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Contents

Productivity in Information Communications Sector

1. Overview and Trends of Singapore Infocomm Sector

According to the "ICTs for Inclusive Growth," The Global Information Technology Report 2015, ICT (Information and Communication Technologies) impacts productivity gains, social development and transformation by improving basic services access, connectivity and employment opportunities. Singapore Infocomm ranks top in 2015 in the World Economic Forum (WEF) Global Information Technology Reports (GITR) Ranking (see Figure 1 and 2 in the next page) and is one of the most consistent in performance across the 10 categories of the Index. It tops three pillars (Business and innovation environment, Government usage, and Social impacts), with 53% of its population employed in knowledge intensive jobs.

Statistics in Figure 3 shows the total Infocomm Industry revenue by segments from 2008-2014. With the exception of the Hardware segment, all segments showed a drop in revenue from 2008 to 2014.

Infocomm productivity span a wide range of Singapore businesses that serve the global markets. The electronics industry builds personal communication devices like PCs and mobile phones as well as the huge systems that support hardware, networks, and infrastructures of infocomm services and products. Singapore has continued to work towards its goals of the Intelligent Nation 2015 Master Plan and the National Broadband Network.

Launched in 2006, Intelligent Nation 2015 (iN2015) introduced a 10-year master plan developed by residents and private sectors. It established a goal to become an internationally recognised Intelligent Nation, Global City powered by infocomm. iN2015 is the conduit that provides Singapore with the ability to export products, services, and ideas to the global marketplace.

A specific highlight of iN2015 goals is to be the world's #1 nation for harnessing infocomm to add value to society and the economy. Other goals include achieving 100% computer ownership in homes with school-going children, 90% home broadband usage, and creation of 80,000 additional jobs.

Rank	2008	2009	2010	2011	2012	2013	2014	2015
1	Denmark	Denmark	Sweden	Sweden	Sweden	Finland	Finland	**Singapore**
2	Sweden	Sweden	**Singapore**	**Singapore**	**Singapore**	**Singapore**	**Singapore**	Finland
3	Switzerland	US	Denmark	Finland	Finland	Sweden	Sweden	Sweden
4	US	**Singapore**	Switzerland	Switzerland	Denmark	Netherlands	Netherlands	Netherlands
5	**Singapore**	Switzerland	US	US	Switzerland	Norway	Norway	Norway
6	Finland	Finland	Finland	Taiwan, China	Netherlands	Switzerland	Switzerland	Switzerland
7	Netherlands	Iceland	Canada	Denmark	Norway	UK	US	US
8	Iceland	Norway	Hong Kong	Canada	US	Denmark	Hong Kong	UK
9	S. Korea	Netherlands	Netherlands	Norway	Canada	US	UK	Luxembourg
10	Norway	Canada	Norway	S. Korea	UK	Taiwan, China	S. Korea	Japan

