid on the ground and left there until summer. The same goes for building access roads into inaccessible areas.

ALWAYS COME WITH THE RIGHT GEAR

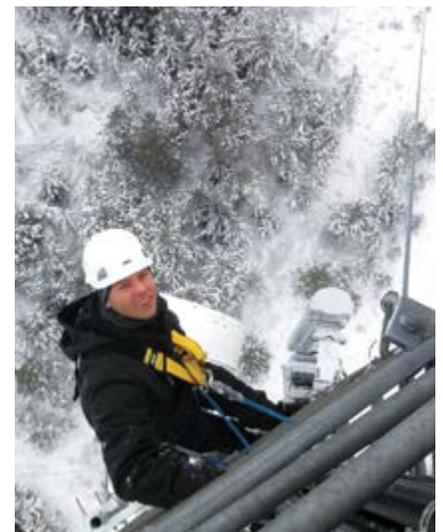
Husky Energy also deploys special equipment for working in the north. Keeping drilling equipment working in extreme cold means that all equipment is 'winterised' with things like trace wires that carry a current to generate heat. Much of the equipment generates its own heat – as long as it keeps operating – and can be controlled remotely.

Trevor Pritchard is Husky Energy's Senior Vice President, Process and Occupational Safety. He was impressed when he arrived in the north and discovered that "trucks up in the Northwest Territories have a small engine built into the hood of the vehicle and connected to the main engine cooling system. This generates enough heat to keep the cooling system from freezing and also allows the cab heater to work for short durations." This is important because, "Otherwise you need an electrical heater and electrical supply, or you need to leave the engine idling ... Either way, fuel costs go up when working in the cold," he explains.

HERE THERE BE ICEBERGS

Other special vehicles include aircraft whose only job is to look for icebergs that could pose a risk to offshore drilling operations. February to July is peak season, as warming weather causes ice to break off of the main

Strict protocols exist for dangerous, exhausting conditions in order to protect 3 Sweden's telecom professionals.



Arctic ice mass or glaciers. As the icebergs float south, they could take months to melt. Special aircraft are dedicated to locating and assessing the threat of bigger or smaller icebergs. Icebergs are the big, visible ice masses, but medium-sized 'bergy bits' and even smaller, less visible 'growlers' also pose a threat.

Once an ice mass is identified as a risk, other supply vessels will be recruited to divert the ice from its trajectory. This can be done using ropes, nets and water cannons, literally towing or blasting errant ice. However, if ice density becomes a real problem, drilling rigs can evacuate the area and the supply ships then all focus on protecting the SeaRose, the centre of the White Rose oil and gas field operation, much like chess pieces forming ranks to protect the king.



Remember, it's what lies beneath that you need to watch out for. Husky Energy patrols are on the lookout!

Those ships cost more than normal ships operating in more temperate climates as they have to be made of special cold-tolerant steel. There is almost never a break on costs when working in northern climes. The one exception is **3** Sweden's savings on air conditioning! By using a fan blowing

filtered outdoor air into the equipment room, they can save up to 80 per cent of the energy costs compared to traditional air conditioning in hotter climates.

COMMUTING ON ICE

Peak iceberg season is followed by a quiet window before hurricane season in the North Atlantic kicks off in mid-September. Lots of routine maintenance is done during this time. Once the windy weather and cold returns, getting to and from work can be a challenge and helicopter travel can be hit or miss as inclement weather grounds the choppers. The height of waves can also dictate whether or not helicopters can land on the SeaRose, a floating facility.

For those on land in the north, extreme blizzards may make travel impossible, but the Husky Energy teams are equipped for almost any weather (with their second mini-engine!). **3** Sweden employees have a wide variety of means of getting to remote sites once the deep snows hit.

Some remote areas are actually easier to access using snowmobiles. Invented by Joseph-Armand Bombardier in Quebec, Canada in 1942, they have become an invaluable part of snow travel, replacing dog sleds in most instances in northern Europe and Canada. In both Sweden and Canada, four-wheel drive vehicles, snow shovels, snow tyres, chains and spikes for tyres are all standard equipment. **3** Sweden also uses all-terrain vehicles (known as ATVs), but with treads instead of wheels. Light helicopters also provide easier access to some areas. Occasionally, a friendly farmer with a snowplough may be enlisted to assist in clearing blocked roads. All in a day's work!

