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Executive Summary

The ability for businesses large and small, and located almost anywhere, to enter the global supply chain over the Internet has been one of the most compelling and transformative developments in information technology over the last decade. Traditional businesses have found a new lease of life online and been able to find and access new markets, while next-generation businesses have developed, often at a blistering pace. This new digital economy is one that celebrates technological advancement and innovation.

And yet, despite the universal appeal of “innovation”, the concept of innovation itself remains difficult to capture and open to diverse interpretation. The business case studies in this collection all celebrate innovative approaches to development, but they diverge widely in application, scale and scope.

For one group, innovation is a new method or solution to a known problem, such as creating a network of real-time sensors to track market deliveries or manage food supply, or finding a better way to measure energy consumption by data centers. It can be creating a new, more accurate approach towards online advertisement costing and bidding.

For another group, innovation means finding new ways and means to access markets – providing cheap and widely-available Internet access via orbiting balloons or, via freely available and unused radio spectrum for example, or the creation of an online personal identity authentication system. Innovation to this group appears as mass-market enablement, often with existing technologies, such as providing rural access to finance via ATM machines, offering small business owners a cheap and easy way to transact with credit cards using their mobile phones.

Sometimes, innovation is pursued not as an end in itself, but for to effect social change, such as harnessing the power of social media to provide new channels of public communication, or designing cheaper and more efficient condensation equipment to provide clean water where there is none to be had.

This set of business profiles from APEC economies brings together a collection of stories where we observe innovation in action – be it a completely new and creative product, a new method of approaching an existing problem, or pursued as an enabler.
Brandscreen: Media Market Disruption Hubbed from Singapore
Brandscreen: Media Market Disruption Hubbed from Singapore

“Brandscreen is to advertising what Bloomberg is to share trading, giving real-time insights into what is happening”

– Stu Spiteri, CEO Brandscreen

Brandscreen is a digital media platform provider that has focused on the emerging automation of ad placement and media buying across the rapidly growing Asian media markets. Founded in 2006 and headquartered out of Singapore, Brandscreen is the first enterprise-grade demand side platform (DSP) to go live across Asia-Pacific markets, including China, Japan, India, Korea, Australia, and the South East Asian region.

Brandscreen builds the trading platforms that media agencies use to buy online advertising media on a real time basis. This includes providing the underlying infrastructure, optimization intelligence and applications required to power media trading desks, enabling media to be traded in a fully automated end-to-end stream, a service which can be compared to an online share-trading platform.

Real Time Bidding

Advertising money is increasingly shifting from non-measurable to measurable media; with the increase in digitalization, mobile devices, GPS-style solutions, and big data analytics, a core challenge for advertisers and marketers is to give media and marketing greater accountability, transparency and results. Real Time Bidding (RTB) media purchasing is seen to be a key new approach in this shift, enabling advertisers to deliver up instant access to a desired audience and thereby direct results.

RTB involves buying the attention of people, one impression at a time, while an individual is browsing on their PC, tablet, phone or smart TV. The RTB process works in the following way:

• users head to a page on a publisher’s website, causing it to start loading
• in the same instant the publisher sends out a bid request to thousands of potential advertisers describing the user’s profile and asking how much advertisers are willing to bid for advertising on that page
• Within 100 milliseconds the publisher gets bids from different advertisers, which then analyses to figure out the highest bidder and the brands being advertised
• The winner is alerted by the publisher and allowed to place its ad on that page.
The entire series of to-and-from communication between publisher and advertisers takes place in 300-500 milliseconds, causing no visible delay to the user. This process is repeated for every ad slot on a page. The whole process enables significant cost efficiencies in targeting advertising and customer acquisition.

Much like algorithmic trading on a stock market, RTB technology values online users on criteria such as an individual’s likelihood to buy a particular product. To do this, it looks at their browsing history anonymously. And just as high frequency automated trading systems have replaced human market makers and brokers in the financial world, demand side platforms (DSPs) are being used by media buyers as their core media trading and procurement platform that allows them to buy advertising in a highly automated, programmatic manner.

Market Disruption and Standardization

To understand the potential impact, including across APEC member economies, a better comparison may be to the evolution in online travel bookings. Electronic bookings first became possible for American Airlines travel agents through the introduction of the SABRE system in 1959.

In 1976, other airlines added their data to SABRE, enabling travel agents to book travel using one streamlined tool. In 1996, this data became available to consumers, who for the first time were empowered to book their own travel online. Today, travel booking is a liquid marketplace. Ninety million Americans accounting for 76 percent of leisure travel book travel online.

Online advertising is experiencing a similar revolution, thanks not least to standardization work by various industry associations and the growth of exchanges. And this in turn is facilitating the adoption of technologies such as RTB which enables the rapid buying and selling of individual impressions rather than groups of inventory. The increase in marketplace
liquidity will increase the size and growth of the digital ad marketplace dramatically. Each of the RTB exchanges that exist to date used their own methods and protocols for communicating with DSPs and SSPs, but there is now an emerging industry standard, OpenRTB.

As inventory becomes more liquid, advertisers can access precisely the impressions they want, where and when they want them. Publishers, in turn, can take steps to receive market-clearing prices for those impressions. As a result, the projected growth and impact of the industry are enormous. eMarketer projects that RTB will capture one in five ad dollars in 2013, accounting for US$3.4 billion in the US alone. The same data shows the Australian market to be worth some $100 million and is growing at about 80 percent per year; China is worth $80 million and growing at a 200 percent per year. China and Japan will be the number 2 and 3 RTB markets globally by 2016 on current projections.

Locally Deep, Globally Broad

“We are committed to the development of solutions that meet the needs of marketers who are based across Asia, but sell globally. We are focussed on a wholesale transformation of marketing based on the emergence of new ways of driving consumer insight from analytics.”

– Tony Surtees, COO Brandscreen

The major factors behind growth in real-time bidding are operational efficiency and better targeting. But programmatic buying is a complex activity, requiring local expertise and investment so as to customize solutions for local markets and merchants.

Across Asia data collection is still nascent and there is a relative dearth of the companies such as those in the US enabling advertisers to buy Asia-focused third-party data. To address this gap, Brandscreen established as Asia’s first media trading platform. Brandscreen is the only global DSP in China, it was the first local DSP to have access to the Facebook Exchange (FBX), and the first Asian DSP to launch private market exchanges (known as “Deal ID”) for digital publishers.

In 2012, Brandscreen sold about 200 million individual advertisements a day and analysed 117 billion advertising spots per month. Reaching more than 90 percent of the online community across Asia, Brandscreen processes some 200,000 individual advertisements a second via its real-time media trading offerings, allowing and enabling real time cross-border campaigns and merchant support.
eBay: Defining Metrics for Success with Digital Services Efficiency Methodology
“Digital Services Efficiency measures four different factors: a service’s carbon footprint, its impact on the environment, how much revenue is generated per unit of power consumed, and financial cost. Tuning these variables in tandem is like solving a Rubik’s Cube. It’s easy to solve the same color on one side of the cube independently, but solving all sides at the same time is difficult.”

– Dean Nelson, VP, Global Foundation Services, eBay

“Traditional data centers consume about twice as much power as the computing equipment actually needs.”

– Charles Babcock, Editor, InformationWeek

Global data center power use has been increasing at a dramatic rate. As of 2010, data centers used as much as 2.2 percent of global power output, up 56 percent over 2005. Data center operators have been responding to these changes by increasing their focus on efficiency, increasingly using metrics-driven approaches to bring down overhead costs. However, energy efficiency choices to date have mostly been made in a piecemeal, component-by-component manner that can miss the larger context: running the infrastructure to deliver optimal business value for the economic, opportunity, and environmental costs.

Right-sizing an application for the appropriate data center redundancy, fault-tolerance, and maintainability characteristics can enable a substantial amount of redundant equipment to be removed, which can significantly cut costs, improve efficiencies, and reduce environmental impact and waste. But this requires being able to measure impacts in tandem. And to have reliable industry benchmarks.

Data Centers are the engine of the new economy

Data centers are a driving force behind today’s economy. The servers, storage, and network equipment they contain support everything from traditional enterprise systems to global commerce engines. The relationships driving the demand for data centers are growing ever more complicated with the rise of cloud computing and federated applications comprised of multiple services wrapped up in one program. A data visualization service, for example, that ties a company’s Salesforce data with internal business data will rely on servers hosted by Salesforce, possibly located in-house.
Rapidly, this set of relationships has become the new digital supply chain, with data centers as the hubs. But with millions of square meters of data center space being added and data centers being of such strategic and commercial importance, there has been very little sophistication to date in the measurement of data centers or their output.

Not all data centers are created equal

Traditionally, data centers have been segregated based on their redundancy and security. Thus, a Tier-4 class of data center is defined as a high-availability data center with high redundancy and secured premises. This is the kind of facility that typically hosts financial information and NSA files. It is also the most expensive to build: in the vicinity of $10-20 million per megawatt.