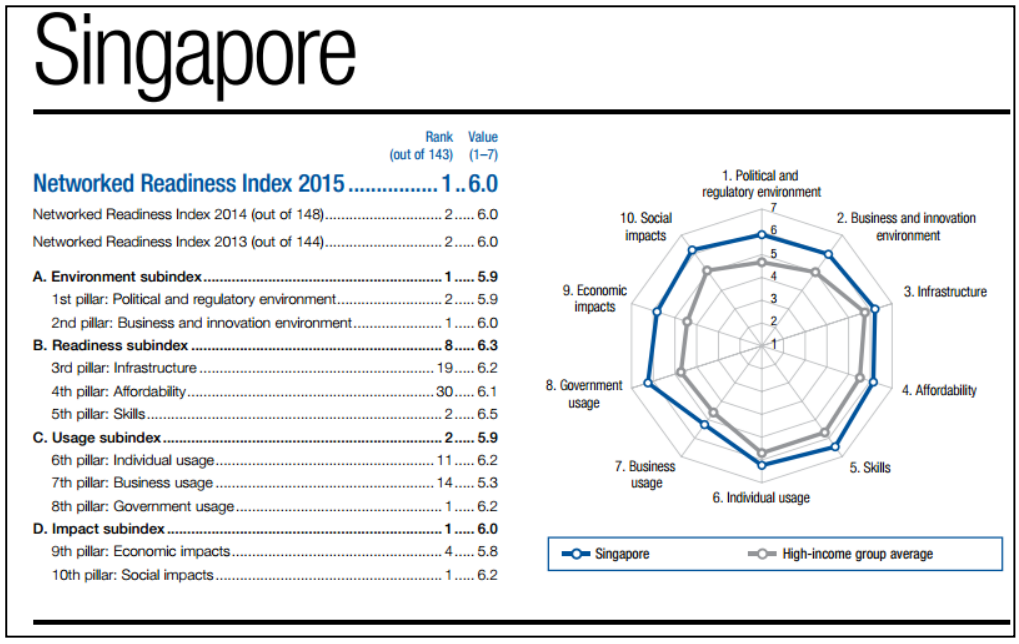

Figure 1 and 2: World Economic Forum (WEF) Global Information Technology Reports (GITR) Ranking

Source: http://www3.weforum.org/docs/WEF_Global_IT_Report_2015.pdf

The Infocomm Media 2025 report (see Figure 4 in the next page) published by the Ministry of Communications and Information in August 2015 highlights six technology areas that will play a significant role in realising the ideas in the Infocomm Media 2025 report. From this futuristic roadmap, we can anticipate the trend in technologies that could potentially impact the Infocomm sector in a significant way over the next 5 to 10 years.

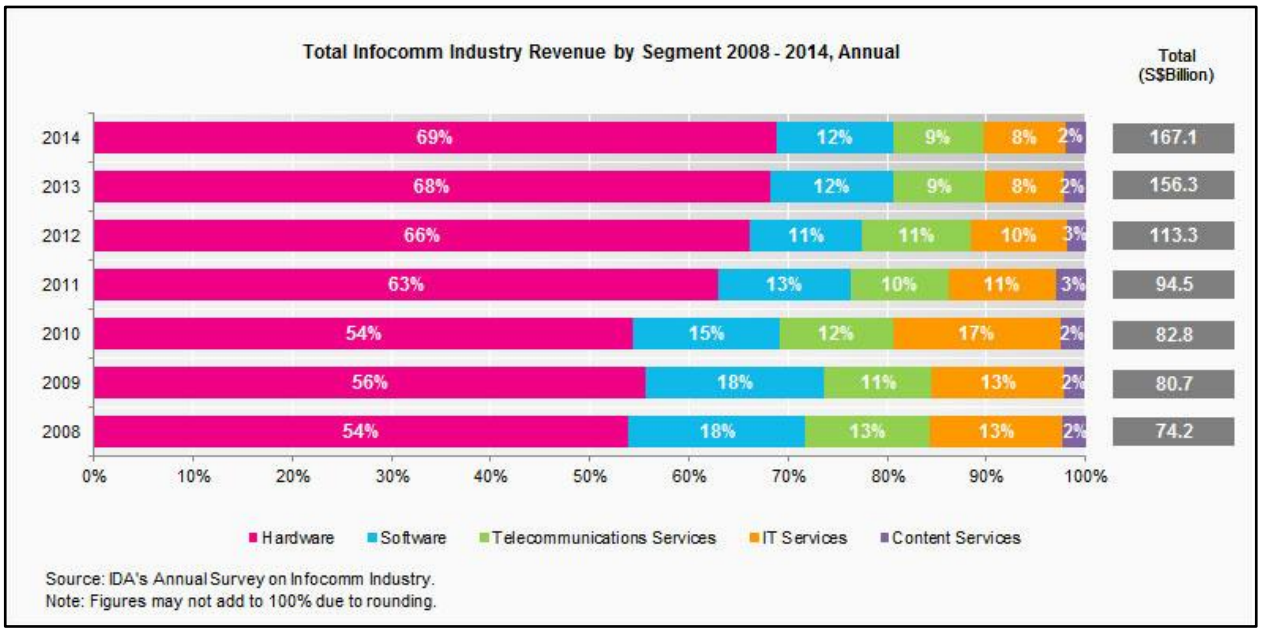

Figure 3: Total Infocomm Industry Revenue by Segments

Source: https://www.ida.gov.sg/Tech-Scene-News/Facts-and-Figures/Infocomm-Industry