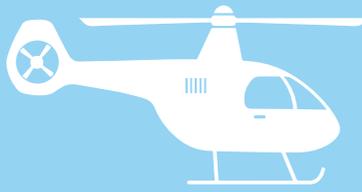
PROTECTING CANADA'S NORTH

Even when considering an emergency response to protect the environment, there are still some peculiarities to working in

EQUIPPED FOR THE ICE



Snowmobile



Helicopter



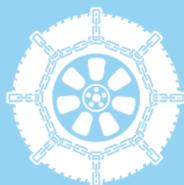
All-terrain vehicle



Four-wheel drive



Snow tyre



Chains



Spikes for tyres

the north. For example, petroleum workers in the oil-rich Middle East have probably never considered the difference between dealing with a potential oil spill in cold versus warm weather, or in transitional seasons like spring.

Husky Energy is hyper-aware of these considerations. Cold conditions retard response time, and equipment can be more brittle and prone to breakage if not treated carefully. In springtime, a leak would see oil move quickly into major lakes and rivers as snow melt means lots of water is moving quickly, creating temporary tributaries and small streams that don't exist in winter or autumn. Should a release happen in winter, contaminated snow is carried directly to containment units for separation of oil and water. Summertime emergency response may see water flow diverted directly into the containment areas. Husky Energy professionals understand how oil behaves differently in colder water and have plans for recovering oil that is trapped under ice.

ICEBERGS AREN'T THE ONLY GROWLERS

Husky Energy staff working in the north have one more thing that poses risk to life and limb: grizzly bears. These massive beasts compete with polar bears for the 'biggest bear' title. While they normally avoid humans, if bears are especially hungry or under other environmental pressures, they can kill. All outdoor working staff are trained on bear awareness and how to scare bears away. This can include bangers (a noise-making projectile) and pepper spray. For those who think the danger exaggerated, 2014 saw a (non-Husky Energy) technician killed in a bear attack in broad daylight in front of staff unable to prevent it. However, the last attack in Canada before that was in 1991 so it is not a frequent occurrence. Still, Husky Energy makes sure staff are prepared.



On the lighter side, non-Canadian employee Trevor Pritchard was asked what would surprise people from non-northern climes. Canadians normally have



Special clothing and an understanding of oil behaviour at sub-zero temperatures are all part of the job.

a long stick with a heavy duty scraper on one end and a brush on the other as part of their collection of tools in their car. "In the UK, we would just use a credit card to clear snow and ice from our windshields, so I have taken many a long-handled snow scraper back as a Christmas stocking stuffer."

Like the toque, Canadians don't even know that this is a national quirk, probably shared by Swedes. The staff at Husky Energy, 3 Sweden and Park'N Fly wouldn't consider themselves cold savvy - it's just daily life. But the lifetime of chilly education they get is buttressed by a huge range of research, systems, equipment and expertise that is designed to protect CKHH staff and the environment, serve their customers and help get the job done. For CKHH's sub-zero heroes, that's pretty cool. □

One more thing that poses risk to life and limb: grizzly bears.





SALTY SOLUTION

SALT NEVER TASTED SO SWEET

Australians have taken the sting out of the pool swimming experience by using a high-tech solution.

Australians love the sun and surf. Being on and in the water is second nature, from toddlers on surfboards to a plethora of world champion swimmers. When they aren't in the ocean, they are in their pools. Just as central to family and community life as the barbie (barbecue), the pool is where Australians gather. It's no surprise then, that they are also the world leaders in making the pool swimming experience even better through clever innovation.

Their biggest water quality innovation often surprises visitors to Australia when they see the great swimming nation has 'saltwater pools'. Especially if located close to the ocean, tourists could be forgiven for thinking that saltwater-chlorinated pools would taste like salty seawater. But in fact, Australia is a world leader in a water purification method that uses a far more human-friendly and environmentally friendly form of cleaning water - using salt to create chlorination.

THERE IS A BETTER WAY

Chlorine is the bane and boon of swimmers everywhere in the world. The smell of chlorine assures one that, assuming proper management, their environment is going to be clean, no matter how many people have been in the water. But the stinging of the eyes and the deadening of hair and skin caused by chlorine is detested. Frequent and competitive swimmers who use public pools endlessly discuss what products to use to avoid straw-like hair and how to get the persistent stink out, even after showering.

The answer, surprisingly, is salt. While it is true that salt (NaCl) is the simple combination of sodium and chloride ions, its composition and how it is deployed can make a huge difference in, for example, how it impacts taste and cooking. But for those wise in the ways of salt, this simple chemical has a wide array of uses.

Cheetham Salt, headquartered in Melbourne, knows its salt - it's been

producing it, with the help of sun, sea and wind-driven evaporation, since 1888. Cheetham Salt joined the CK Life Sciences Int'l., (Holdings) Inc. family of companies in 2013 and provides salt for a range of uses, from consumer products for the kitchen to industrial and pharmaceutical production.

