SETTING THE STANDARD

W3C Chief Executive Jeff Jaffe reveals what being a custodian of the World Wide Web entails.
Simple solutions

Technology doesn’t have to be complicated. It may have been years in the making, requiring some brilliant minds and top-of-the-range equipment, but the best examples present simple solutions to sometimes complicated problems, needs or desires.

We’re big believers in this philosophy – just look at our motto, “Security to be free.” At its best, technology puts power in the hands of users, simplifying their lives and saving time and even money.

Take contactless payments, for example. As our feature on page 32 explains, some consumers may initially be nervous about making payments with their mobile phone, but when they start doing so, they will soon realize that it’s actually safer than using a plastic card, as well as faster.

Another positive example is Estonia, which has embraced digital technology in areas from healthcare to voting. The citizens we spoke to for our multimedia special (review.gemalto.com/estonia) had nothing but praise for how eServices make their lives simpler. See page 20 for a sample.

On page 10, we look at how farmers are also benefiting from state-of-the-art Internet of Things technology. It’s taking the guesswork out of growing crops and managing livestock – and it’s even letting them run farm vehicles safely from the comfort of their desk chairs.

And while his role as caretaker of the World Wide Web – all of its one billion sites – may seem at first glance to be immensely complicated, Jeff Jaffe’s mission is simple: to foster consensus among developers and make users’ experience straightforward and secure. Our exclusive interview with him is on page 22.

There’s plenty more in this issue of The Review. I hope you enjoy reading it.

Frédéric Vasnier
Executive Vice-President, Embedded software & Products, Gemalto

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In this issue...

4 DIGITAL DIGEST
From cashless countries to beating bushfires, check out these interesting tech stories from around the world

8 INNOVATION
Wearing your heart on your sleeve
Wearables could be the answer to professional sports’ safety problems

10 INNOVATION
Connected countryside
How M2M technology is making a difference in the agricultural sector

16 SOCIETY
Can technology make a nation more democratic?
Discover the new tech that is transforming elections in many African nations

18 SOCIETY
Is technology making our lives simpler?
Consumers want devices that make life easier, but are developers hitting the mark?

20 INSPIRATION
Why Estonians love eGov
Some of Estonia’s citizens speak out about the country’s eGovernment credentials

22 FIRST PERSON
Custodian of the World Wide Web
W3C CEO Jeff Jaffe on the challenges that come with being a steward of the web

26 DIGITAL PLANET
Data breaches
The most serious data breaches from the first half of 2015 – and how to avoid one

28 INNOVATION
Banking’s new frontier
How banks are reacting to millennials’ desire for innovative products and services

32 INNOVATION
Paying it safe
As contactless payments become the norm, what are the ramifications for data security?

36 INSPIRATION
M2M tech: an insider’s view
Emmanuel Routier, Vice President of Global M2M at Orange Business Services, on the future of M2M in the business space

38 EARLY ADOPTERS
Marketing outside the box
Smart product labels are revolutionizing the world of marketing. Here’s how

What do you think?
- Like what we’re doing? Want to see stories on a particular topic? We’d love to know what you think about The Review. To help us make this award-winning magazine even better, visit review.gemalto.com/survey and follow the instructions.
As an organization, we’re only successful if we’re engaging the entire world, who are all stakeholders in the web”

JEFF JAFFE, W3C
Read more on page 22

#IoTMaker Challenge winner’s blazing idea

The #IoTMaker Challenge is a contest aimed at unearthing the most exciting new IoT ideas, with a prototype of the winning device being built for real. This year’s winner was Jason Mitcheson, who lives in Australia. Here, Jason tells us about what inspired his winning idea – a 3G bushfire alert system – and the potential for IoT technology in rural areas.

When did inspiration strike?
I was on a camping vacation in Australia’s bushfire season, which means checking fire bans and driving past a lot of highway warning signs, and my mind wandered as I rode in the back seat. I thought about the possibility of using Gemalto Java modules as compact fire detectors for remote regions.

How did it feel to see your idea become an actual prototype?
It was extremely humbling. Seeing an idle thought that you had in the back seat of a car come to life on the other side of the world is quite a trip.

What advice would you give to anyone embarking on an IoT project?
Start small and try to base as much as you can on kits like the Gemalto Concept Board, where there is a community you can look to for existing solutions. When you build the cloud side of your IoT project, I cannot stress enough that you will need to build in debugging and network introspection tools right from the beginning. If you don’t, you will get stuck quite easily!

You work for a company that makes technology solutions for the farming industry. Do you see IoT technology making an impact here?
Definitely. Already, every piece of farm equipment can be connected to the internet. It is having a massive impact on farm labor costs, energy saving and effective crop water management.

Check out the other finalists at tinyurl.com/IoTmakerfinalists

SNAPSHOT

MOBILE MESSAGING HITS NEW HEIGHTS

Mobile and online messaging traffic will reach 160 trillion per year by 2019.

438 billion messages are sent and received via SMS, MMS, instant messaging [IM], social media and email every day.

Although email accounted for the largest share of traffic last year – with no fewer than 35 trillion messages – IM is expected to overtake it in the next 12 months. Due to the negligible cost of IM, service providers such as WhatsApp and WeChat now have more than 400 million active users.

Social media sites also continue to rise in popularity, with Facebook alone seeing more than 5.8 billion posts, likes and comments a day.

Source: juniperresearch.com
Denmark takes steps to become cashless

In a landmark step that could see Denmark become the first country to outlaw paper money, the Danish Parliament has proposed a law that would allow stores to refuse cash payments. The Danish Chamber of Commerce recommended that stores be allowed to ban cash completely and insist that customers pay with debit and credit cards or smartphones only.

The move is supported by the UN Capital Development Fund’s Better Than Cash Alliance, which aims to further the digital transition of payments. If the Danish Parliament approves the bill, retailers could begin rejecting cash from as early as January 2016.

VISUALIZE THIS
REVENUE GENERATORS FOR INDUSTRIAL IOT (IIoT)

When asked what would be the biggest revenue generator for IIoT, respondents to the IoT Outlook 2015 report said:

- Sensors 23.6%
- Cloud & big data 22.2%
- Professional enterprise IoT services 18.7%
- Tablets & wearables 15.9%
- RFID & tracking technology 10.5%
- Embedded software 8.2%
- Other 0.9%

Read the full IoT Outlook 2015 report at gemalto.com/iot/documents/iot-survey
This segment of young customers [millennials] is most disengaged with the banking sector.”
GENEVIEVE GAY, OCBC BANK
Read more on page 28

The US embraces contactless payment

The US payment industry has historically been attached to traditional magstripe cards, but new research from MasterCard suggests the tide may finally be turning in favor of contactless. Some 82% of US consumers have now heard of contactless payments, while 75% have heard of biometric payments and 56% currently make in-app or online mobile payments.

The new findings are taken from MasterCard’s Emotion of Safety & Security Survey, which quizzed 1,000 US consumers. There were many positive results, including 77% of respondents feeling that new payment technologies have an overall positive effect on personal security and 83% being excited about new secure technologies helping to protect their financial information. However, worries about data security were also prevalent, with 77% of US consumers feeling anxious about their financial information being stolen or compromised.

M2M technology has enabled a wide array of products to become both smart and connected, which have in turn become connected product systems. Now, thanks to IoT solutions, they are evolving into cloud-connected information systems, also known as IoT System of Systems.

In plain English, this means a product – let’s say a tractor – is now not only smart but also connected to various pieces of smart farm equipment around it, such as trailers and combine harvesters. Through IoT, that “farm equipment system” can also connect to other connected product systems on the farm, such as irrigation, weather data and seed optimization systems to make one vast “farm management system.”

Here’s a look at how it works...

THE CONNECTED FARM

IoT System of Systems

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Here’s a look at how it works...

