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THE DIGITAL OPPORTUNITY

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CyberSecurity MALAYSIA

PIKOM

OUTSOURCING MALAYSIA

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PIKOM, the National ICT Association of Malaysia, is a not-for-profit organisation. It is the largest association representing information and communications technology (ICT) players in Malaysia. Since its inception in 1986, PIKOM has come of age as the voice of the ICT industry. It has become an ICT referral centre for government and industry players, as well as international organisations. In this regard, PIKOM takes on the responsibility to publish ICT-relevant information in a periodic manner.

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Ramachandran Ramasamy
Head of Policy, Capability and Research, PIKOM

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FOREWORD BY

The Minister of Science, Technology and Innovation

I would like to take this opportunity to congratulate PIKOM on its effort to publish ICT Strategic Review series. Now in its fifth edition, PIKOM's ICT Strategic Review is without doubt the premier publication on local as well as global trends and developments in ICT. I am proud that the Ministry of Science, Technology and Innovation is a partner in this endeavor.

The publication is a valuable resource regarding ICT; from the thought leadership provided by prominent figures in Government, industry and academia to the analysis of prevailing challenges we are facing in moving forward. Indeed, the articles contribute towards the formulation of ICT related policies as well as the development of its business and its practitioners. I am heartened to note that many of the articles also bolster the tenets envisioned in the National Strategic ICT Roadmap 2008 that underwent review in 2012. With such Government and industry alignment, I am confident that Malaysia will be successful in harnessing the plethora of new opportunities arising from the convergence and reinforcement of people, institutions and technologies.

As a final word, I would like to urge PIKOM to continue with this publication in the years to come.

Datuk Dr. Ewon Ebin

MESSAGE BY THE **PIKOM Chairman**

I am delighted to present the 'PIKOM ICT Strategic Review 2013/14: The Digital Opportunity', the fifth instalment of PIKOM's Thought Leadership series. The continuing support and encouragement given by industry players and mainstream agencies have enabled PIKOM to successfully produce this year's report. My appreciation goes out to all the contributors from industry, agencies and academia as well as individuals for making this publication a success. We have adopted the theme 'The Digital Opportunity', an appropriate focus for this year's edition. Capitalising on the digital opportunity is key towards creating a comprehensive digital ecosystem to provide a platform for the community at large to adopt and embrace a digital lifestyle.

With mobile penetration reaching the 140% mark and household broadband at 70% coupled with the proliferation of social media and e-commerce - these being the critical ICT building blocks - we are well placed to integrate a more extensive digital lifestyle. There is also no doubt that technology, content, institutions and people are becoming increasingly intertwined, in the process generating new business opportunities at an unprecedented rate. Undeniably, the current era also comes with new threats manifesting in various forms and posing challenges to business, traditions and societal ethics and values. Naturally, these warrant due consideration.

Ultimately, we hope all these will encourage an increasing adoption of technologies in businesses, at home, through government services and in schools to drive greater efficiencies and effectiveness in the entire ecosystem. The key question will again be: the pace at which technology is diffused to the masses to drive towards a digital economy encapsulating the characteristics of a knowledge-based and innovation-led society. Governments today, especially in emerging economies, realise that they can leverage on readily-proven technological platforms and knowhow to leapfrog their socio-economic state and lift the standard of living of their citizens.

In Malaysia, the services component in ICT will continue to accelerate economic growth by bolstering domestic demand. We have been fortunate that in addition to the growing penetration of mobile and broadband, the overall ICT sector has been consistently one of the fastest growing sectors in Malaysia. Our local ICT industry is expected to achieve a growth rate of 9% in 2013 and will continue to be a top five paying industry here. Over the last five years, the average ICT salary has also consistently grown at 10% per annum with jobs becoming more specialised towards big data, analytics and cyber security-related areas.

On the local economic front, our country will continue to weather the economic upheaval of countries like the US and regions like the Eurozone. However, there are signs that these two economies are slowly but gradually experiencing some growth while China may only go through a soft landing (if any). That said, it is not yet time for any euphoria or premature celebration. Malaysia, being a relatively small economy, also faces imminent internal risks due to an over reliance on direct taxes, oil reserves and subsidy model – that are all compounded by a relatively weak currency. Another continuing issue is talent retention and attracting Malaysians back to our shores. All these factors will certainly have an adverse impact on the ICT industry.

As in previous years, the Strategic Review will provide a chapter on the local economy including the state of play of the industry, thus offering a comprehensive outlook to readers in addition to subject matters that are specific and important to the industry. Other topics of interest include: mobility enhances business agility, ICT services sector capability, social media policy, IT governance, Internet threats and security including national strategies, open innovation platforms, big data analytics, talent needs for economic transformation, and broadband for innovative capacity building.

PIKOM continues to value these diverse contributions - from expressing views to voicing concerns on digital growth and opportunities including the inherent risks. The research findings would certainly be beneficial to members of PIKOM as well as the industry as a whole.

Let me also take this opportunity to thank the Ministry of Science, Technology and Innovation (MOSTI), particularly the Minister, YB Datuk Dr Ewon Ebin, for your support for this project.

To all our readers, I hope this year's report will again provide you with an insight into our industry and offer information relevant to seeking opportunities in a digital environment.

Once again, thank you to all our contributors and sponsors.

Woon Tai Hai

Introduction to Outsourcing Malaysia

Outsourcing Malaysia (OM), an initiative of the outsourcing industry and a chapter of the National ICT Association of Malaysia (PIKOM), was established to promote and develop Malaysia's outsourcing services industry as a global hub for high-value outsourcing.

Supported by its founding partner – the Multimedia Development Corporation (MDeC) – and spearheaded by a group of prominent leaders from the global services industry, OM focuses on bringing together buyers and providers to address service needs within the aegis of global best practices and competencies.

Officiated by the Prime Minister in 2006, OM represents Malaysian outsourcing providers and aims to collectively build a vibrant and strong industry through collaboration and partnership.

OM members are acknowledged as world-class service providers and are recognized by leading industry publications and listings. OM represents the local outsourcing industry to governments and private sectors here and abroad. Highlights of the benefi ts OM members enjoy are:

1. Industry & Government Policy Enablement
2. Active Engagement with Economic Transformation Programme
   - OM members will be the direct benefi ciary of the country's Economic Transformation Programme (ETP) through trade missions,programmes, events, benefits and information
3. Trade Promotion
   - A platform for B2B / B2C engagements, subsidized international conference passes
4. Business Exposure
   - A platform to promote and showcase your brand through OM's events and initiatives
5. Industry Inform ation
   - A forum for members to hold regular thought leadership brainstorming sessions
6. Global Affi liation
   - Opportunity to engage with international associations e.g ASOCIO, NASSCOM, WITSA
7. Exclusivity, Subsidies and Discounts
   - Subsidies on overseas campaigns and other capacity development programmes. Discounts and complimentary priorities are allocated for participation in seminars, conferences, cocktails,industry talks, surveys and media promotion
8. Human Capital Development - Subsidized training

Mission

To Position Malaysia as a Global Sourcing Hub for Vertical Services and Solutions

Government – Industry Collaboration

MSC Malaysia is the national ICT initiative spearheaded by the Malaysian Government to develop and promote the information and communications technology industry.

Steering the development of this initiative is the Multimedia Development Corporation (MDeC), a Government implementation agency driving the MSC Malaysia vision of an innovation-led, knowledge-rich and progressive society and nation.

PIKOM is the National Information and Communications Technology (ICT) Association of Malaysia. Its membership currently stands at over 1,000 members comprising companies involved in a whole spectrum of ICT products and services covering 80% of the total ICT trade in Malaysia.

Outsourcing Malaysia's Charter

Global Trade Development
Global Trade Missions
Conferences & Forums
Awards
Merger & Acquisition Initiatives

Initiatives with Government
Policy Advocacy
National Standards
Economic Transformation Programme

Research and Publication
Industry reports, surveys and white papers

Directory publications

Talent Workforce Development
Human Resource Talent Recruitment
Training and Certifi cation
Educational Tours

Special Initiatives
Special Focus Group
Corporate Social Responsibility

Malaysia's Service Industry Landscape

Tagline: A promising destination, a great head start

Malaysia is rapidly establishing itself as a premier global outsourcing destination. Its beginning is largely driven by Malaysia's ICT strategic framework known as National IT Agenda (NITA) formulated in 1996, and the implementation of the Multimedia Super Corridor (MSC Malaysia).

Malaysia had long been admired as an advanced and diverse economy on the fast track to becoming a fully-developed nation. Our government encourages foreign direct investment and it actively supports the local outsourcing industry.

Blessed with a growing population of young workers and a positive business climate, Malaysia is poised to be the ultimate outsourcing hub.

OVER 200 MULTINATIONAL COMPANIES HAVE CHOSEN MALAYSIA AS THEIR SHARED SERVICES LOCATION

Malaysia is ranked 3rd in the world as a global services location – nine years in a row

(Source AT Kearney Global Services Location Index 2004-2012)

Malaysia stands 9th globally ahead of other countries in Asia such as Hong Kong (12th), South Korea (13th), China (29th) and India (30th). Malaysia is ranked the MOST PROFICIENT among countries in Asia where English is not the fi rst language.

Source: Education First, English Profi ciency Index 2011 report

www.outsourcingmalaysia.org.my

EXECUTIVE SUMMARY

Woon Tai Hai
PIKOM Research Committee Chairman

CHAPTER ONE: **Capability ofInformation & Communications Technology Services (ICTS) Sector in Malaysia: An Industry Perspective**

Contributed by PIKOM, this chapter is based on the findings of a research covering 271 ICTS PIKOM members, mostly located in the Klang Valley. The objective of the primary survey was to assess the capability of ICTS companies in the country. The capability of these companies is not only critical in nurturing their own growth paths, but is equally vital in providing effective services to user communities especially those that are aspiring to move their value chain in tandem with new technological capabilities.

The study probed eight broad factors: namely organizational dynamics; innovation process capability portfolios; business and market efficacy; human capital; working environment; team motivational elements; visionary leadership and knowledge; and awareness and perception (KAP) of facilities and incentives offered by mainstream agencies. Briefly, the study revealed that ICTS companies secured the lowest score of 2.29 out of a maximum 5 in the Likert scale, indicating the weak relationship between PIKOM member companies and mainstream agencies that provide R&D grants, innovation and commercialization support.

The study also revealed that Malaysian ICTS companies are weak in securing globally-recognized certification accorded for standards and quality. This, in turn, reflected poorly on their ability to export ICT services to other countries.

The study also recommended that Government agencies should adopt a more proactive role, as opposed to the reactive strategy of the past, in raising awareness about incentives and facilities offered by them as well as participatory engagement in industry-relevant policy dialogues as well as program formulation and implementation.

CHAPTER TWO: **Malaysian Economic and Information & Communications Technology (ICT) Industry Outlook**

As in previous editions, KPMG Malaysia is once again providing a snapshot of the Malaysian economic and ICT outlook. The PIKOM Chairman expects the Malaysian economy to grow at rate of 5.1%, which is not far off from predictions made by mainstream Government agencies, research institutions and private sector organizations as well as international development agencies like the IMF, WB and ADB. Positive growth is attributed to factors such as strong trade ties with Asian countries particularly China, the recent surge in FDI especially in the services sector, and also strong domestic demand.

The latter is fuelled by strong macro fundamentals such as low inflation rate, low unemployment rate, stable overnight policy rate, the strengthening Ringgit in the monetary market, and public and private consumption growth driven by mega projects and the Economic Transformation Programme. However, the economy continues to grapple with economic challenges such as a diversion of foreign investors to other emerging markets, the slack in implementation of corridor projects, fiscal deficits and quality workforce.

Indeed, the current economic growth fuels the growth of the ICT Services sector, especially capital intensive projects that require intensive deployment of ICT components and systems. The ICTS sector is also experiencing prolific growth in the export and import of ICT services, particularly through MSC Malaysia projects in cases where the foreign-based companies have extensive dealings with their home countries.

The ICTS sector is poised to grow at a much faster rate in the near future on the back of the convergence of cloud computing, big data analytics, mobile devices and social media in the provision of business and household services. However, the ICT sector is not totally free from encumbrances. The ICTS sector faces challenges like the supply of quality graduates, talent migration to neighbouring countries, securing globally-recognized accreditation and certification for standards and quality, R&D and the commercialization culture.

CHAPTER THREE: **Social Media Policy as an Integral of HR Practices: A Digital Era Work Culture Perspective**

The use of social media at the workplace has become a controversial topic and is highly debated in various human resource forums. Specifically, some employers are against such new age practices, fearing it may affect staff performance and productivity. This chapter looks into this issue from both the employer and employee perspectives by taking into consideration the evolution of the web and development of content technology, work governance and processes, as well as rights of expression of individuals. The positive

side of social media is that, much like traditional media, it can reach out to global audiences; can help in building networking and relationships with customers, vendors and suppliers; can provide accessibility to the public at large; does not demand high skills for postings unlike in the case of traditional media; and offers immediacy of content posts and editing.

As such, its features and characteristics can be used effectively for advertising and marketing purposes, warranting due attention from both employees and employers. However, the negative side includes exclusiveness when data cannot be ported from one site to another; the widening of disparity and the digital divide gap between users and non-users; reliability, validity, timeliness, quality and authentication as well as sense of ownership of user generated content of posts on the site; and loneliness and Internet addiction.

Nonetheless, the convergence and reinforcement of cloud computing, content, mobility and social, increasing consumerization of IT phenomena at workplaces and the socially fearing of missing out (FOMO) phenomena is exerting pressure on both employers and employees to formulate new workplace strategies so that individual employees do not lose their freedom of expression and employers are not at risk of losing workplace productivity. As such, this chapter provides some guidelines on enacting and harnessing social media policy practices as an integral component of HR practices, not only from the business perspective, but also in closing the inter-generational gaps.

CHAPTER FOUR: **IT Governance in the Digital Economy: C-Level Management Perspective**

In this chapter, the author highlights five important lessons from his years of working experience in IT governance - disaster occurrence, process documentation, risk management and audit control, security and staff engagement at all levels. The author also points out that business, operations and IT systems must be aligned in order to be more productive, efficient and effective. However, in the absence of good IT governance, both traditional and non-traditional organisations have failed due to the huge gaps in processes, single point of failures, mismanagement of information, data disparity, lack of alignment between business and IT, lack of timeliness in key data, heavy staff turnover, lack of vital control and access - affecting business continuity.

Recognizing the challenges, the author emphasizes on the need for a holistic approach in integrating the entire ecosystem of an organization. The ecosystem should not only encompass infrastructure and its access and control elements, but also habits and the behavioral aspects in management; awareness, practices and adaptation dictating work culture; defining and aligning system processes with business processes; detailing out configurations, workflow and methodology; and deploying policies and procedures organization-wide.

With such a governance system in place, an organization can facilitate in patching up the loopholes and gaps in the processes; avoiding potential damages arising from external intrusions and internal foul play; resolving management crisis pertaining to division of responsibility, task completion schedules and quality assurance; undertaking periodic strengths, weaknesses, opportunities and disaster (SWOD) analysis; instituting data governance entailing value, security, loss, misuse, disclosure, damage and change as well as associated policies, procedures, rules, roles and regulations; and instituting compliance, confidentiality, visibility, preparedness, availability and integrity in enterprise business framework including risk management and mitigation.

As such, good IT governance practices are poised to play a significant role not only in meeting business objectives, but also in ensuing business continuity from the strategic, financial, legal, operational and reputation perspectives. Indeed, the demand is more critical in the current digital economy where upheavals in technology, processes and people are occurring at an unprecedented rate.

CHAPTER FIVE: **Business Agility Grows with Mobility: An Industry Perspective**

The advent of Internet technology coupled with the liberalization of the telecommunications market since the early nineties has resulted in cellular devices increasingly replacing the fixed lines services. Despite the higher subscriber costs, cellular services eventually overtook their fixed line counterparts in the household sector in 2000. Further, the growth of fixed line services in the business sector

has virtually stagnated since 2011 with the increasing number of technology-savvy young and mobile professionals entering the workforce.

In any case, the availability of seamless connectivity and real time interactivity 'anytime, anywhere' has led to Generation Y creating a new work culture and practices that enable them to work from their home or Starbucks or any other teleworking centre. The 'buy your own device' (BYOD) concept at work places is also posing new human resource challenges in terms of office inventory control, data authentication and security. The growth of mobile services is on an upward trend due to the popularity of the pre-paid payment mode, which is considered more convenient than post-paid.

The broadband market is also incrementally shifting towards the mobile version, which in the near future has been projected to offer more competitive prices and quality services in comparison to fixed broadband services that are widely used now. In terms of devices, technologists have projected that in the next five years, cellular devices offering greater mobility, convenience and versatility will replace tablets, laptops and desktops - indicating potential for mobile businesses. It is not only technology that has become mobile, but also talents who are easily moving across borders in search of greener pastures for career advancement. Mobile communications, interactivity networking and building relationships greatly facilitate talent migration and mobility among knowledge workers.

CHAPTER SIX: **Fast-tracking Industry Innovation through Open Innovation Platforms: The MIMOS Experience**

This chapter on the country's R&D is contributed by MIMOS. In the previous series, MIMOS highlighted R&D efforts on frontier technologies while in this series, it expounds on open innovation platforms that industry can leverage on. The adage 'Big eats the Small' is passé. Now it is 'Fast eats the Slow'! So how do you rapidly develop new products and move them into the market in double-quick time? The answer is 'open innovation'. To drive open innovation optimally, MIMOS advocates the concept of Open Innovation Platform.

This serves as the lynchpin for pulling in and holding together both the research community and industry fraternity so that innovative products can be fast tracked into the market. One crucial barrier for new products is market acceptance. MIMOS advocates the process of 'technology industrialization', whereby product field trials are carried out to address issues such as product reliability and track record.

CHAPTER SEVEN: **Cyber Security as a Central Strategy to National Sovereignty and Economy**

In this paper, Cybersecurity Malaysia discusses how pervasive digital technology has created new demand for cyber security in order to protect the ICT infrastructure and information system services we have produced and are using. Cyber threats are not only technical in nature but also in the form of content posted on cyber media like seditious and defamatory statements that can be detrimental to national security and social harmony.

In Malaysia, based on the statistics of cyber incidents referred to CyberSecurity Malaysia, fraud constituted 37.5% followed by intrusion (32%,) besides cyber harassment, denials of service, intrusions and malicious codes. Estimated losses as a result of cyber crimes amounted to RM241 million from 2010 to 2012. Hence, it is expected that the trend on cyber-based crimes will continue to rise. Globally, acts of aggression and hostile activities such as cyber espionage, malicious software infection, system intrusion, technically complex and sophisticated high scale attacks targeting critical systems have also been on the rise in recent years. Some of these activities are complex and believed to be state sponsored. Malware threats are now becoming more devastating and some of them are aimed at critical systems and to steal sensitive data.

The paper also highlights the fact that cyber security has evolved into a billion dollar market, globally worth about USD60 billion in 2011 and growing at 10%. The bulk of the spending is directed at four key areas, namely network security (41%), security operations (18%), data security (18%) and identity and access control (15%). Recognizing the growing cyber threat and market potential, the paper highlights the need to mobilize resources in R&D, development, testing and manufacturing. More importantly, the paper sees a greater role for cyber security in Malaysia to foster innovation, knowledge enrichment

and wealth creation - achieved through a secure, trusted and resilient cyber environment.

CHAPTER EIGHT: **Internet Security Threat Report: Trends 2012**

Symantec, as in previous years, provides a detailed report on Internet security for the year 2012, reporting five areas of concerns in this chapter. First, the report indicates that 50% of all targeted attacks are aimed at small businesses, which offers a path of least resistance to attackers in comparison to large businesses. The misconception is that small businesses typically think that they have nothing a targeted attacker would want to steal; on the contrary, they forget that they retain valuable customer information, create intellectual property, and keep money in the bank. Moreover, small businesses tend to lack strategies in fortifying cyber defenses in comparison to large businesses.