But not all data centers are built and run in the same manner or for the same objective. Most of the larger hosting companies, such as Peer1 and Rackspace build out their own hardware and servers but can’t control what people run on them. Companies such as Equinix, Switch and Digital Reality Trust that operate co-location space run their huge data centers like server hotels: companies lease space, buy connectivity and pop their own gear into the space. Both of these types of operators can be contrasted to the likes of Google and Facebook and the very large enterprises who control their own hardware, building and underlying infrastructure, as well as the apps running on the hardware, and are thus able to optimize the entire technical ecosystem for their operations.

How to measure productivity?

The Green Grid, a collaborative organization committed to improving the resource efficiency of data centers and business computing ecosystems, spent several years evaluating various metrics that could be used to measure data center productivity, eventually introducing and popularizing its Power Usage Effectiveness (PUE) metric as the leading metric for data center energy efficiency. Power usage effectiveness is a measure of how much power is brought into a data center divided by how much gets used by computing equipment. Traditional data centers consume about twice as much power as the computing equipment actually needs, giving them a PUE of 2.0, meaning that total facility power is twice as much as IT equipment power. eBay’s Phoenix data center has recorded one of the world’s lowest PUE certified by the Green Grid case study with a partial PUE of 1.018.

The emergence of a standard measure subsequently sparked competition in the industry with operators and companies aiming to achieve the lowest
PUE. Google began publishing trailing 12-month PUE results in 2008, achieving an impressive 1.12 average for one of the largest data center portfolios in the world. But PUE is primarily a measure of facilities infrastructure, and doesn’t address the effectiveness of IT systems within the data center. Various gauges have been proposed to measure productivity, but none has addressed all the objectives for an industry-level metric. Nevertheless, given the success of PUE, The Green Grid began introducing other metrics further elaborating on data center environmental impact, including Water Usage Effectiveness (WUE), and Carbon Usage Effectiveness (CUE). Organizations thus began to track and report on these measurements, demonstrating greater data center efficiency, and resulting in lower long-term costs for business and the environment.

In 2012 eBay introduced its DSE dashboard as a means of driving efficient data center usage and growth. The dashboard was introduced to help eBay to see the full cost, performance and environmental impact of customer buy and sell URLs, all together and in one place. Much like a dashboard in a car, DSE provides a visual and intuitive approach to measuring the overall performance of the eBay engine in real time, and it serves as a flexible tool to fine-tune the entire infrastructure to achieve maximum performance across all key business dimensions.

Thus, with the Digital Service Efficiency (DSE) methodology, eBay has developed an approach to bring the various diverse measurements together. According to Winston Saunders, Intel’s lead on server and data center efficiency initiatives, DSE addresses “two of the most persistent problems in IT”. The first is getting the IT, Finance, Business Unit, and Facilities teams on the same page. While many companies work to address this, primarily through committees and communications, eBay’s methodology provides a metric and the next level of detail, and by “fixing misplaced incentives enables the potential for efficiency improvement.”

The example cited is of a software engineer who looked at a major ecommerce application and concluded that it had probably been assigned more server memory than needed. When the server configuration was adjusted the application’s performance was unaffected, resulting in 400 relatively new servers being taken out of service for the application and put to use elsewhere: a capital expense saving of $2 million that also reduced the amount of power consumed by a megawatt over the course of a year. (In 2012, eBay for example, one of the larger data center consumers, used 18 megawatts of power.) The DSE methodology captures these measurements on its dashboard making such decisions available to all.

And this is the second problem solved: communicating detailed management of core business. Through open disclosure the sustainability benefits of the digital economy can be quantified. It becomes relatively easy, for example, to calculate the carbon and water impact of each URL
from the data. For instance, for the roughly 46,000 URLs/kWh recorded in 2012, eBay used about 0.053 mL of water and about 22 mg of carbon. This equates to about a drop of water and a mass of CO2 equivalent to a small grain of rice per URL.

Thus, the carbon impact of ‘bricks and mortar’ retailers vs. online retailers can now be compared. (For a physical transaction, driving to a store 10km away to make a similar purchase will generate about 4.5kg of CO2, assuming an efficiency of 35kmpg: about the mass of a decently sized kettlebell.) In other words, a well-managed data center has an astounding reduction in resource impact compared to physical activity: almost a factor of 200,000 in this example.

“I believe this is the first time anyone has connected power efficiency to the IT infrastructure [and derived metrics on how effectively digital services are being delivered]. Initiatives like this are important because most companies don’t know how to measure such efficiency, and many companies will have to experiment and share the results in order to lead the way.”

– Dean Nelson, VP, Global Foundation Services, eBay

As of Q2 2013, eBay’s 52,533,000 servers require 20.25MW of power to support 119.7 million active users, according to its own dashboard. Through DSE, eBay also publishes the carbon footprint of its data center infrastructure. In Q2 2013, the level of associated carbon emissions was 16.42 grams of CO2 equivalent gases per 1,000 URLs – showed a net decrease of 2 percent year-on-year. eBay tracks and reports its progress on a quarterly basis and all information can be found at http://dse.ebay.com.

eBay has provided a role model, organized around common metric, to optimize the overall effectiveness of IT, and have openly disclosed the metrics and indicators they use to do it. This has the huge side benefit of enabling customers to understand the impacts of their own actions in terms of carbon and water use.
Democratizing Philippines’ Financial Access.
ENCASH: Democratizing Philippines’ Financial Access

“Only about 41 out of 100,000 Filipinos own a deposit account, and this is still far from the target of 750 by 2016. To further expand client reach in the countryside, market participants and regulators alike have to innovate and foster strategic partnerships.”

– Arsenio M. Balisacan, Socioeconomic Planning Secretary

The Philippines is an archipelago of some 7,100 islands stretched across 300,000 km², making infrastructural connectivity an ongoing challenge. (There are 7,107 islands at low tide!) By 2012, according to the Philippine Central Bank (BSP), only 26 percent of Filipinos had access to formal financial services and, of 1,635 municipalities, 37 percent had no bank access. As a result, residents of remote towns and villages need to travel to the nearest city or more commercially-developed town to access their accounts to withdraw cash, distribute payroll, or remit funds.

ATMs have long been used to provide extended or remote access to banks. But in the Philippines, most of the country’s universal and commercial banks and branches are still concentrated in Metro Manila and the key urban centers. Led by Metro Manila, the top five commercially-developed regions in the country accounted for 69.8 percent of the total banking network nationwide. The rest of the country is mostly serviced by thrift banks and rural banks whose infrastructure and resources, including ATM service, are comparatively limited. By 2012, there were still only 17.7 ATMs per 100,000 adults and 35.7 ATMs for every 1,000 km².

Indeed, one of the reasons the Philippines has become a global leader in mobile money development is precisely because of the limited access to banks and other formal financial services combined with the rapid uptake and organic growth of mobile phone usage for a variety of services. But the use of mobile money has constraints, particularly in fungibility and access to cash.
“Everybody tends to conduct business the standard, same-as-usual, traditional way. Our guiding principle is that when everybody conducts business in the traditional manner and we find an effective alternative approach, we’ll take it.”

– Eric Severino, CEO, ENCASH

ENCASH Network Services (ENS), the Philippines first independent (non-bank) switch network, began operations in 2007 by connecting the ATMs of five rural banks. Targeting the underserved rural market, and recognizing the potential for network economies to take effect through the construction of an open platform, ENCASH (which is short for “Electronic Network Cash Tellers”) turned the traditional ATM development network model on its head. Instead of selling ATM solutions to rural banks, ENCASH shouldered the capital outlay for the ATM equipment and software installed in rural banks, asking the banks instead to share the access fees each time a customer withdrew money from an outlet. With no heavy initial investment required on their end, the rural banks, naturally, welcomed the proposition. By 2012 ENCASH had expanded its network to 337 ATMs, spread over the country’s three biggest island groups (Luzon, Visayas and Mindanao), making ENCASH the fastest-growing ATM network in the Philippines.

In 2007, ENCASH became the first non-bank member of the MegaLink network consortium, which is interconnected with other Philippine interbank networks. A key driver of growth is partnership with the large cooperative and rural bank networks in the Philippines, of which some 140 rural banks and cooperatives have joined. Partnership with the country’s biggest telecom provider PLDT, and subsequently Globe Telecom, for the development of wireless data communications support for ATMs also enabled ENCASH to operate the country’s first and only 100 percent wireless ATM network, a necessity when targeting – or enabling – rural banks in remote places with no access to a fixed line telephone network.
“ENCASH intends to bring rural and provincial banks to the forefront of banking technology with this new network.”

– Eric Severino, CEO, ENCASH

Before the deployment of the ENCASH ATM in rural areas, townsfolk would have to travel via motorcycle, jeep, boat or in some instances, a combination of all three modes of transportation. ENCASH, with the help of software developer Switchware, now provides a secure, advanced, standards-compliant network for rural banks and other savings, thrift and private development banking institutions who cannot afford the costs of connecting to any of the three main networks. In a country where most commercial transactions are still paid in cash rather than credit or debit cards, this fee-based business is seen as viable even in areas shunned by banks.