But it is salt used to chlorinate backyard swimming pools where the distinctly Australian flavour comes in. Or rather, it doesn't. The secret of salt-chlorinated pools is that you can't taste the salt.

NOTHING FISHY ABOUT SALTWATER POOLS

Again, tourists invited to a private swimming pool billed as saltwater chlorinated may be disappointed not to see toothy fish or even toothier saltwater crocs. But those immersed in a salt-chlorinated pool first notice what they don't taste or smell - chlorine and salt. The level of salt is only 3,000 parts per million, well below the normal ocean salinity of 35,000 parts per million and even below the human tasting threshold of 3,500 parts per million.

Almost 75 per cent of Australian households with private backyard pools have installed salt-chlorination systems.

The lack of taste is a distinguishing feature of saltwater-chlorinated pools.

It's there – you just can't taste it. Swimmers also say they avoid the irritation associated with traditional liquid chlorination. The word most commonly used is the 'softer' feel of the water – an absence of harsh chemical contents affecting their hair and skin.

This technology is popular with Australians, with almost 75 per cent of Australian households with private backyard pools having installed salt-chlorination systems, with market share growing at a rate of about 10 per cent a year.

Regarding cost, the normal payback period for the cost of installing and maintaining a saltwater-chlorination system is about 10 years. The initial salt-chlorination hardware can cost up to AUD1,000, and chlorinator cells need to be replaced around every five years, costing AUD400 each. However, over a 10-year period, the total cost of a saltwater system compared to using liquid or granular chlorine is approximately the same, due to the higher cost of liquid chlorine and the higher volume of chlorine required to maintain pool cleanliness.

This doesn't include the value inherent in a more pleasant bathing experience for pool-mad Aussies who spend countless hours in their backyard pools. Regular

swimmers change their conversation from hair remediation to more weighty subjects, such as how to best cook their snags (sausages) and prawns on the barbie.

SALTY SECRETS

All this begs the question: How does it work? Doesn't the 'Cl' in NaCl mean chlorine? And why call it 'salt chlorination' if no liquid chlorine is used?

The secret lies in the fact that chlorine, used to kill bacteria and viruses, is still the means of disinfection. It's how it is delivered into the water, and in what concentrations, that makes all the difference.

Salt-chlorination systems use a salt-chlorine generator to free the chlorine ions from NaCl at an effective, moderated and even concentration over a longer period of time. This contrasts sharply with manually adding high doses of liquid or granular chlorine to pool water. Rather than dumping a high concentration of chlorine into the pool, the salt-chlorination system continually adds a moderate amount of chlorine over time.

A 25kg bag or two of Cheetham Pool Salt, which is simply NaCl, is poured into the pool water and quickly dissolves. As discussed, as the concentration in parts per million is very low, swimmers do not even taste or notice the salt. The pool water is then slowly pumped through to the heart of the salt-chlorination system – the chlorine generator. This is a simple set of electrolysis metal plates that carry a low-voltage current. When salt-infused water passes over the plates, electrolysis occurs and this splits the salt (NaCl) and combines it with water (H₂O) to produce small amounts of hypochlorous acid (HClO). Whenever chlorine is added

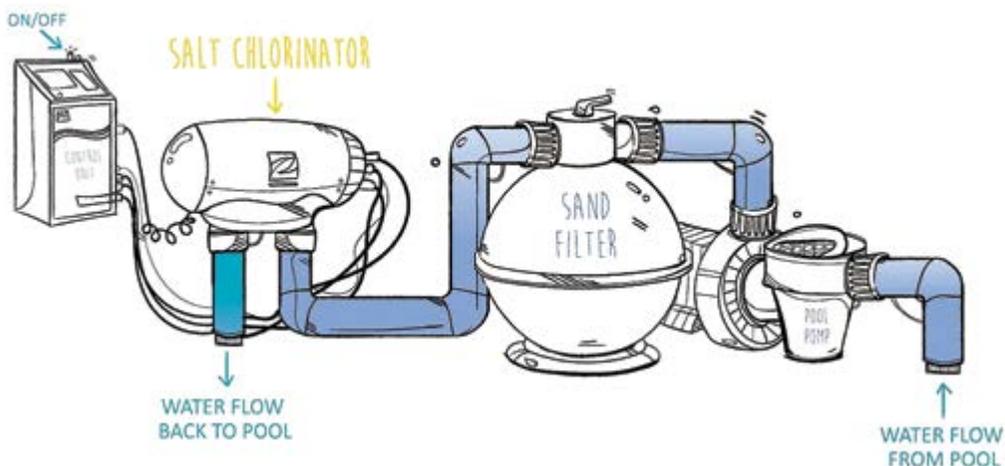


to water in liquid or granular form, or through salt chlorination, it's this same hypochlorous acid that kills the things we don't want in the water.