The white paper reveals that cyber espionage gangs hijack websites of small businesses and lie in wait for their targets, especially big businesses, to visit so that they can infect them. Second, malware authors act like a big brother by spying, tracking movements and stealing personal information such as banking particulars, phone numbers, email addresses of friends and business associates, jobs, professional interests, conferences we attend and personal identities with an ultimate goal of making fast money. Third, vulnerabilities reported in the mobile operating system have increased by 58% within a year because of the openness of the platform and multiple distribution methods available to applications that can be embedded with malware. Fourth, Stuxnet and Elderwood Gang used zero-day vulnerabilities strategy for their attacks, which increased by 14% in 2012. Fifth, proving attribution and motives are not easily determined in the event of hacktivism, despite someone claiming responsibility.

For instance, the responsibility for a malware named Shamoon, aimed at wiping computer hardware drives of energy companies in the Middle East, was claimed by a group calling itself the "Cutting Sword of Justice"; similarly, DDoS launched attacks on financial institutions, but it was Izz ad-Din al-Qassam that claimed responsibility. In essence, constant innovation from malware authors and expansion of traditional threats such as spam and phishing attacks into social media and mobile devices warrant due attention in safeguarding online security.

CHAPTER NINE **Connected Generation: Perspectives from Tomorrow's Leaders in a Digital World-Insights from the 2012 IBM Global Student Study**

This chapter by IBM Institute for Business Value reports key findings from the IBM Global Student Study in conjunction with the 2012 IBM Global CEO Study. The study covered 3,400 college and university students worldwide to better understand the opinions, perceptions and aspirations of our future employees, customers, leaders and citizens. First, the findings reveal that students viewed market and macroeconomic factors as the top two forces likely to make an impact on organizations over the next five years. On the contrary, the CEO study indicates that the impact of technology and human capital on their organizations are more critical. Second, that the CEOs, especially those from outperforming organizations, expect demands on greater transparency, connectivity and openness to help stimulate creativity, innovation and growth, but balance is needed without jeopardizing security, confidentiality and intellectual property. Third, today's CEOs believe face-to-face interaction is the most important tool in building customer relationships while students cite social media and websites.

However, both agree that traditional media falls behind both face-to-face interaction and social media/websites. Fourth, students see more value in digital channels than face-to-face interaction when it comes to their own education, though they expressed otherwise on customer relationship. Improving response time to market needs is also a higher priority among students. Fifth, regarding customer centricity, students emphasize more on improving social and environmental responsibility (SER) rather than improving response time. Six, regarding leadership, both students and CEOs concur that qualities such as communication, collaboration, flexibility and creativity as well as constant self-reinvention, openness and responsiveness to constant change, and learning from others' experiences, warrant due attention. Seven, leadership imperatives differ among CEOs and students, particularly those imperatives that students indicate are not fully attuned to the social values and environmental commitment.

Alternatively, students may not yet fully understand day-to-day business imperatives. Eight, regarding education for success, overall the students believe that their education has equipped them with the skills needed for future employment. Collaborating with others, for example, is identified by CEOs as the number one trait they seek in employees. In addressing the gaps, the report suggests that students make the business case for change; be a social media ambassador; embrace education as a life long journey; create the workplace of tomorrow; and invent the work organizational pyramid, mobility and social interactivity characteristics. Similarly, the report makes a clarion call for educators that constantly anticipate new business imperatives and expansion of the educational ecosystem in response to economic, financial and social disruptions towards developing a competent, innovative and creative work force.

CHAPTER TEN
From Big Data to Big Insights: Microsoft Perspective

This chapter is prepared by Microsoft on the growing importance of big data that can be used for culling out valuable business insights. Unlike the traditional database systems, big data comes in the form of YouTube videos, Facebook posts, credit card transactions, store inventory, your last grocery purchase - trillions of pieces of information are being collected, stored, and analyzed almost daily with increasing speed. According to IDC, the digital universe will grow to 35 zettabytes (i.e. 35 trillion terabytes) globally by 2020. Not only is the data voluminous, but it also comes structured, unstructured and in a variety of forms. More importantly, the rise of new technologies like Hadoop is making it possible to analyze voluminous data without incurring much cost.

The paper cites three types of big data analytics, namely social and web analytics that can be used for analyzing brands, products or services; advanced analytics that can used for predicting future outcomes; and live data feeds providing optimization like in the case of weather and traffic patterns. Big data analytics require a holistic approach entailing a flexible data management layer that support virtually all data types; an enrichment layer for discovering, transforming, sharing, and governing data; a compelling suite of tools for gaining insights from analytics; and a marketplace that combines organization data with data from external sources. Pertinently, the paper also indicates that data processing is increasing and becoming simpler – meaning that we do not require business intelligent experts or data scientists to analyze the community, personal, organization and world data and convert them into valuable information for business.

CHAPTER ELEVEN
Addressing Talent Needs of the Economic Transformation Programme (ETP)

This chapter by TalentCorp acknowledges that Malaysia has skilled world class talents who are in high demand. Unfortunately, due to globalization and the increased mobility of labor, the country has to compete for our own talent in the international market. Brain drain has adverse effects on economic growth and investments, posing challenges to realizing the ambitions of the Economic Transformation Programme (ETP). Malaysia's talent pool not only comes from the local education system, but also returning Malaysian graduates from overseas as well as foreign talent. However, key issues affecting the talent pool equilibrium, as mentioned by TalentCorp, include quality of education, availability of talent, workforce productivity and quality of life. Compared to regional countries, the process of employing the right talent in Malaysia is costlier and is a time-consuming process. Lack of information technology skills, poor English proficiency and poor communication skills have been cited as key restraints to hiring.

Despite gender parity in education, women participation rates in the workforce has not surpassed the 50% mark since the 1980s, which is low by regional and international standards. Since 2004, the highly-skilled expatriate base has been shrinking in Malaysia. Malaysia's immigration regulations are also deemed cumbersome by both foreign talent and the employers wishing to hire them. Addressing these challenges, as proposed in the New Economic Model (NEM), TalentCorp agency was established as a single focal point to act as a bridge between talent, industry and relevant government agencies, with a mandate responsible for sourcing top global talents to fill the skills gap and to deliver the human capital that Malaysia needs..

In this endeavour, Talent Corp has embarked on three strategic thrusts. First is to optimize Malaysian talents through initiatives such as providing career awareness and career guidance, enhancing school

to work transition and building platforms on optimise talents. Second is to attract and facilitate the global trend through programmes such as outreaching to Malaysians abroad, facilitating returning talents and enhancing expatriate facilitation. Third is building networks of top talent vide building networks of future leaders, developing diaspora networking platforms and engaging the expatriate community.

CHAPTER TWELVE
Broadband Diffusion, Innovative Capacity and Sustainable Economic Development: Lessons for Malaysia

The authors in this study show that broadband-powered network externalities are crucial for countries to move up the innovation value chain. Specifically, network externalities are poised to facilitate speedy and cost-effective knowledge transfer between all stakeholders via formal and informal channels; provide access to national, regional and global knowledge networks that can be mutually beneficial for the research communities in the developed and developing countries; and enable the international research community to address global challenges such as health pandemics or natural disasters in a relatively short period of time.

Recognizing the power of network externalities, the researchers establish the relationship between broadband diffusion, quality of scientific institutions, innovative capacity and socio-economic development. In this study, Malaysia's performance was benchmarked against other developed and developing countries.

The study shows that Malaysia lags behind developed and pace-setter countries in the innovation race due to the slow deployment and high cost of broadband, leading to inadequate capacity for high end applications, poor industry and university engagements in research and development, and a widening of the urban-rural digital divide. In overcoming the challenges, the authors recommend that Malaysia emulate lessons from pace-setter countries in charting a new path to sustainable socio-economic development using more advanced communication networks.

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Your **cyber safety** is our **concern**

Securing Our Cyberspace

CyberSecurity Malaysia, an agency under Malaysia's Ministry of Science, Technology and Innovation was set up to be the national cyber security specialist centre. Its role is to achieve a safe and secure cyberspace environment by reducing the vulnerability of ICT systems and networks while nurturing a culture of cyber security. Feel secure in cyberspace with **CyberSecurity Malaysia.**

www.cybersecurity.my

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Ministry of Science, Technology and Innovation

CHAPTER 01

CAPABILITY OF THE INFORMATION AND COMMUNICATIONS TECHNOLOGY SERVICES SECTOR IN MALAYSIA: AN INDUSTRY PERSPECTIVE

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PIKOM

Introduction

Convergence and reinforcement of information, cloud, mobile and social elements (Carlton, 2012) well supported with speed, seamless communications, multi-facet technological capabilities and diverse devices are poised to register a continuous plethora of new business opportunities and technological innovations. Over the past decade, many disruptive technological innovations have emerged in the Information and Communications Technology (ICT) sector, changing entire business landscapes and market structures as well as consumer behaviour and lifestyles (Christensen, 2011; Drucker, 2008). Currently, 'consumerization' of the Information Technology (IT) phenomena as well as the advent of social businesses, cloud computing, mobile social commerce, big data analytics, platform as a service (PaaS) and content as a service (CaaS) are increasingly impacting businesses and economic development (IBM, 2012, Saleh, 2012).

Specifically, 'consumerization' of IT connoting the usage of consumer devices and services in the workplace are giving rise to new work practices and business cultures (Mansor, 2012). Similarly, with the support of seamless broadband connectivity, e-mail communication, data security and authentication systems in place, many companies are already experimenting or re-inventing themselves with new work cultures such as Bring Your Own Device (BYOD) and working remotely from anywhere at anytime. Indeed, the technology savvy Y & Z generations prefer such work practices as opposed to typical rigid working hours. Social technology platforms are also increasingly being used for generating new networks of customers, partners and employees, thus expanding the business coverage and innovation scope (Mansor, 2012; IBM, 2012).

Some companies gauge customer mood and employee sentiments using social networks platforms. These are only the tip of the iceberg, with many other things to come. Such changes are not only evolutionary but sometimes revolutionary, impacting not only the technology providers but also the users of ICT services (ICTS). Therefore, the innate capability of ICTS providers is not only critical in ensuing their own business growths, but also their capacity to serve effectively the ICTS user communities in sectors such as banking, insurance, education, health, civil service, et cetera.

Policy And Industry Imperatives

Since the advent of the Internet in the early nineties, the Government of Malaysia has continuously promulgated the deployment of ICT as a major development thrust in achieving a knowledge-based economy (EPU, 2001; Abdulai, 2001; Nair, 2007; Abdul Wahab and Ramachandran, 2011;) and an innovation-based economy (EPU, 2006 ; Abdul Wahab, 2012). The New Economic Model (NEM) released in March 2010, among many others, had identified ICT as a strategy to alleviate the country from the middle income trap (NEAC, 2010; PEMANDU, 2010).

It has been more than two decades of concerted effort to usher the nation incrementally into an endogenous growth path vide an ICT promulgation strategy but it has yet to reach the global standards like what the Koreans and Japanese have achieved. In the industrial age, Japan has created numerous global brands with global standards and quality (e.g. Honda, Toyota, Panasonic and Sony), and in many instances, they have overtaken the Western market which had been dominating the industrial market for many ages since the Renaissance started five centuries ago (Yu, 2012).

In the same vein, the Koreans are making an indelible mark by innovating world class ICT products and services (e.g. Samsung, Hyundai and LG), which have successfully captured a substantial share in the global market (Hollis, 2008). The Chinese are joining the global brands rank, even at a faster rate (Hollis, 2008). Despite poor command in the English language, which is considered the lingua franca of business and the Internet world (Wolk, 2004; Bhatnagar, 2006), companies in Japan and Korea have registered meteoric rise in entrepreneurial development.

This may be conjectured to many factors including cultural, societal, educational, legal, financial and political will as well as an ingrained societal value system. However, such factors alone would not suffice unless companies enhance their organizational capabilities, which is fundamentally critical for research, development, innovation, patenting intellectual properties, registering trademarks and branding as well as for having a successful commercialization track record.

Organizational capabilities have been always a major concern for any company for its existence, relevance, and business continuity

(Schienstock, 2009; Dosi, Nelson and Winter 2000; Grant, 1996). The only difference is what was apt for an agricultural or industrial age may not be appropriate for the current information era (OECD, 1997), which comes with ubiquitous and pervasive impact of contemporary ICT on all spheres of life, unprecedented in the human history (Castells, 1996; Tapscott, 1997; Azzman, 2000; Castells, 2000; Ramachandran, 2008). It is continuously changing the way one works, plays and performs transactions, including institutional structures, roles, rights, rules and regulations as well as relationships and networking (Graham, 2008; Shapiro & Hal Varian, 1999; Dertouzos, 1997; Cairncross, 1997).

ICT investments in Malaysia are targeted at sources of new growth areas such as hybrid of wired and wireless telecommunications, multimedia content development, packaged software, software and hardware consultancy as a service, exports and imports of ICT services, e-commerce, mobile and online banking, e-government and outsourcing. Similarly, on the technology front, the country has also been experiencing significant strides in technological advancements pertaining to Nanotechnology, Micro-Electro-Mechanical Systems (MEMS), Semantic Technology, Wireless Communication, Grid-Computing, Biometrics and Biotechnology, which are aimed at revitalizing the ailing micro-electronics sector (Abdul Wahab, 2012).

In tandem, the Government has also been promoting research and development in the ICT Services segments through six technology focus areas (TFAs) under ICT Roadmap 2012, namely e-Services, Wireless Intelligence, Ubiquitous Connectivity, Big Data Analytics, Security & Platforms and Cloud Computing (Abdul Wahab, 2012). The TFAs were identified after taking into consideration global ICT trends such as pervasive and ubiquitous computing, pay as you use models, smart infrastructure, preventive health care, rise of the machines, real time and all the time, mass customization and cyber warfare as well as capabilities pertaining to human capital, patenting and commercialization culture (Abdul Wahab, 2012). The earlier ICT Roadmap 2008 focused on only three key TFAs, namely Wireless Sensor Networks, 3D-Internet and Predictive Analytics. The industry membership, specifically the composition of The National ICT Association of Malaysia, popularly known as PIKOM, has also diversified over the years. When it started in 1986, it solely consisted of members from the computer hardware and software vendor industry (Saleh, 2011).

Today, its membership covers the entire ICT landscape, namely bio technology, business process outsourcing, communication / networking, consultancy / professional services, creative content, data centre / web hosting providers, education / training, hardware design, Internet-based business, information technology Outsourcing (ITO), business process outsourcing (BPO), shared services outsourcing (SSO), maintenance, repairs and services, mobile and wireless, network security, software development, system integrators / value added resellers, telecommunications and principal for manufacturers. The country has been always at the point of inflexion, pursuing new frontiers and heights in the ICT evolution (Rasiah, 2009) beginning with main-frame introduction in the Sixties (Alhabshi, 2002) followed by setting up of micro-electronics production factories in the Seventies (Vijayakumari, 1994; Jomo and Edwards, 1993). In this evolutionary process, the role of the ICT sector, more so the ICT services segment, is undeniably seen as a mover and shaker of not only ICT products and services producing companies but also the ICT user industries like banking, insurance, medical, education, transport, logistics, et cetera. Indeed, the era of the Internet saw emergence of many modern lifestyle applications pertaining to online banking, distance learning, tele-working, tele-medicine, e-commerce, online shopping, cloud computing, big data analytics, provision of e-government services and e-democracy et cetera (Tapscot, 1997; Castells, 2000; Saleh, 2011). Similarly, with an eye towards creating an eco-friendly environment, new and innovative green ICT products and services are being added into the market more often now than in the past.

For the same objective, creation of green ICT jobs are also on the rise (Rajendra, 2012). In tandem with technology evolution, industries are also compelled to beef up their organizational capabilities in coping with structural reforms and institutional changes pertaining to online publishing (CIJ, 2012), Internet freedom (CIJ, 2012; RWB, 2011), data protection (Khera, 2012), cyber threats and security (Ong and Tan, 2012), intellectual property rights (IPR) and branding (Kwang, 2010). In other words, today the ICT sector in its contemporary form has evolved to be more than a mere

collection of technological tools (Azzman, 2000). Knowledge-based organizations (Grant, 1996) and skilled biased techno-organizational change (Breshhnaham, Brynjolfsson and Hitt, 1999) imperative for not only for spearheading the nations into more advanced developed status but also for accelerating the phase, pace and speed of knowledge-based innovation society and economy. As highlighted earlier, the reinforcement of information, cloud, mobile and social elements in the days ahead are likely to register a plethora of new applications (Carlton, 2012) that have never been seen before. Therefore, the level of preparedness and, more so, the ability to cope with contemporary demands have become imperative not only for ICT services providers but also for ICT users in the Government and businesses as well as societies at large.

Capability At Sector Level

Sectors are seen as complex systems of organisations, which also involve a wide range of stakeholders in the public sector, as well as across the civil society and the private sector – at the international, national, sub-national and local levels (OECD, 2010). All these players are likely to shape and condition the dynamics of a sector (Van Esch et al., 2010).

Typically, sector dynamics are influenced by political decisions, policy directions, socio-cultural elements, power relations, incentive systems and inter-linkages with other sectors (Boesen, 2008). The ICTS sector is not an exception to such complexity, multidimensionality and interdependence as well as multi-stakeholder partnership involvement. However, the paper did not assess all the dimensions of the sector's dynamics, which would have been a formidable task, but rather only confined to the business capability of firms in the ICTS sector.

Significance of Organizational Capability

Businesses consider organizational capability as the overall ability of a company in managing its resources efficiently and effectively in meeting its business goals and aspirations (Gusberti and Echeveste, 2012; Kelchner, 2012) as well as ensuring their business relevance, continuity and growth (Prahalad and Hamel, 1990). This can be seen from two aspects: managing business efficacy and managing internal dynamics. As surmised by Kelcher (2012), organizational capability in managing business efficacy includes: (i) ability to administer, manage and appropriately direct the experiential knowledge and skills endowed in the workforce towards achieving the company's business objectives (Drucker, 2008; Helfat and Lieberman, 2002); (ii) ability to create new knowledge, innovating new products, services and processes as well as undertake commercialization of patents and licenses (Knight and Cavusgil, 2004; Christensen, 2011); and (iii) ability to uphold good customer relationship including learning from customers (George, 2003; De Feo and Bernard, 2005).

In managing the internal dynamics, the organization capability is reflected on: (i) its ability in balancing customer demands and organization resources especially in managing quality and process improvement dynamics (Keller and Keller, 2010; George, 2003; Pyzdek, 2002); (ii) creating a conducive working environment and motivational elements for its employees (Helfat and Peteraf, 2003) and (iii) how flexible, versatile, and responsive it is towards changing work culture and practices, business dynamics and sustainable growth (Drucker, 2008; Lawson and Samson, 2001). Succinctly put, organizational capability does not only involve business factors but also institutional and people elements that support business growth. As such, when firm level strengths and weaknesses are aggregated across the industry, it will provide a cumulative reflection on sector level business capability.

However, in practice, organizational capability vary greatly among companies depending on their size, financial strength, core competencies, human resource practices, technology adoption, work culture and practices, institutional support system, R&D and innovation capability as well as organizational values (Knight and Cavusgil, 2004; Schienstock, 2009). Typically, the multi-nationals and the big corporations who aspire to remain relevant and sustainable in a fast changing business and technological world are likely to have a greater tendency, as well as the capacity, to put capability models in place. When processes, procedures, methods, rules, roles and regulations are in place, it will be a lot easier for organizations to constantly identify gaps, business risks and market potentials and also undertake competitor analysis, and comprehend product and service development nuances (Lawson and Samson, 2001; De Feo, Joseph and Barnard, 2005; George, 2003).

Due to resource constraints, it is unthinkable for small and

medium businesses to pursue globally recognized certifications, which typically come with high expectations in terms of standards and quality and, more so, being expensive. Such organizations are likely to depend upon Government support in building their organization capabilities and workforce competencies. Therefore, assessing sector level capability is not only in the interest of business development but also as a public policy and macro-economic matter, especially for resource appropriation and allocation by mainstream government agencies.

Shades of Capability Models in ICT

There are many types of models and levels of capability assessment targeted at the organizational, team and even individual level (Bakhru and Grant, 2010). Prahalad and Hamel (1990) viewed core competence of a firm as a tree – roots constitute competencies, trunk and limbs as core products and flowers representing end products. Similarly, Chandler (1992) conceived firm level capabilities as a vertical chain consisting of R&D, raw materials sourcing to marketing and up to sales and distribution.