ENCASH could also become the first network in the Philippines to fully adopt EMV technology on all its ATM cards. A new Central Bank requirement, aiming to mitigate fraud in ATM transactions, is for banks to adopt the Europay, Mastercard and Visa (EMV) standard by 2017. And more ENCASH-powered ATMs means more Filipinos living in remote towns and villages will no longer need to spend more and travel far just to withdraw money to meet their most pressing needs.
Google’s Project Loon: Balloon-Powered Internet for Everyone
Google’s Project Loon: Balloon-Powered Internet for Everyone

Google’s Project Loon, already on trial in New Zealand, is a proposal to build a ring of balloons 20km above the earth to bring affordable Internet access to those who otherwise don’t have it, or have patchy access at best. The balloon networks are being built and launched to float freely in stratospheric winds and relay 3G-level data traffic over a 40km radius. In this sense it is being portrayed as a super-amplifier for a nation’s Internet, rather than a separate Internet. Essentially the balloons are connected to the local internet infrastructure and signals are beamed to them. The balloons then relay that signal to each other.

The Issue

“Half of the world’s ‘offline population’ is located in six countries in Asia, including the major markets of India and China.”

– Karim Temsamani, Asia-Pacific President, Google

For two out of every three people on earth, a fast, affordable Internet connection is still out of reach – and this is far from being a solved problem. Moreover, there are many terrestrial challenges to Internet connectivity that continue to stymie rollout plans and connectivity developments – including jungles, archipelagos, and mountains. There are also major cost challenges. In most of the countries in the southern hemisphere, for example, the cost of an Internet connection is more than a month’s income.

In rural and remote areas the drag that this constraint imposes impacts farmers and agricultural development, universal education and health care provision, and in times of natural disasters, it limits relief efforts and supply coordination. But more generally, affordability also remains a major constraint – there are 47 million small businesses in India alone, with just 1 percent of those online.

The Approach

Project Loon uses high-altitude balloons placed in the stratosphere at an altitude of around 20km to create an aerial wireless network able to provide up to 3G-like speeds.

The balloons are maneuvered by adjusting their altitude to float to a wind layer after identifying the wind layer with the desired speed and direction using wind data from the National Oceanic and Atmospheric...
Administration (NOAA). Users of the service connect to the balloon network using a special Internet antenna attached to their building (see picture). The signal travels through the balloon network from balloon to balloon, then to a ground-based station connected to an ISP, then onto the global Internet. These stations are spaced about 100km apart and bounce the signal to other relay balloons that send the signal back down. This makes Internet access available to anyone who has a receiver and is within range to a balloon.

The high-altitude balloons float on the prevailing winds, mostly in a direction parallel with lines of latitude, i.e. east or west. Winds in the stratosphere are generally steady and slow-moving at between 5-20 mph, and each layer of wind varies in direction and magnitude. Software algorithms are used to determine where the balloons need to go, moving each one into a layer of wind blowing in the right direction. By moving with the wind, the balloons can be arranged to form one large communications network.

Traditionally, wind currents in the stratosphere travel west to east, so the entire flock would eventually be forced along this path. To address this problem, Google plans to release a steady stream of balloons that will essentially encircle the earth, and if done correctly, stable internet access will be maintained. The inspiration allegedly came from the way birds flock together when they fly.

At an altitude of 20km the balloons are flying twice as high as airplanes, but below the range of satellites. Each balloon provides Internet service for an area that covers roughly 1,256 km². The balloons communicate using unlicensed 2.4 and 5.8 GHz ISM bands.

The Balloons

The balloons, made of polyethylene plastic, are superpressure balloons filled with helium, and stand 15m across and 12m tall when fully inflated (see picture). A small box weighing 10kg containing each balloon’s electronic equipment hangs underneath the inflated envelope. This box contains circuit boards that control the system, radio antennae to communicate with other balloons and with Internet antennae on the ground, and batteries to store solar power so the balloons can operate during the night.

Each balloon’s electronics are powered by an array of solar panels that sit between the envelope and the hardware. In full sun, the panels produce 100 watts of power, which is sufficient to keep the unit running while also charging a battery for use at night. A parachute attached to the top of the envelope allows for a controlled descent and landing when a balloon is ready to be taken out of service. In the case of an unexpected failure, the
parachute deploys automatically. The balloons currently have a maximum life of about 55 days, although this may be possible to lengthen.

The Trial

“In the next two years, 500 million people in emerging markets in Asia will go on the Internet for the first time, and that will drive transformation even faster, because they won’t have the desktop habits that we have... One of the key benefits of improving access to the Internet in Asia will be for small businesses.”

– Karim Temsamani, Asia-Pacific President, Google.

New Zealand’s regulatory environment, which encourages innovation by supporting early-stage R&D with flexibility and speedy decision making, made it an ideal place to test new technology to bring Internet access to rural and remote areas. On 16 June 2013, Google began a pilot experiment in New Zealand where about 30 balloons were launched in coordination with the Civil Aviation Authority from the Tekapo area in the South Island. About 50 local users in and around Christchurch and the Canterbury Region tested connections to the aerial network using special antennas.

“Here in Christchurch, we’re well aware of the importance of connectivity in crisis situations, and Project Loon could be of major benefit to aid organizations and disaster-affected governments alike as they help get cities up and running again.”

– Bob Parker, Mayor of Christchurch, New Zealand

The first person to connect to the ‘Google Balloon Internet’ after the initial test balloons were launched into the stratosphere was a farmer in the town of Leeston, New Zealand – one of the 50 agreed early testers. The New Zealand farmer lived in a rural location unable to receive reliable broadband access to the Internet. He had used a satellite Internet service in 2009, but had had to pay more than $1000 per month on occasion for the service.

Following the initial trial, Google plans to send up some 300 balloons around the world at the 40th parallel south, providing coverage to New Zealand, Australia, Chile, and Argentina. Google hopes to eventually have thousands of balloons flying in the stratosphere.

The technology designed in the project could allow countries to avoid using expensive fiber cable that would have to be installed underground to allow users to connect to the Internet. Google believes this stands to greatly increase Internet usage in developing countries in regions such as Africa and Southeast Asia that can’t otherwise afford to lay underground fiber cable.
HP Earth Insights with Conservation International: Using Big Data to Create an Environmental Threat Early-Warning System
HP Earth Insights with Conservation International: Using Big Data to Create an Environmental Threat Early-Warning System

“Until now, the right data, the technology and scale have been noticeably missing from our field. What once took a team of scientists weeks, months or more to analyze can now be done by a single person in hours.”

– Peter Seligmann, Chairman and CEO, Conservation International

Over the next century, the world’s population will grow to more than 9 billion people. We will double our demand for food, energy and water, at the same time that climate change will have greater ecological, economic and social impacts. Preserving and protecting our natural environment is critical for the well-being of current and future generations.

Monitoring the Earth’s health is key to ensuring our survival and a sustainable supply of the Earth’s natural resources. Therefore, the ability to synthesize telltale signs of ecosystem decline, and get that information into the hands of policymakers and leaders in a timely fashion, is a priority. HP Earth Insights, developed in collaboration between HP and Conservation International (CI), helps address this issue through a groundbreaking combination of information technology, environmental science and big data analytics.

Bringing Policy Up To Speed...

“… we are entering into an enlightened stage in Environmental Science and it’s time that we have the power of big data and the power of monitoring to help us actually make a better world.”

– Dr. Jorge Ahumada, Executive Director, TEAM Network

While governments around the world are increasingly working to protect at-risk ecosystems, questions remain around resource allocation: what to protect and when; which to prioritize and how? Compounding the problems of environmental degradation and accelerating change is the fact that most indices of biodiversity are based on data from scientific literature, which has a long lag time from collection to publication. This means that
policymakers were often required to make resource allocation decisions based on information up to five or more years old.

The Tropical Ecology Assessment and Monitoring (TEAM) Network, a partnership between CI, the Smithsonian Institution and the Wildlife Conservation Society, has been working with 83 local partners across 16 countries through Africa, Latin America and Southeast Asia to gather data on changes in biomass, biodiversity, climate, species distribution and other indicators of ecosystem health. By establishing protocols and scientific methods for data collection the TEAM Network has created a process that ensures consistent, reliable data for science, analysis and decision making.

Yet despite this work, a challenge has remained: how to deliver the collected data in a way that helps scientists and policymakers better understand the true state of tropical forests, the species within them and the ecosystem services they provide. To address the problem, CI and the TEAM Network needed a scalable solution that enabled them to collect, manage, analyze and share data within and outside their organizations.

... With More Accurate Data and Faster Analysis Data ...