Salt-chlorination systems smooth out the introduction of this hypochlorous acid into the pool water – and this makes all the difference to swimmers.

Cheetham Salt provides staff training for pool equipment shops and hosts *How to use Pool Salt* videos on its customer websites to ensure owners get proper instruction on how to use their salt-chlorination system. But with such widespread adoption, Australians can simply knock on their friendly neighbour's door for a little help when they get started.

People around the world with year-round pools and seasonal pools alike, may start looking Down Under for a new way to enjoy their private pools, with open eyes underwater and happy hair, and find a better way to enjoy their aquatic life. They may find that Australian saltwater-chlorinated pools don't have sharks and crocodiles, but rather a high-technology solution that will sweeten the taste of their summertime swimming experience. □



INNOVATION

A DREAM COMES TRUE: GTIIT IS BORN

A promise is kept as the Li Ka Shing Foundation brings Chinese and Israeli students together to build a bright future through innovation and research.



A promise was made in 2013 and, four years later, the dream came true.

Over 200 students from China were admitted to the Guangdong Technion Israel Institute of Technology (GTIIT) in 2017 and will form the vanguard for what will become, “a major research institute that will help not only China and Israel, but also mankind in general,” according to Technion President Peretz Lavie.

President Lavie spoke those words at the school’s groundbreaking ceremony in December 2015 as building was beginning on the new campus adjacent to Shantou University, in Guangdong, in the People’s Republic of China. The promise was made two years before that, in 2013,

with a major project bringing together academia, government and the Li Ka Shing Foundation (LKSF).

A DREAM IS BORN

The Guangdong provincial government and Shantou municipal government committed RMB780 million and 383,700 square metres of land for the new campus to rise. The LKSF pledged over USD130 million in 2013, the largest ever single donation to Technion and one of the largest in Israeli education.

In the beginning, Mr Li saw the investment as not just something nice to do, but as a solemn duty, stating, “Our responsibility is to invest in reforms in education that unlock that genius and enable the continuing realisation of human potential, building

a knowledge-rich society and securing a sustainable quality of life for all. Failing to do so amounts to a crime against the future.”

This was in the early days of a fast-developing relationship between the Chinese and Israeli institutions, with the LKSF acting as a catalyst to bring them together. A range of Israeli luminaries have supported the connection and looked forward to this opening. At the 2015 groundbreaking ceremony, luminaries included the late Israeli President, Shimon Peres, Nobel Laureate Aaron Ciechanover (Chemistry, 2004), and the Mayor of Haifa, Yona Yahav.

Professor Ciechanover was born in Haifa and now has a sister; a sister city, that is. That same ceremony saw Shantou and

13 buildings

29 classrooms

14 teaching laboratories

55 research laboratories



An impressive new campus beckons the innovators of tomorrow.

Shantou University, Technion Israel Institute of Technology and the Li Ka Shing Foundation pull together for a brighter future.

LKSF will commit another RMB10 million to develop new programmes and ensure GTIIT becomes a hub of innovation in Guangdong.

Haifa, the Israeli city home to Technion, joined as sister cities. "This week, Shantou became Haifa's fourth twin city," says Mayor Yahav. Professor Ciechanover's interest did not flag and he is now the Vice-Chancellor of the new GTIIT.

That campus is impressive, boasting, at its launch, 13 buildings, 29 classrooms, 14 teaching laboratories and 55 research laboratories. Later, an adjacent industrial park will connect research to development and commercial applications.

BEHOLD!

From promise to groundbreaking to completion, the new GTIIT may look to the future, but celebrates the past. The launch ceremony in December 2017 celebrated the ancient Chinese and Jewish cultures,



with Chaozhou drums and lion dances combined with the Jewish hymn, "Hine Ma Tov" whose title means "Behold how good!"

The whole opening verse is from Psalm 133 of the Jewish scriptures and translates as "Behold, how good and how pleasant it is for brethren to dwell together in unity!" Unity was certainly on the minds of the backers of this important project.

Unity means that this will not just be a bilateral effort, but a truly global enterprise. The on-campus language of instruction will be English, and professors, researchers and students will come from all over the world. Technion President Professor Lavie plants his flag for global unity, stating, "We believe in globalisation. We believe that



Mr Li Ka-shing tries out a shofar (an ancient musical instrument made from a ram's horn) presented by Professor Peretz Lavie, President of Technion, as a souvenir.



“There is no limit to the quest for knowledge.”