However, the predominant view about organizational capabilities is integration of knowledge hierarchy entailing various functional and cross-functional capabilities (Bakhru and Grant, 2010) at strategic, tactical and operational levels (Zollo and Winter, 2002). As mentioned earlier, any organizational capability model is simply aimed at measuring what organizations are able to do, or more precisely, deploying resources towards achieving a desired end result (Helfat and Peteraf, 2003). It is the question of how organizations build or create their capabilities, which may entail cognitive search through one or more of the following: covert or overt learning via concepts and models (Gavetti, 2005), sourcing from outside or transfer of capabilities from existing to new businesses (Buenstorf and Klepper, 2005), prior employment of the founders (Philips, 2002), knowledge conversion from tacit to explicit modes between individual and organizational levels (Nonaka, 1994) or, simply learning by doing (Prencipe & Tell, 2001).

Capability Models in ICT

In the ICT sector, models such as Capability Maturity Model Integration (CMMI) from the Software Engineering Institute (SEI), used for gauging software development maturity (SEI, 2013; Nandayal and Ramasamy, 2011) and Information Technology Infrastructure Library for gauging IT management practices (ITIL, 2013) are widely used in assessing organizational capabilities and competencies. Some organizations that pursue CMMI also, in tandem, implement People Capability Maturity Model (PCMM) from SEI, which is used for gauging workforce competency at organization wide level (Nandyal, 2003; Nandyal and Ramasamy, 2011).

Similarly, agencies like the Green Computing Initiative (GCI) provide dedicated certifications for organizations and individuals in the area of Green Computing that aligns all IT processes and practices with the core principles of environment sustainability, which are to reduce, reuse, and recycle wastes (IAOP, 2013; Curry, Guyon, Sheridan, and Donnellan, 2012; Rajendra, 2012). In the contemporary outsourcing sector where ICTS usage is the core, capability models like e-Sourcing Capability Model for Service Providers (eSCM-SP) and the e-Sourcing Capability Model for Client Organizations (eSCM-CL) from International Association of Outsourcing Professionals (IAOP) are deployed in assessing organizational competencies. Some capability models are organization specific like IBM Process Reference Model for IT (PRM-IT), which assesses IT management processes within IBM, mainly by providing a checklist on adherence to process and quality (Finden-Browne, 2007).

Subject Matter Specific Capability Models: Also Applicable to ICT Sector

Besides sector specific organizational models, some models are subject matter specific but applicable to any sector including ICT. To name a few, these include new product development (Ethiraj et al, 2005), project management (Ethiraj et al, 2005), R&D capability (Nerkar and Prachuri, 2005), acquisition capability (Arikan and McGahan, 2010), customer relations capability (Ethiraj et al, 2005), engineering capability (Kazanjian and Rao, 1999) and quality and process improvements capability using Six Sigma methodology (DE Feo and Joseph, 2005; Pyzdek, 2003).

A close scrutiny reveals that these models are supported with well-defined methods, processes, procedures, rules, regulations and operational templates as well as

certification and accreditation mechanisms for assessing organizational competencies, but focussed on organizational needs (Bakhru and Grant, 2010).

Mixed Models

In this progression, it is not uncommon nowadays to discover deployment of mixed models especially software companies pursuing CMMI, PCMM and Six Sigma practices as these models complement each other well. Specifically, CMMI provides the framework for developing maturity levels in organizational process, PCMM provides framework for attaining maturity in workforce competency and Six Sigma practices come in handy as a data supported problem solving methodology (Nandayal and Ramachandran, 2011). Whichever model an organization may use, they all have one common objective of getting certified based on their use of and adherence to the best practices and processes as well as quality. Indeed, certifications help greatly in branding organizations and their products and services, which is critical for market access and entry; for example, CMMI certification is one of the requirements for any company (including foreign companies) to procure software development businesses that come under the Government contract (Carmel, 2003).

Capability Certification

Most of these organizational or individual capabilitiy models come with certifications, which determine competency, authority, or credibility. Capability certifications are issued either by a global institution or an individual organizational. A certificate is issued once the applying organization attains the prescribed standards in product development or service delivery or process maturity or workforce competency as per the criteria and guidelines laid out by the certification issuing agency. Certification agencies can be divided into two types, one operating at the global level and the other at an organization level. For instance, SEI of Carnegie Mellon University holds the authority in issuing CMMI certification for software development maturity and PCMM for attaining work force competency. Similarly, ITIL Certification Management Board (ICMB) of United Kingdom certifies IT Management practices; GCI on green computing practices and IAOP on outsourcing practices.

Organizations like General Electric and Motorola, early adopters of Six Sigma for process and quality improvement activities, have developed their own certification programmes as part of their Six Sigma implementation, verifying individuals' command of the Six Sigma methods at the relevant skill levels, namely White Belt, Green Belt, Black Belt, etc. Though started in manufacturing plants, today the Six Sigma practice has spread to transactional and services-based organizations (Keller and Keller, 2010; De Feo and Bernard, 2005). Unlike global institutions, criteria for Six Sigma certifications vary across organizations as there is no standard certification body (Coryea, Leroy, 2006).

Key Challenges

Not all organizations are at the same level in pursuit of organizational capabilities (Knight and Cavusgil, 2004). Typically, the multi-nationals and the big corporations who aspire to remain relevant and sustainable in a fast changing business and technological world have a greater tendency to put capability models in terms of processes, procedures, methods and approaches as well as administrative and institutional support systems in place. Such institutional best practices facilitate organizations to constantly identify gaps, distinguish business risks, conduct competitor analysis, understand market potentials and comprehend product and service development nuances (Lawson and Samson, 2001).

Lacking such agility, maturity and competency may affect an organization's performance in terms of decision making and undertaking timely corrective actions, which in turn becomes detrimental to revenue, growth, profitability, corporate governance, market positions and industry leadership (De Feo, Joseph and Barnard, 2005; George, 2003). Smaller organizations may lack adequate resources in pursuit of globally recognized certifications, which typically come with high expectations in terms of standards and quality and is quite costly. Such organizations are likely to depend upon Government support in building their organization's capabilities and workforce competencies. The other challenge is that levels of capabilities vary across organizations and among individuals (Schienstock, 2009). Individuals enhance their capabilities either on their own, if it is affordable, or with their organization's support (Rajendra, 2012, Nandyal and Ramasamy, 2011). Failing which, they also may become irrelevant due to lack of up to-date knowledge and competency at work.

Generic Capability Models

Some models are generic but applicable to specific situations like Carmel's (2003) Oval Model for gauging success factors for software exports. Similarly, Lawson and Samson (2001) reviewed Kanters' (1989) Innovation Capability model by incorporating new business streams, products and process systems, knowledge factors, end customer and market demands. In the same vein, this paper also proposed a H-Model Framework in gauging the ICTS sector's capability.

H-Model Framework For Assessing Sector Level Capability

Recognizing the gaps as well as the business and policy relevance, the paper proposed a generic H-Model Framework (HMF) to investigate the collective capability of the ICTS sector, as shown in Figure 1. The H-Model Framework represents eight broad based factors under three dimensions, namely Institutional Dimension, People Dimensions and Environmental Dimensions. The institutional dimension entails three factors, namely organizational dynamics, innovation process capability portfolios and business and market efficacy; the people dimension entails human capital, working environment and team motivational elements; and the environmental dimension, central to both the institution and people dimensions, consists of visionary leadership along with knowledge, awareness and perception (KAP) of government relations.

Essentially, the H-Model Framework provided the conceptual framework for designing survey instruments, particularly survey questionnaires and analytics frameworks. Besides probing basic demographic characteristics and features of firms, the questionnaire probed a total of 40 variables of a firm's capability level, with five questions under each broad based factor. Due references are also made to experiences of past studies so that the relationship between the 40 variables and the observed patterns have relevance, validity and that it remains appropriate to the study.

Malaysia as a Case Study

For illustrating the proposed sector level capability, the study attempted to assess the collective organizational capabilities of ICTS providers in Malaysia. Malaysia has a long ICT history, which began in the early seventies when the micro-electronics sector started to flourish. Since then, all the national development plans have regarded ICT as one of the key policy thrusts. Specifically, over the past two decades, the Internet driven contemporary ICT is considered as a key enabler to build a knowledge-based economy and society.

Currently, the country is in pursuit of attaining a high income status by 2020. Besides depending upon

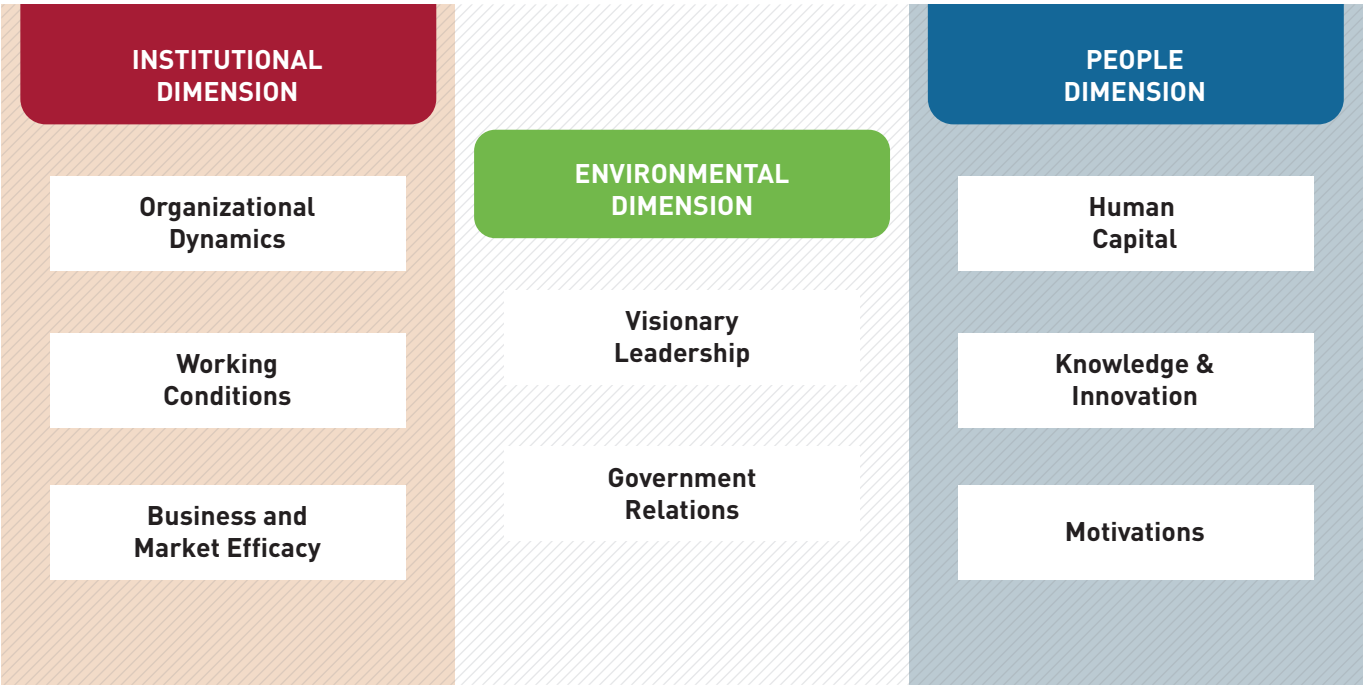

Figure 1 : H-Model Framework for Assessing Capabilities of ICTS Companies

foreign direct investment (FDI) as in the past, in tandem the country also promulgates an endogenous growth strategy. With this strategy, the country is poised to embark upon indigenous inventions and innovations of globally recognized stature. Again, contemporary ICT and its services component are poised to play a significant role in this endeavour. Unequivocally, this aspiration can only be achieved provided that the ICTS sector is endowed with a competent workforce and is responsive to technology adoption, conducting R&D, having innovation and process capabilities as well as an ingrained commercialization and patenting culture.

Survey Methodology

A total of 377 ICTS companies were targeted for data collection. The selected respondents were members of The National ICT Association of Malaysia (popularly known as PIKOM) and constituted only a sub-segment of PIKOM's membership database. The selection process excluded wholesalers and retailers who were essentially involved in buying and selling of computer hardware and software products as well as accessories, which are considered as a low end economic activity. The survey coverage also excluded MSC Malaysia (formerly known as the Multimedia Super Corridor) status companies, who come under the direct purview of the Government. Indeed, MSC Malaysia status companies by default of their accorded status are involved in high end R&D and innovative activities.

In other words, the survey strictly targeted PIKOM members who were in the business of provisioning ICT services such as IT consulting, system integration, project management, application development, multimedia content development, web development, cloud computing, big data analytics, outsourcing, et cetera. The study was conducted nationwide using a combination of telephone and e-mail as a communication medium, followed by field visits and face-to-face interviews with the non-responding companies. Primarily the survey focused on two advanced geographical locations, namely Selangor and Kuala Lumpur that accounted for 77% of the total ICTS business in the country. The study successfully netted 271 cases or a 72% response rate. Of this total, 58.3% of the respondants fell under the Small and Medium Enterprise (SME) category, where the official criterion is a company which has not more than 50 employees.

Model Assumptions

The study used both exploratory and factor analysis. Factor analysis was used mainly to reduce the 40 variables into a few meaningful latent constructs. Prior to that, the following conceptual and statistical assumptions of the model were validated:-

i. ***Reliability measure***: Cronbach's measures of reliability using Alpha and Split-Half method were carried out. This measure ensured internal consistency between multiple measurements of a variable and clarity of respondents in understanding the constructs investigated, that is, organizational capability of each company (Hair et al., 1992; Hair et al, 2006; Timm, 2002; Liu, Onwuegbuzie and Meng, 2011). The results are shown in Table 1, which were well above the recommended measure of 0.7 as a threshold limit (Field, 2005; Hair et al, 1992);

ii. ***Adequacy of response rate:*** 271 responses netted in the survey fulfilled the condition that it should exceed the total number of study variables, which was 40 and the recommended sample size of 50 cases for undertaking meaningful factor analysis;

iii. ***Reducing error variance:*** Since the study is based on pre-determined conceptual framework, the selection of appropriate variables implicitly ensured that specific and error variances are smaller than common variance;

iv. ***Rotated factor loadings:*** Orthogonal rotation was used not only for assuming independence among the variables but also aimed at redistributing the variance among the latent roots, otherwise heavy loadings will be concentrated on the first component under un-rotated factor loadings;

Methodology	Number of Items	Cronbach's Alpha
Alpha	40	0.968
Split-half	Part 1 = 20 items	0.953
	Part 2=20 items	0.949

Table 1: SPSS Cronbach's Reliability Measure on Questionnaire Consistency

v. ***Significance of correlation measures:*** Statistically, all the correlations in the correlation matrix were found to be significant at the 0.01 level;

vi. ***Adequacy of sample size and normality assumption***: As shown in Table 2, the Kaiser-Meyer-Olkin measure of sampling adequacy score of 0.939 is well above the recommended threshold level of 0.3 (Malhotra, 2008; Hair et al, 2006; Hair et al, 1992), indicating that the sample size is adequately large thus it validates the normality assumption;

vii. ***Suitability of factor analysis:*** The Bartlett's test of Sphericity, shown in Table 2, also provided a single measure to assess the statistical significance of the correlation matrix at the 0.001 level of significance. Literature review has indicated that at least 30% of the variables investigated in the study should fulfil this statistical significance condition before factor analysis could be considered on data reduction activity (Hair et al, 2006; Timm, 2002; Hair et al, 1992). The results showed that all correlations were significant; see Table 2.

viii. ***Communalities measure:*** Table 3 shows the communalities measures for the 39 factors. The communalities indicate the amount of variance an original variable shares with all the other variables and, as such, variables that recorded a correlation value below 0.5 were removed from subsequent analysis. Based on this minimum criterion, the only variable removed from subsequent analysis was the financial capital variable, which recorded a correlation value of 0.4. Further, investigation also revealed that 90% of the 741 correlations generated by the 39 variables exceeded the

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.939
Bartlett's Test of Sphericity	Approx. Chi-Square	10093.858
	df	741
	Sig.	.000

Table 2: KMO and Bartlett's Test

Communalities					
Variables	**Initial**	**Extraction**	**Variables**	**Initial**	**Extraction**
Organization Focus	1.000	.872	Managing innovation portfolios	1.000	.773
Effective Communication	1.000	.694	Research process	1.000	.787
Empowerment	1.000	.734	Creativity development	1.000	.713
Responsive to Change	1.000	.713	Market & business development	1.000	.510
Risk Taking Culture	1.000	.653	Networking for new opportunities	1.000	.663
Managerial Capability	1.000	.596	Voice of Customer	1.000	.638
Business Development Skills	1.000	.501	Voice of Employees	1.000	.706
Marketing Ability	1.000	.406	Web-based systems	1.000	.665
Networking Ability	1.000	.478	Social Networking	1.000	.584
ICT Technical Skills	1.000	.505	Leadership and institutional support	1.000	.753
Project Management Skills	1.000	.569	Training & exposure	1.000	.656
Communication & Writing Skills	1.000	.593	Adequacy of resources	1.000	.602
Knowledge Seeking Culture	1.000	.628	Financial rewards	1.000	.585
Staff loyalty to firm	1.000	.610	Recognition	1.000	.572
Competitive remuneration	1.000	.586	Commercialization incentives (AIM)	1.000	.833
Rewards and incentives	1.000	.668	Grass-root innovation incentives (MIF)	1.000	.882
Motivational incentives	1.000	.635	R&D Government Grants	1.000	.849
Multi-skilled and Interdisciplinary	1.000	.666	MATRADE Export Promotion	1.000	.805
Empowered Work culture & Processes	1.000	.667	SME Corp incentives	1.000	.824
Ideation process	1.000	.730			

Table 3: Communalities of Study Variables under Extraction Method: Principal Component Analysis

correlation measure of 0.3, which is one of the criteria set in the literature review for determining appropriateness of factor analysis (Hair et al, 2006; Timm, 2002; Hair et al, 1992).

ix. ***Variance analysis:*** Table 4 shows that the total variance is explained by the latent roots under initial eigenvalues (un-rotated) and Varimax Orthogonal Rotation factor loadings. By default, the SPSS system generated 7 loading latent factors, accounting for 75.1% of the total variations. Under the initial eigenvalues component one alone accounted for 47.6% of the total variations and the rest of the components contributed only a small percentage of variations each (Table 4). However, the efficiency of variation distribution among the 7 latent components improved greatly under the Varimax Method of orthogonal rotation. As shown in Table 4, it can be observed that the skew in the variation was reduced with component 1 accounting for 14.9 % of the total variation as opposed to 47.6% under an un-rotated situation. Similarly, component 2 and component 3 each accounted for 12.9%, which are much higher than those depicted under an un-rotated condition.

x. ***Number of latent factors:*** Deciding on the number of factors is more of a discretion than a rigid objective criterion. The analysis of the initial seven components posed two challenges. One was the correlation value for some of the best represented variables under certain components fell below 0.5, which was set as a minimum criterion for deciding

Component	Initial Eigenvalues Extraction			Varimax Orthogonal Rotation		
	Sums of Squared Loadings			Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	18.573	47.623	47.623	5.796	14.862	14.862
2	3.672	9.416	57.039	5.047	12.940	27.802
3	2.050	5.258	62.297	5.016	12.861	40.664
4	1.611	4.131	66.427	4.303	11.034	51.697
5	1.198	3.071	69.499	3.677	9.428	61.125
6	1.147	2.941	72.440	2.847	7.301	68.426
7	1.038	2.661	75.101	2.603	6.675	75.101

Table 4: Sums of Squared Loadings by Various Methods

Component	Varimax Orthogonal Rotation		
	Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	7.633	19.571	19.571
2	7.364	18.882	38.453
3	5.651	14.491	52.944
4	5.258	13.483	66.427

Table 5: Latent Roots Extraction under 4-Factor Option

on the representative variable (Hair, et al, 2006; Hair et al, 1992). However, in practice this assumption was not strictly adhered to in some cases, where a value above 0.4 was considered. The other challenge, and more critical, was that in some of the latent components, the number of variables fell below 5, which was set as a minimum criterion for understanding and examining intra-relationships among the constructs before making any meaningful attempts in naming or interpreting the latent components (Hair, et al, 2006; Hair et al, 1992). After taking into consideration these constraints, the study arbitrarily concluded on four latent components for the final analysis and, accordingly, the sums of the squared loadings under the Varimax Orthogonal Rotation are shown in Table 5. The results showed improved distribution of percentage of variance compared to the earlier seven-factor loadings but at the expense of reduction in total variance from 75.1% to 66.4%.