"Until now, scientists had to manually collect and analyze this data from tropical forests, making it difficult to identify new patterns and intervene to protect biodiversity. HP's solution is analyzing the data 89 percent faster."

– Meg Whitman, CEO, HP

HP Earth Insights is an integrated big data solution that enables scientists and policymakers to more efficiently and accurately collect, analyze and visualize data in a dramatically accelerated timeframe. Key components of this customized solution include:

- End-to-end technology: HP laptops and tablets improve data collection in the field at 16 TEAM sites in 14 countries. Collected data is uploaded and centrally managed on HP servers and backed up in the HP Cloud.
- HP Vertica Analytics Platform: Managing and analyzing very large and fast-growing volumes of data with speed and accuracy, this next-generation software integrates disparate data sets and runs massive simulations to calculate species trends and related impacts of climate, people and land use 89 percent faster than before.
• Wildlife Picture Index (WPI) Analytics System: This dashboard and analytics tool enables visualization of user-friendly, data-driven insights by anyone, anytime, anywhere. It turns a "system of record" into a "system of engagement" that enhances collaboration and accelerates time to action.

Data and analysis are shared with protected area managers to develop policies regarding land use and other factors adversely affecting species communities and ecosystem services. The data is also publicly available to empower policymakers and scientists to proactively respond to environmental threats as they emerge and work together to find solutions.

As of 2013, HP Earth Insights had helped CI and TEAM manage over 3 terabytes of critical biodiversity information collected via more than 1,000 sensors and camera traps, including more than 1.4 million photos of animals and more than 3 million climate measurements such as precipitation, temperature, humidity and solar radiation. Recent findings revealed:

• Of the 275 species being monitored, 60 species (22 percent) are either significantly decreasing or likely decreasing in population compared to baseline levels.
• 33 of the species being monitored (12 percent) have significantly decreased in numbers. Among these are the sun bear and the wild boar found in the Pasoh Forest Reserve (see below).
• Insectivores, including the moonrat and masked palm civet in the Pasoh Forest Reserve and the large tree shrew found in Bukit Barisan Selatan (see below), are likely declining.

.... In Specific Locations ....

The TEAM Network focuses on tropical forests because they are central to Earth’s life-support system. These forests are home to half of all the plants and animals on Earth. The plants in tropical forests generate 40 percent of the Earth’s oxygen, and approximately 25 percent of all modern pharmaceuticals originate from tropical forests. These ecosystems also contain more than half the species on the planet, store huge amounts of the carbon we emit and support productive agriculture. Approximately 7 million
people live close to TEAM Network sites—people who would be negatively affected should these ecosystems be degraded or disappear.

HP Earth Insights is active in 16 sites across four continents - including six APEC economies. Three examples in Malaysia, Indonesia and Peru include:

**Pasoh Forest Reserve (Malaysia)**
The Pasoh Forest Reserve, located in peninsular Malaysia is mainly covered with lowland and hill dipterocarp forest. While the core area of approximately 600 ha is still covered with old growth forest, most of the surrounding area has been logged and the rainforest has largely been destroyed by loggers and miners.

Although surrounded by oil palm plantations, there are still a high variety of living organisms thriving in the forest fragment. The most notable feature of Pasoh is its floristic richness. Although Pasoh today lacks big game animals, such as tigers and tapirs, there were recent observations of elephants, and a high diversity of small mammals, primates and birds.

**Bukit Barisan Selatan (Indonesia)**
Bukit Barisan Selatan, on the island of Sumatra, was established as a TEAM site in 2009. The park provides an enormous range of economic and ecological benefits. It contains genetic diversity, maintains water quality for rivers and lakes that are used by people in surrounding towns and serves as the primary watershed for Southwest Sumatra. The park provides various additional ecosystem services to people living in the surrounding areas, such as fish stocks and non-timber forest products.

It also contains a high diversity of wildlife, from large mammals, such as Sumatran elephants, Sumatran tiger, Sumatran rhino and six primate species, to a diverse bird community, including six species of hornbills. Seventy-seven of these species are listed in Endangered or Critical status.

**Cocha Cashu – Manu National Park (Peru)**
The Cocha Cashu Biological Station site is located inside the core area of Manu National Park, Strict Protection Zone. The park protects 14 ecological zones ranging from as low as 150 meters in parts of the Amazon Basin to the Puna Highlands at altitudes of 4,200 meters. Because of this topographical range, it has one of highest levels of biodiversity of any park in the world. More than 3,800 species of vascular plants are found in Manu, and inside Cocha Cashu there are about 1,800 plant species.

For many over-exploited plant species, Manu National Park provides one of the last conservation strongholds. Mammal diversity is high with 159 species.
These include big terrestrial mammals, such as the jaguar, mountain lion, peccary, tamandua, red brocket, tapir and white-lipped peccary.

.... to Effect Real Change

The ability to gather, analyze and share data is key to helping scientific and non-scientific communities take steps to protect current ecosystems, address the effects of climate change and create a more sustainable world. Solutions such as HP Earth Insights, able to deliver near-real-time analytics in effect create an early warning system for conservation efforts, thereby enabling proactive responses to environmental threats. In so doing they help environmental leaders, public officials and policymakers turn insights into action.
Microsoft and the Singapore White Spaces Initiative: Smart Radio for a Smarter City:
Microsoft and the Singapore White Spaces Initiative: Smart Radio for a Smarter City

“Radio frequency spectrum is a scarce commodity. There will not be sufficient spectrum to support the exponential growth in the wireless broadband traffic we are seeing today and going forward.”

– Mok Pak Lam, CTO of Starhub, a founding member of the Singapore White Spaces Pilot Group

“IDA welcomes industry-led efforts such as the TVWS commercial pilots by the Singapore White Space Pilot Group. We will continue to support and provide regulatory guidance to industry initiatives looking at new and innovative ways to deploy TVWS.”

– Aileen Chia, Deputy Director-General (Telecoms & Post), Infocomm Development Authority of Singapore

As the demand for wireless continues to increase exponentially, regulators are becoming ever more aware of the limitations on existing frequency allocations and the need to come up with alternative and innovative approaches in allocation. In Singapore, mobile penetration stood at 152 percent as of March 2013, with some 8 million mobile accounts generating 6 petabytes of mobile data usage. This is more than a 6-fold increase in mobile data usage from 2008, where it stood at less than 1 petabyte.

The sharp growth in demand for mobility and broadband access will further increase as mobile devices become smarter and more pervasive and machine-to-machine (M2M) communications become an ever greater part of the smart city infrastructure and operations. Successfully leveraging under-utilized spectrum will allow Singapore to continue to explore the potential for high-speed connectivity across a variety of applications in support of its smart city vision.

Super wi-fi

“White Spaces” spectrum refers to allocated but previously unused or underutilized frequency bands that can now be exploited for commercial use. For example, some radio frequencies are licensed but used only for intermittent communications, such as radio stations which only broadcast from 9am to 5pm. Of greater interest is the large amount of allocated but unassigned or unused spectrum in the TV band known as TV White Spaces (TVWS).
TVWS technologies are of particular interest to a high-density location such as Singapore because of their ability to carry high capacity broadcasts greater distances, through opaque obstacles and tougher terrain, compared to higher frequency bands (such as conventional wi-fi), while requiring less power. For many applications systems using TVWS technologies can be deployed for lower cost than other those using other technologies. These same propagation characteristics – lower power requirements, greater reach – make TVWS suitable for rapidly and cost effectively extending connectivity throughout the rural areas of emerging economies, which is of interest to many regional regulators such as those in the Philippines and Indonesia. However, regional frequency harmonization is required to successfully capture this opportunity.

Singapore's White Spaces Roadmap

Singapore's Infocomm Development Authority (IDA) is supporting TVWS initiatives as part of the government’s intelligent Nation (iN2015) Masterplan to develop Singapore into a world leading ‘smart city’. Specifically, IDA’s support of TVWS has 3 objectives:

• To enable greater efficiency of currently allocated spectrum, particularly given that not all frequencies are used all the time, such as radio stations which only broadcast for certain hours. White spaces technology dynamically allocates unused frequencies, demonstrating an immediate gain in efficiency.

• The best-use reallocation of the large swathe of frequencies in the 50-700MHz band which will become available following the TV broadcast switchover from analogue to digital.

• To capitalize on the economies of scale and opportunities that an emerging regional market for TVWS could generate. To achieve this, regional harmonization of certain spectrum bands will need to be addressed to ensure clear communication reception, especially at country broadcast boundaries. Regional frequency harmonization will immediately allow businesses to benefit from the economies of scale resulting from
regional markets, bringing down the cost of equipment such as end-user devices.

**Industry Initiative: The Singapore White Spaces Pilot Group (SWSPG)**

In April 2012, the Singapore White Spaces Pilot Group (SWSPG) was established by I2R, Starhub, and Microsoft to run a series of trials demonstrating the commercial viability of TVWS technologies:

- **Smart Grid Advanced Metering Infrastructure (AMI)**: the foundation for next-generation power grid management, enabling smart metering via M2M communications through white spaces frequency bands. As part of the trial, Singapore’s National University Town is tracking air conditioner use through remote data collection points that have a broadcast range of up to 1km, allowing control of energy consumption.