Richard Li
Director, Li Ka Shing Foundation



Mr Li Ka-shing and Mr Richard Li, Director of LKSF (left), walk the new campus with supporter Mr Zhu Xiaodan, former Governor of Guangdong (centre left) and Mr Li Jiange, the first GTIIT Chancellor (right).

cross-cultural dialogues are essential. Opening up Technion and Shantou to these cultural dialogues is very important.”

At its core, however, will be the two nations and campuses. “When you combine the innovation and entrepreneurial spirit of Israel with the unbelievable scale of China, you have a great partnership,” he explains.

A BEGINNING WITH “NO LIMIT”

Indeed, expansion plans are already in place and there is more to come from this partnership. At the recent on-campus inauguration ceremony, it was announced that the LKSF will commit another RMB10 million to develop new programmes and ensure that GTIIT becomes a hub of innovation in Guangdong.

Students will study across a range of engineering, life science and basic science disciplines. The GTIIT Chancellor, Professor Li Jiange, knows that while serving humanity, they must serve the students as well, ensuring that they can succeed and contribute to society.

He explains, “The global environment

is changing rapidly and every nation is competing for talents who can meet these challenges. The mission of GTIIT is to nurture creative explorers and innovators with the capacity to tackle future challenges with theoretical knowledge as well as practical skills.”

One beneficiary of that view of preparing the next generation for the future is Richard Li, son of Mr Li Ka-shing. He is a director of LKSF and appreciates that vision. “My own father has always reminded me that there is no limit to the quest for knowledge, and his unwavering support of higher education and research to better mankind is a testament to this belief.”

LKSF Chairman Mr Li Ka-shing acknowledges achieving progress does not come without sustained effort in an ever-changing world, but when the fruits of that effort arrive as new technology, they can seem miraculous. “In this new world of fluid boundaries, the fast changing, fascinating, and transforming power of technology sometimes does seem to wave like a magic wand, bringing new models and opportunities to many frontiers and

generating new solutions to entrenched problems at a pace that is often hard to keep up with.”

Vice-Chancellor Ciechanover echoed the dedication needed to move forward, saying, “It is important to remember that we [Israelis] also have something to learn from the Chinese – planning and carrying out large-scale projects, adhering to timetables and boundless industriousness.”

The school will equip students to tackle those entrenched problems. In the beginning, it will have a College of Engineering, a College of Science, and a College of Life Science. Areas of study will eventually include chemical engineering, materials engineering, environmental engineering, mechanical engineering, chemistry, mathematics, physics, biotechnology and food engineering, biology, and biochemical engineering. The first students, who started their studies in 2017, will graduate in 2021 with a degree from Technion.

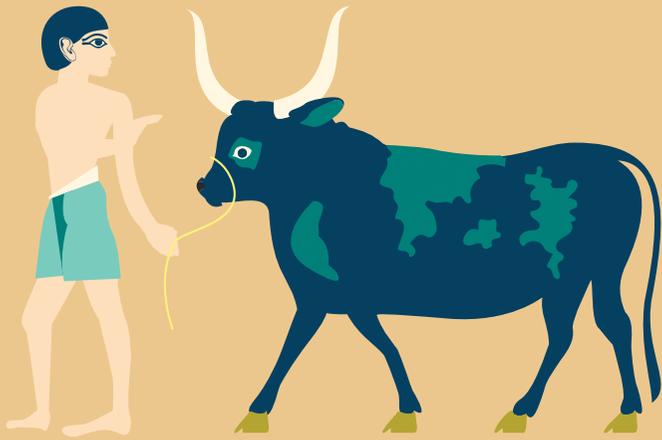
They will need to work hard – and be creative. Mr Li Ka-shing is clear that creativity is key to the future of students and humanity.

“In this day and age, no one has an iota of doubt that technological innovation underpins a country’s ability to create collective wealth, and that it is the key impetus to individual success. Creativity is the defining centrepiece of our time – powering us into the future. Establishing a creative paradigm is not easy to set right, only through education and the rule of law can we build a free and fair, fun and fruitful future for all,” says Mr Li.

Behold – the future! □







9000 BC



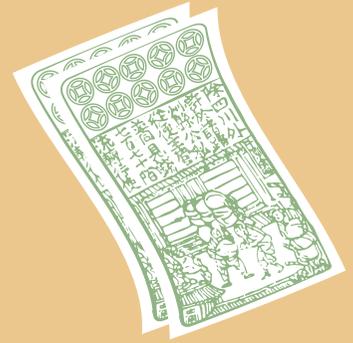
1200 BC



600 BC



221 BC



1024



1661



1966



1990s



1993



2008