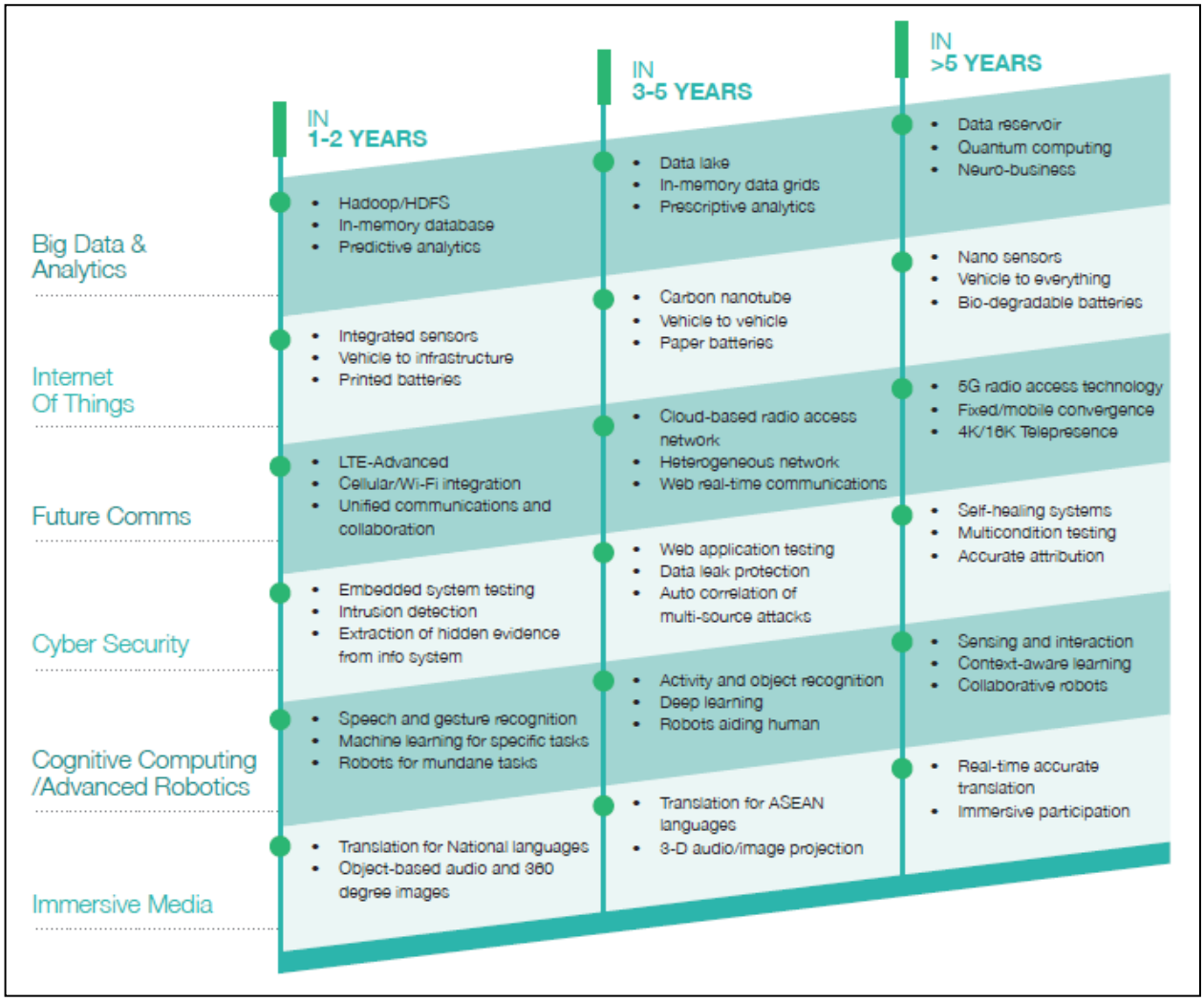

Figure 4: Infocomm Media 2025 report – 6 technology areas with significant impact I

Source:
http://www.mci.gov.sg/~/media/data/mci/docs/imm%202025/infocomm%20media%202025%20full%20report.pdf

2. What are the barriers/challenges facing the sector's productivity?

From the Protiviti's 2014 IT Priorities Survey, it was found that requirements from all types of businesses to deliver added value, enhance business performance and increase security has driven many major IT transformation in organisations across many industries. These initiatives have broaden the scope of responsibilities of Chief Information Officers and restructuring the IT departments. The IT's department mission has changed from fulfilling technology requests to providing an integrated approach to add value and protect business operations.