- **The Singapore Island Country Club (SICC)**: has deployed white spaces to simply and cheaply create an extended private wi-fi network, thus providing connectivity where it had previously been impossible. Thus far TVWS is the only solution the Club has been able to deploy successfully – previous efforts have even included floating antennas on balloons.

- **Open Water Communications**: focuses on providing cheap and reliable communications to ships anchored in Singapore waters. The marine wi-fi project utilizes Cognitive Radio devices and a geo-location database to select the best operating frequency in order to avoid interference. Ships anchored in Singapore typically rely on satellite communications, which are both expensive and dependent on weather conditions for connection stability.

- **Gardens by the Bay**: TVWS to provide wi-fi connectivity across the iconic tourist attraction in a reliable and cost-efficient manner, without intrusive equipment and wiring build-ups over its greenery.

**New projects announced and in implementation include:**

- **Sentosa**: a smart city-style deployment across the island resort, based upon wi-fi coverage and deploying security surveillance cameras, and demonstrating the co-existence of multi TVWS vendors in a single environment.

- **Housing & Development Board (HDB):** video surveillance for rooftop security, car park enforcement and getting real time video from the lift system in HDB buildings. With the use of real time video recordings, it is possible to perform real time video analytics and allow multiple departments to share the same surveillance resources.
• **Eurokars**: Using TVWS to cost effectively extend the IT network to outlying buildings, complemented with concierge services such as test-drive vehicle tracking, customer scheduled service management and other customer value added services.

The objective of Singapore’s white spaces initiative is to help create a greener city through the use of smart metering and M2M communications to enable more efficient use of resources such as electricity (lights, air conditioning) and water (washing, hydration), etc. Environmental monitoring systems which are deployed with white spaces will help to usher in a safer, smarter city, with opportunities for businesses to develop applications such as tsunami early-warning, or flood monitoring systems, or vehicle-to-vehicle communications.

**Beyond Singapore**

Going beyond better remote metering and M2M communication systems, the characteristics of white spaces technologies and TVWS to propagate signals further at lower power, through difficult terrain make it an attractive technology to provide connectivity in emerging economies. Examples include:

• The Philippines’ ICT Office deploying rural broadband using TVWS as part of their USD11.5m Integrated Government Philippines (iGovPhil) Project to bridge the digital divide.
  
  - Microsoft is currently deploying Internet over TVWS with the Kenyan Ministry of Information and Communication, and Kenyan Internet Service Provider, Indigo Telecom. Project “Mawingu” deploys solar-powered TVWS base stations that offer high-speed Internet access into rural, undeveloped country as part of Microsoft’s 4Afrika initiative. microsoft.com/africa/4afrika

• In Tanzania, as part of Microsoft’s 4Afrika initiative, Microsoft is partnering with UhuruOne and the Commission on Science and Technology to make available “Broadband4Wote” – a package of low-cost broadband connectivity, Windows 8 devices, Skype Wi-Fi, and other applications to 74,000 university students, faculty, and staff in Dar es Salaam.

• In South Africa, as part of Microsoft’s 4Afrika initiative, Microsoft is partnering with the CSIR, the University of Limpopo and MultiSource to deliver low-cost broadband, ICT labs, and relevant content and applications to schools located in townships near Limpopo.

• Google is testing the provision of cheap broadband access to the Internet by TVWS to ten schools in Cape Town, South Africa.
P&G: Digitizing Distribution to the Grassroots
P&G: Digitizing Distribution to the Grassroots

“Industry observers initially believed that [small] independently owned shops would die out as major retailers expanded their reach into developing markets. Instead, the opposite happened. As emerging economies have grown, more tiny stores have popped up to serve their customers’ rising fortunes. The buy-in-bulk mentality which had made mass-merchants roll over smaller stores in the U.S. simply didn’t apply.”


Across Southeast Asia’s emerging markets, it is estimated that 80 percent of people buy their wares from ‘mom-and-pop’ stores, in spaces that are, in many cases, no bigger than a closet. These locally owned bodegas, stalls and kiosks become very high-frequency stores, because of the multiple times shoppers visit them during a week, or even a single day.

While previously viewed as too small for customized attention, and largely expected to give way as markets grew richer and retail grew, these outlets have become increasingly attractive in the age of Big Data and integrated logistics. In part this is because of the high frequency of sales and turnover and the richness in data they present; in part it is because in total these small corner stores comprise a sizeable portion – if not the vast majority – of retail spend in emerging economies. But addressing the opportunity does mean successfully customizing supplier attention on these outlets.

Digitizing Distribution

To target the opportunity, the world’s largest consumer goods company, Procter & Gamble (P&G), has digitized its sales and distribution operations from end to end across the South East Asian region. P&G’s Digital Distributor Project sets standards in place in sales and distribution across the region to ensure quality control at the point-of-sale, and to incorporate up-to-date business intelligence for decision-making.

The program is thus important for the company’s distribution network which is wide and diverse across the region. (P&G’s direct store coverage across the region is amongst the top 3 in the industry.) The network includes mass merchandisers, grocery stores, membership club stores, drug stores, department stores, salons and high-frequency stores.

As a result, the company sees a significant opportunity in driving ‘store-centric planning’ at the stores of its distributors using centralized cloud based solutions for P&G distributors and resellers. P&G, for example, believes that stores can be arranged in a certain way to maximize consumer sales, and has ‘performance standards’ that retailers in emerging economies can employ to visualize such changes on, say, their
phones. Thus, if the store partners with P&G, it can call up the performance standards on the proprietor’s phone, hold it up, look around the store, and compare it with what is seen. Eventually, the idea for P&G is to be able to take a picture of a shelf, have it digitally compared, and then automatically send action steps back to the retailer to help rearrange the shelf for maximum consumer sales.

The Digital Distributor Project

“Our purpose at P&G is to touch and improve lives; everything we do is in that context. With digital technology, it’s now possible to have a one-on-one relationship with every consumer in the world. The more intimate the relationship, the more indispensable it becomes. We want to be the company that creates those indispensable relationships with our brands, and digital technology enables this.”

–Robert McDonald, P&G, Former CEO

At the core of P&G’s Digital Distributor Project are its wide-array of digital solutions such as paperless selling and other technical capabilities aimed at increasing intelligence at the points-of-sale. A recent set of regional pilots focused on P&G’s digital solutions such as paperless selling, warehouse management, promotions execution, distributor connect and HR systems.

The Digital Distributor Project initially adopted four approaches:

• Developing an e2e digitization distribution strategy from store shelf to P&G. This applies to every store covered by P&G in the South East Asian region.
• Standardizing retail execution processes in store. This focused on capturing store owner information and GPS coordinates to improve planning and selling.
• Adoption in the back-end of technology tools such as business intelligence and cloud computing to allow P&G and its partners to focus on capabilities and standards rather than technology implementation.
• Qualifying the model across key regional distributors with emphasis on business outcomes, so as to determine the guidelines for a scalable model to cover all distributors.

Benefits cited included an increase in sales productivity (more calls from customers) and an increase in call quality (more sales per call). According to P&G, these improvements can lead to growth in sales and faster decision-making, shortening processes from monthly to weekly and thereby lowering costs. Other improvements cited were enhanced collaboration between P&G and its distributors and the lower operation costs from having more efficient systems and processes.
Regional Pilots

Pilot tests of the Digital Distribution Project have been conducted in Indonesia, Malaysia, Thailand and Vietnam.

• In Indonesia, the operations of P&G’s top distributor were upgraded with end-to-end automation of key systems, supply chain optimization using a warehouse management system, coverage optimization, and the installation of paperless selling. Particular benefits noted by the distributor were time savings per day, resulting in better store visit compliance and store productivity; increase in quality call; and improvement in backroom productivity.

• In Thailand, digital solutions were used to speed up order processes. Errors during manual entry had been discovered to have been slowing inventory processes. The rate of “un-served” orders dropped to single digits after the deployment of digital solutions.

• In Malaysia, certain stores were installed with location mapping and sales force automation leading to an immediate increase in sales and the upgrading of sales targets.

• In Vietnam, the use of “100% mapping of store coverage” allowed a key distributor to have full visibility of store locations, resulting in improved store visit compliance and lower delivery costs.

For companies like P&G that rely on external data partners, getting the data becomes part of the currency of the relationship. Joint business planning with retailers requires a scorecard for both sides, and the algorithm becomes all about value creation. Getting data is now a big part of the value for P&G who have the analytic capabilities that most retailers don’t have, allowing the company to use the retailer’s data to help the retailer better decide how to merchandise or market their business in a positive way. In this way, data modeling, simulation, and other digital tools are reshaping innovation, even at the grassroots.
Rappler: Social Media for Social Change in the Philippines
“What would happen if we imagine news for the Internet and mobile, incorporating a bed of social media? How would journalism change – in processes and philosophy? Then add another idea: crowdsourcing. For the first time in our history, journalists can actually do more than just tell stories. We can act – by giving direction to hundreds, thousands, tens of thousands of small actions for change. So that’s what Rappler is – a social news network where stories inspire community-engagement and digitally-fuelled actions for social change.”