Overall Analysis

One of the objectives of the study was to assess the demographic features of the ICTS companies that were surveyed. The features were analysed in terms of:

i. Principal activity status by Two-Digit and Five-Digit Classifications;
ii. Secondary activity status;
iii. Legal status;
iv. Ownership status;
v. Annual sales;
vi. Employment size;
vii. Foreign workers' participation status;
viii. Trading status;
ix. Process and quality standards status.

MSIC 2008 Two Digits	Industry Descriptions	Frequency	Percentage
58	Publishing Activities (including Online)	13	4.8
61	Telecommunication Activities	13	4.8
62	Computer Programming, Consultancy and Related Activities	184	67.9
63	Information Services Activities	24	8.9
64	Venture Capital for ICT	3	1.1
72	Scientific Research & Development (R&D)	4	1.5
82	Office Administrative, Office & Business ICT-supported Activities	23	8.5
85	Education	4	1.5
95	Repair of Computers and Communication Services	3	1.1
	Total	271	100.0

Table 6: ICTS Companies by Principal Activity, 2012: Two-Digit MSIC 2008 Classifications

MSIC 2008 Five Digits	Industry Descriptions	Frequency	Percentage
58100	Publishing Books, Periodicals, Online Publishing	8	3.0
58200	Ready Made Software / Online Software Publishing	5	1.8
61100	Wired Telecommunications, including Internet Infrastructure	9	3.3
61200	Wireless Telecommunications, including Internet Infrastructure	2	0.7
61300	Satellite Telecommunications Services	1	0.4
61900	Other Telecommunications, ISP	1	0.4
62010	Computer Programming	52	19.2
62021	Computer Consultancy	79	29.2
62022	Computer Facilities Management	7	2.6
62091	ICT System Security	16	5.9
62099	Other IT Services Activities	30	11.1
63111	IT Infrastructure / Web Application Hosting	4	1.5
63112	Data Processing Activities	3	1.1
63120	Web Portals / Search Engine Facilities	17	6.3
64301	Venture Capital ICT	3	1.1
72104	R&D in Bio-technology	1	0.4
72106	R&D in ICT	3	1.1
82110	Business Process Outsourcing (BPO)	5	1.8
82112	Information Technology Outsourcing (ITO)	1	0.4
82113	Shared Services Outsourcing (SSO)	2	0.7
82114	Software as a Service (SaaS)	5	1.8
82116	Platform as a Service (PaaS)	1	0.4
82200	Call Centre and Data Centre	9	3.3
85494	Computer Training	4	1.5
95100	Repair of Computers and Communications Equipment	3	1.1
	Total	271	100.0

Table 7: ICTS Companies by Principal Activity, 2012: Five-Digit MSIC 2008 Classifications

Principal Activity by Two-Digit Industry Classification

Table 6 shows the distribution of principal activity of the surveyed ICTS companies based on the two-digit broad industry classification. It can be seen in Table 6 that 67.9% of the 271 companies surveyed came from computer programming, consultancy and related activities. This is followed by information and services activities (8.9%) and office administrative, office and business support activities (8.5%).

Principal Activity by Five-Digit Industry Classification

As shown in Table 7, a detailed breakdown based on the five-digit industry classification revealed that computer consultancy and computer programming ranked as the two most ICTS principal activities among PIKOM members. A significant number of companies are also involved in providing web portals and search engine facilities services (6.3%), ICT System Security services (5.9%), wireless telecommunication services (3.3%), data centre and call centre services (3.3%) and publishing activities including online publishing, which are considered fast growing new age activities arising from the advent of Internet technology.

The data also showed that the number of companies involved in high value adding knowledge and innovation driven activities such as research and development in bio-technology and ICT, business process outsourcing (BPO), shared services outsourcing (SSO) and information technology outsourcing (ITO) are meagre. The number of companies engaged in the fast growing business segments such as Software as a Service (SaaS), Platform as a Service (PaaS) and venture capital activities were fewer in number.

ICTS Secondary Activities	Number	%
Call Centres / Data Centres	79	29.2
Computer Consultancy	76	28.0
Other IT Services	70	25.8
Computer Training	69	25.5
Computer Facilities Management	67	24.7
ICT System Security	58	21.4
Web Portals and Search Engine Facilities	56	20.7
R&D ICT	54	19.9
Information Technology Outsourcing (ITO)	47	17.3
Wireless Telecommunications / Internet Infrastructure	45	16.6
Computer Programming	42	15.5
Data Processing Activities	42	15.5
Software as a Service (SaaS)	40	14.8
Cloud Computing Services	39	14.4
IT Infrastructure Services: Web Application	38	14.0
Wired Telecommunications / Internet Infrastructure	36	13.3
Business Process Outsourcing (BPO)	34	12.5
Infrastructure as a Service (IaaS)	33	12.2
Other Telecommunication Services	32	11.8
Ready-Made Software and Online Software Publishing	30	11.1
Computer and Communications Equipment Repair Services	30	11.1
Shared Services Outsourcing (SSO)	28	10.3
Platform as a Service (PaaS)	27	10.0
Knowledge Processing Outsourcing (KPO)	24	8.9
Satellite Telecommunications	23	8.5
Big Data Analytics Services	23	8.5
Security System Maintenance Services	21	7.7
Television Programming & Broadcasting / Internet TV	18	6.6
Radio / Internet Broadcasting	17	6.3
News Agency	16	5.9
Publishing Books, Periodicals etc	11	4.1
R&D Bio-technology	11	4.1
Cyber Cafe / Internet Centre	10	3.7
Venture Capital for ICT	8	3.0

Table 8: ICTS As a Secondary Activity

Distribution by Secondary Activity

Most of the ICTS companies were also found to be engaged in more than one activity, that is, besides its principal activity. As shown in Table 8, 29.2% of the companies surveyed were also involved in the provision of call centre

/ data centre services as a secondary activity. Similarly, 28.0% were also in computer consultancy; 25.8% in computer training and 24.7% in computer facilities management.

By Legal Status

Table 9 shows the distribution of ICTS companies by legal status. The results showed that 82.7% of the companies were private limited companies and only 4.1% were in the sole proprietorship category.

ICTS Companies by Ownership

Table 10 shows the distribution by majority ownership status, which clearly indicated that 77.9% of the companies surveyed were owned by Malaysians and 18.8% or almost one-fifth belong to foreigners.

By Annual Sales

Table 11 shows the distribution of the cases by annual sales. A number of companies failed to report their revenue. However, by cross referencing with the information found in the PIKOM Membership Database, efforts were made to impute appropriate sales figures. The result are shown in Table 11 where 29.9% of the companies had under RM5 million annual turnover, which is the cut-off mark for defining Small and Medium Enterprises.

By Employment Size

Table 12 shows the distribution of employment size where 63.4% of the companies surveyed fell under the SME category.

Legal Status	Frequency	Percentage
Partnership	10	3.7
Private Limited Company	224	82.7
Public Limited Company	26	9.6
Sole Proprietor	11	4.1
Total	271	100.0

Table 9: ICTS Companies by Legal Status, 2012

Ownership Status	Frequency	Percentage
Malaysian	211	77.9
Non-Malaysian	51	18.8
Others	9	3.3
Total	271	100.0

Table 10: ICTS Companies by Majority Ownership, 2012

Sales Size	Frequency	Percentage
Less than RM200,000	12	4.4
RM1 million - < RM5 million	69	25.5
RM10 million - < RM15 million	27	10.0
RM15 million - < RM20 million	6	2.2
RM20 million - < RM25 million	15	5.5
RM200,000 - < RM1 million	29	10.7
RM25 million - < RM50 million	53	19.6
RM5 million - < RM10 million	17	6.3
RM50 million & above	43	15.9
Total	271	100.0

Table 11: ICTS Companies by Sales Group, 2012

Employment Size	SME Classifications	Frequency	Percentage	Cumulative Percentage
Less than 5	Micro	26	9.6	9.6
5 - < 20	Small	83	30.6	40.2
20 - < 50	Medium	49	18.1	58.3
50 - < 500	Large	85	31.4	89.7
500 - < 1,000		10	3.7	93.4
1000 - < 5000		13	4.8	98.2
More than 5,000		5	1.8	100.0
Total		271	100.0	

Table 12: ICTS Companies by Employment Size, 2012

By Foreign ICT Professionals Status

Table 13 reveals that only 16.6% of the surveyed companies employed foreign ICT professionals.

Employment	Frequency	Percentage
Fully Local Workers	226	83.4
Including Foreign Workers	45	16.6
Total	271	100

Table 13: ICTS Companies by Foreign Workers Participation

ICTS Companies by Trade Status

Table 14 shows that, on the overall, not many local ICTS companies were involved in export or import of ICTS services; only 14 of the total 271 surveyed companies had shown some indication of foreign trade. Among those who were involved, most were trading with neighbouring countries like Singapore, Indonesia, Philippines and Vietnam with which Malaysia has established trade and cultural ties.

Total number of cases =271

Countries/Regions	Export	%	Import	%
Singapore	14	5.2	8	3.0
Indonesia	5	1.8	1	0.4
Philippines	4	1.5	0	0.0
Vietnam	5	1.8	0	0.0
ASEAN	7	2.6	1	0.4
China	4	1.5	7	2.6
Hong Kong	2	0.7	5	1.8
Taiwan	3	1.1	6	2.2
Korea	1	0.4	2	0.7
Japan	2	0.7	3	1.1
India	4	1.5	1	0.4
USA	7	2.6	7	2.6
United Kingdom	1	0.4	3	1.1
Middle East	3	1.1	0	0.0
Other European	8	3.0	3	1.1
Australia / New Zealand	2	0.7	1	0.4
Others	7	2.6	1	0.4

Table 14: Trade Status of ICTS

Process and Quality Standard Status

The survey also probed the process and quality standards attained by ICTS companies in Malaysia. The probe targeted at two levels, namely organizational level and personal level certifications.

Organizational Level Certifications

The organizational level certifications covered five types, as follows:-

i. Capability Maturity Model Integration (CMMI);
ii. People Capability Model Integration (PCMM);
iii. Information Technology Infrastructure Library (ITIL);
iv. International Standard Organization (ISO) and
v. Green Computing Certifications

Global Certifications: Organizational Level	N=271 ICTS Companies	
	Number	%
Capability Maturity Model Integration (CMMI)	16	5.90
People Capability Maturity Model (PCMM)	4	1.48
Information Technology Infrastructure Library (ITIL)	23	8.49
ISO	42	15.50
Green Computing Certifications (Organization)	5	1.85
Other Organization Certifications	26	9.59

Table 15: Types of Global Certifications at Personal Level

Generically speaking, these organizational certifications are critical for gauging process and quality conformity to global standards, which is imperative for entering into global markets with greater confidence. The results from the survey are shown in Table 15. It can be seen that only an insignificant number of ICTS companies in Malaysia sought after such globally recognized certifications. Among the certifications probed, the traditional ISO ranked first and only 15.5% of those surveyed fell under this category. As mentioned previously,

the CMMI is aimed at measuring software quality and standards and PCMM is deemed to assess the workforce competency. Both these certifications are offered by the Software Engineering Institute (SEI) of Carnegie Mellon University of the United States of America.

Despite incentives offered by Multimedia Development Corporation (MDeC), the number of PIKOM members in the ICTS sector which showed interest in acquiring CMMI stood at only 5.9% or 16 out of the 271 companies canvassed. The number for PCMM certifications obtained was even smaller, only 1.48%. The number was slightly higher, that is 8.49% for ITIL Certifications which come from the United Kingdom. The proportion of ICTS seeking Green Computing Certifications was also dismally poor, below 2%!

Since the Ninth Malaysia Plan, the Malaysian Government has earmarked outsourcing as one of the new sources of growth. Recognizing this, the survey also probed on the prevalence of various types of Outsourcing Certifications, especially those offered by International Association of Outsourcing Profession (IAOP). Again, the ICTS sector showed dismal performance, with only two companies from the 271 investigated to having such certifications, as shown in Table 16.

Outsourcing Certifications: Personal Level	N=271 ICTS Companies	
	Number	%
Other Organization Certifications, including Nomenclature	0	0.00
Certified Outsourcing Executive (COE)	2	0.74
Associate Certified Outsourcing Professional (aCOP)	2	0.74
COP-Outsourcing Governance (COP-GOV)	1	0.37
COP-Business Development (COP-BD)	1	0.37
Certified Outsourcing Specialist- Foundation Principles (COS-FP)	0	0.00
Certified Outsourcing Specialist- Transaction Principles (COS-TP)	0	0.00
Certified Outsourcing Specialist- Finance & Accounting (COS-F&A)	1	0.37
Certified Outsourcing Specialist- Human Resources (COS-HR)	0	0.00
Other Outsourcing Cert, including Nomenclature	0	0.00

Table 16: Types of Outsourcing Certifications at Personal Level

Personal Level Certifications

Two types of personal level certifications were canvassed, namely Six Sigma and Green Computing. Six Sigma certifications are accorded to individuals who have attained capability in undertaking process and quality improvements or mitigating waste in a process or innovating new products or services or processes through design approach. Unlike CMMI, PCMM, ITIL or ISO types of certifications, Six Sigma certifications are issued by the organization itself, that is, there is no central or global organization in charge of this certification. Therefore, the standards and criteria set for Six Sigma certifications greatly vary among the organizations.

Six Sigma practices started off in the manufacturing sector, especially in the production line, where gauging quality conformance played a significant part before a product is sent to the market place. Motorola and General Electric were pioneers in popularizing Six Sigma practices including certification norms and standards. There are many levels of certifications offered in Six Sigma, however they can be broadly surmised under three categories, namely Six Sigma White or Yellow Belt for Awareness Level, Six Sigma Green Belt and Six Sigma Black Belt for attaining certain monetary earnings through value creation or savings through cost reduction efforts. In recent years, Six Sigma practices have also set foot in the services sector, including in software development.

Recognizing that Six Sigma practices have made it into the

Six Sigma Certifications: Personal Level	N=271 ICTS Companies	
	Number	%
Six Sigma Awareness (White / Yellow Belt)	1	0.37
Six Sigma Green Belt Certified	5	1.85
Six Sigma Black Belt Certified	4	1.48
Green Computing Certification (Individual)	1	0.37
Other Certifications (Individual)	17	6.27

Table 17: Types of Outsourcing Certifications at Personal Level

ICTS industry, the survey fielded a number of questions on Six Sigma Certification attainment, on the presumption similar kinds of process and procedures prevail in the ICTS sector as in the manufacturing sector. The results are shown in Table 17, which clearly indicates that Six Sigma practices are hardly seen among Malaysian ICTS companies: less than 2% of the companies reported having Six Sigma certified ICT professionals. Unfortunately only one company reported having Green Computing Certification, which is a relatively a new phenomenon.

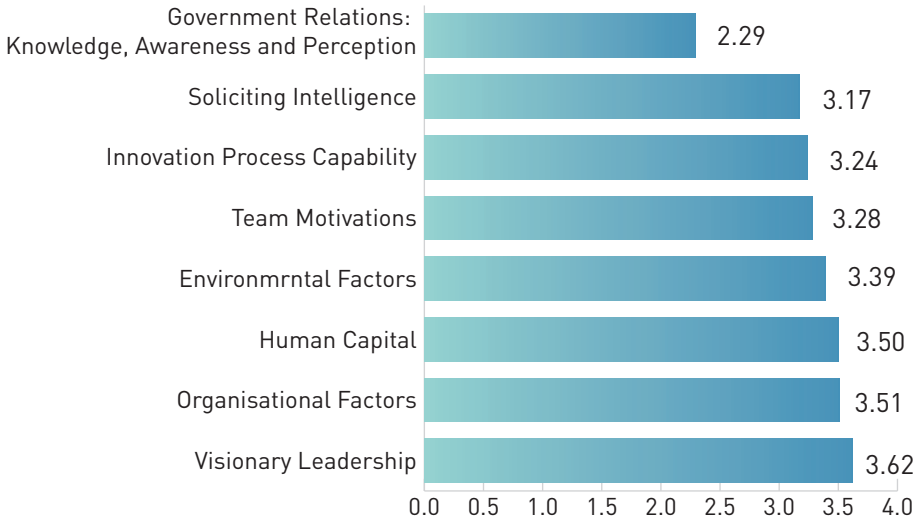

Figure 2: Mean Score by Broad-based Capability Factors

Overall Capability

The survey used the Likert Scale for gauging performance of each organizational capability variable by defining "1" for very weak and "5" for very strong. Against this backdrop, the analysis defined a binomial criterion for defining Sector Capability Maturity, which are as follows:-

Mean Score Value	Sector Capability Maturity Status
≥ 3.5	"Attained Capability Maturity"
< 3.5	"Further Work Needed on Improving Sector Capability".

As shown in Figure 2, of the eight broad-based factors investigated, only visionary leadership, organizational factors and human capital reflected maturity in this sector's capability. Knowledge, awareness and perception about Government relations secured the lowest mean score of 2.29, indicating prevalence of poor working relationship between the industry and public agencies.

The sector's performance is also poor in soliciting policy, business and market intelligence, building innovation and process capabilities, which are deemed critical for an endogenous growth strategy that the country aspires to pursue to attain high income status by the turn of the first quarter of this century. The study also revealed an average performance in team motivational elements and providing working environment conducive for employees in the ICTS sector.

Factor Analysis

For understanding the inner dynamics of the broad-based factors, factor analysis was used in reducing the original 40 study variables into four meaningful components, as explained earlier. After closely examining the variables, the four components were assigned the following names: Component I – Business Development Efficacy; Component II – Human Capital & Talents; Component III – Competency and Standards and Component IV – Government Relations; see Table 18. Table 11 also shows the variables that are associated with each component, correlation value between the study variables and the latent constructs as well as the mean score value for each variable and latent component.

As revealed in the results, all variables have positive correlations. Except for the 'market and business development' variable, the correlation values were well above 0.5, indicating strong relationships between the study variables and the latent constructs. For making a meaningful interpretation, the analysis ensured that each latent construct is adequately represented by at least 5 variables.

Government Relations

Of the four latent constructs derived from the factor analysis, the Government relations component secured the lowest mean score of 2.29, which is also reflected in

the exploratory analysis shown in Figure 2. Like in many countries, the Malaysian Government has created a host of support institutions and facilities to create risk capital, provide matching grants, give business plan development and marketing advice, attract foreign direct investment, furnish R&D investment, set up incubator units that provide space and infrastructure for business beginners and innovative companies, run quality control programmes, carry out export promotions, foster foreign partnerships as well as disseminate information on regulations, standards, taxation and customs duties (Wahab, 2012).

However, in probing Government relations, the survey covered only five key items pertaining to: spurring grassroot innovations (by Malaysian Innovation Foundation-MIF), commercializing R&D outcomes and innovative ideas (by Malaysian Innovation Agency -MIA), accessing research and development Government grants (by Ministry of Science, Technology and Innovation-MOSTI), leveraging upon export promotion (by Malaysia External Trade Development Corporation (MATRADE) and small and medium enterprise (SME) development (by SME Corp). Specifically, the survey probed on knowledge, awareness and perception (KAP) of ICTS companies in seeking incentives, facilities and support services from the named mainstream agencies involved in the development of ICTS activities.

The investigation revealed that all the five variables under Government relations secured low mean scores, ranging between 2.24 to 2.38, as shown in Table 6. This dismal showing reflects the poor working relationship between the Government and industry. There could be a number of reasons for this, however two reasons are noteworthy. One is the lack of awareness and adequate knowledge on incentives and facilities offered by the Government and the other is the rigid bureaucratic environment that is, most of the time, cumbersome to deal with.

If poor working relationship prevails between the Government and private companies, more so with the industry associations that represent the interests of these companies, it will be highly probable that the companies may not have the awareness or knowledge of the types of institutional services and incentives offered by the government agencies (Wahab, 2012). Such problems can be only overcome provided the Government agencies play a pro-active role in sharing and disseminating information, as opposed to the typical practice of industry taking the lead. It will be a lot easier and convenient for Government agencies to take the first move whenever new policies, programme strategies or business incentives are introduced.