Discover innovative ways to pay at tinyurl.com/4waystopay

Learn more about the connected countryside on page 10
Tablets changing children’s lives in Guatemala

With no internet service, variable electricity supply and trails and paths instead of roads, getting education sources to the children of Guatemala’s remote villages is not an easy task. Now, the Magic Classroom – a free, digital learning program – is helping to teach five- and six-year-olds across the country.

The children learn from a tablet that is loaded with interactive activities and an audio program that promotes literacy and other essential skills. Rather than a teacher, a young facilitator – usually a 16- to 24-year-old from the local community – uses a wireless speaker to amplify the lessons. Due to the lack of internet coverage, the tablet uses Android and Bluetooth functions, which are increasingly available in isolated areas due to the number of smartphones being used.

“The tablet idea came about when we were trying to figure out how we could keep the curriculum materials up to date and communicate with teachers in rural areas,” says the program’s founder, Fred Zambroski.

Magic Classroom currently serves 168 children in nine Guatemalan communities, with 10 more classrooms to be added by the end of 2015.
Could wearables be the solution to professional sports’ safety problems?

Soccer fans looked on in shock as Bolton Wanderers’ Fabrice Muamba collapsed on the pitch during an English FA Cup match against Tottenham Hotspur in 2012. The majority of viewers couldn’t fathom how such a young and healthy athlete could suddenly drop down onto the turf without so much as a knock from an opposition player. It turned out that 23-year-old Muamba had suffered a cardiac arrest caused by an undetected heart defect. Although he was clinically dead for 78 minutes, after spending 30 days in a London hospital, he recovered – but he’ll never play soccer professionally again.

What if the dangerous change in Muamba’s heart rate had been detected in real time? New ultra-smart wearables are making this vision a reality, with various devices coming onto the market that can measure a host of biometrics and use machine-to-machine (M2M) technology to relay the findings back to coaches and doctors instantly. GPS monitoring systems, such as Catapult’s S4, are already being used by professional rugby teams, including the British and Irish Lions, as well as English soccer teams such as Newcastle United and Aston Villa.

Essentially a clip-on GPS monitoring system, the Catapult S4 is attached to players’ jerseys and measures velocity, heart rate, distance covered, acceleration and impact loading to determine whether they are staying within their allocated range or risking injury. The collected data is then wirelessly transmitted to the bench for real-time analysis. While it is primarily used to evaluate performance, it is also a leap forward in the monitoring of potential injuries.

Sports clothing brand Under Armour has gone a step further and introduced a shirt with all of this technology and more built in. The E39 Compression Shirt, which has been used by up to 50 college and professional sports teams across the US, features a thin disk that contains sensors, a power source, a Bluetooth transmitter and memory storage. Coupled with fabric electrodes, the system monitors the wearer’s cardiac activity, anaerobic threshold and aerobic capacity. After reviewing the metrics, coaches and trainers can learn how to maximize their players’ performance, while doctors can spot warning signs such as dehydration.

HEADING IN THE RIGHT DIRECTION

Another dangerous aspect of sports that has been in the spotlight recently is concussion. In rugby and American football – as well as other high-contact sports such as Gaelic football and Australian rules football – it’s a regular occurrence for players to suffer from concussive injuries. However, in recent times, there has been a media backlash against the perceived lack of concern from the powers-that-be regarding the effects of concussion.

In January 2015, English Premiership rugby team Saracens hit the headlines after players wore sensor patches behind their ears for the first time in a professional match. Created by Seattle-based tech company X2 Biosystems, the xPatch is a high-tech
piece of equipment that measures and records the angle and the force of blows to the head throughout the match. As well as Saracens, a host of US college football and soccer teams are also using the device in the battle against the medium- and long-term effects of concussion. As Ed Griffiths, then Saracens Chief Executive, admitted: “The effect of concussion is a question the game has not dared to ask for fear of what the answers might be.”

However, the progression of wearable tech may mean we can prevent serious concussions in the future. Irish inventor Mark Dillon has created the Mamori mouth guard, which is currently in experimentation phase. It’s designed to gather important data while protecting the teeth and acting as an effective gum shield. The Mamori’s built-in sensors can communicate when its wearer has received a serious head injury, even if it’s not physically evident. And if the force absorbed is significant enough, the data can be transferred to a computer via the Mamori app instantly.

As anybody who has watched a contact sport will know, players often shrug off powerful hits, sometimes without realizing they’ve suffered a concussion. Serious problems can then arise if they are hit again while already concussed, and wearable technology like the Mamori can help to ensure that no longer happens.

**GAINING THE UPPER HAND**

This new technology represents not only a breakthrough for athletes’ safety but also a critical advantage in sports analysis, with myriad wearable devices now available for performance evaluation.

From the relative simplicity of the Fitbit to heads-up displays (HUD) like the Recon Jet – smart glasses that deliver data from wearable sensors and your smartphone directly into view – wearable tech’s ability to inform tactical analysis is growing all the time.

In the world of sailing, HUDs were once only available to the elite sportsmen in the Americas Cup, but now any racing sailor with a spare US$1,899 can buy Afterguard, a state-of-the-art racing system that delivers instant information to the entire crew. Using smart glass technology, the wearer of Afterguard’s HUD sunglasses can see all of the boat’s need-to-know information, as well as instant decision-making intelligence to give them the competitive edge in a race.

For those on dry land, Sensoria has created the Smart Sock, which promises to help runners perfect their style. The Smart Sock tells you how fast and how far, but also how well you run. Textile sensors detect foot pressure and conductive fibers relay data collected by the sensors to an attached anklet. This is then paired to an app, so you can receive real-time feedback.

When it comes to sports becoming safer and athletes being able to evaluate their performance, the sky is the limit for wearables. As wearable technology continues to grow and develop, it’s surely only a matter of time before it becomes the norm for athletes to wear smart monitoring systems, making sports safer for all.
From remote livestock tracking in the Australian outback to wireless sensor analysis in Spanish vineyards, the smart farming revolution is sowing the seeds for the future success of the agriculture industry.

It’s all part of the exploding “smart farming” sector, which uses machine-to-machine (M2M) technology to track livestock, manage fields in minute detail, keep tabs on farm machinery and buildings, and even deploy robot swarms to tend fields. The “connected countryside” is providing farmers with masses of data to help them wring every last drop of productivity out of their land and machinery.

According to Cisco, there are more than 16 billion people, processes and devices connected to the internet, and it expects that number to rise to more than 50 billion by 2020. While some of those devices are the connected thermostats and tweeting cat flaps of this world, others are agricultural devices that are in use across the globe, from cattle pastures in Scotland to oyster beds in Australia.

“Agriculture is one of the key areas of Internet of Things [IoT] activity,” says Adrian Segens, Chief Commercial Officer at software company RedBite. He characterizes the IoT as “a world of objects and systems, where the blank space is the people who need to interact with them.”

**DIGITAL FUN ON THE FARM**

The quest for efficient land and resource use is the impetus for technologies such as SAP Digital Farming, where a farmer’s digital toolbox of sensors, software and analytics creates a rich visual overview of the property. From that overview the farmer can zoom down to individual fields and portions of fields to get a granular view.

This is possible thanks to sensors that report data on metrics such as nutrients, moisture and the weather in a straightforward visual representation so...
that the farmer can then be precise about which parts of the field need more water and fertilizer.

“You want to optimize the arable land use and use every millimeter of land intelligently,” says Saverio Romeo, one of the authors of Towards Smart Farming, a report produced by M2M analyst Beecham Research about this kind of monitoring. “The data from the soil can be used by the farmer to map the density of seedlings, optimizing his sowing via the very rich data collected.”

The software also suggests which tasks should be prioritized, such as fertilizing the field, and can even recommend local subcontractors to come and do the job. Once the farmer has chosen someone for the task, they can share the relevant data – such as which parts of the field need more attention than others – with the subcontractor.