– Maria A. Ressa, CEO, Rappler

Rappler.com is the Philippines’ self-anointed national institute of citizen journalism — a ‘social news network’, presiding over an army of online journalists. Its flagship initiative is a road show, the Social Media for Social Change Chat Series, a series of sponsored events where top Rappler online journalists tour the country to speak about social media activism, standards, responsibilities and ethics.

Having taken root in the Philippines it is already branching out to other regional markets, attracting interest in Singapore, Indonesia, China and others.

Reimagining Journalism

“Just give the 20-somethings an iPhone, add lens and mike to it, and they’ll be able to shoot and edit their own video faster than a TV station. These new tools give you a lot of room. Pros, on the other hand, will resist change. You need a whole new people.”

Rappler, launched on 1 Jan 2012, consists of veteran journalists trained in broadcast, print and web disciplines working with young, ‘digital natives’ providing constant reporting and using social media tools to report and engage. These include web artists, designers, publishers and professionals bringing together broadcasting and IT processes, into a convergence of technology, open data and media.

The company was co-founded by former CNN bureau and counter-terrorism expert, Maria Ressa. Ressa has employed network mapping technologies learnt from her counter-terrorism experience along with social network theory to push an aggressive new model of citizen journalism. Social network theory views relationships as a series of nodes and links, with the nodes denoting individual actors and the links illustrating the relationships between them. Recent counter-terrorism efforts are an
example of how the theory has been applied to real world scenarios. Rappler has co-opted this approach into a new direction: civil activism and new media business. Ressa’s belief is that once the mapping has begun the effects can be “supercharged” and made increasingly efficient as the data is already out there.

A second tenet of the approach has been to revamp the existing business model, moving away from advertising CPMs and banner ads, to using “strong, independent, journalism” as a loss leader and a tool for collecting data which can then be sold to large corporations for business intelligence. Finding sustainable business models in both traditional media and new, social media is a challenge across the board; capturing data from journalism and activism provides a new and innovative approach. Rappler’s growth has been impressive with a 400 percent growth (3.7 million to 16.8 million pageviews) it the three months between March and May 2013 alone, making the site one of the top three news sites in Philippines, and suggesting that the company’s new model premised upon strong content and community engagement combined with data for business may well be viable.

While the content of the data is fascinating, Rappler’s Ressa cites other studies showing how documenting emotions can cause people to think in a more rational or proactive manner.

**Emotionally Vested**

“More than at any other time, how we feel collectively is important because brain imaging scans show that the Internet and social media are stimulating our emotions and rewiring our brains. Globally, emotions are spreading quickly through large swathes of societies with both positive and negative effects. Social media helped spread courage and hope to challenge dictators during the Arab Spring, but it was also used to plan riots in London and challenge traditional power structures in Occupy Wall Street.”

Thus, a further and final influence for Rappler was a 2007 study by two Harvard professors which, using mapping and data visualization, concluded that social networks magnify emotions and behaviors like happiness, loneliness, and voting behavior. In the study they formulated the so-called ‘Three Degrees of Influence Rule’, which states that emotions and behavior spread through three degrees in a social network. For example, if A is feeling lonely, then A’s friend B has a 52% chance of feeling lonely, and B’s friend C (two degrees) has a 25% chance of feeling lonely because A does. C’s friend D (three degrees) has a 15% chance of feeling lonely.

The same studies showed that up to 80 percent of the way people make decisions in their lives are determined by the way they feel. Neuroscientists
also believe that the mere act of labeling emotions increases our ability to reason.

Rappler thus took ‘social’ one step further developing a “Rappler Mood Meter”, a clickable response app set on the right side of each story, inviting readers to respond if the story made them feel some emotion: happy, sad, angry, don’t care, inspired, afraid, amused, annoyed. After voting, readers are then invited to make a comment on why they voted the way they did.

All the data is then collected, collated, and then visualized in a mood navigator that summarizes how readers are feeling as a whole and what stories have influenced their emotions.

Community Engagement

Rappler has benefited from its environment but appears poised to do well elsewhere regionally. The Philippines population of 95 million, while small compared to say, Indonesia, still makes mass media a viable and potentially lucrative enterprise. More importantly, Filipinos are extremely social media savvy: by 2011, the Facebook penetration rate in the country was already 93.9 percent while Twitter registered 16.1 percent, and has subsequently grown more than fourfold.

The company’s activist approach to journalism is also a product of its environment. The country has been marred by corruption scandals which the current government, under President Benigno S. Aquino III, has been working to address. Rappler is therefore seen to be playing its part with social media initiatives aimed at curbing violence and vote buying.

The company is also experimenting with data-driven story-telling. For example, using a mixture of algorithms and manual work, the website gathered information from Twitter and crafted it into a story about users’ reactions to the impeachment of Supreme Court Chief Justice Renato Corona.

And in recent senatorial elections, Rappler used voting data to create interactive infographics which broadcast live results by the minute. While these initiatives are still raw in execution, the coverage is rich in potential and ambition, and shows new ways for combining opportunities into innovative new approaches.
RealMe: a Personal Digital Authentication System, by the Department of Internal Affairs and New Zealand Post
“RealMe is another example of better public services making life easier for New Zealanders. It will soon be a reality that Kiwis can apply for a passport, update their electoral roll details, and open a bank account – all while staying in their living room, and using the same username and password each time they prove their identity.”

- Chris Tremain, Minister of Internal Affairs, New Zealand (31 Jul 2013)

Successfully enabling a country’s digital economy rests on a foundation of creating public trust in the security of online transactions. With online identity theft, fraud, and hacking on the rise, there will be a limited amount of government success in developing an e-economy unless concerted effort is taken to educate and strengthen public faith in these systems.

RealMe is a secure online identity verification and authentication system which allows New Zealanders to verify their online identities when they transact online. Instead of waiting in line with personal identification papers each time identity verification is required, with RealMe, New Zealanders can now access and use transact online with more than 40 government services and later this year with several banks with a single username and password.

Created by the Department of Internal Affairs and New Zealand Post, the system works by allowing New Zealanders to create a free RealMe account. Users select a username and a password, and include other details such as their mobile phone number for support. These form the basic RealMe account which can be used to login to participating online services.

In order to undertake transactions with a high level of identity risk, users will need a verified RealMe account, which requires the additional step of visiting a PostShop to take a biometric photograph, and tie it to their user account. The Department of Internal Affairs then verifies the photograph and other details provided by the user, against authoritative records, such as passports and birth, to confirm the person’s identity. Users can thereafter use this verified RealMe account to prove who they are safely on online services. Re-verification will have to be done every five years.

Building Trust in Digital Enablement Systems

RealMe uses the current New Zealand igovt infrastructure to create a new user interface for a national digital passport system. This resolves a number of issues which rose to the surface following the implementation and rollout of the igovt system.
“Historically, igovt has been dreadful to access and use, and has gotten in the way of making stuff happen rather than enabling it.”

- Mike O’Donnell, Trade Me head of operations

The development of RealMe reflects the iterative nature of technological development – there will be times when available services, able and willing users, and authentication methods do not grow in tandem with each other, resulting in a less-than-perfect take up or implementation. Investment in RealMe represents NZD$76.8 million public investment, and underscores the New Zealand government’s determination to pave the ground for their citizens to enter the digital economy.

“A verified RealMe account will, over time, allow people to fully access services online. Currently they have to physically visit the offices of organizations and show photo ID to get some services. A verified RealMe account will enable the provision of services online to truly grow enabling the digital economy.”

- Mandy Smith, RealMe spokesperson

Public Support, Private Participation

Governments today are more ready to offer e-government systems and services than they were a decade ago. At least 13 New Zealand government agencies are currently using RealMe, with many other services exploring RealMe use, such as banks. While financial institutions may already have security and authentication systems in place, banks are likely to adopt this service due to the new Anti-Money Laundering (AML) legislation which requires financial institutions to undertake customer due diligence, including identity verification; therefore proving to be an opportunistic market for RealMe.

RealMe represents an innovative business solution New Zealand Post can offer its customers. RealMe solves a real need (pardon the pun) for New Zealanders to have a secure verified online identity system, and is aligned to New Zealand Post’s strategy of providing customer-focused solutions utilizing digital platforms. No fee is charged to users, but organizations are charged every time someone’s identity is verified by RealMe.