But the challenge is that Government agencies typically tend to play a reactive role unless a mindset change occurs like in India, where the pro-active involvement on the part of the Government made the country one of leading software exporters in the world (Salmenkaita and Salo, 2002; Carmel, 2003). However, reciprocal willingness and responsive participation of the industry players are also deemed critical. Dealing with a rigid, bureaucratic and unfriendly government agency can be a monumental task (Maniam and Halimah, 2008). Sometimes, tough and tense situations arise when private sector customers do not get the right treatment or cooperation from the civil service counters. Consequently, customers may refrain themselves from making future visits in search of support services from Government agencies.

This age old bureaucratic issue has to be seen from a broader context of "re-inventing the quality of the civil service", which has a broader connotation (Maniam and Halimah, 2008). It is not only quality, standards, productivity and service that have become key words in the lexicon of public sector reform, but also de-bureaucratization and inception of good governance elements promoting transparency, accountability and responsibility, including public participation in decision making processes (Maniam & Halimah, 2008). Despite increasing prominence been given to these concerns in line with the rising expectations and changing perceptions of customers, who constantly crave for delivery of high quality services, much of the challenges dealing with government agencies still linger.

The customer relationship management issue in the civil service can be tackled effectively by improving provision of quality service levels by: incorporating continuous improvement processes; instituting monitoring and evaluation of service performances; mindset change of service providers on supply side; and citizen orientation on receiving ends (Maniam & Halimah, 2008). However, these clarion calls are not new but can be enhanced further through the deployment of e-Government services. It will

Latent Components	Variables	Mean Score	Component Mean Score	Correlation Between Variables and Latent Components Under Rotated Matrix
Component 1 : Business Development Efficacy	Leadership and Institutional support	3.46	3.32	.766
	Training & Exposure	3.37		.737
	Voice of Employees	3.28		.706
	Voice of Customer	3.31		.700
	Networking for New Opportunities	3.14		.672
	Web-based Systems	3.11		.668
	Social Networking	3.03		.665
	Adequacy of Resources	3.28		.642
	Recognition	3.28		.589
	Motivational Incentives	3.34		.576
	Multi-skilled and Interdisciplinary	3.49		.576
	Empowered Work Culture & Processes	3.52		.562
	Competitive Remuneration	3.37		.478
	Staff Loyalty to Firm	3.54		.476
Component 2 : Human Capital & Talents	Organization Focus	3.63	3.56	.885
	Responsive to Change	3.67		.811
	Empowerment	3.54		.800
	Effective Communications	3.70		.778
	Risk Taking Culture	3.57		.739
	Managerial Capability	3.73		.630
	Communication & Writing Skills	3.58		.590
	Knowledge Seeking Culture	3.56		.570
	Business Development Skills	3.58		.548
	Networking Ability	3.41		.507
	Project Management Skills	3.47		.479
	Marketing Ability	3.31		.449
Component 3: Competency & Standards	Managing Innovation Portfolios	3.25	3.23	.787
	Creativity Development	3.25		.764
	Research Process	3.31		.751
	Ideation Process	3.41		.721
	Rewards and Incentives	3.23		.566
	Financial Rewards	3.00		.492
	ICT Technical Skills	3.36		.478
	Market & Business Development	3.00		.402
Component 4: Government Relations	Grassroots Innovation (by MIF)	2.24	2.29	.896
	R&D Government Grants (by MOSTI)	2.28		.881
	SME Facilities (by SME Corp)	2.38		.873
	Commercialization Incentives (by AIM)	2.27		.855
	Export Promotion by MATRADE	2.30		.851

Table 18: Mean Square and Correlations Between Latent Constructs and Study Variables

not only improve work efficiencies of routine tasks, but also provide information and networking capabilities to a wider public audience at a greater comfort level and with minimized bureaucratic interactions.

Competency and Standards

Table 18 also reveals that Malaysian ICTS companies did poorly in acquiring adequate capability in developing competency and standards, which on the overall, secured only a mean score of 3.23. Indeed, all the mean score values of the eight variables implicitly selected under this latent construct were below 3.5, which is set as the minimum bench mark value for attaining capability maturity. Among them, 'market and business development' and 'financial rewards on staff motivation' variables secured the lowest mean score value of 3.00. In other words, the Malaysian ICTS companies' performance in new idea generation, embarking on creative developments, developing efficient research processes or managing innovation portfolios are considered generally weak. This partly explained the poor performance on export of ICT services as revealed in the exploratory analysis. Despite export promotion facilities offered by MATRADE, the exploratory analysis revealed that only 5.2% of the ICTS companies surveyed were involved in export services and that only 3.0% engaged in import services, primarily trading with Singapore where Malaysia has been enjoying long term trade and cultural ties.

Poor performance in trading can be also attributed to the lack of initiative by Malaysian ICTS firms in pursuing globally recognized and accredited competencies and standards as well as certifications. The survey results showed that only 5.9% of the companies surveyed in the study had attained Capability Maturity Model Integration (CMMI) Certification on software development maturity and only 1.5% had People Capability Model Integration (PCMM) certification on workforce competence maturity.

Even in pursuant of typically well-known International Standard Organization (ISO) or Information Technology Infrastructure Library (ITIL) certifications, only 15.5% had the former and 8.5% had the latter. Disappointingly, only less than 1% of those surveyed has obtained IAOP certifications despite the Government having earmarked the outsourcing sector as one of the new sources of ICT growth. Similarly, obtaining certifications in green computing either at organizational or individuals levels is yet to gain strong footing or even recognition among Malaysian ICT companies, despite the promulgation of The National Green Technology Policy since 2009. On seeking individual capability certifications, only 2% of the PIKOM ICTS companies have employed Six Sigma certified professionals. The low level attainment in competency in quality and process certifications indicate the sector's poor capability in entering foreign markets, especially for participation in US government contracts on provision of software development services (Carmel, 2003).

Indeed, such weak capabilities posed critical challenges in realizing the nation's agenda of becoming a high value adding nation on the road to becoming a developed or high income nation by the turn of first quarter of this century.

Many reasons could be conjectured for the low level participation in export services or seeking standards and quality accreditations from globally recognized institutions. As highlighted earlier, besides poor Government relations, the other most feared factor is business complacency (Anderson, 2011), which can happen to any company irrespective of size, length in business and location. Complacency is almost always a product of success, or perceived success; it is the successful ones who are most susceptible to complacency (Anderson, 2011). When current business performance is at satisfactory level and more so, free from business risks and with no obvious threats to business prosperity, it is very unlikely such companies will invest in standards and quality driving exercises.

Without appropriate recognition and accreditations, it is quite difficult for ICTS companies to bid for deals in the international market, especially in the United States and Europe where stringent conditions prevail on quality acceptance.

It is also conjectured that Malaysian ICTS companies may lack a sense of urgency in equipping themselves with adequate capacities and capabilities in harnessing the fast moving globalization and market liberalization phenomena (Wahab, 2012). Indeed, with increasing number of countries liberalizing their markets for foreign investments and business participation, new opportunities have begun to emerge in a high volume globally. Moreover, the playing field is levelled between developed and developing countries,

particularly in the ICT businesses, where new inventions, creations and innovations are proliferating at an unprecedented rate. Like the English proverb cites, the early bird catches the worm, so it is up to the individual companies to equip themselves in reaping the new age benefits. If the lackadaisical attitude continues to prevail in the business sector, it could lead to a disaster when competitors take over their existing businesses by developing business models that are better, leaner and more attractive to consumers. Anderson (2011) cited the best medicine to use in the fight against such complacency is developing a sense of urgency that can create an internal alertness, focus, business re-engineering and continuous improvement processes.

More importantly, businesses need to recognize that change is continuous and not episodic. For instance, Research in Motion Company grew exponentially from a scrappy upstart to become a market leader with their BlackBerry phones that provided e-mail push technology. However, in less than two years, they lost out to Apple that had focused on delivering an entirely new kind of product supported with multimedia content and much more superior features appealing to the Y generation, who are technology savvy. However, both Apple and Blackberry have realized a significant portion of their market share has been taken up by the Android operating system – a classic example of complacency in business.

Business Development Efficacy

The analysis showed that Malaysian ICTS companies are also weak in business development efficacy, which secured a mean score value of only 3.23, as reflected in Table 2. All variables under this category, except 'leadership and institutional support', 'empowered work culture and processes', 'multi-skilled and inter-disciplinary knowledge' and 'staff loyalty to work', recorded mean score values below the benchmark measure. Specifically, the weaknesses are reflected in the areas pertaining to: usage of social networking tools for business development; developing web-based systems for sharing and disseminating information and knowledge; networking in search of new business opportunities; gathering voice of customer and employees for process and quality improvements; giving due recognition on work performance; and providing adequate resources especially manpower expertise.

One of the reasons for weaknesses in business development efficacy could be due to the lack of adequate organizational capability in developing a dynamic business intelligent (BI) system or a knowledge management system (KMS) that can help to recognize and detect changes in policy, market and business dynamics (Lavalle, et al, 2011; Saleh, 2012). Gartner defines BI as an umbrella term that spans the people, processes and applications / tools to organize information, enable access to it and analyse it to improve decisions and manage performance. As the future unfolds, more business decisions will be supported by the facts that only analytics can provide; and fewer business decisions will be made on the basis of instinct and guesswork (Davenport and Harris, 2007).

With business information increasing over time, more so with its increasing complexity, scope and coverage, the demand for analytic capabilities, especially Big Data Analytics (BDA), is on the rise (TATA, 2012). Besides focusing on traditional structured information, BI supported with BDA is able to undertake data that are found organically within organizations but in an unstructured form, which require capabilities in areas pertaining to text analytics, context analytics, speech analytics, predictive analytics, prescriptive analytics and embedded analytics (TATA, 2012).

As revealed in the survey, many companies do not pay much attention in building such BI and analytics capabilities, despite having learnt that such systems have the ability to process, interpret, encode, manipulate and access information and convert them into purposeful business needs. Therefore, companies need to recognize that BI can play a significant role not only in business development efficacy but also in improving internal processes in terms of cost saving, cycle time reduction, identifying opportunity cost, managing technical obstacles in engineering, paving way for new technology adoption, assessing product relevance, studying market trends and undertaking SWOT analysis, product differentiation analysis as well as to make informed business decisions with real-time data that can put a company ahead of its competitors (TATA, 2012) .

Human Capital and Talent Development

The only component that secured a mean score above the threshold point (3.50), was 'human capital and talents', which registered a mean score value of 3.56, as shown in Table 2. Detailed examination

revealed that of the 12 variables listed under this latent construct, all except networking and marketing ability secured mean score values well above the threshold limit. Specifically, the study reflected that the Malaysian ICTS firms have attained some level of capability and maturity in charting their vision, mission and business strategies; possess managerial ability to strategize and implement new tasks and opportunities; have inherent resilience to be responsive to a changing environment; not short of any communication and writing skill; have adopted knowledge seeking culture and also able to institute empowerment culture at work places. Indeed, most of these capabilities are institutional and modern in nature, which can be achieved over time through adequate resource allocation and efficient appropriation.

The weaknesses reflected in the networking and marketing ability are more of a reflection of innate quality of human capital. Such weaknesses may be attributed to a number of reasons. First, the lack of adequate exposure to knowledge forums like attending or participating in international conferences and workshops. Second, the employees may not have adequate learning experience from multi-nationals who, despite their long presence in the country, have yet to establish a strong R&D and innovation base that is critical for the transfer of technology and knowledge, exchange of ideas and building global networks (NEAC, 2010; Yu, 2012). Third, except for internship types of training while pursuing degree courses, the employees do not get adequate opportunity to acquire advance knowledge from universities due to the weak industry and university linkages pertaining to R&D, innovation, patenting and commercialization endeavours (NEAC, 2010; Wahab, 2012).

Fourth, as revealed in the study, employees generally lack interest and motivation in attaining global standards in process and quality improvement activities (Wahab, 2012; NEAC, 2010; EPU, 2001), not only on their own, despite the Government's support in pursuit of CMMI, PCMM, ITIL, ISO, Green Computing, IAOP Outsourcing, Six Sigma and Lean Six Sigma as well as subject matter specific certifications and accreditations (Nandyal and Ramasamy, 2011; Nandyal, 2003; Pyzdek, 2003).

Another interesting finding in the survey was the low mean score value of only 3.37 recorded for the competitive remuneration variable, as shown in Table 2. Indeed, this particular factor has to be seen from a macro perspective. It was reported in various policy dialogues and forums as well as in research publications that the ICT enrolment in both public and private institutions of higher learning has been declining continuously over the past decade (PIKOM, 2013; Wahab and Ramasamy, 2011; Ramasamy, 2008). Specifically, ICT enrolment in the public universities has stagnated over the past decade; the number lingered around 22,466 in 2002 to 24,991 in 2011. Understandably, with budget constraints, it will be difficult for public universities to increase their capacity to produce more ICT graduates.

Nonetheless, ICT enrolment in private universities also has not improved very much. Indeed, the ICT enrolment number declined from 96,090 to 49,731 over the same period. According to Gartner, the decline is due to the lack of interest and glamour in ICT courses among the younger generation these days. Moreover, the younger generation increasingly shun the industry because of its reputation of hard work and long hours of toiling in the office (Ramachandran, 2009). Quality, competency and employability of ICT graduates in meeting the industry's demands also continue to remain a critical issue (Wahab, 2012; Wahab and Ramasamy, 2011; NEAC, 2010).

Despite a tight labour environment, ICT professionals in Malaysia are experiencing much lower remuneration in comparison to their counterparts in the neighbouring Asian and English speaking countries, where many Malaysian talents tend to migrate in search of better opportunities. According to industry findings, Hong Kong and Australia topped the salary scale, where the salary was 1.90 times higher in comparison to Malaysian ICT professionals, after taking into account purchasing power parity (PIKOM, 2013).Within the ICT industry, rampant job-hopping for better terms of employment is also a major problem.

In addressing the problem of many of the graduates not meeting the requirements of the industry and also in view of correcting the unbalanced emphasis in the provision of university curriculum and industry demands, the Ministry of Education (MOE) – formerly under the Ministry of Higher Education (MoHE) - had approved the setting up of a boutique university named University Malaysia of Computer Science & Engineering (UniMy) (Fong and Yee, 2013). This new university is dedicated to increase the supply

of ICT graduates pertaining to computer engineering, computer science and software engineering.

Towards increasing the marketability and employability of graduates, UniMy has developed syllabus conforming to the standards of Association for Computing Machinery (ACM) and Institute of Electrical and Electronics Engineers (IEEE) Software Engineering Body of Knowledge (SWEBOK).

Towards ensuring integrity, sustainability and relevance, the UniMy programmes performance will be audited yearly by the Melbourne School of Engineering of the University of Melbourne. Initiatives by TalentCorp, which is a Government linked entity established in January 2011, is also poised to help in overcoming some of the talent gaps in the ICT sector (PIKOM, 2013). The initiatives are carried out via three strategic thrusts: optimise Malaysian talents, attract and facilitate global talents and build networks of top talents.

Being new, these endeavours are yet to be realised. While addressing the supply problem, industry players are also poised to play a significant role in retaining their scarce ICT talents through: providing competitive remuneration that are regionally compatible; provide training and exposure and also incentives, recognitions and awards for innovations.

Conclusion

There is an urgent need on the part of the Government to play a proactive role in building a cordial working relationship with the industry, especially for sharing and exchanging information and ideas that can help to formulate more effective policy and programme strategies. Reciprocally, the industry needs to play a more aggressive and responsive role in beefing up their business intelligence as well as innovation and process capabilities along with seeking globally recognized certifications and accreditations. In this endeavour, the role of industry associations such as PIKOM in Malaysia, are critical in bridging the gap between the industry, government and academia.

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CHAPTER 02

MALAYSIAN ECONOMIC AND INFORMATION COMMUNICATIONS TECHNOLOGY (ICT) INDUSTRY OUTLOOK

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Introduction

The Malaysian economy grew at 4.1% in the first quarter of 2013; see Figure 1. This rate is markedly lower than the 5.2% growth during the corresponding period in 2012 and also lower than Central Bank of Malaysia's prediction of between 5% and 6%. Some of the contributing factors cited for the weaker growth are contraction in private sector investment, currency depreciation leading to higher import costs, increasing household debts, guaranteed federal Government debts for Government linked companies and the rise in inflationary pressure by 0.6% in the first half of the year.

Despite these weaknesses, domestic demand is projected to be resilient, supported by stable overnight lending rates at 3.0%; subdued inflation; strong labour market with low unemployment rate; robust private consumption; prudent measures in mitigating financial risks; and increased business confidence.

Global growth is generally conjectured to remain weak in 2013. The International Monetary Fund (IMF) has projected a global growth rate of 3.1% in 2013, the same as in 2012. However, the World Bank has revised downward the global growth rate from 2.4% to 2.2%. Protracted recession in the Eurozone is projected to continue, affecting global growth and the economies of many countries that are dependent on the region for trade and investment.

Nonetheless, the World Bank has predicted a higher growth rate of 3.3% in 2014, attributing this to the easing of risks from advanced economies. More importantly, the World Bank has indicated that rising trade among south-south and developing countries are poised to stimulate the global economy. Despite the slowdown in the global economy and regional uncertainties that have adversely affected the first quarter performance, Central Bank of Malaysia is still confident of achieving a growth rate of between 5% and 6% in 2013, as shown in Table 1. All institutions listed in Table 1 except the Malaysian Institute of Economic Research (MIER) have forecasted a growth rate of not less than 5.0%. Indeed, the IMF has revised upward the growth rate for Malaysia from its earlier prediction of 4.7% to 5.0% on the presumption of strong domestic demand. In contrast, CIMB has revised downward the Malaysian growth rate from 5.5% due to continuing shrinkages shown in the Eurozone. Clearly, the predominant sentiment is that the national economy is poised to be on track for sustained growth. PIKOM is confident that the country will achieve 5.1% in 2013, provided there is no major upswing in the global economy or disruption to domestic demand.

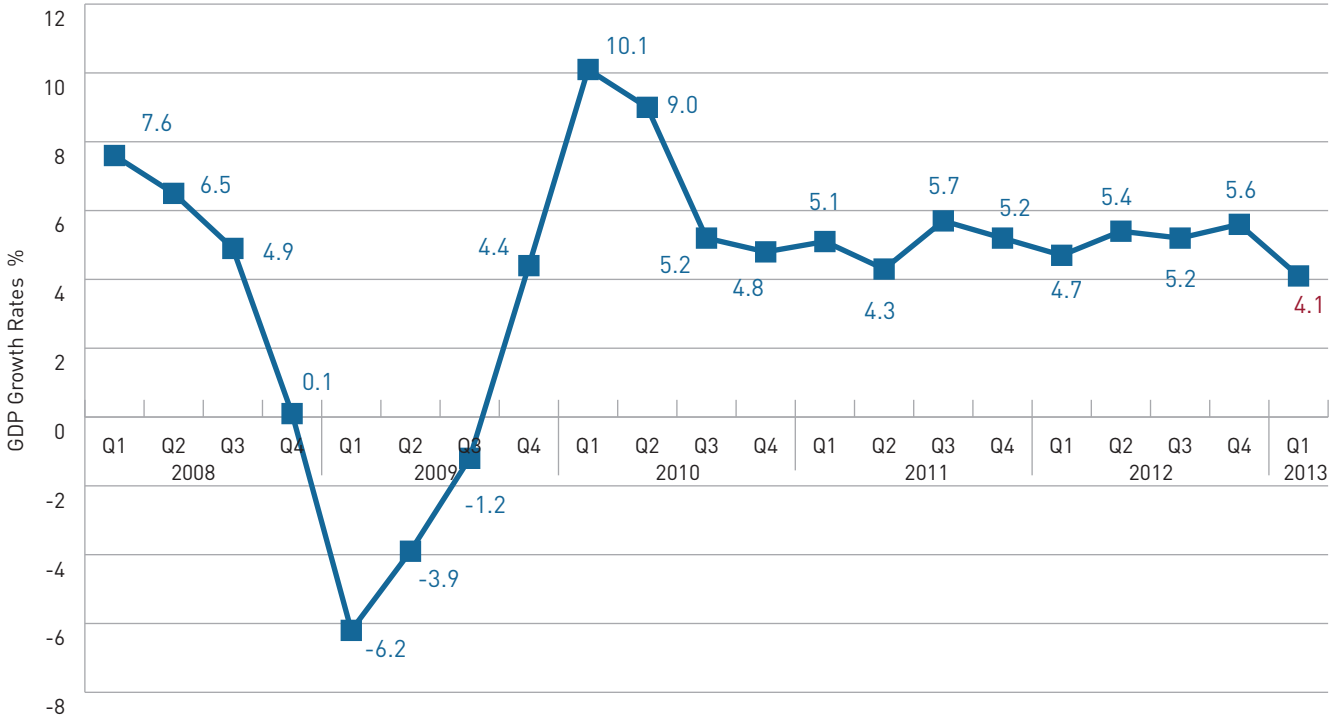

Figure 1: Quarterly Gross Domestic Growth Rates: Q1 2008 – Q1 2013
Source: The Malaysian Economy in Brief, Department of Statistics, June 2013 and other DOS publications

Institutions	Growth Forecast 2013	Remarks
Bank Negara Malaysia	5-6%	
Malaysian Institute of Economic Research (MIER)	4.8%	Revised downward from 5.6%
Malaysian Rating Corporation Bhd	5.0%	
CIMB Research Sdn Bhd	5.1%	Revised downward from 5.5%
Malaysian Business Advisory	5.4%	
Asian Development Bank (ADB)	5.3%	
World Bank (WB)	5.1%	
International Monetary Fund (IMF)	5.0%	Revised upward from 4.7%

Table 1: Malaysian Economy Growth Forecasts by Institutions

The external and domestic factors likely to influence the growth of the Malaysian economy in 2013 are as follows:-

Trade Dependency

The Malaysian economy is largely dependent on trade. Any decline in the economic performance of its trading partners is likely to cause a contraction to the Malaysian economy due to the fall in external demand. It is for this reason that many financial research houses have projected a much lower growth rate for Malaysia given the unfolding Eurozone debt crisis (As depicted in Table 1). The general opinion is that the Eurozone crisis could dampen the economic growth rates of both China and India. However, the IMF has projected a growth rate of 7.8% for China in 2013, which is same as 2012. Similarly, India is forecasted to achieve a growth rate of 5.6%, which is higher than the 3.2% recorded in the previous year. Positive economic growth in these two giant economies mean better trading opportunities for Malaysia.