The farmer can then use telematics on farm vehicles to track the progress of the person actually driving the farm vehicles and also keep an eye on fuel consumption and how much fertilizer is being used. The software can also suggest tasks to be prioritized based on weather forecasts and allocate resources depending on the profitability of the field.

IS ALL THIS DATA SAFE?

One area of concern around smart farming is the data that’s generated and collected by the devices. Unless it is used in sectors such as mHealth and eGovernment, M2M data isn’t considered personal data, so it isn’t covered by data protection legislation. However, it needs to be protected in the same way as personal data, not least because it can be used to identify individuals.

While there doesn’t yet seem to have been a damaging hack of agricultural devices, the broader Internet of Things has already proven itself vulnerable to hackers: in July 2015, Chrysler issued a safety recall that affected 1.4 million of its cars after security researchers proved that they could be taken over by malicious hackers.

Graham Cluley, an independent security expert, points out that the issues surrounding IoT devices also apply to smart farming. “What we’ve found with these end-to-end devices is that they pose a real challenge: is there going to be a safe infrastructure?” he says.

He adds that these devices may well be inexpensive, but warns that cheap products might not have the capacity to encrypt data. Also, low-cost devices might not be updated regularly to keep on top of security threats as they emerge.

For farmers thinking of deploying smart sensors and other devices, Cluley warns: “The foundation of everything on the Internet of Things is to start by making it secure, and then make it useful. I worry that these devices will be made cheaply, and not with the future in mind.”

So the message is clear: think twice before you choose the cheapest sensors for your cows or your fields, and make sure you know that they are secure as well as useful.

Read more about the Internet of Things at gemalto.com/IoT

According to Cisco, there will be more than 50 billion people, processes and devices connected to the internet by 2020.
Farmers can map the density of seedlings and optimize sowing. They can even get recommendations on subcontractors that might be best placed for the job.

Viticulturists use sensors to measure the ambient temperature, humidity, atmospheric pressure and the wetness of leaves in vineyards.

Individual sheep wearing wireless devices can create a mesh network to give them connectivity across areas where there’s no mobile or Wi-Fi signal.
The next stage of development in the connected countryside is driverless farm vehicles. Some manufacturers are already at the prototype stage.

Smart collars for cows use accelerometers to monitor how the animals move and can identify when a cow comes into heat or gets sick.

Field sensors can report data on metrics such as nutrients, moisture and the weather to determine which areas need more water and fertilizer.

Farm vehicles equipped with telematics can report their location, fuel consumption and fertilizer supply to the farm office or a farmer’s smartphone.
Farmers can also use geofencing, where the user sets a defined geographical area using the software for the device, to keep an eye on machinery. If a vehicle is stolen, for example, its on-board computer can be set to call the farmer’s mobile phone as soon as it leaves the defined area, and the farmer can track its whereabouts and, with a bit of luck, direct police to the thief.

SENSING THE DANGER

Sensors are at the heart of any smart agriculture system, collecting and transmitting data for analysis and problem solving. Viticulture is just one area using sensors to mitigate problems such as soil compaction, which leads to erosion and the need for increased watering. Another problem that can be mitigated by the use of sensors is harmful fungi such as oidium and botrytis.

At a vineyard in the Pontevedra region of Spain, viticulturists have been using Waspmote sensors to monitor the condition of the grapes, while statistical models developed by Grupo Austen predict the outbreak of fungus plagues in vineyards. Among other factors, the sensors measure the ambient temperature and humidity as well as atmospheric pressure and the wetness of leaves. They then feed the data into the models and alert the irrigation and air conditioning systems to respond to any change in the conditions.

This system also makes the most of Spain’s plentiful sunshine, using solar panels to keep everything supplied with power, while the grapes themselves are traced via radio-frequency identification (RFID) technologies so that the outcome can be measured.

RFID technology is also used to monitor livestock: Australia implemented its National Livestock Identification System in 1999 to trace animals destined for the meat trade. Animals’ ears are tagged with an RFID chip that gives them a unique number, which is then registered with the national database. At every stage of its life, the animal is scanned, recording data about vaccinations and exposure to chemicals, among other things. The record ends with details of the abattoir where the animal is slaughtered.

Other technologies are used to monitor the health of livestock: Silent Herdsman, based in Scotland, produces collars for cows that use accelerometers to monitor how the animals move and associated

We think too much about our cities; we don’t think about the rural areas enough”
SAVERIO ROMEO, BEECHAM RESEARCH
software that can identify when a cow comes into heat or falls ill. And the Swiss-designed Anemon system uses sensors to monitor the cow’s body temperature and identify when it is in heat.

It’s not just mammals whose health can be tracked: in a collaboration between CSIRO, Australia’s national science agency, the University of Tasmania and Sense-T, a smart-data company, three oyster-growing areas in Tasmania are being monitored by tiny sensors on oysters that collect and report real-time information on environmental conditions and the health of the oysters themselves. As well as helping Australia’s oyster farms to operate more efficiently and sustainably, the project should also ensure that more oysters make it to their final destination – a diner’s plate – with a heartbeat, thus being edible and unlikely to make the diner regret their menu choice.

APPROACH WITH CAUTION

However, all this technology and information is “just another tool,” says Belinda Clarke, Director of Agri-Tech East, an umbrella grouping of farmers, growers, researchers and breeders. “Farmers are keen on big shiny toys, but these sit alongside the more traditional tools,” she says. She notes that while big data tools and technologies might help with “understanding the variability across a field,” those tools still have to feed into on-farm decision-making. Understanding how to use both the new tools and the old ones to get the best results is key. “If you’ve got some satellite data that can give you information on a small scale, that’s great, but if you’ve only got a spray that’s a blunt instrument, then the data is pointless,” she says.

Another issue holding back efficient use of smart farming technology is “a lack of digital culture” among farmers, says Romeo. He points to an unwillingness among the older generation to invest in the technology and adds that a further barrier is the patchy and often expensive network access – cellular, broadband and satellite – in rural areas. “We think too much about our cities; we don’t think about the rural areas enough,” he says. The lack of standards that allow different technologies to work together is also a problem. “Interoperability between systems is key,” says Romeo.

Clarke agrees: “Interoperability is a major challenge.” She goes further, pointing out that a lack of standards “opens questions on the routes to market for the companies developing these technologies.” As is the case with consumer and business technology, this means that ecosystems dominated by vendors whose data is incompatible with other systems emerge. “We urge the sharing of data for the greater good,” says Clarke.

However, even with the current fragmented commercial landscape, it’s clear that smart farming means farmers can spend less time out in windy fields and more time monitoring their property from the comfort of the farm office – or even from their beds before they dream of electric sheep.

A lack of digital culture among farmers is holding back the progression of smart farming technology in the very industry it has been designed to benefit
New technology is transforming elections in many African countries – and has the potential to change the future of the continent.

Few Kenyans will forget the bleak days at the end of 2007. On 27 December, the country went to the polls to elect its president, and just a day later – amid allegations of vote rigging after the incumbent was returned to power – partisan supporters of the two leading candidates turned the normally peaceful country into a battlefield.

Sadly, this is a familiar story in many African nations. It’s estimated that at least 80% of African elections are associated with violence and loss of life. And yet this dark period in Kenya’s history also gave birth to one of the most extraordinary tools of our time: Ushahidi, an application that maps outbreaks of violence in real time by allowing Kenyans to report locations via SMS.

Ushahidi has since grown to become the go-to tool for crowd mapping. It has been deployed as far afield as Brazil, Macedonia and India to allow citizens to report political corruption and aid the cause of democratic accountability.

Ushahidi may be the biggest name, but it’s far from the only technology used to further the cause of democracy in Africa. Grassroots activists and political institutions are finding high-tech ways of making elections in Africa fairer, more transparent and safer.

CHANGING THE SYSTEM
Take, for example, the GotToVote platform developed by non-profit organization Code for Africa. This open-source tool has been used in Kenya, Malawi and Ghana to help citizens register to vote by locating nearby registration centers. It also creates social media campaigns to encourage people to sign up.