Based on the survey findings, the top five major areas that present the most pressing challenges for the sector are:

1. **Enhancing and protecting business value:** Aligning and integrating IT risk management and business continuity capabilities with broader, long-term business strategy.

2. **Cybersecurity:** Managing and strengthening security and privacy for the organizations' systems and data is now a top priority across all industries.

3. **Data classification:** Effectively organising, managing, and securing growing amounts of data within the organization.

4. **IT asset and data management:** Improving data and information governance programs, driven by the growing use of mobile devices and applications and the continued integration of cloud computing into IT strategy and processes.

5. **Mobile platforms and social media:** Incorporating secure, integrated systems for mobile commerce, devices, etc., and addressing social media safeguards and strategy within the organisation.

InfoComm Executive Director, Dave Labuskes, at AVEC 2015 (AV Executive Conference) discussed recent challenges facing the industry, citing the merger of personal and enterprise technology, the simplicity of consumer devices, and "good enough" services (such Skype) are totally free. He also talked about companies being forced to compete on price as margins get squeezed leading to cut back on people and training, which potential lead to a vicious cycle of price cutting because resources put towards value adding services have been cut back.

3. What are the enablers and disruptive technologies available to boost productivity in the sector?

Transport Minister and Second Minister for Foreign Affairs Mr. Lui Tuck Yew announced at the opening of the Asia Pacific ICT Summit 2012 that the Government will spend $46 million on the Singapore Infocomm Productivity Roadmap over the next five years. Spearheaded by the Infocomm Development Authority (IDA) and the National Productivity and Continuing Education Council, its focus is to boost productivity in software development, IT consultancy, and systems integration.

The initiative is designed to help local infocomm companies in the following ways:

- Facilitate access to cost-effective shared resources.
- Remodel their businesses with newly acquired resources and capabilities.
- Extend market outreach and develop specialised skill sets.

Recognising that it is not sustainable to rely on foreign workers, the Government is pushing increased productivity levels across all sectors. The roadmap, which benefits over 1,100 local infocomm companies, will also train 10,000 infocomm professionals. The value-add per worker in software development, IT consultancy, and systems integration will increase over the next five years from $79,451 to $105,434.

Grants will be given by IDA to companies wishing to purchase project management, security testing and development software. Available training for infocomm professionals wishing to boost their project management and cloud computing skills will also be available.

In Singapore, the Infocomm Technology (ICT) Roadmap 2012 outlines technology trends that affect Singapore's ICT landscape. Its purpose is to inform public and private sector organisations about respective market opportunities, inhibitors, challenges, and enablers. Understanding the topics lets organisations navigate opportunities to create value for themselves, customers, and stakeholders.

The 3 important themes to Singapore's ICT landscape have potential impact on the economy and society are listed in 3.1 to 3.3.

3.1 **Big Data** describes massive, complex datasets that exceed the ability of ordinary database software tools to capture, store, manage and analyse. Information in the data pool provides guidance to enterprises and governments about targeted interest groups, such as opinions and behaviours. Adopting technologies to manage and extract the data lets effective policies and models be created to address the needs and wants of the public. It is most effective in education, retail, finance, transport and healthcare sectors.

3.2 **Cloud computing** is an organised combination of various technologies that uses connectivity to deliver computing much like a public utility. The bottom line of an organisation realises improved efficiency because of cloud elasticity. It affects the topline by improving turnaround time and permitting low-risk experimentation and innovation. Adopting community and personal cloud services are just two of the ways cloud computing enables organisations to remain competitive and ahead of others in the business landscape.

3.3 **Cyber security** continues to grow as individuals and organisations increase connectivity. Increased cyber attacks add to the productivity of finding ways to protect data and systems. Threats must be determined ahead of their evolution and safeguards established to guard against harm until a solution is developed. Intrusion detection systems (IDS) and mobile device management (MDM) are two recent ways to guard against cyber security.

3.4 **Disruptive Technologies**

Corey Moss, in Blogsquad on Infocomm 2015, identified a list of 10 solutions that could create a disruptive market impact from various realms of AV/IT technology. We feature 3 that could potentially boost the productivity of end users and Infocomm professionals as well.