Any downtrend in the economic performance of these two economies will inevitably spill over to countries

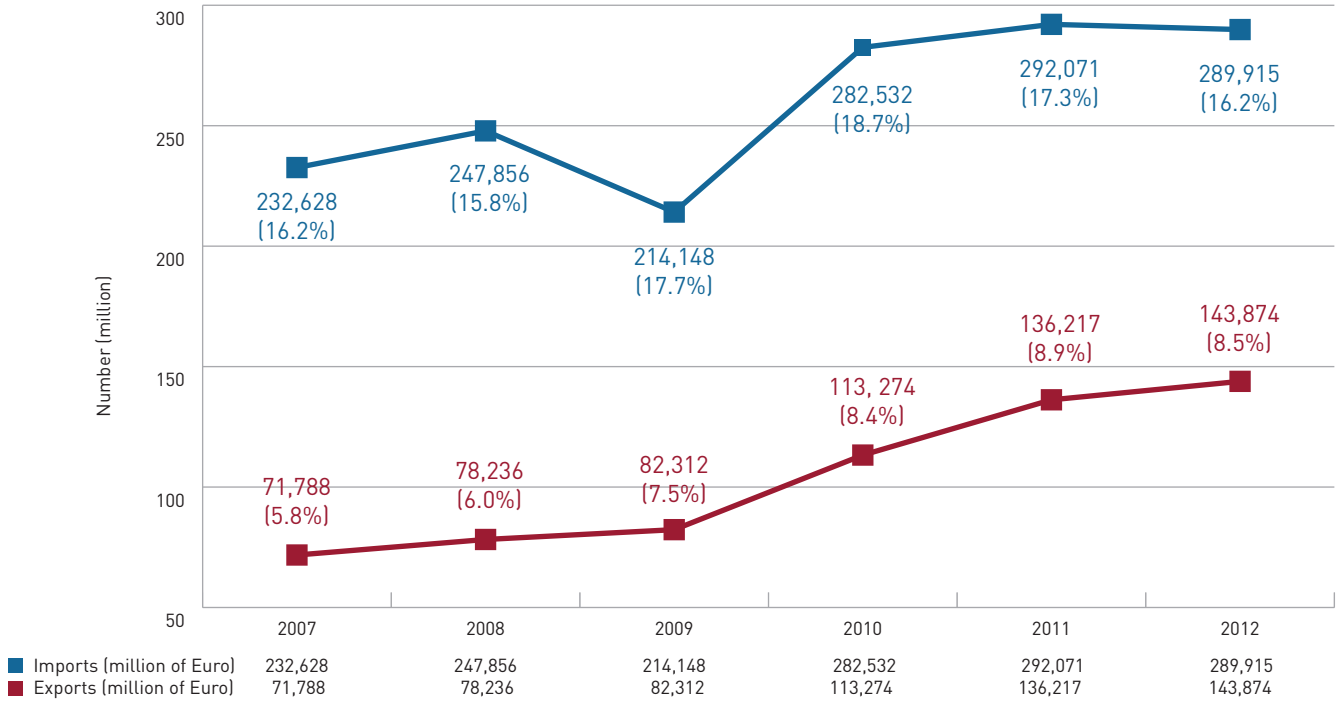

Figure 2: European Union Trade with China 2007 – 2012
Exports and Imports in millions of Euro / Share of total exports and imports
Source: The Malaysian Economy in Brief, Department of Statistics, June 2013 and other DOS publications

Country	January - May 2013			
	Exports (RM million)	Percentage	Imports (RM million)	Percentage
Japan	32,591	11.6	22,999	8.8
Australia	10,324	3.7	6,702	2.6
Singapore	41,342	14.7	33,540	12.9
India	10,393	3.7	7,633	2.9
Hong Kong	10,920	3.9	4,300	1.7
USA	23,747	8.5	20,091	7.7
The Philippines	3,681	1.3	1,869	0.7
Thailand	16,356	5.8	15,395	5.9
South Korea	10,345	3.7	11,897	4.6
European Union	25,012	8.9	28,862	11.1
China	35,038	12.5	42,165	16.2
United Arab Emirates	5,081	1.8	6,244	2.4
Vietnam	4,950	1.8	7,087	2.7
Taiwan	7,693	2.7	11,316	4.3
Indonesia	12,667	4.5	11,393	4.4
Other countries	30,504	10.9	29,038	11.1
Total	**280,644**	**100.0**	**260,531**	**100.0**

Table 2: Exports and Imports by Country: Jan-May 2013
Source: The Malaysian Economy in Brief, Department of Statistics, June 2013

like Malaysia. It is pertinent to note that China alone accounted for 12.5% of Malaysia's total exports (RM35 billion out of RM260.5 billion) and 16.2% of its total imports (RM42.2 billion out of RM260.8 billion) in January-May 2013 (See Table 2).

Meanwhile, India is gradually becoming a major trading partner for Malaysia, with total trade volume currently amounting to RM18.0 billion compared toRM16.2 billion in 2012; representing an 11% increase in trade where the balance has been in favour of Malaysia. To what extent would the economic performance of these two trading nations - in particular the impact of the Euro crisis on China -affect Malaysia's trade?

A close examination of the European Union's (EU) trade with China (As shown in Figure 2) reveals that its share of imports from China has been fluctuating between 2007 and 2012, with a peak of 18.7% in 2010 and a low of 17.7% in 2009 at the time of the Global Financial Crisis (GFC 2009). On the other hand, the EU's share of exports to China has been steadily increasing from 5.8% in 2007 to 8.9% in 2011, but declined to 8.5% in 2012 due to the on-going economic slowdown in the Eurozone. Interestingly, it can be seen that despite the GFC 2009 and the Eurozone crisis, the share of the EU's imports or exports from China remained at an average of 17.0% and 7.5% respectively.

Indeed, the presence of a strong trade relationship between these two giant economies is a positive factor for Malaysia's trade growth. Specifically, Malaysia has strong trade, diplomatic and cultural ties with China, the EU economies, as well as India. On another note, Malaysia's trade with its Asian neighbours accounted for 66.3% of its total exports in January – May 2013 in comparison to only 8.9% to European nations.

Similarly, total imports from Asian countries during the same period of January to May 2013 amounted to 65.1%, compared to 11.1% from EU economies. A closer look at the data shows that Malaysia has stronger trade ties with countries like the United Kingdom, Germany and the Netherlands whereas it has only limited trade with economies like Greece, Spain and Italy, the epicenters of the current debt crisis. On this score, the financial turmoil in these nations is unlikely to have a direct impact on Malaysia's economic growth.

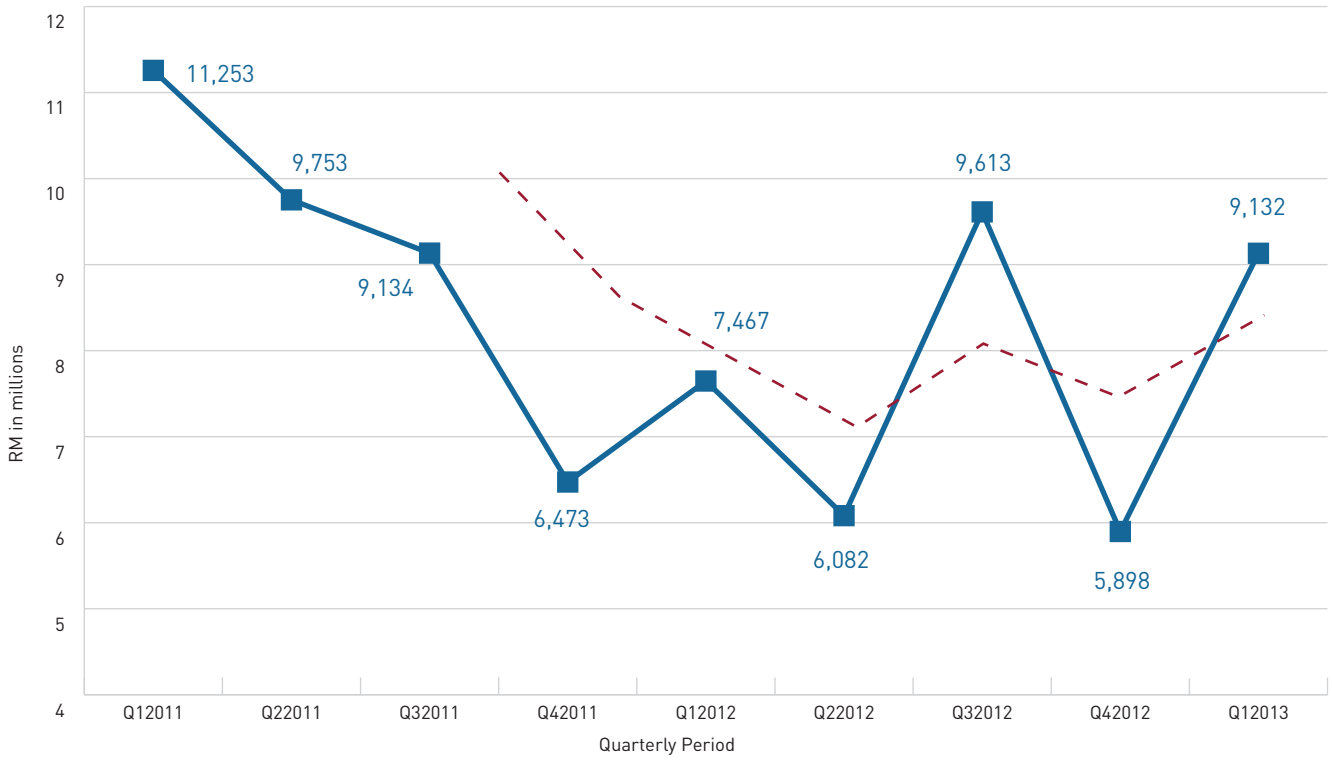

Figure 3: Foreign Direct Investment in Malaysia by Quarter: Q1 2011 - Q1 2013
Source: The Malaysian Economy in Brief, Department of Statistics, June 2013

Country	2010		2011		2012		2013 Q1	
	RM million	%	RM million	%	RM million	%	RM million	%
USA	8,031	27.4	3,527	9.6	- 2,008	-6.9	1,164	12.7
Central & South America	2,954	10.1	3,503	-9.6	691	2.4	1,547	16.9
Netherlands	6,125	20.9	3,522	9.6	1,723	5.9	1,570	17.2
Denmark	-104	-0.4	101	0.3	-68	-0.2	52	0.6
Luxembourg	132	0.5	-558	-1.5	537	1.8	-707	-7.7
Germany	-476	-1.6	3,091	8.4	998	3.4	-292	-3.2
France	607	2.1	391	1.1	-42	-0.1	272	3.0
Switzerland	798	2.7	599	1.6	1,634	5.6	47	0.5
United Kingdom	-1,301	-4.4	1,086	3.0	922	3.2	699	7.7
China	-3	-0.01	-44	-0.1	87	0.3	-148	-1.6
Hong Kong	-761	-2.6	-378	-1.0	862	3.0	523	5.7
Japan	2,876	9.8	9,591	26.2	5,794	19.9	1,346	14.7
Korea	4,576	15.6	423	1.2	-180	0.6	-177	-1.9
Chinese Taipei	-412	-1.4	-134	-0.4	-228	-0.8	275	3.0
Thailand	-398	-1.4	1,169	3.2	-136	-0.5	-99	-1.1
Singapore	1,405	4.8	6,314	17.2	5,745	19.8	1,372	15.0
Australia	15	0.1	493	1.3	1675	5.8	-42	-0.5
Other Countries	5,258	17.9	10,925	29.8	11,054	3.8	1,730	18.9
Total	29,322	100.0	36,615	100.0	29,060	100.0	9,132	100.0
Europe		19.7		22.5		19.6		18.0
North Asia		21.4		25.8		21.8		19.9
South East Asia		3.4		20.4		19.3		13.9

Table 3: Foreign Direct Investment in Malaysia by Countries: 2010 - 2012 and Q12013
Source: The Malaysian Economy in Brief, Department of Statistics, June 2013

Foreign Direct Investment (FDI) Dependency

Although the Government has been aggressively encouraging domestic driven growth as the way forward towards building a resilient economy, the country is still highly dependent on foreign direct investment (FDI). As shown in Figure 3, the trend line (the dotted line) provides an indication that the FDI has been on an upward trend since the second quarter of 2012; prior to that, the trend was declining. Malaysian Investment Development Authority (MIDA) reported that during the first half of 2013, FDI investments totalled RM30.7 billion, registering a surge of 71% and providing a reflection of strong investor confidence in the prevailing business environment in the country.

As shown in Table 3, roughly one-fifth of the total FDI inflow into Malaysia comes from the EU - 19.7% in 2010 and 19.6% in 2012. During Q1 2013, FDI from Europe – specifically the Netherlands, the United Kingdom, France and Switzerland - accounted for 18.0% of the total. In Q1 2013, the Netherlands alone accounted for 17.2%. Again, it can be seen that there are hardly any FDI coming from countries currently afflicted by the deepening debt crisis. Based on this information, we can cautiously conjecture that Malaysia is poised to attract FDI from European nations that still enjoy relatively healthy economic growth. From Asia, Singapore and Japan accounted for a significant portion of FDI inflow into Malaysia.

Domestic Demand

Despite a challenging external environment, the positive economic outlook for Malaysia in 2013 is underpinned by strong domestic demand attributed to a number of factors:

- Performance of economic sub-sector

Table 4 shows the sectorial performance of Malaysia's economy from Q1 2011 until Q1 2013. Except for mining and quarrying, all sectors posted a positive performance in 2013, measured in terms of constant prices. As reported by the Department of Statistics, the mining and quarrying sector declined to 1.9% due to lower production of crude oil (-2.8%) and condensate (-6.5%). Crude oil production dropped from 18,776,700 barrels in January 2013 to 16,719,000 in May 2013. During this period, the average price of crude oil also dropped from USD116 per barrel in January 2013 to USD107.85 in May 2013. The marginal positive growth of natural gas could not mitigate the overall downward performance of this sector in the first quarter of 2013. The construction sector did remarkably well by registering

Economy Activity	2010	2011	2012	2011				2012				2013
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Agriculture	2.4	5.8	1.0	-0.3	7.6	8.7	6.8	2.4	-4.6	0.6	5.6	6.0
Mining & Quarrying	-0.3	-5.5	1.4	-3.7	-9.1	-5.5	-3.6	0.3	2.2	-1.2	4.2	-1.9
Manufacturing	11.9	4.7	18.1	5.8	2.6	5.3	5.1	4.4	5.7	3.3	5.7	0.3
Construction	7.4	7.0	6.4	5.1	2.1	4.0	7.3	15.4	21.5	17.9	17.6	14.7
Service	9.6	13.0	15.6	7.2	7.0	7.2	6.8	5.7	6.6	7.0	6.4	5.9
Type of Government Expenditure												
Government Final consumption expenditure	3.4	15.8	5.1	10.8	5.7	20.7	22.5	9.2	11.0	2.4	1.2	0.1
Private final consumption expenditure	6.9	6.8	7.7	6.7	6.3	7.3	7.0	7.3	8.6	8.6	6.2	7.5
Gross fixed capital formation	11.9	6.2	19.9	11.3	2.9	5.5	6.0	14.9	26.2	22.3	16.0	13.2
Exports of goods and services	11.1	4.6	-0.1	2.2	5.5	5.0	5.7	2.2	1.6	-2.5	-1.6	-0.5
Imports of goods and services	15.6	6.1	4.7	9.7	4.3	4.0	6.9	7.0	8.3	4.5	-0.6	3.6

Table 4: GDP by economic activities and expenditure at constant 2005 prices - Percentage change from corresponding quarter of preceding year
Source: The Malaysian Economy in Brief, Department of Statistics, June 2013

14.7% growth in Q1 2013. Civil Engineering remained the main impetus with a growth of 36.2%, reinforced by infrastructure projects and also residential development, which rose to 9.8%, stimulated by housing projects mainly in the Klang Valley and Penang. The services sector expanded to 5.9% in Q1 2013. As indicated by the the Department of Statistics, Communications improved to 9.0 %, largely backed by data communication services mostly fuelled by the growing broadband penetration rate.

Remarkable growth in the services sector is also fuelled by the sound performance of the Wholesale & Retail Trade and Finance & Insurance sub-sectors. Thus, the positive performance of all economic sub-sectors is poised to continue into Q2 2013 in anticipation of sustained domestic demand. The growth of the sub-sectors is also likely to have spillover effects on information and communications technology (ICT). Both the private and public sectors are increasingly adopting ICT as an enabling tool to improve operational efficiency, production effectiveness, innovation and research & development methodologies. Contemporary ICT also enhances 'anytime and anywhere' communications, interaction and networking among stakeholders and customers, especially with the increasing deployment of smartphones and tablet PCs that provides greater mobility and convenience as well as being cost effective.

• Consumption Expenditure

Long term trend

Except for the recession in 2009 following the Global Financial Crisis, the consumption expenditure by the government and private sectors grew at a healthy annual average growth rate of 10.7% and 9.7% respectively. These consumption growth rates reflected the healthy economic performance and growth, as well as the general well-being of the population in terms of lifestyle, savings, investments and increase in wealth.

The gross fixed capital formation in the private and government sectors also registered significant growth rates of 11.0% and 9.3% per annum respectively. In Budget 2012, the Government has forecasted 7.1% growth in private consumption in 2013. Consumption in the household sector was likely supported by the various cash hand outs that the Government had announced during the Budget and before GE13.

Short term trend

Final consumption expenditure posted a positive growth of 4.1% in the first quarter of 2013, which was however lower than the previous quarter at 6.5%; see Figure 4. As shown in Table 4, private final consumption expenditure picked up to reach 7.5% as compared to 6.2% in the fourth quarter of 2012. The expansion was driven by better growth in most types of expenditures, mainly in transport & communications, housing & utilities and food & beverages, as reported by the Department of Statistics. However, the Government final consumption expenditure grew at a slower pace of 0.1% against 1.2% in the previous quarter.