New Zealand Post has a commercial interest to see RealMe succeed. The Department of Internal Affairs and the New Zealand government want to enable their citizens and businesses to transact safely on secure digital systems. RealMe is laying critical groundwork for the enablement of New Zealand’s digital future.
Sense-T: From Sensing to Intelligence

“Sense-T will establish Tasmania as a living laboratory in innovative and sustainable social, environmental and economic management. It offers the opportunity to test new approaches to address global challenges that can then be scaled in a cost effective manner elsewhere.”

– Ros Harvey, Director of Sense-T

Based in the Australian southern island state of Tasmania and using cutting-edge technology, Sense-T is creating the world’s first economy-wide sensor network. It combines research excellence with practical outcomes, demonstrating how real-time data can be harnessed to enable economies to become more competitive, efficient and sustainable.

Sense-T is federating sensor networks that span the entire state, overlaying the data from many different types of sensors with historical and spatial data to create a digital view of Tasmania. The aggregated data will be made available via an app-store for a range of decision support applications and services. Sense-T is a shared community resource, open to people to develop more sustainable approaches as well as new technology and services.

Data Federation

Sensor technology is not new. What is new is the combination of different sensors from across an entire economy into a single, large-scale integrated information system. Sense-T is federating existing sensor networks that monitor environmental conditions across the state, such as those owned by government departments, energy and water utilities and businesses. It is also encouraging investment in new sensors by designing next-generation sensing technologies that are cost-effective and easy to maintain.

The real-time sensor data is drawn into a cloud to be aggregated with historical and spatial data. Sophisticated modelling and data analysis can be done in real-time, allowing people to identify and examine relationships across the whole economy, not just individual industries or communities. Application programming interfaces (APIs) will be published to make it easy to develop applications using Sense-T’s core infrastructure.

Sense-T is a partnership program between the University of Tasmania, the Tasmanian Government, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and IBM. It is also funded by the Australian Government.
Initial Sense-T projects focus on agriculture and food production, aquaculture, emerging carbon markets, smart infrastructure and logistics, as well as water catchment management. These are to demonstrate what is possible using Sense-T’s rich data sets.

**Aquaculture**

One early and leading application is Sense-T’s AquaDS system, a web-based application for the oyster industry that gives a real-time digital overview of oyster farms across Tasmania. It is an easy-to-use web interface that presents a range of real-time, historical and geographical data about environmental conditions that can impact the oyster industry. The app is currently being used by the Tasmanian Shellfish Quality Assurance Program (TSQAP), which is charged with protecting consumers from illness caused by shellfish. It has to judge whether the water being filtered by oysters could make people sick. Using the app, the regulator no longer has to collect and analyse the available data every time it needs to make a decision. This helps to protect consumers, while minimising the impact on industry by ensuring closures occur only when necessary.

**Pathways to Market**

Sense-T’s *Pathways to Market* project is a $10 million international research collaboration that has significant implications for the production, process and distribution of food. As part of the five-year project, Sense-T is collecting real-time data about the conditions under which food is produced, processed, transported, stored and sold. That information can then be made available to consumers, producers and distributors to verify and improve the quality of food products.

The project involves six work streams to be delivered over five years:
i. Research into food stability, traceability, logistics and environmental impact, following specific products from the domestic market into the US and Asia

ii. Development of new commercial technologies, including sensors that can be embedded in packaging to track factors vital to food stability

iii. Research into what consumers want to know about where their food comes from and how that affects their purchase behaviour

iv. Methodologies to measure and value nature that can contribute to regional and national reports (natural capital accounting)

v. Development of apps for businesses and consumers

vi. New data visualisation tools that can support new shopping experiences for consumers, for example by presenting information about provenance and the conditions under which food is produced at the point of purchase.

A Test Bed for the Future

“Sense-T is a test-bed for the future. Sense-T combines real-time and historical data and makes this available to the community through user-friendly applications. Sense-T allows business, government and citizens to use this information to make better decisions and create a more sustainable future. It allows us to do more with less.”

The Australian state of Tasmania is the ideal location to demonstrate the prospects of this approach as it is a relatively sizeable island of 68,000 square kilometres with a mix of urban, rural and wilderness areas. Tasmania will also be the first state in Australia to have high-speed broadband connected to every premise.

Tasmania has a strong agricultural tradition and the sector is highly diversified, with food and agriculture accounting for 8.2 per cent of the State’s GDP and almost a third of exports. From fresh vegetables, to fruit, to viticulture, to poppies, to beef and dairy – Tasmania produces some of Australia’s best food.

Sense-T is thus working with farmers and producers to make the most of the state’s agricultural advantages. It is prototyping user-friendly applications that draw on real time data to improve yield quality and productivity, reduce input costs, and improve environmental sustainability and to demonstrate food provenance and safety to export markets.

And while Sense-T’s early focus has been on food production, it has a pipeline of projects that will demonstrate its applications across a whole range of sectors such as education, tourism, carbon markets and infrastructure.
A Billboard that Produces Clean Drinking Water

UN PANEL QUE PRODUCE AGUA POTABLE DEL AIRE
ES INGENIO EN ACCIÓN.

EXAMEN DE ADMISIÓN:
3 DE MARZO

University of Engineering and Technology (UTEC)
Peru and Mayo Publicidad
In an area near the middle of the Peruvian desert where annual rainfall is no more than around 1.3 centimeters, atmospheric humidity is 98 percent on average through summer, and clean drinking water is therefore difficult to obtain, an advertising billboard has been created that can generate up to 100 liters of water a day from nothing more than humidity, a basic filtration system and a little gravitational ingenuity.

The issue

Lima is Peru’s largest city and the fifth largest in the Americas, with a population of some 7.6 million people. When surrounding metro areas are included this increases to almost 9 million. Lima, sitting on the northern edge of the driest desert in the world, the Atacama coastal desert, is also the world’s second largest desert city after Cairo. But where Cairo has the Nile flowing by at a rate of 2,830 cubic meters per second, in Peru, the Rímac, the largest of the three rivers that feed Lima, averages just 29 cubic meters per second, and is in serious long-term decline due to climate change.

As a result, some 700,000 people have no access to clean water for drinking or bathing, while another 600,000 residents must rely on cisterns for their water, which must be filled by pumps or by hand and cleaned regularly. In other words, almost 20 percent of the city’s population lacks running water entirely, depending on unregulated private-company water trucks which charge up to 30 soles ($10) per cubic meter – 20 times what more affluent Peruvians pay for their tap water – and frequently leave their customers waiting desperately.

The Approach

Facing a slump in new enrollments, the engineering department of Peru’s University of Engineering and Technology (UTEC) was looking for a new, socially-engaged, way to attract students to the university. They approached local ad agency Mayo Publicidad and, between them, the engineers and advertisers, looked for an innovative way to inspire young Peruvians to study engineering at UTEC while simultaneously illustrating how advertising can be more than just an eyesore - hence the billboard.
Electricity from the city’s power lines runs the five condensers inside the billboard. Like the condenser in a home air conditioner, those ones in the UTEC billboard are cooler than the air outside. When air contacts the cooled surfaces of the condensers, the air also cools, and the water vapor in the air condenses into liquid water. After reverse-osmosis purification, the water flows down into a 20-liter storage tank at the base of the billboard. The billboard generates almost 100 liters of water each day and a simple faucet gives local residents access to the water. The engineers built the system and the ad agency erected the billboard along the Pan-American Highway at kilometer marker 89.5 when summer started in December 2012. By early March the billboard had produced some 9450 liters of water.

This is not the first attempt to pull clean water out of thin air. In 2011, French company Eole installed a wind turbine in Abu Dhabi, which the company claims generates more than 1400 liters of water each day. That system stands 24 meters tall, with a 13-meter rotor turning at up to 100 rpm to run a 30-kilowatt generator. This in turn powers a cooling compressor inside the turbine. An intake pulls air into the compressor, and moisture condenses out as the air cools. The water runs down into a purification and storage tank at the base of the turbine.

The turbine needs winds of at least 25 kph to generate enough power for the compressor. In a desert climate with an average temperate of 35 degrees Celsius and average relative humidity of about 30 percent, the system can generate about 350 liters of water a day. In humid coastal climates, production increases to about 1200 liters a day. Adding a solar power unit to the turbine could increase output by a few hundred liters more.

While Eole designed the turbine for remote communities of fewer than 5000 people, the commercial price for a single turbine is around $660,000. By contrast the UTEC billboard cost only $1200 to install.
The Results

“We wanted future students to see how engineers can also solve social needs in daily basis kinds of situations.”

– Alejandro Aponte, Creative Director, Mayo DraftFCB

Two additional ways have been found by UTEC and Mayo Publicidad to offset cost: advertising and enrollments. Following the billboard’s installation, UTEC reported a 28 percent increase in enrollment. Results like that will attract the attention of private companies looking for new ways to advertise. The city of Lima and other urban areas, such as Cairo, Egypt, suffer the same lack of potable water as remote villages, and an advertising-funded solution that taps into an existing electrical infrastructure may work well.