3.4.1 Jupiter Systems: Canvas 3.0

Jupiter Systems Canvas is visual business intelligence tool that supports collaborative visualisation through video, data, applications remotely. You can draw or type on live video, work together on a shared whiteboard or point your phone at anything and share a live view of what you see. Canvas 3.0 provides integrations with major unified communication and collaboration platforms to deliver collaboration with advanced communications and presentation features.

Figure 5: Collaborative Visualiser - Canvas 3.0 by Jupiter Systems
Source: http://www.ravepubs.com/creating-impact-infocomm-2015-disruptive-top-10/

3.4.2 T1V: ThinkHub

ThinkHub is a multiuser software application designed to help teams to have productive meetings. You do that by sharing content to ThinkHub via USB drive or by sharing your device screen (laptops, tablets, smart phones) with your team on a large-format touchscreen. All devices can display simultaneously on ThinkHub, while all being manipulated (annotated, resized) at the same time too. ThinkHub is a software solution that will replace all the cables, switchers, control panels, projectors, screens, even the phone lines. It provides a truly multi-touch, multi-user, multi-application experience.

Figure 6: T1V Think Hub – Multiuser Solution for ideation, visualization and problem solving
Source: http://www.ravepubs.com/creating-impact-infocomm-2015-disruptive-top-10/

3.4.3 Collaboration Squared: Ubiety Room

Ubiety is the cloud collaboration platform for interoperability of video conferencing, web collaboration and phone conferencing with a simplified intuitive user interface. Ubiety Room uses multi-functional computing device that's already in most meeting rooms and transform it into a video system using the collaboration software to expand enterprise meeting room video conferencing capabilities. All the customer does is add the USB peripherals and a login is assigned specifically to the room with the capability to call Ubiety Room to Ubiety Room, to and from traditional video conference systems, Lync, Jabber, Ubiety users and Ubiety meetings. You can even call into other bridge vendors such as Polycom and CIsco from these meeting room PC's. It is an opportunity for AV integrators to earn new recurring revenue from such meeting room spaces, overcoming the cost barrier of meeting rooms with video conference systems due to the high cost of implementation.

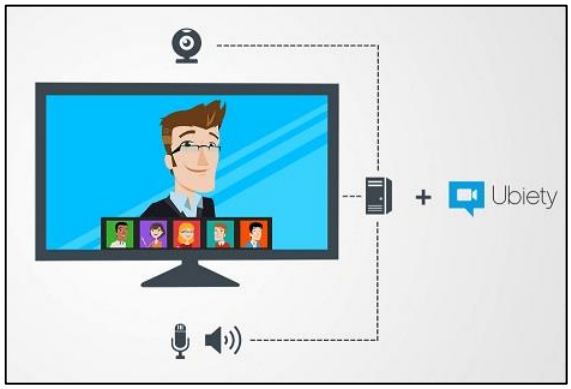

Figure 7: Ubiety Room - a fully interoperable video collaboration room

Source: http://www.ravepubs.com/creating-impact-infocomm-2015-disruptive-top-10/

4. Possible Immediate Actions

Paul Simoneau, Global Knowledge Training LLC, identified possible solutions to 12 main challenges for IT management and staff including new technology, cloud, big data, virtualization, BYOD (Bring Your Own Device) and BYOA (Bring Your Own Access), shadow IT, boomers, energy efficiency, user systems, interoperability, creating value and social networks. We highlight 5 that we think are immediate actions that ICT companies could consider in bringing about productivity improvements. These are actions that could also address the challenges shared in Section 2.

4.1 Outsourcing non-critical functions to create value

For ICT departments to focus on value creation and improving service to their users, ICT managers must remove any non-essential activities to optimise manpower resources through outsourcing non-core activities. One way of doing so is to move as many services to the cloud for standardised services so as to reduce the need to maintain software or hardware. SME companies with limited manpower resources will benefit from this solution.

4.2 Big Data Analytics – Invest in faster processing solutions

Data is projected to grow by 800 percent in the next five years, especially unstructured data (e.g plain text, email, blog, formatted document, standard and non-standard image, video, voice, animation, sensor input and web search logs). To benefit from this growth, invest in data mining to understand the organisation's market and customers. To provide the best value to the organisation, consider solutions like 100 GB Ethernet, parallel- processing, and SSDs (Solid State Drives) that offer good response times and data mining solutions to process data generated in real time and provides usable information as needed.