Year	Private final consumption expenditure	Government final consumption expenditure	Gross fixed capital formation: private	Gross fixed capital formation: government	Gross fixed capital formation: overall
	Value Ringgit Malaysia million at 2005 current prices				
2005	240,188	62,368	66,229	55,008	121,237
2006	264,584	66,647	70,918	60,105	131,023
2007	300,418	76,959	83,337	65,727	149,064
2008	344,215	88,581	86,114	72,268	158,382
2009	348,168	93,017	81,028	75,633	156,661
2010	377,631	96,947	95,853	81,050	176,903
2011	418,473	114,750	111,789	83,213	195,002
2012	460,208	126,747	137,676	102,596	240,272
CAGR : 2005-2012 (%)	9.7	10.7	11.0	9.3	10.3

Table 5: Consumption expenditure and gross fixed capital formation by private sector and Government
Source: Department of Statistics

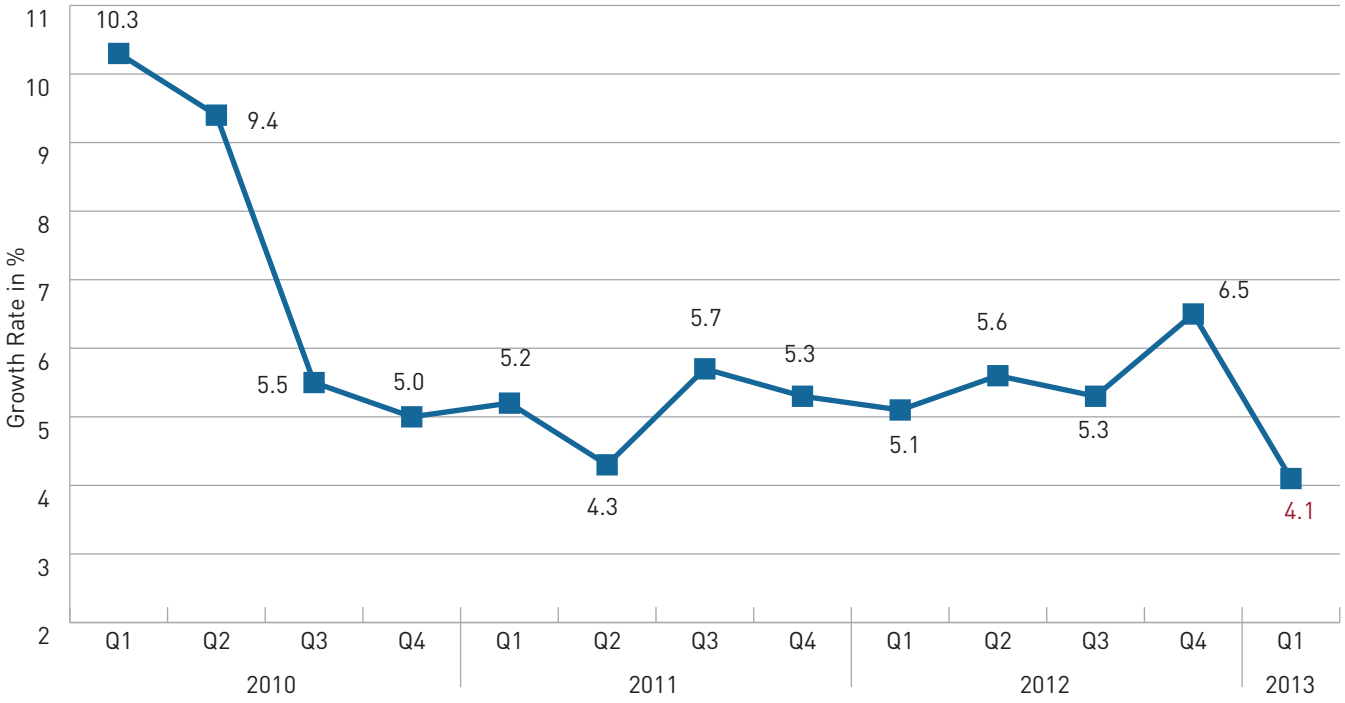

Figure 4: Final consumption expenditure growth rate Q1 2010 - Q3 2013
Source: The Malaysian Economy in Brief, Department of Statistics, June 2013

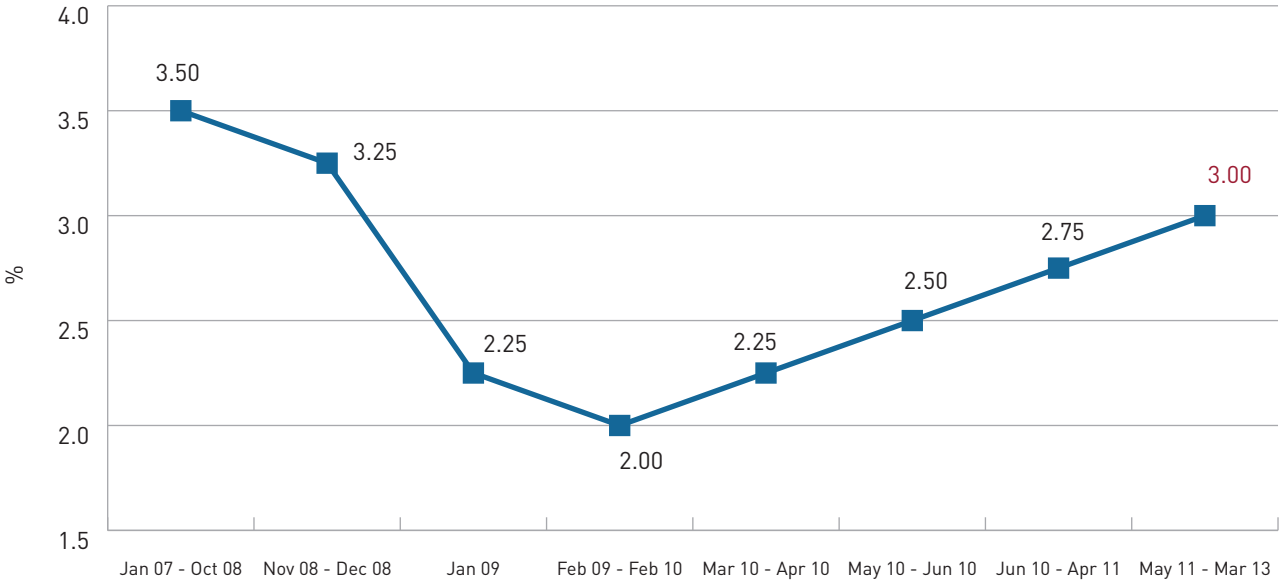

Figure 5: Bank Negara Overnight Policy Rates (OPR) since January 2007
Source: Bank Negara Malaysia website

• Private consumption

Private consumption is poised to sustain its growth with the support of a number of macro-economic factors that favour healthy growth, as follows:-

Overnight policy rate (OPR)

The overnight policy rate was maintained at 3% as decided by the Monetary Policy Committee of Bank Negara Malaysia in the month of July 2013. Indeed, as shown in Figure 5, the OPR has been at this rate since May 2011. This rate was determined after taking into consideration the weak external conditions in advanced economies. The rate is poised

to increase capital spending in domestic-oriented industries and the on-going implementation of infrastructure projects that will also support investment activity, besides containing inflationary pressures.

Base lending rates

As acknowledged, the OPR provides the guidelines for determining the base lending rates (BLR) by financial institutions in the country. It typically differs among financial institutions, which take into account the cost of operations besides statutory regulations and global monetary conditions. However, as shown in Figure 6, the BLR in Malaysia has been low and also stable over the years; currently, average BLR is standing at 6.53% per annum. Such low BLR have been stimulating not only private consumption at the household level, but also small and medium business loans.

Inflation rate

As shown in Figure 7, the inflation rate has been contained at 1.6% during the first half of this year. With such a low inflation rate, private consumption especially at the household sector is also poised to grow. However, the inflation also faces pressure from heightening expenditures arising from hand outs given by the Government - earlier one-off financial assistance to low and middle income groups in support of General Election 13 followed by bonuses for civil servants in support of festival celebrations. The disposal of income is also likely to expand and exert pressure on inflation in tandem with the implementation of a minimum wage (RM800 in Peninsular Malaysia and RM900 for Sabah and Sarawak) since 2012.

Foreign exchange rate

The performance of the Malaysian currency against the US dollar for the period January 2012 to June 2013 is shown in Figure 8. Purchasing power, especially on foreign goods and services, is augmented in tandem with the increasing strength of the Malaysian Ringgit against the USD, which has been fluctuating between RM3.0000 in February 2012 and RM3.1895

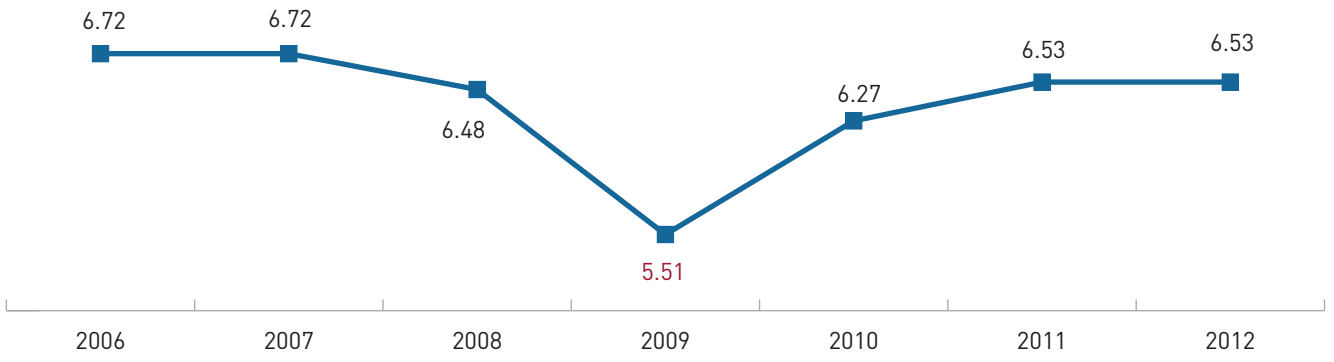

Figure 6: Average Base Lending Rates: 2006-2012
Source: Bank Negara Malaysia website

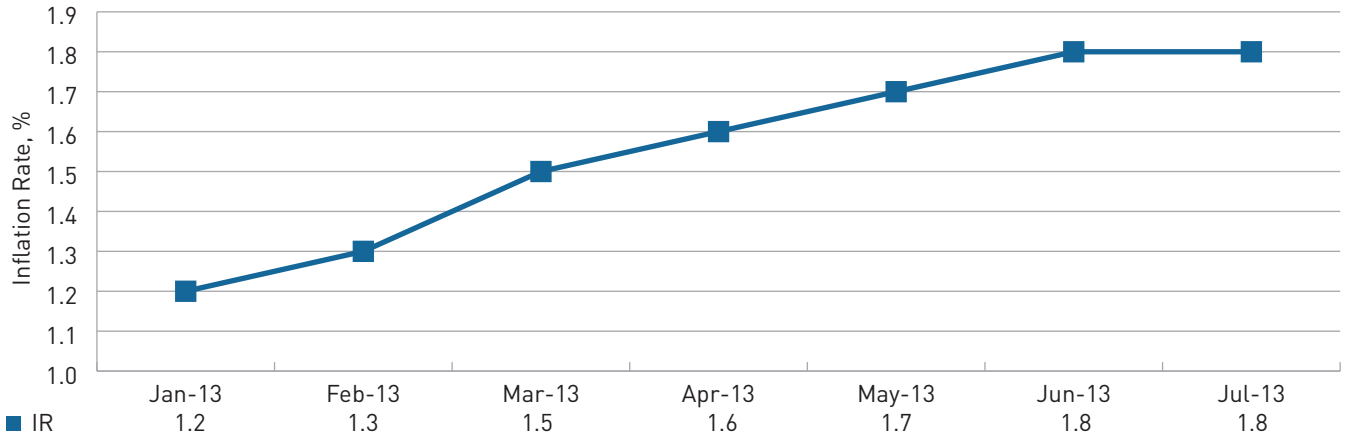

Figure 7: Inflation Rates in Malaysia, January 2013 - July 2013
Source: Department of Statistics

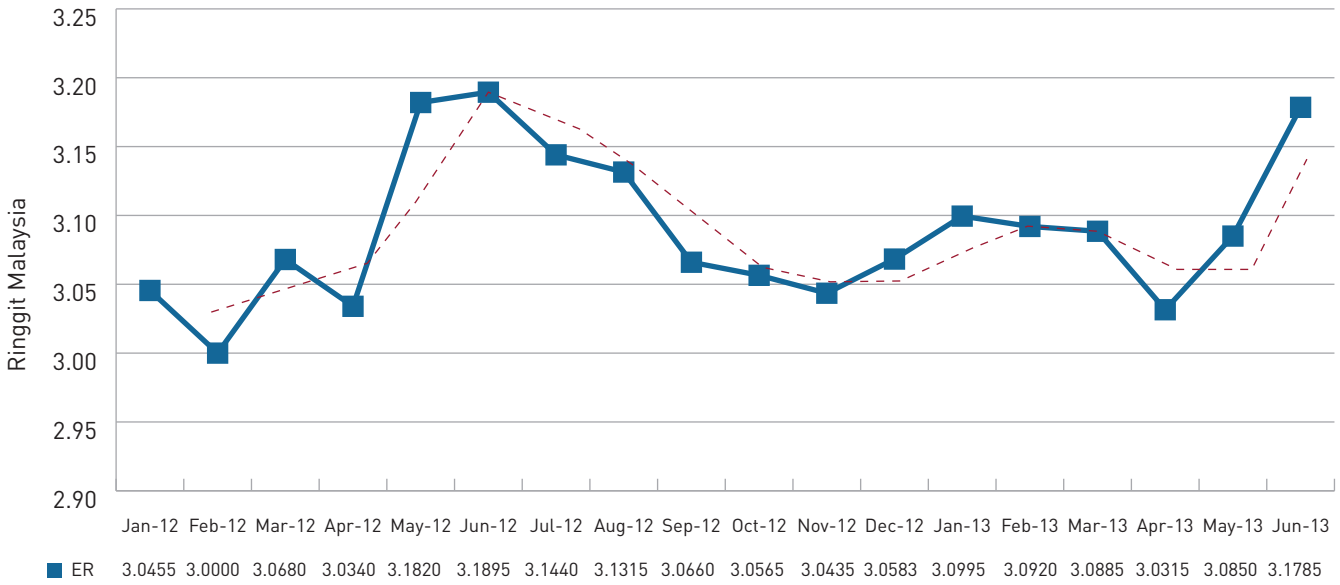

Figure 8: Foreign Exchange Rates January 2012 – June 2013
Source: Bank Negara Malaysia website

in June 2012. The exchange rate averaged RM3.0958 over the past six months, indicating currency appreciation that is poised to stimulate private consumption from a trade perspective.

- Domestic direct investments

As reported by the Malaysian Investment Development Authority (MIDA), of the total investments approved in 2012, RM127.6 billion (78%) were contributed by Domestic Direct Investment (DDI) and RM34.8 billion (22%) by FDI. Clearly, higher achievements attained in DDI growth is poised to stimulate domestic supply and demand for goods and services. Specifically, a total of 5,536 projects worth an investment value of RM117.6 billion were approved in the services sector including RM6.6 billion in information and communications technology services (ICTS); DDI accounted for RM105.4 billion. The DDI performance also clearly indicated that Malaysian investors have favourably responded to the Government's promulgation to invest more within the country, as stipulated in the Tenth Malaysia Plan (2010-2015) and Economic Transformation Programme (ETP).

Resilient Factors

Thus, the resilience in the Malaysian economy is poised to continue in the remaining months in 2013, which can be summarised as:-

i. strong domestic demand arising from economic transformation programmes and on-going mega projects;
ii. increased export earnings owing to strengthening of Ringgit Malaysia against US dollar;
iii. stable overnight lending rates stimulating business investments;
iv. sustained private and public consumption and expenditure;
v. low inflation rate;
vi. low unemployment rate lingering between 3.0% and 3.7% over the past one decade;
vii. steady and positive growth in the various economic sectors, especially in Information and Communications Technology Services (ICTS); and
viii. higher economic growth forecasts for China, India and ASEAN countries, where at least 60% of Malaysia's total trade is concentrated in and is highly likely to bring about a positive impact on the Malaysian economy in 2013.

Economic Challenges

Nonetheless, the Malaysian economy is not totally free from economic encumbrances and faces a number of investment related risk factors such as:-

i. External environment: Risk aversion strategy among potential investors due to the globalisation and market liberalisation phenomena;
ii. Macro policy environment: Any slacking in the delivery of economic transformation initiatives, mega projects and geographically defined corridor projects;

iii. *Reducing fiscal deficit:* Poor management on the part of the Government in its ambitious task to reduce the fiscal deficit from 5.4% of GDP in 2011 to 3% in 2015 may dampen public expenditure and investments unless the Government achieves the target through revenue-increasing measures or operational cost reduction strategies;

iv. *Macro indicators:* Fluctuation in oil and commodity prices in global markets could result in higher prices for consumers through increasing inflation and base lending rates;

v. *Capital flight:* Massive capital outflow arising from volatile foreign exchange rates is also bound to hurt export and import earnings;

vi. *Quality of Malaysian workforce:* Over dependence on low skilled foreign workers may not be healthy for the Malaysian economy in the long term unless a concerted effort is made to increase the quality of the local workforce - one that is ingrained with technological capabilities, innovation culture, R&D capabilities, productivity, quality and competitive edge best practices.

ICT Industry Outlook: ICT Services Sector

As it was in the past, the ICTS segment in Malaysia is projected to register significant growth in 2013. The ICTS segment grew at a Compound Annual Growth Rate (CAGR) of 13.6% by increasing its value added services from RM12.7 billion in 2001 to RM55.1 billion in 2012 (table 6). The ICTS segment is poised to reach the mark of RM61.7 billion in 2013 with an annual growth rate of 12%. In tandem with this, the share of ICTS in the national Gross Domestic Product

Year	ICTS Value Added Services ('000)	Share of ICTS to GDP (%)	Telecom-muni-cation services ('000)	Com-puter services ('000)	Sub-total: ICT services Value Added MSIC 2000 ('000)	Publish-ing ('000)	Motion picture, video and televi-sion pro-gramme ('000)	Pro-gram-ming and broad-casting ('000)	Infor-mation services ('000)	Sub-total MSIC 2008 ('000)
2000	11,771,057	3.3	10,335,256	868,758	11,204,014			193,273	373,770	567,043
2001	12,744,792	3.6	10,815,979	1,257,657	12,073,636			269,319	401,837	671,156
2002	14,652,306	3.8	12,261,462	1,412,888	13,674,350			254,765	723,191	977,956
2003	14,992,154	3.6	12,368,517	1,916,304	14,284,821			255,963	451,370	707,333
2004	16,087,422	3.4	12,773,701	2,056,348	14,830,049			356,714	900,659	1,257,373
2005	20,187,921	3.9	16,352,349	2,718,059	19,070,408			387,730	729,783	1,117,513
2006	23,858,012	4.2	19,252,783	3,125,191	22,377,974			419,412	1,060,626	1,480,038
2007	25,036,393	3.9	19,532,436	3,772,887	23,305,323			427,088	1,303,982	1,731,070
2008	30,090,354	4.1	22,655,972	5,168,116	27,824,088			447,618	1,818,648	2,266,266
2009	31,999,469	4.7	22,912,378	6,496,356	29,408,734	271,688		479,443	1,839,604	2,590,735
2010	42,095,951	5.5	28,146,911	9,363,020	37,509,931	503,080	1,056,006	525,271	2,501,663	4,586,020
2011	48,212,887	5.8	30,665,572	10,921,164	41,586,736	1,047,171	2,197,859	543,294	2,837,826	6,626,151
2012	55,096,058	6.3	33,925,850	11,831,261	45,757,111	1,760,360	3,694,737	569,022	3,314,828	9,338,947
2013	61,699,089	6.7	37,422,766	12,741,358	50,164,124	2,293,120	4,812,923	593,835	3,835,086	11,534,965
Sub-sector Share (%) in 2013	100.0		60.7	20.7	81.3	3.7	7.8	1.0	6.2	18.7
CAGR (%): 2000-2013	13.6		10.4	22.9	12.2			9.0	19.6	26.1

Table 6: Distribution of ICT Services by sub-sectors, 2000-2013
Source: Department of Statistics and PIKOM Estimates

(GDP) has almost doubled from 3.3% to 6.3% between 2001 and 2012 while the segment's share of the GDP is now poised to reach 6.7% in 2013.