At an institutional level, many countries have turned to biometric identification schemes to counter widespread vote rigging. Biometric registration – usually using photograph and fingerprint recognition – ensures that applicants can’t register to vote more than once. The secure voter cards that are produced in the course of such a program are considered by
At an institutional level, many countries have turned to biometric identification to counter widespread vote rigging.

many governments to have the same identity value as an ID card.

More than 25 African countries, including Namibia, Kenya, Nigeria and Democratic Republic of Congo (DRC), have deployed this technology. Of course, in resource-strapped African countries – DRC has the same population size as New Zealand but just 1/77 the amount of electricity – high-tech solutions have to overcome significant challenges and don’t always make the grade.

The Nigerian election in March 2015, for example, ran a week late. One of the reasons for the delay was the malfunction of some of the card readers designed to authenticate voters’ fingerprints.

BEST LAID PLANS
And what of Kenya? In 2013, the country planned what was supposed to be one of the most technologically advanced general elections on record, with biometric voter registration and identification, electronic voting and real-time result-gathering via SMS.

It didn’t quite go to plan: laptops ran out of power, software crashes left biometric readers unable to boot and an exceptionally close result meant all the ballots had to be manually recounted. And yet, despite high tensions and a prolonged wait for the results, the election was one of the most peaceful in recent Kenyan history.

Happily, there are plenty of examples of technology working to bring peace and uncontested results in African elections. In Ghana’s local elections this September, the New Patriotic Party claimed it had removed 76,000 fake voters from the electoral role using facial recognition technology to spot duplicates, so there’s high-tech hope ahead.

HOW DOES ELECTORAL TECH IN AFRICA COMPARE WITH EUROPE?

EXCELLENCE IN COMOROS
Historically, Comoros’s leadership has been typified by coups and conflict, but the island nation off Africa’s southeast coast has undergone change since 2010.

February 2012 saw the United Nations Development Programme (UNDP) work with the Secrétariat National Administratif Permanent to purchase digital voter kits that incorporated digital cameras and fingerprint sensors. The goal was to create a biometric voter registration system under the guidance of the UNDP and to provide each Comorian voter with a biometric voter registration card. This was designed to mitigate the impact of fraud and be more inclusive of all citizens.

The process was started well in advance of the upcoming 2016 election to ensure as many people as possible were registered. More than half of the estimated total of 400,000 voters were enrolled in the system’s first year.

eVOTING IN ESTONIA
While emerging technologies are shaping the electoral landscape in many African countries, the same can be said of some European nations. Estonia, in particular, is a global leader in this sector.

In 2007, Estonia became the first country in the world to allow its citizens to cast their votes over the internet in parliamentary elections. Other countries have experimented with online voting, but only Estonia has embraced it in a permanent way.

An eVoting system is not only convenient for the electorate, it also reduces the administrative burden when it comes to collecting and counting votes. It’s certainly been successful: voter participation rose from 61.9% in 2007 to 64.2% in 2015. What’s more, March 2015’s parliamentary elections set a new record, with more than 30% of citizens voting online. The purpose of eVoting in Estonia is not to kill off paper-ballot voting but to encourage more people to vote overall.

Thanks to technology, such increased engagement and improved quality of voting are also being felt in Africa. Although there’s a way to go before an African nation will compete with the likes of Estonia in the eVoting sphere, it’s clear they are moving in the right direction.

Find out what Estonians have to say about eGovernment on page 20

Read about Gemalto’s Coesys solution for electoral enrollment at tinyurl.com/coesys-solution
Psychologists tell us that too much choice is overwhelming, but when it comes to technology, how much is too much? The Review delves into the debate.

Is technology making our lives simpler?

As long ago as 2005, New York psychologist Professor Barry Schwartz warned that people were feeling overwhelmed by the modern world’s emphasis on choice. In his seminal work *The Paradox of Choice*, he showed that instead of making people feel empowered, too much choice actually makes them feel overwhelmed.

This was two years before the launch of the iPhone. Today, we have access to more than 1.5 million apps that can do everything from ordering pizza to turning up the heating while you’re not at home.

This is why it’s more crucial than ever for developers of new applications and devices to focus on reducing complexity and making users’ lives easier.

However, research commissioned by Gemalto consistently shows that while users and technologists believe technology should be making their lives less stressful, many people feel that it actually makes their lives more difficult.

“I have so many ways to pay that knowing which method is best to use, and tracking what I spend, is a hassle,” said one respondent.

Adrien Weinert of C Space, the market research firm behind the research, says he was surprised by its findings. People are becoming less interested in “mastering” technology, he says, and are more impatient if it doesn’t do what they think it should.

“People aren’t as impressed by technical achievements as they are by the value products bring to their lives,” Weinert says. “We’ve passed the point of technical novelty impressing people; we’re in what I call the ‘post-technophilic world.’”

Some companies have got the balance right. Google famously launched its search engine with a simple, uncluttered design at a time when its rivals were cramming more and more onto their homepages.

Apple’s focus on making technology that “just works” has seen it become the most valuable IT company in the world.

“I think that Apple launching products without instruction manuals was symbolic as to what end-users have now come to expect: that technology should adapt to their skills and their knowledge, rather than the other way around,” says Weinert.

The same philosophy can be applied to almost any technology, from smart homes – where technologists are eagerly awaiting Apple’s HomeKit – to government and civic engagement services.

Thiago Olson is the CEO of Stratos Card, a new universal payment card launched in the US that replaces your entire wallet of payment options with one piece of plastic. The technology is elegant: users store the data from all of their magnetic-stripe...
The success of wearables is arguably more reliant on simplicity of design and clarity of purpose than any preceding technology. No one needs an expensive smartwatch: it has to have real purpose and work elegantly on a small screen.

Mark Skilton, Professor of Practice at Warwick Business School, singles out fitness tracker Fitbit as a good example of how to make wearables relevant and easy to use – and says that its simplicity and versatility have been rewarded by strong results in the marketplace.

“The Fitbit story is a great example of a company that understands the mix of design, form and function in a new category of business technology,” Skilton says. “Notably, the devices display information easily, which is a critical difference to Apple Watch and other wearables. This, plus the fact that the functions of smartphone sync are essentially the same for 40% to 80% less cost, makes a compelling case.

“A smartwatch needs to be thought of as a ‘location-based service on your wrist’, rather than the misconception of an add-on accessory or a digital version of your old watch,” he adds. “It is, in fact, a ‘weigh scale’, ‘to-do list’, ‘shop assistant’, ‘payment tool’ and more that connects you to the location space you are living in or moving and traveling around in.”

Will wearables help?

Product designers must make it easy and intuitive to get started,” says Olson. “New technology needs to be empowering, habit-forming and integrated into the user’s daily life without eliciting stressful reactions.”

Olson adds that mainstream consumers are also growing more cautious about new technologies; they’ll wait for longer and read more reviews before committing to a purchase. In order to be adopted, a new technology must quickly form habits.

“The product also needs to allow a consumer to feel smart and successful. They need to have confidence in the product that it will always work,” Olson says. “A product that is too difficult to use or understand, or that isn’t consistently reliable, may quickly be given up on and never used again.”

The flipside is that if a product or device is easy to use, understandable and consistently reliable, you’ll have a user for life.

In fact, there appears to be a direct correlation between the simplicity of the technology and its capacity for simplifying modern life.

Cards – including loyalty cards – on their smartphone, which then syncs with Stratos Card over Bluetooth. The Stratos Card’s programmable stripe can then mimic any one of the stored cards depending on where you’re using it.

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Proceed with caution

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We recently launched a multimedia project looking at eGovernment leader Estonia. Here’s what some of its citizens had to say

WHY ESTONIANS LOVE eGOV

“I vote online, I file tax reports online, I do all types of banking online. I sign papers with my mobile – I never sign anything on paper. I start companies online. I do pretty much everything online, except eating.”