4.3 Interoperability and controlling data access

Open applications and systems built on open standards are the way of the future. Development efforts must focus on how that system/application interoperates with each other. Systems need to send and receive data that will be compatible on all user platforms. With the advent of smartphones and tablets, users now bring in BYOD (Bring Your Own Devices) and BYOA (Bring Your Own Access). When a user brings their own device, they will also bring their own applications that they have grown used to using. That is a plus for productivity if there is a way to secure the organisation’s data access they are authorised to access, but does not store any data on their mobile devices.

4.4 Energy Efficiency

According to most estimates, a 25,000 square foot data center will use about $4 million in energy this year. A saving of a few percent can make a big difference to an IT budget. Resources and tools are readily available to help IT and data center managers benchmark energy use, monitor ongoing trends, identify any savings opportunities, and adopt the most energy efficient practices.

4.5 Adoption of New Technologies Smartly

Leverage on new technologies wisely by evaluating the value they offer to companies and will work to the best interest the company’s priorities and long term goals. New technologies such as cloud, big data, and mobility all become tools for experienced IT managers who understand their organization's riorities. To make the most of any new technology, IT professionals need a spolid understanding of the company and the challenges its users and markets face. IT professionals must answer the question: "How does this help us address our current challenges or meet our strategic goals?"

Case Study

Case Study: Singapore – Fleet Visibility Vehicle Tracking System – V3 Teletech Pte Ltd

V3 TeleTech is a leading Telematics Service and Technology Provider specialising in B2B Telematics, LBS, RFID solutions and services covering the full spectrum of M2M market. The company has the largest proven subscription service with more than 600 customers and 10,000 vehicles under management. V3 began life almost 13 years ago, with a GPS system as its initial product. The collaboration with Singtel came about in 2005.

Figure 8: V3 Teletech and Singtel Partnership
Source: http://cloud.singtel.com/wp-content/uploads/2015/12/V3-Teletech-and-Singtel.pdf

The track-and-trace solution is a 24/7-hosted fleet management system. "The whole concept is to enable the user to have 100 percent visibility of their fleet or vehicle or even personnel using GPS and 3G technology," says Mr. Adrian Long, General Manager of V3 Teletech, the company providing this solution in partnership with Singtel. The Fleet Visibility solution basically covers a web-based job scheduling system. At the same time, there's a mobile job status update application for drivers to constantly update their status, while the system also tracks the whereabouts of their vehicles.

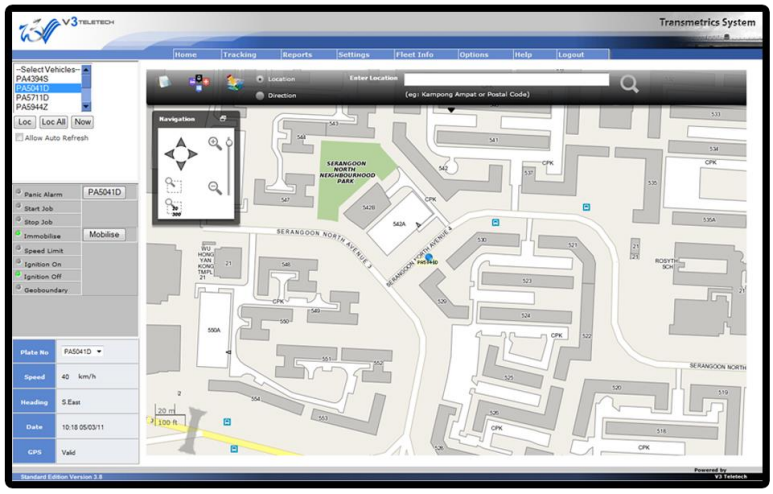

Figure 9: Fleet Visibility Vehicle Tracking System by V3 Teletech
Source: https://mybusiness.singtel.com/catalogue/fleet-visibility-vehicle-tracking-system

SMEs can use the tools to optimise their resources, securing vehicle utilisation and driving data for the purposes of two key things: ensuring driver safety and that the vehicles are in tip-top operational readiness at all times. Adopting such solutions will help SMEs increase productivity.
One of the biggest issues that SMEs are currently facing is sparse and limited resources. Through the usage of these tools, the controller from their company is able to obtain full visibility of their fleet of vehicles or personnel, up to the nearest intervals, which means the actual location and also the status of the vehicle or the personnel. SMEs are then able to more effectively assign these resources to the right and most efficient location to carry out jobs, therefore reducing non-revenue mileage and also reducing idling time, which leads to an increase in productivity of overall operations.