The World Health Organization (WHO) estimates that globally, around a billion people lack access to safe drinking water. Lack of clean water is a leading cause of a host of illnesses such as cholera and other diseases that cause diarrhea, still one of the world’s leading causes of death. And in many places this is only expected to get worse. Peru is expected to be the third-worst affected country by climate change, after Honduras and Bangladesh, according to the University of East Anglia’s Tyndall Centre for Climate Change Research. Its unusual topography, with most Peruvians living on the desert coast but reliant on Andean precipitation, also make it South America’s most water-stressed nation. Global warming has already seen the surface area of Peru’s glaciers shrink by an estimated 30 percent in the last three decades. In southern Peru, Quelccaya, the world’s largest tropical glacier, is now retreating at 60 meters a year, so fast that it is actually possible to watch it drip away over the course of a few hours. UTEC has not yet announced plans to install more billboards in Lima or to make the technology commercially available elsewhere, but the project has started new discussions about how to provide access to clean water.
Visa: Promoting Economic Growth through Mobile Merchant Transactions - the Case of Thailand
Visa: Promoting Economic Growth through Mobile Merchant Transactions - the Case of Thailand

“Mobile acceptance technology is precisely the kind of innovation we need to bring the benefits of electronic payments to more merchants, financial institutions and consumers around the globe.”

– Jim McCarthy, Global Head of Innovation and Strategic Partnerships, Visa

Emerging economies have traditionally been cash-driven, the result of poor infrastructure, lack of access to banks, underdeveloped electronic payment systems, and the costs associated with issuing cards and acquiring both customers and merchants. However, the emerging ubiquity of mobile communications networks, the rapid fall in the costs of devices such as handsets and tablets, and high cash usage, has made emerging markets particularly attractive for mobile point-of-sales (mPOS) developments. In Thailand, the payment providers, financial institutions and key merchants have begun aggressively promoting mPOS adoption and usage in a bid to promote economic growth through a shift to card-based transactions. In addition to the standard use of point of sale (POS) machines in retail outlets, the mPOS devices being promoted in Thailand are also being used to increase financial access and efficiency through use in other fields such as insurance and logistics.

Promoting Economic Growth

Recent studies have shown the positive – and at times dramatic – correlation between adoption of electronic payment systems and economic growth. Moody’s Analytics, for example, has developed a model showing the extra consumption resulting from credit card usage led to an increase in global GDP of nearly $1 trillion between 2008 and 2012, a yearly average of 0.4 percent in additional GDP. Across emerging economies, increased use of electronic payments added 0.8 percent to GDP.

While the impact across countries varies, the level of consumption and card usage is highly correlated. Consumers in wealthier countries tend to have the opportunity to use cards more often than in poorer countries, and therefore benefit more. A natural question therefore is how much greater credit and debit card usage or penetration contributes to consumption and GDP. Overall, a 1 percent increase in card usage produces a 0.06 percent increase in consumption and a 0.03 percent increase in GDP.
Increased card usage contributes to economic activity by reducing transaction costs and improving efficiency in the follow of goods and services. All cards, whether they are credit, debit or prepaid cards, serve to reduce transactional and opportunity costs by eliminating the need to carry cash. In developed markets the need to carry cash can be burdensome and represent a financial opportunity cost. But in emerging markets carrying cash can expose someone to the risk of theft and directly hinder economic activity.

For consumers, the use of credit and debit cards can optimize consumption decisions by providing secure and immediate access to funds on deposit or a line of credit. For merchants, there is less cash and check handling in the system as they have access to a large pool of customers with guaranteed payment. They are freed from developing and maintaining their own credit systems, allowing them to focus on core competencies. Cards are also a necessary part of e-commerce, with its inherent efficiencies. This leads to a virtuous economic cycle whereby increased consumption leads to increased production, more jobs and greater income.

The value obtained from a migration to electronic payments is a composite of a number of factors:

- Higher potential tax revenues;
- Lower cash handling costs;
- Guaranteed payments for merchants;
- Reductions in the grey economy due to lower unreported cash transactions, greater formal financial access and participation; and,
- Greater financial inclusion.
Promoting Mobility

“I see point-of-sale terminals going mobile. In the next five years, the majority of retailers will be using mPOS systems.”

– Jordan McKee, Yankee Group

Mobile point-of-sale devices are no longer seen as just a tool for micro-merchants to accept card payments. Increasingly, large retailers have been equipping sales people with smartphones and tablets that let them accept customer payments from the sales floor. Indeed, in developed markets mPOS devices are seen to be “transforming the retail industry in a way that few technologies have done before”, according to the Yankee Group, a technology market research firm from Massachusetts.

The large U.S. retailer J.C. Penney has noted that a quarter of its POS transactions are already taking place via mPOS devices. While, a Yankee Group survey from early 2013 found that 32 percent of U.S. merchants with more than 500 employees have already deployed mPOS, and another 29 percent plan to do so within 12 months.

Thus, while a disruptive impact, the opportunity in developed markets appears relatively straightforward. Generally, developed markets are characterized by lower cash usage, usually in the range of 20-30 percent of all retail purchases, and are well served by extensive POS networks, typically with more than 15 devices per 1,000 residents. The emerging markets proposition is more complex (see table below).

<table>
<thead>
<tr>
<th>PAYMENT MARKET TYPE</th>
<th>ACCEPTANCE</th>
<th>CARD USAGE</th>
<th>MPOS OPPORTUNITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed</td>
<td>• Generally more than 15 POS devices per 1000 inhabitant</td>
<td>• Electronic transactions typically account for &gt; 50% of retail payments</td>
<td>• Expand acceptance into non-accepting small merchants&lt;br&gt;• Augment and/or replace existing POS devices to enhance customer experience</td>
</tr>
<tr>
<td>Emerging</td>
<td>• Typically fewer than 6 POS devices per 1000 inhabitants&lt;br&gt;• Less than 1 device in a number of markets&lt;br&gt;• Urban concentration</td>
<td>• Electronic transactions typically account for &lt; 15% of retail payments</td>
<td>• Drive commerce through broad-based expansion of acceptance&lt;br&gt;• Extend payment acceptance beyond merchant purchases&lt;br&gt;• Extend capabilities to “Cash-in” and “Cash-out”</td>
</tr>
</tbody>
</table>

Source: Philip M. Miller and Daniel G. Salazar, “Expanding Card Acceptance to Small Merchants Globally through Mobile Point of Sale (mPOS)”, Global Insights, May 2013

They are characterized by geographically spotty and underdeveloped acceptance networks, typically with fewer than six devices per 1,000 individuals and in many cases less than one device per 1,000 residents. High cash usage, generally assumed to be more than 90 percent of retail purchase volume, however, makes emerging payments markets particularly attractive for MPOS development. The situation is compounded by the absence of a robust issued card base in these markets.
markets, and this is where mPOS devices and a focus beyond small retail merchants can have a transformative effect.

**Thailand: Promoting Broad Adoption**

In a bid to encourage Thais to shift from cash-based to card-based transactions, a number of financial institutions such as Krungsri Bank and Kasikornbank have begun aggressively promoting mobile point of sale technology. Upgrades in local payment systems over the past decade and a half has helped boost the number of credit card users from 4-5 percent to 10-12 percent, according to Visa country manager for Thailand, Somboon Krobteeranon, but still cash remains the key payment channel in Thailand. The new technology solutions are seen to provide a means of aggressively addressing this.

Thailand is one of the first countries in Southeast Asia to introduce the mPOS solution, which is a small payment card reader that can be plugged into a smartphone or tablet. Once configured, the device with the mPOS attached allows merchants to accept card payments via either swipe or chip. This underscores Visa’s efforts in expanding merchant acceptance of electronic payments beyond major cities to rural areas. For the banks the focus is on small businesses such as delivery services and direct sales, larger enterprises such as insurance companies with a large agent work force as well as to the retail sector.

Aeon Insurance Service is deploying mPOS to be the primary system supporting its card business as with most customers prefer to pay by card, and mPOS can facilitate credit-collection and drive revenue growth. Aeon revised its targets upwards by Baht100 million following the introduction of the Visa mPOS devices. The company’s focus is on non-life insurance, 60 percent of which is auto insurance. Aeon plans to add 300 agents to its current force of 200 in using mPOS for accepting premiums. According to managing director Yasuhiko Kondo, “By next year, the number of AEON mPOS units will increase to 20,000.”

Visa has been working with merchants and retailers in Thailand over a range of sectors to introduce more convenient ways to pay, including adding an automatic top-up service for registered users of Easy Pass, Bangkok’s exclusive service for regular users of the city’s expressway network. New forms of electronic payments reduce the risk associated with cash transactions for small merchants and large corporates, bringing greater value to consumers who are increasingly looking for better and more reliable ways to make payments.
Acknowledgements

Our thanks go to the following companies for providing funding and input into this project:

Applied Materials
eBay Inc
Google
HP
Microsoft
P&G
Visa

About the Authors

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