GUSTAF HERTSIUS, BUSINESS CONSULTANT AND ENTREPRENEUR

“In Estonia, you can start your own business in two to three days. All the declarations for tax and everything – it’s very smooth and easy and there’s no extra paperwork involved. You just need your eID card, go to the website, log into the website and you’re done.”

JOHANNES KANTER, MARKETER, FLEEP

“There is a saying that for Estonians, the internet is not a luxury, it’s a human right.”

KATRIN KOCH-MAASING, SMALL BUSINESS OWNER
You don’t realize when you’re sitting here what you’re used to, but I travel a lot between the US and Estonia, and I started to realize that, first of all, we don’t actually use paper very much. I’ve joked that the only time Estonians use paper is in the toilet. And when you get used to not having the hassle of bureaucracy, you get so much more done. So it is a very productive country to work in.”

KAROLI HINDRIKS, FOUNDER AND CEO, JOBBATICAL

When you combine good services with a willingness to open up and try new things technologically, I think Estonia is well ahead of the pack in terms of technology.”

CARLOS MICELI, CONCEPT PIONEER AND BIZ DEV WIZ, JOBBATICAL

I really hope we can have these kind of [eServices] cross-border in the near future. From Estonia, we’re working strongly to create cross-border services, starting with neighboring countries like Latvia and Finland, but we’re looking at a wider use of them.”

TIIT TAMMISTE, CHIEF TECHNOLOGY OFFICER, EESTI TELEKOM
"Herding cats in the wilderness of the web" is just one way to describe W3C Chief Executive Jeff Jaffe’s day job. Here, he tells us about the challenges that come with leading the World Wide Web Consortium.
In the history of the internet, there’s something special about the 1970s: it was a time when everything seemed to be both possible and happening at once. For Jeff Jaffe, who started a math degree at MIT in 1972, “that was when the whole information technology revolution started, and it was the most exciting thing to be doing at that time.” With computers suddenly becoming not only available but also talked-about, “it was clear that this was where the future was for society, that society was going to be transformed by technology, and I wanted to have a role in that.”

Jaffe switched to computer science for his parallel computing PhD and then went to work for IBM, where he remained for more than 20 years, mainly working on networking research. After spending five years at Bell Labs (AT&T’s spun-off telecommunications equipment company and its research labs, which were seeking to commercialize their research) and then holding the position of Chief Technology Officer at Novell from 2005 to 2010, Jaffe decided “it was a good time in my career to give back to the community and focus on where the real growth was happening, which was on the web, rather than focusing on individual companies and individual strategies.”

CONTROLLING THE WEB

Jaffe joined W3C as its Chief Executive in 2010, moving at once into a completely different field. W3C, or World Wide Web Consortium, is a strange beast in the wilderness of the web: the global web technical community meets at W3C to set interoperability standards so people know what to do on a network where the end points (websites, apps or devices) can do what they like, and the only thing that is commonly agreed are the transport protocols used for transporting information.

“At W3C, we view ourselves as the stewards of the web,” Jaffe says. “Of course nobody controls the web; the web is just there. On the other hand, what’s challenging about it is that, as people develop new technologies – enhancing security technology and adding capabilities that makes the web more accessible – the question is, how does the web community get together to leverage these new technologies in a rapidly changing field and bring them to everyone, given that nobody controls it?”

W3C’s role is thus to foster consensus among all the players – big and small – who are driving the web forward. That can be tricky: W3C mailing lists often echo to the sound of obscure battles being fought over what seems like trivia but, over the course of years, can turn out to be deeply important.

Consensus is also time-consuming. In September 2014, W3C published the final specification for HTML5, the fifth standard iteration of the web markup language. It’s been a long journey: the first working draft was published seven years ago in September 2008. Jaffe says getting the differing business strategies of as many as 400 members to align behind a standard can be “quite challenging”.

HTML5 is now complete, but there is still plenty more on W3C’s agenda: notably its drive to continue to create an Open Web Platform (OWP) and to add brand new standard capabilities, such as its Web Payments Interest Group (a group that is interested in payments, not interest on payments), or WPIG for short.

SECURE SPACE

The OWP is an idea that follows on naturally from the completion of HTML5. The confluence of HTML, CSS (Cascading Style Sheets, for formatting elements on a web page) and JavaScript (offering programmatic behavior) means that a web page can behave indistinguishably from an app. Thus, the combination provides an OWP built on those open standards. A survey of more than 10,000 app developers in late 2014 found that 42% were using HTML, CSS and/or JavaScript for building applications. That’s a huge vote of confidence in the web. But Jaffe sees it as only the start of what has to be a wide-ranging foundation, with multiple layers of standardization, that will work with all the possible devices – desktop.
The World Wide Web was home to one billion websites as of September 2014, according to NetCraft’s Web Server Survey.

Who inspires you?
No question – for anyone in the web community, it’s Tim Berners-Lee. Well, if you’re British, Sir Tim. He’s the inventor of the web and also Director of the W3C. What he’s done from a technological perspective, which is inventing the web, and from a social perspective, which is getting the world to choose to be totally turned upside-down based on his invention, is incredible.

Will there be an HTML6?
HTML is a live technology and it will continue to be enhanced. HTML5 was a long time in developing and getting consensus – that was really hard. We will probably have a 5.1 before we have a 6, because we’ve put so much into HTML5. We need some time to absorb that, and it’s not perfect. As for HTML6, we’ll reserve that phrase for the next major turn in technology. We don’t yet have a date or agenda for that.

What gives you job satisfaction?
Imagining the future and then trying to figure out how to work with our 400 members, all of whom have different points of view and business strategies. Visions are much easier to have than to make happen.

It sounds like it’s like herding cats sometimes?
(Pause) There are days that are like that.

MOBILE MATTERS
Meanwhile, for an organization that has been developed around gradually building consensus, there’s a challenge in the abrupt shift in people’s use of the internet. They have moved away from the desktop and laptop, and toward mobile phones, which in some countries are becoming people’s first, and sometimes only, route to the internet. But in many cases, those people on mobile phones aren’t using the “open web” on a browser; they’re using apps on their native platform, which don’t behave in the same way and which can vary from device to device (or even be unavailable on some devices).

Do Jaffe and the W3C see native apps’ popularity as a problem or an opportunity? “There are some functions that are more natural for people to access via the web. There are other functions that are more natural for people to access via apps,” he says. “We think both will coexist, and we have no problem with that.” The important thing is to learn what native platforms do well and try to incorporate those features in the web, he adds.

Such as? “One of the things native platforms did very well was creating payment frameworks. We see a need for people to have a payment system based on web standards, not proprietary frameworks.”

To that end, WPIG was formed to help make web payments easier and more secure, leveraging technologies such as “digital wallets”. Increasingly, Jaffe says, “We have thousands of people building web apps and wanting to be paid for it in a standard fashion, not necessarily having to go through a proprietary store to get payment for their applications.” To solve that, various companies are building payment methods, but they tend to be incompatible. “There’s a growing feeling in the industry that it’s time to create some standards for web payments: how to manage transaction flow, how to guarantee security, how to use encryption. We need to come to a standardization point now.”

Many standards for payments exist today, but there are no standard programming interfaces that connect web apps to diverse underlying payment systems.
Ultimately, W3C’s efforts in payments would aim to introduce standards for interactions with digital wallets so that “the wallet [in reality, the browser interacting with the wallet via the W3C framework] knows how you want to pay. So when you buy something, you have a standard way to tell the merchant, here is the right means of payment for that particular transaction,” Jaffe says. The desired payment form won’t matter; the wallet will be smart enough to transfer the credit.

There’s plenty more, of course. One potential focus of the group is to work with those that standardize the means of authentication and security, giving a higher level of assurance to merchants that the charge is legitimate and that there’s no fraud involved.

How long will it take for the group to produce useful outputs? “I don’t think we’re talking about months,” Jaffe says. “The way the standardization process works is that different people bring proposals together, and then you develop consensus on the proposals.”