At least 50 percent of V3's SME customers have benefited from it or used it to adopt these solutions. In 2011, myBus, a local transport company providing private bus services, intended to increase their fleet. However, as a result of using V3's solution, they maintained the same fleet of buses but were able to carry out their jobs more efficiently. They reduced their fuel consumption to about half of the usage before this system was used.
As an SME, V3 has also grown and benefitted from these improvements in the industry. The company have already expanded and are working with partners around the world, in places like India, Myanmar, Indonesia, the Philippines and the Middle East, who trying to adopt the same applications in their regions. They also service other countries in the region, with Singtel hosting their applications. And the company has more expansion plans for the near future, planning to move into industrial automation - machine-to-machine - by introducing robotic systems into the industry. In the future, customers may see unmanned vehicles and even video analytics of their drivers' patterns.

The IDA offers prequalified infocomm packages supported under iSPRINT (Packaged Solutions) to enable SMEs to start deploying IT into their operations sooner and at a lower cost, helping them to reap the benefits of ICT adoption. The Fleet Visibility Vehicle Tracking System is one piece of software listed under this iSPRINT program. SMEs can claim up to 70 percent of the qualifying costs, capped at $20,000, for the purchase of the first packaged solution under each solution category. The grant is subject to the company fulfilling the SME eligibility criteria and the availability of funds. For more information on the iSPRINT Funding For Packaged Solutions, see the IDA website.

Case Study: Global – Cambridge Communication Systems Limited (CCS) in the UK

IET Innovation Award 2014: World's First Self-Organising Small Cell Microwave Backhaul System for Mobile Networks. Cambridge Communication Systems Limited (CCS) in the UK was recently awarded an IET Innovation Award for its high-capacity backhaul for 4G/LTE small cells, which alleviates familiar capacity issues in wireless systems.

A significant advancement for the communications sector, the high-capacity backhaul was one of over 400 submissions from 30 countries. The Institution of Engineering and Technology Innovation Awards, given to the best engineering, technology, and science global innovations each year, are judged by over 80 acknowledged academic and industry experts. The judges remarked on the system's capability to transmit at 480 Mbps. They also noted it is easy to install and requires no continuous network planning, antenna realignment or site revisits.

Infocommunication is a familiar challenge to CCS. The company pioneered the first self-organising small cell backhaul system, proving the viability of outdoor small cells. An initial commercial deployment with China Mobile has led to an additional installation in that company's Fujian Mobile branch.

Figure 10: World's First Self-Organising Small Cell Microwave Backhaul System for Mobile Networks. Cambridge Communication Systems Limited (CCS), UK
Source: http://www.ccsl.com/media/uploads/files/2015-ccs-metnet-brochure-web.pdf

5. Conclusion

Productivity in areas like cloud computing and cyber security benefits from research tested in actual settings. Singapore, one of the most connected nations in the world, has an active infocommunication infrastructure and framework. Its businesses and leaders are motivated to seek out and apply economical, trustworthy ways to sustain resources. That knowledge leads to advanced systems and solutions for creating smarter cities and a Smarter Planet. Companies in Singapore could leverage on the national infrastructure, framework and funding support available.

Recommended Readings

Title	Digital Disciplines: Attaining Market Leadership via the Cloud, Big Data, Social, Mobile, and the Internet of Things
Author(s)	Wiley CIO
Publisher	Wiley
Year of Publication	2015
ISBN	978-1118995396

Title	Collaboration with Cloud Computing: Security, Social Media, and Unified Communications
Author(s)	Ric Messier
Publisher	Syngress
Year of Publication	2014
ISBN	978-0124170407

Title	From Big Data to Big Profits: Success with Data and Analytics
Author(s)	Russell Walker
Publisher	Oxford University Press
Year of Publication	2015
ISBN	978-0199378326

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