**ENGAGING THE WORLD**

W3IG is only one of the many parallel projects that Jaffe oversees. Another is the Web of Things, which aims to create a web interpretation of the IoT that is expected to embed connected sensors and actuators at a huge rate over the next few years. “What the Web of Things says is that what made the web successful was interoperability and open data, so you can take any data, make it available to the world, and people will figure out how to reuse it,” Jaffe says.

“A fear we have for the IoT is that so much is driven by ‘stovepipe’ [proprietary and single-use] applications. The Web of Things is asking, how do we make sure we use open data formats for the IoT so that we’ll be able to get interoperability based on rich metadata and shared semantics across many different applications.”

One gets a sense that the patience required to see through research projects at IBM that lasted years, and then trying at Lucent to get unused research commercialized, has stood Jaffe in excellent stead for the deliberate and essential progress of web standards.

“As an organization, we’re only successful if we’re engaging the entire world, who are all stakeholders in the web,” he says. “It’s important that we bring in stakeholders from all countries, all the major and minor players, innovative players, governments and universities across the world. We need the participation of everyone to make this the best possible platform and make sure it has the openness that is required. And the web community has done pretty well on that score.”

“We want to standardize sophisticated means of authentication”
DATA BREACHES

Serious data breaches are affecting organizations – and their customers – across the globe. Which countries were worst hit in the first half of 2015?

Source: breachlevelindex.com

AUTHOR LAUREN DOWEY

671 USA

Perhaps unsurprisingly in a country of more than 300 million people, the US had the highest number of data breaches in the first half of 2015. This vast figure represents more than three-quarters of all breaches in that time period: in total, there were 888 worldwide.

The largest breach in the US was a headline-grabbing identity theft attack on Anthem Insurance. It exposed 78.8 million records and scored a 10 (the highest score) in terms of severity on the Breach Level Index. This breach alone represented almost a third (32%) of the total data records stolen worldwide in the timeframe.

245,919,393 Total number of records breached in the first half of 2015

4 Turkey

Although Turkey had just four recorded data breaches, two of them were exceptionally destructive. Its biggest was identity theft on a massive scale: more than 50 million records were stolen from the government’s General Directorate of Population and Citizenship Affairs in early January. Just six days after this breach, 15 million Ministry of Education files went missing in a case of accidental loss. All four of Turkey’s breaches hit the government or education sectors.

63 UK

Telecom group TalkTalk was the worst-affected UK organization in the first six months of 2015. Around four million of its customers’ records were breached in an identity theft attack by a malicious outsider. Since the attack, some of TalkTalk’s customers have reportedly been contacted by scammers posing as legitimate TalkTalk employees by quoting the user’s account details. Other high-profile cases included greeting card service Moonpig, which had more than 3.5 million records breached, and British Airways, which had 10,000 records compromised.
It’s no longer a question of if your network will be breached, but when. That’s why it’s critical to know how to defend against a potential breach.

1. **Control user access**
   Strong authentication protects user identities while ensuring that only authorized users have access to systems and applications.

2. **Manage encryption keys**
   Use an encryption management platform to generate, store and securely manage keys, so even if data is seized, it can’t be decrypted.

3. **Encrypt your data (at rest and in motion)**
   Data encryption of voice, video and metadata, as it moves across your network, is vital. You should also encrypt structured and unstructured data in physical, virtualized or cloud environments, as this will render it useless to prying eyes.

Source: securethebreach.com

There are many different types of data breach. Here are the most frequent.

**Nuisance** – a malicious attack that is designed to cause problems on an organization’s website.

**Identity theft** – when information about a person’s identity, such as name, date of birth and current or previous addresses, is accessed.

**Financial details** – when an organization’s financial details are compromised in an attack.

**Account access** – when records or user accounts are accessed and often exposed.

**Existential data** – when emails, usernames and/or passwords are accessed and potentially exposed.

2 **Russia**
There were just two recorded data breaches in Russia in the first half of the year, but one of them was an attack on online dating service Topface that resulted in the theft of 20 million files. According to a Bloomberg report, the stolen information included the user names and email addresses of 20 million visitors to the site. With a risk score of 9.2, it was one of the five worst breaches in the world.

3 **India**
A malicious outsider infiltrated the Telecom Regulatory Authority of India (TRAI) in the country’s largest data breach of 2015. Two million records were compromised in the attack, which was allegedly carried out in retaliation to TRAI purposely exposing up to one million email addresses online of respondents who had taken part in a company survey. Other breaches included the identity theft of 50,000 records from India’s Principal Controller of Defence Accounts and an unknown number of records stolen from Bangalore-based minicab service OlaCabs.

9 **Japan**
While Japan only suffered nine data breaches in the timeframe, two were relatively serious. In April, almost eight million records were breached in an attack on various web-based companies, including online shopping mall operator Rakuten and messaging app LINE Corp. The fraud was detected when the Metropolitan Police Department of Japan found the IDs and passwords of more than five million online shoppers on a computer that was seized in an investigation into unauthorized access through proxy servers. The second-largest breach was on Japan’s pension system. Hackers stole the data of more than 1.25 million people.
Younger consumers want innovative products and services – and they want them now. How are banks meeting the needs of this tech-savvy generation – and going beyond them?

The millennial generation – also known as Generation Y – is a force to be reckoned with. It’s the fastest-growing demographic of banking customers and encompasses almost 25% of the US population. This generation is making significant financial and banking decisions, offering an opportunity for banks to win their loyalty for a lifetime.

According to Gemalto’s recent Generation mBanking report, nearly four in five (77%) young people use online banking services, more than three in five (62%) use mobile banking apps, and almost half (47.6%) bank by phone. Furthermore, 27% said they never visit a branch, with a further 27% estimating that they go just once a month.

BYE-BYE BANK BRANCH?
These figures illustrate the fast growth of online banking and the high number of mBanking options available. It’s because of evidence like this that some banks are taking new approaches to the future of branches. While new entrants to the banking sector are responding to tech-savvy customers by going online-only, others are using technology to reinvent the branch for this new generation.

French bank BNP Paribas unveiled a new banking model for the digital generation in November 2013. Hello Bank! was Europe’s first 100% mobile bank, enabling customers to interact with their bank

1 generationy.com
Spain’s BBVA, one of the largest banks in the world, is a pioneer in the transformation of branch banking. In 2008, it became one of the first banks in Europe to introduce an online personal finance management service that allowed customers to see account balances and transactions from different providers in a single place, as well as personalized product offers.

Since then, BBVA has tested and developed a number of other innovations through its dedicated Innovation Center. These include:

- **ABIL next-generation ATMs**: a radical new design of touchscreen ATMs where a virtual teller named Hero guides customers through transactions
- **Efectivo Móvil transfers**: a mobile cash feature for its iPhone, Android, BlackBerry and iPad applications that lets customers send money from a smartphone
- **BBVA Contigo Adviser**: a personal adviser for every customer who can be contacted by email and phone
- **BBVA Compass Virtual Banker**: combines video technology with the bank’s branch networks so advisers can simultaneously exchange documents on screen with customers from a remote location.

Teppo Paavola, Chief Development Officer, General Manager of New Digital Businesses at BBVA, says that today’s generation expects the same service from their banks as they would from any provider of mobile services, and banks have to rise to the challenge.

“The idea that banking services are different or should be any more difficult to use [than other services] is unacceptable, especially to the younger generation,” he says.

“Banking needs to be available everywhere, accessible through the minimum number of clicks, visual and without any unnecessary delays.”
She believes large branch networks prevent traditional banks from being as nimble and flexible as new entrants. “Technology is the crux of delivering a superior experience, she says. It can take as little as five minutes to set up a new customer by auto-filling personal information from their ID. Automated bill payments and person-to-person payments using mobile phone numbers can also help to save a customer’s time. “We will continue to create new ways to make banking effortless,” says Sidhu.

DIFFERENT DESIGN

While Frank, a new bank launched in Singapore aimed at teenagers and young working adults, may have ditched the traditional branch, it has replaced it with retail store outlets designed for shopping malls. Launched by Oversea-Chinese Banking Corporation (OCBC) in 2011, Frank has already captured a large segment of its target market.

Genevieve Gay, Head of Youth Segment, Advertising and Brand, at OCBC Bank, says: “Customers are served in Frank by OCBC retail stores

Technology is the crux of delivering a superior [banking] experience”

LUVLEEN SIDHU, BANKMOBILE
At Frank by OCBC Bank, customers can customize their debit and credit cards from more than 100 different designs.

instead of [traditional bank] branches. The store is designed differently from a traditional bank branch and allows the customer to take time to browse, touch and ask questions about the products and their banking needs.” The bank is design-focused: customers can customize their debit and credit card from more than 100 designs.

“We recognized that this segment of young customers is most disengaged with the banking sector in terms of how banks provide their products and services,” says Gay. “They feel banks are uncaring, and they do not trust them to do the right thing for them. We seized the opportunity to implement a targeted banking program and experience that is holistic and meaningful for them.”

Although it’s important for banks to keep pace with new technology, it’s also critical that they maintain their ‘regular’ security values, such as keeping customers’ identities safe and protecting personal data and transactions.

NEW ESSENTIALS
Whatever distribution channel a bank chooses, the latest technology will underpin their offerings today and in the future. Teppo Paavola, Chief Development Officer, General Manager of New Digital Businesses at BBVA, believes we are already at the point where the smartphone is more essential than a wallet due to the growing adoption of NFC payments.

“I believe in payments being integrated into other experiences,” says Paavola. “Once you have a payment method, such as a debit or credit card, integrated into an app, then you don’t think about payments any longer. Consumers have become so used to mobile technology that you actually have to have a reason why you don’t do it by mobile.”

In the future, he says biometric technology will further strengthen security and add more convenience banking. With the world’s first contactless payment coat, the result of a partnership between Barclaycard and fashion brand Lyle & Scott, now available, it seems there is no going back.
EMV and contactless mobile payments make the act of payment secure and convenient. As they become ubiquitous worldwide, what are the ramifications for the security of data stored on servers or whizzing around financial networks?
When Apple CEO Tim Cook first unveiled Apple Pay back in September 2014, the essence of his pitch was this: you can now make a payment with a single tap. People in the audience went bananas. Tap to pay? What is this strange magic?

But many observers outside the room were less impressed. The technology had already been available for many years on some smartphones and with contactless payment cards. In the UK, people spent more than £2 billion [US$3.06 billion] using contactless cards in 2014 alone.

Now, contactless is going mainstream in the US. This is because EMV – the standard on which chip and contactless cards are based – is now mandatory for US retailers and is already available in 250,000 outlets. So, although the NFC aspect of Apple Pay and the newly launched Samsung Pay isn’t new, it does raise some new questions, such as:

• How do smartphone users capture and embed their card details safely inside the handset?
• If a payment card has a physical smart chip, what happens to this chip when the card is “dematerialized” into an app?
• If you use a smartphone to pay in a store, is that a “card present” purchase (but without a card)? Or is it a “card not present” purchase (even though it’s face to face)?

These questions are forcing the payments industry to rethink its approach to sensitive card information. According to the Nilson Report, global fraud losses incurred by banks and merchants on all credit, debit and prepaid cards reached US$16.31 billion in 2014. That’s US$5.65 for every US$100 transacted.

Clearly, the old ecosystem can’t handle a world in which shoppers surrender their card details to online merchants with vulnerable data centers, and it is woefully unsuited to a world that turns cards into data on a phone screen.

VULNERABLE DATA
The industry’s main defense so far has been PCI DSS, a set of compliance standards designed for any business that handles sensitive data. These standards include guidelines for encrypting stored...
modules that manage the encryption keys and the network encryptors that protect payment data as it moves between merchants, banks and payment processors. There’s a real incentive to do so: P2PE not only protects against breaches, it also reduces a merchant’s burden of compliance (because it’s not storing sensitive data anymore).

While encryption of data in transit is a must for any company handling payment details, the fact remains that – in theory – hackers could still steal the data if they can access it when it is “at rest”. And they have devised clever ways to do this. High-profile attacks on merchants like Neiman Marcus, for example, have used “RAM Scraper” malware. This intercepts unencrypted data milliseconds before it is stored in the system memory.

While encryption remains an essential weapon in the fight against cyber theft, the payment industry is also getting behind another way to protect sensitive data: tokenization.

**TOKENIZATION TAKES OFF**

With tokenization, card data is sent by a merchant to a bank or payment specialist, which then returns a token that represents that card. The token is entirely worthless to anyone who intercepts it, since the real card data is stored at a secure, off-site location.

Dave Birch, Director of Innovation at the payment specialist Consult Hyperion, is a big fan of tokenization. He says: “Broadly speaking, there are two ways of dealing with the theft of personal data: make it harder to steal or harder to use.

“In the past, we’ve concentrated on making it hard to steal through the PCI DSS standard, but it’s failed. We still get these huge data breaches. So, given that we can’t turn merchant sites into impregnable fortresses, we have no choice but to make stolen data harder to use.

“This is where tokenization comes in. If your phone puts your card information inside a token, that data can’t be used in any other context.”

Birch also likes that tokenization makes transactions more private: the merchant doesn’t need to know anything about you, only that you’re the rightful owner of the token. And you can do that with a PIN or, in the case of Samsung Pay and Apple Pay, a fingerprint.

“People say they’re more nervous about paying from a phone, but I’m convinced that mobile...
payments are actually far safer than card payments,” he says. “When people see the bigger picture, I think the change will come quicker than we think.”

PAYMENT METHODS MULTIPLY
In the past two years, the card networks have accelerated the move to tokenization. MasterCard and Visa have each launched “digital enablement services” to standardize the way they manage tokens and the commercial terms for using them.

Ed McLaughlin, Chief Emerging Payments Officer at MasterCard, says: “Merchants continue to innovate in many different ways, including in app, eCommerce, recurring and subscription-based payment environments. [We want to] make all these shopping environments more secure and convenient for customers using tokens.”

For the moment, there are lots of different ways of doing mobile payment. Apple and Samsung have a secure element approach as they control the handset design; this technology offers high levels of security. To work with the secure element architecture banks, retailers and other issuers need to partner with the original equipment manufacturers (OEMs) to deploy secure contactless payment.

An alternative is host card emulation (HCE), which moves the security from the device to servers: the cloud, in other words. This gives financial institutions more independence when rolling out their own approaches to mobile wallet. This is attractive for bigger banks that want to enhance their branded mobile services.

In this way, a customer can add a card with a verification code from the bank, and then make contactless payments direct from their banking app. In the longer term, this simple enrollment process could be sped up even further: when cards become items on an app rather than pieces of plastic, they could be issued over the air. Indeed, Barclaycard in the UK is already doing this.

The other reason HCE is gaining momentum is that it works well for Android users. In contrast to Apple and Samsung, Android is an OS that sits inside a multitude of devices made by dozens of OEMs. As such, the forthcoming Android Pay system can’t bake card credentials into hardware; it just manages the tokens.

This is why Android Pay (which will be part of the Android M OS) will use HCE. Significantly, Google has the support of the card networks. When Visa announced a standardized HCE service – free to any partner that joins – it confirmed Google as its first signatory. Meanwhile, MasterCard has confirmed that its Android-based HCE projects are under way in more than 15 countries.

SECURING THE CLOUD
Of course, when data is being passed to the cloud, the need to secure it is even more pressing. This is why tokenization and cloud encryption is so crucial to the success of HCE.

Birch says: “If you’re going to use HCE, you have to store some of the card details in the phone memory. And you’ll clearly want to pass along tokens rather than the actual details, which can be stolen.

“To make this more secure, you can adopt limited-use keys, or tokens that are specific to certain environments, or are limited for a day or whatever.”

The migration to mobile payments is at an early stage and, for the moment, some consumers have been tentative in their approach to adopting them because of concerns about security.

James Wester, Research Director for Global Payments at IDC, believes this will change. “All the surveys show that consumers are nervous,” he says. “But in time, they will surely see that a transaction authenticated by a fingerprint that sends a valueless token to a secure server is far safer than a payment made with a magstripe card.”

Once they do, things will really start to shake up. Mobile payment could make “card not present” transactions just as safe as those that are “card present.” Currently, “card not present” transactions cost more to process; in time, the networks will have to rethink their fees.

As plastic turns into software, the boundaries between online and offline payments will eventually disappear. And that could have profound implications for the payment ecosystem.

“If you have a secure platform, such as mobile, there will be pressure to reduce the number of players in the process,” says Birch.

“Retailers will just want to link your account to theirs, with nothing in between. So when I walk to the cash register, their app pops up, I click ‘OK’ and that’s the end of it. I’ve no doubt this is where we’re heading. And the structural implications for the payments industry will be huge.”
Emmanuel Routier, Vice President of Global M2M at Orange Business Services, explains why working in the sector can be both fascinating and challenging.

Traditionally, the focus of telecommunications operators in the business-to-business space has been to help customers get the right telecoms services to operate more efficiently. But in the M2M (machine-to-machine) world, it is more about helping them change their business model entirely. And, because something new happens in this fast-moving sector every day, new business opportunities pop up at a fast pace.

The downside is that, because the technology enables new applications in so many vertical markets and across so many devices, it can be tricky to keep on top of new developments while staying focused on the areas of highest potential.

Emmanuel Routier, Vice President of Global M2M at Orange, is an expert in the field, having worked in it for the last nine years. In fact, he is Orange’s representative within the Global M2M Association’s steering committee – a group of leading mobile operators that aims to facilitate the development of M2M business through common action in innovation, specific processes and enablers globally.

He has managed Orange’s International M2M Center, which was hosted by Mobistar, the firm’s affiliate in Belgium, since its inception in early 2009 and is now part of Orange Mobile Enterprise, a division within Orange Business Services focusing on cellular-related services for international companies.

Routier gives The Review an insight into what the M2M market currently looks like and how he sees it developing in the future.

Why are organizations deploying M2M technology today, and in what ways?

There are different drivers pushing the market to evolve as quickly as it is. A big one is that companies are looking to cut their operational costs.

So, for example, M2M technology can alert an organization selling goods via vending machines that one of them needs filling up. The availability of the information in real time enables the firm to send a truck with the right goods at the right moment, meaning it can send fewer trucks less often.

The main driver, however, is new revenue streams. Take a company selling boilers to industrial sites: rather than just selling the products along with basic maintenance services, if it can anticipate any issues by having access to real-time information, such as the volume of hot water produced, it can change its business model and start selling hot water, among other services. This information changes its approach.

What innovations is the industry focusing on?

The Global M2M Association recently launched a Multi-Domestic Service at the Mobile World Congress. It’s aimed at international global enterprises in the automotive and consumer electronics industries in particular, and enterprise customers are piloting a solution now.

The solution comprises embedded SIM cards (eSIMs), a subscription-based management platform and a connectivity management platform to enable global players to get the best connectivity, enable heavy usages, comply with regulation and support their M2M devices, no matter where they are in the world.

The idea is that the eSIMs are included in each global industrial player’s production process. Like any other component of the machine, they can be tested in the manufacturing plant and take the profile of one of the association members once the...
We are working on new types of machine sensors that don’t have a power supply and rely on the lifetime of the battery to transmit information.

At Orange, we are also working on new types of machine sensors that don’t have a power supply and rely on the lifetime of the battery to transmit that sensor’s information. Such technology will enable us to use sensors in things like water meters and the external parking sensors that I talked about earlier, which opens them up to more applications.

The current problem is that, although the technology exists, there aren’t any standards. Together with the mobile industry and the GSMA, we’re pushing to get new standards in place as soon as possible.

What does the future hold for M2M technology?
Some of the biggest M2M use cases are around transportation. Tracking and tracing systems in cars could be connected to an application that has access to an external parking sensor database, which would then guide you to a free parking spot. It’s about using big data to create value, and there are already pilots in place to do this.

There are also applications in healthcare that help treat chronic disease. For example, someone with a pacemaker normally has to go to hospital regularly so the data can be extracted and analyzed. But it makes a huge difference to the patient’s life if that data can be retrieved remotely – without the patient having to leave the comfort of their home – and the doctor can propose treatment adaptation if and when an indication changes.

This is not a pipe dream; this is already happening today.
For decades, marketers have tried to make us pay attention to their products and then buy them. They’ve used data and psychology to facilitate this process of persuasion. But what happens after we’ve bought the item?

Well, not much. There has been little progress in this sector since Wrigley introduced the first scannable barcode on a pack of chewing gum 41 years ago. Now, at last, change is in the air.

A cluster of technologies has emerged to make packaging smart. Suddenly, brands have the power to know where a product is and when it’s been opened. At any given moment, they can then use interactive labels to push messages direct to the buyer’s smartphone.

The key components in this revolution are printed sensors and NFC. The former lets manufacturers encode information onto a film of plastic, while the latter ensures the smart label can transmit data to another NFC device, such as a smartphone.

An early pioneer was drinks firm Diageo. Its prototype smart bottle for Johnnie Walker Blue Label whisky (pictured below) features a printed-sensor NFC tag on the bottle cap, which can detect whether it’s sealed or opened. This means it can adjust its messaging. So when a consumer taps their NFC-enabled smartphone on a sealed bottle, they see product information on the screen. Tap an opened bottle, however, and it shows cocktail recipes.

THE SMART CHOICE

While Diageo is sticking to “soft” marketing messages, other firms see smart packaging as a means to more sales.

Earlier this year, Australian NFC specialist Tapit teamed up with Gemalto to produce smart labels that, when tapped, present the customer with a link to an eCommerce site. Once there, they can buy downloadable product-relevant content in one click and the purchase price will just be added to their mobile phone bill.

Justin Lello, a consultant for Tapit, believes toy brands and others could use the tech to sell content based on their licenses. He says: “We’re extending the digital experience so that, for brands, the packaging can effectively become a cash till after purchase. “Let’s say you’ve bought your Lego Star Wars toy. After you’ve taken it home and played with it, you could then download and pay for the digital game – after the purchase point.”

Dutch firm Strangelove is using RFID-based PowerCoat tech to power a platform called LoyaltyGrid, which it is testing with luxury brands. Customers can use their smartphones to unlock rewards, exclusive content and invitations to special events direct from the packaging itself.

Teddy Gude, Strangelove’s Commercial Director, Product and Innovations, says: “It’s a great way for luxury brands to build exclusivity around their products. And when consumers sign in through social media, brands can find out a lot about them.”

Another reason high-end brands like smart labels is their anti-fraud capabilities. Every smart label is unique, so consumers can use them to differentiate genuine products from fakes and validate the authenticity of said product.

In a similar vein, brands can embed smart labels with geolocation information to track any goods sent to an unauthorized country, while greater product safety is another potential benefit.

Packaging giant Avery Dennison is currently running a pilot with grocery retailers to test RFID tags on perishable items. The scheme lets workers use scanners to find date-expired products much more quickly than by reading labels. It’s easy to see how consumers could check food at home using their own NFC-enabled smartphones.

For now, smart packaging is a new and largely untested technology. However, with the number of NFC-enabled Android phones predicted to shoot up to 844 million by 2018, according to research firm IHS Technology, it’s unlikely to stay this way for long.

In fact, insiders are confident that smart labels will be the biggest thing to hit packaging since Wrigley gum’s innovation more than four decades ago.
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