Traditionally, telecommunications and computer services together constitute the ICTS segment as per the Malaysian Standard Industry Classification 2000 (MSIC2000). The introduction of MSIC2008 saw the inclusion of publishing services, motion picture, video and television programme, programming and broadcasting and information services as additional items. The new segments constitute about 11% of the total ICTS sector contribution in terms of value added services.

PIKOM is confident of achieving double digit growth in the years ahead through on-going capital intensive economic transformation programmes and mega projects that have been stimulating domestic demand for ICT Services. To name a few, the ICT intensive big projects include the Mass Rapid Transit (MRT) linking Kajang and Sg. Buloh, Petronas Refinery and Petrochemical Integrated Development (RAPID) project in Pengerang, Tun Razak Exchange, River of Life, Bandar Malaysia at Sungei Besi as well as the various economic corridors – Iskandar Malaysia, Northern Corridor Economic Region (NCER), East Coast Economic Region (ECER), Sabah Development Corridor (SDC) and Sarawak Corridor of Renewable Energy (SCORE).

The ICT sector, in its contemporary form, has evolved to be more than a mere collection of technological tools. As a socio-economic enabler and key driver of business, ICT is poised to increase the process efficiency and effectiveness of product and services delivery. ICT's ubiquity, pervasive features and characteristics are continually impacting the way one works, plays and learns. In the early stages of the Information Age, such changes were harnessed through the MSC Malaysia initiative that was introduced in 1996. Having gone through two decades of new age experiences and exposures, viewing from a public policy perspective, the country has reached the next inflection point by creating a digital innovation economy through the Digital Malaysia Programme (DMP). From the private sector lens, the DMP is expected to increase business activities across the board and on a social level, it is poised to enhance the quality of life of the masses.

Productivity Performance of ICTS Sector

As shown in Table 7, the ICTS sector - next to health care services and business and professional services - is considered one of the high performing sectors in enhancing the overall productivity of the nation.

Foreign Direct Investment in ICTS

Before the advent of MSC Malaysia, FDI in the ICT sector was mainly confined to micro-electronics, which was subsumed under the manufacturing sector. Indeed, FDI in microelectronics is still considered a significant contributor to the manufacturing sector and to the overall economy, despite the shifting of investment to low cost economies in the

Key Services Sector	Productivity Level by Key Services Sector: 2007-2012 (RM thousands)						
	2007	2008	2009	2010	2011	2012	CAGR (%)
Logistic	132.5	133.2	123.1	129.6	134.3	140.2	1.14
Information and Communication Technology services	302.6	342.2	350.2	376.4	400.5	423.4	6.95
Wholesale & Retail Trade services		439.8	419.6	463.7	496.6	550.9	5.79
Business and Professional Services	55.25	61.35	69.67	73.79	77.49	84.6	8.89
Tourism Services	49.4	53.1	53.2	55.1	57.6	59.2	3.69
Private Education services	43.8	46.1	47.9	50.3	52.4	54.5	4.47
Health Care Services	47.86	54.93	61.49	67.04	72.31	79.0	10.55
Construction Services	20.74	21.61	22.85	23.9	24.64	25.8	4.46

Table 7: Distribution of ICT Services by sub-sectors, 2000-2013
Source: Productivity Report 2011/12, MPC and PIKOM Estimates

Year	EXPORTS				IMPORTS			
	Electrical & Electronics Goods (TOTAL)	Office Machines & Automatic Data Processing Equipment	Telecommunications & Sound Recording Apparatus & Equipment	Electrical, Machinery, Apparatus & Appliances, nec & electrical parts thereof	Electrical & Electronics Goods (TOTAL)	Office Machines & Automatic Data Processing Equipment	Telecommunications & Sound Recording Apparatus & Equipment	Electrical, Machinery, Apparatus & Appliances, nec & electrical parts thereof
	Ringgit Malaysia (million)				Ringgit Malaysia (million)			
2000	219,583	78,616	49,266	91,702	154,996	17,316	13,192	124,488
2001	189,487	63,711	46,266	79,510	132,235	18,018	12,769	101,448
2002	201,203	68,354	40,399	92,450	149,951	21,154	14,410	114,387
2003	210,724	64,048	39,586	107,088	159,742	24,295	13,224	122,223
2004	241,687	76,802	47,688	117,198	182,524	32,720	16,293	133,511
2005	265,197	87,151	50,797	127,249	193,526	36,672	16,562	140,293
2006	281,346	102,891	52,816	125,640	208,874	37,479	17,241	154,154
2007	266,686	93,260	45,321	128,106	204,097	36,893	16,930	150,274
2008	255,360	87,672	47,566	120,122	189,645	32,175	18,998	138,472
2009	227,778	73,671	35,616	118,492	159,310	31,664	17,939	109,707
2010	237,112	72,888	36,234	127,991	157,736	35,081	19,370	103,285
2011	230,442	70,254	33,549	126,639	149,460	33,762	19,866	95,832
2012	223,772	67,620	30,865	125,287	141,183	32,442	20,362	88,378
AAGR: (2000-2012)	0.16	-1.25	-3.82	2.63	-0.77	5.37	3.68	-2.81

Table 8: Exports and Imports of ICT Sector, 2000-2012
Source: Department of Statistics and PIKOM Estimates

region. According to an industry analyst in 2012, the electrical and electronics (E&E) sector in Malaysia contributed almost RM48.5 billion in gross national income and created 8,800 jobs. To drive the sector forward, companies are aggressively looking for talents in value-added roles.

The Penang Free Trade Zone is currently home to 2,000 companies and a thriving E&E ecosystem, which has evolved over the years since the establishment of the first semiconductor plant in Penang in 1972. Today, the E&E sector is aggressively moving up the value chain into design and development. Large multinational companies from the United States, Japan, and Europe have chosen Malaysia as their base and have consistently increased their investments especially in the exports of E&E goods, which are still registering positive growth.

The E&E sector's dynamic growth is also reflected in the import of high value adding products pertaining to office machines & automatic data processing equipment and telecommunications, sound recording and reproduction apparatus and equipment. These imports registered growth of 5.37% and 3.68% respectively over the 2000-2012 period; see Table 8. Thus, graduates in E&E are currently high in demand, especially in the R&D segment and software development. In particular, candidates with strong fundamentals and a passion for engineering, physics, chemistry, algorithm and statistics are highly sought after.

The Government of Malaysia has promulgated the development of the ICTS sector through flagship applications of MSC Malaysia. Some of the key focus areas include application software, mobility embedded software and hardware (MESH), shared services and outsourcing (SSO), creative multimedia, internet based businesses with R&D incubators set up by institutes of higher learning (IHL). As shown in Figure 9, FDI in the ICTS sector, once unheard of in Malaysia, is now assuming a key position in the national investment portfolio. The fluctuations shown in Figure 9 indicate that FDI in ICTS is

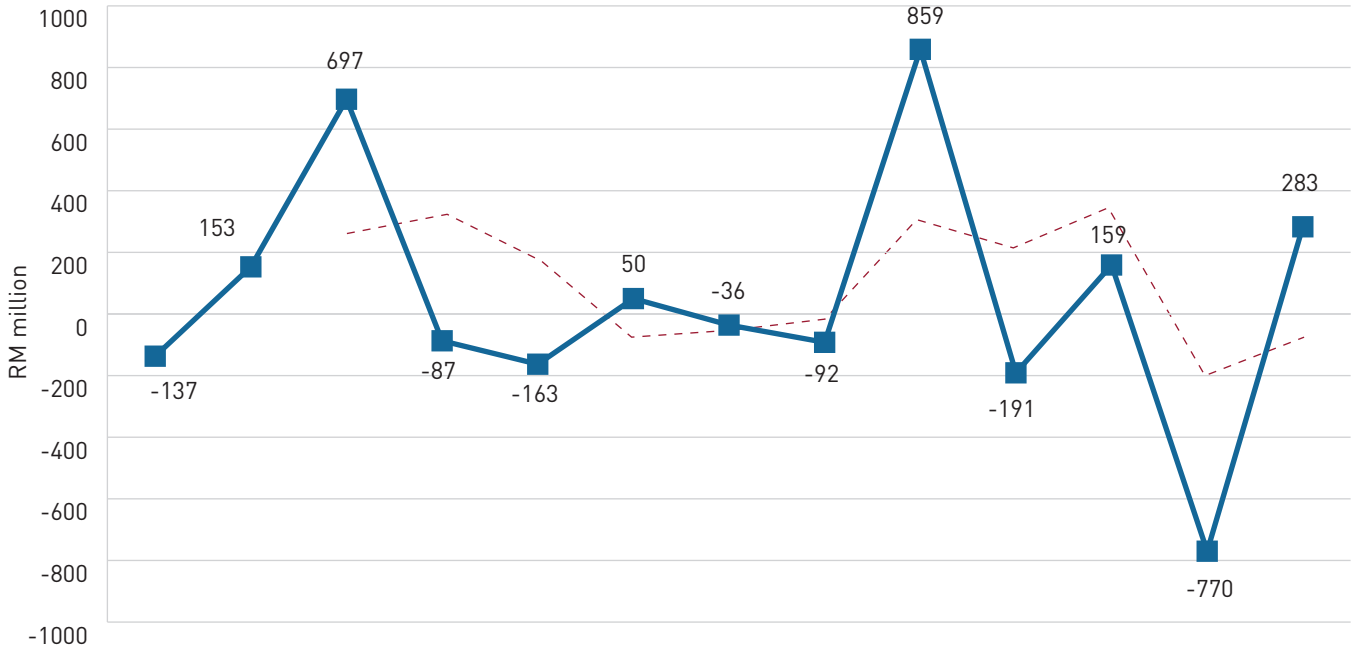

Figure 9: Foreign Direct Investment in Malaysia, Q1 2010-Q3 2013
Source: The Malaysian Economy in Brief, Department of Statistics, June 2013

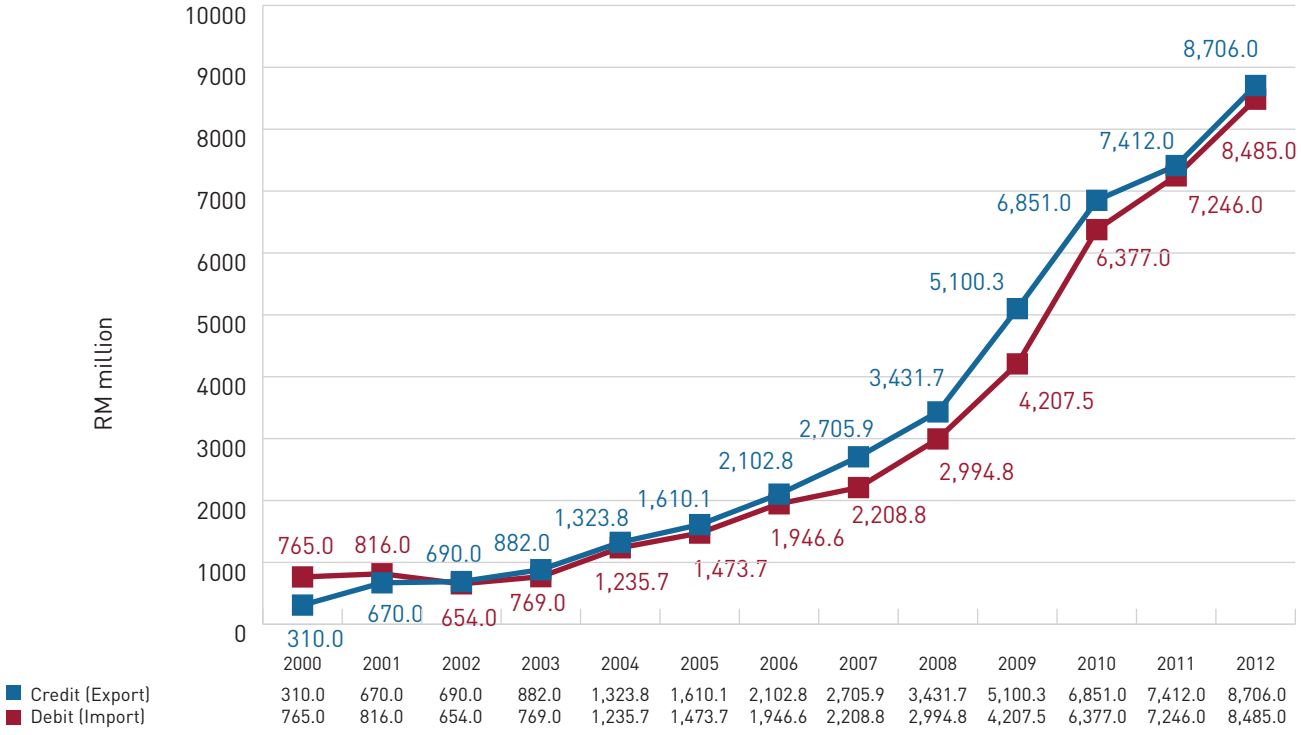

Figure 10: Exports and Imports of ICT Services 2000 - 2012
Source: Department of Statistics

still in its infancy. Nonetheless, as shown by the dotted lines, the overall trend is poised to swing upward in the years ahead with increasing globalisation and market liberalisation policies that the Government continues to pursue.

Exports and Imports of ICT Services

Investment in the ICT sector has also led to significant growth in exports and imports of ICT Services. As reflected in Figure 10, export of ICTS grew from RM310 million in 2000 to RM8.706 billion in 2012, registering an annual average growth of 32.0%. Similarly, ICT imports also grew from RM765 million to RM8.485 billion, recording an annual growth rate of 22.0% over the same period. Notably, import

of ICTS services was higher than exports of services at the beginning of the new century and since 2002, the country has become a net exporter of ICTS. The other notable trend is that ICTS trading has been registering exponential growth over the past five years and is projected to sustain such growth in the years ahead with increasing emphasis placed on the services sector including ICTS.

ICTS Trends

In 2013, industry pundits are projecting at least four key trends that will change the way in which companies operate, and in turn, contribute to economic growth. The four key trends are:

i. ***Big data analytics,*** which is deployed in a variety of industries to serve customers better by culling out insights and predictions that the data can generate. The process can help to improve the profitability of the company by assessing credit worthiness, risk analysis and/or data supported decision making processes;

ii. ***Cloud computing,*** which is one of the fastest growing technological advances that helps companies to structure, organise and store large amounts of data without the need to invest heavily in hardware and software tools. More importantly, company employees can remain connected with the help of smartphones and tablets. Under such a work culture, people need not be in the office to complete their tasks; they can do their work from the train or bus while commuting to work, besides teleworking from home;

iii. ***Mobile device usage,*** particularly smartphones and tablets, makes customers and clients more mobile and also provides access to companies' websites, applications and records wherever they happen to be;

iv. ***Social media,*** an offspring of the internet age. This new age media - although it can be regarded as a disruptive and unproductive activity when staff waste time on personal matters, can be a powerful tool for customer engagement, relationship building, networking, information sharing, and soliciting feedback, as well as branding products and services.

ICTS Challenges

Despite its growing dynamism, the nation's ICT sector continues to face several persistent challenges:

i. *Supply of ICT graduates:* As it was in the recent past, ICT enrolment in both public and private institutions has stagnated. The ICT enrolment in public universities has not improved much, as the figure has been lingering around 25,000 per year over the past three years. Understandably, with budget constraints, it will be difficult for public universities to increase their capacity to produce more ICT graduates. ICT enrolment in private universities has also not improved very much and averages around 50,000 per year, which notably is double than what it was a decade ago.

ii. *Quality of ICT graduates:* Quality, competency and employability of ICT graduates in meeting industry demands continue to remain a critical issue. Low remuneration, especially in comparison to regional countries, rampant job-hopping for better terms of employment, and a declining interest among young people in ICT jobs that demand long working hours continue to plague the growth of the ICT industry. However, initiatives by TalentCorp, which was established in January 2011, is helping to redress some of the talent gaps in the ICT sector. The initiatives are carried out via three strategic thrusts: optimising Malaysian talent, attracting and facilitating global talent and building networks of top talent. Being new, these endeavours have yet to bear fruit.

iii. *Talent migration:* Table 9 below shows a comparative analysis of the remuneration earned by ICT professionals in selected Asian and English speaking countries. Without any purchasing power parity (PPP) adjustment, the results showed that more advanced Asian economies, in particular Hong Kong and Singapore, recorded average remunerations that were 2.25 to 2.54 times more than the average remuneration earned by Malaysian ICT professionals in 2012. Besides these two countries, China, Thailand and Vietnam offer higher remuneration for ICT professionals, offering 1.87, 1.36 and 1.20 times more than Malaysia respectively. Indeed, technically speaking, ambitious job seekers should use PPP adjusted figures when searching for overseas jobs as the compilation takes into account inflation and foreign exchange

Country	IT Skill/ Speciality	Company Size	Years of Experience	Average Benchmark Scale	IT Skill/ Speciality	Company Size	Years of Experience	Average Benchmark Scale
	Benchmarking Scale: Malaysia=1.00 (Atlias Method)				Benchmarking Scale: Malaysia=1.00 (Purchasing Power Parity (PPP) Adjusted)			
Malaysia	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Singapore	2.25	2.23	2.31	2.26	1.74	1.72	2.06	1.84
Thailand	1.35	1.49	1.22	1.36	1.45	1.59	1.05	1.36
India	0.50	0.42	0.56	0.49	0.71	0.60	0.68	0.66
China	1.66	2.06	1.89	1.87	1.54	1.91	1.44	1.63
Philippines	0.15	0.39	0.47	0.44	0.45	0.40	0.46	0.44
Vietnam	1.10	1.10	1.41	1.20	1.61	1.62	2.39	1.87
Hong Kong	2.54	2.59	2.35	2.53	1.95	2.06	1.69	1.90
Indonesia	0.66	0.73	0.79	0.73	0.57	0.63	0.47	0.56
United Kingdom	2.67	2.41	2.45	2.51	1.38	1.24	1.79	1.47
Canada	3.25	2.96	2.95	3.05	1.57	1.48	2.16	1.72
New Zealand	3.08	2.74	2.75	2.86	1.74	1.55	2.25	1.84
Australia	4.08	3.52	3.59	3.76	1.80	1.60	2.31	1.90
USA	3.43	3.11	3.17	3.24	1.85	1.68	2.70	2.08

Table 9: Benchmarking salaries earned by ICT professionals of selected countries and Malaysia, 2012
Source: (http://www.PayScale.com/research/) and PIKOM

rates as well as the standard of living. Malaysians are typically known to search for better opportunities beyond the shores of Asia especially in English speaking countries, in particular the United States, United Kingdom, Canada, Australia and New Zealand. Despite the distance, these countries have long standing diplomatic and trade ties with Malaysia. Table 9 shows that the Australian and US job markets offer the highest remuneration. One of the issues companies in the information and communications technology sector, particularly in the services segment, faces is how to retain critical talents who are likely to migrate to better paying destinations unless appropriate measures are put in place.

iv. *Quality and competency standards of human capital in ICT firms:* The ICT industry, including its workforce, generally lacks the interest in attaining global standards in process and quality improvement activities. PIKOM's internal investigation revealed that only 6% of Malaysian Information and Communications Technology Service (ICTS) providers have attained Capability Maturity Model Integration (CMMI) certification and less than 1.5% are equipped with the People Capability Maturity Model (PCMM) certification. The numbers are disheartening upon realising that less than 2% of PIKOM members in the ICTS segment have employees certified with Six Sigma or Lean Six Sigma accreditations. Green ICT Certifications have yet to gain a foothold in the Malaysian ICTS landscape. Pursuit of these certifications is critical to globalise Malaysian ICT products and services, or to solicit ICT contracts from developed economies like the US; and

v. *Research, development and commercialisation culture:* Public and private universities and industries are still behind in creating globally-recognised ICT products and services due to the lack of a strong R&D and patenting culture. Despite the long established presence of some multinationals, the country still has weak links in the global R&D and innovation network. This is due to difficulties in getting the right candidates to embark on high value adding ICT activities that the Government is passionate about over the past two decades.

Conclusion

Despite the weak global economy affecting certain parts of the world, the Malaysian economy is poised to achieve positive growth. National institutions like MIER have projected positive growth rates for 2013 and also 2014, when it is expected to expand by not less than 5%. As reflected in the macro indicators in terms of DDI, FDI, productivity, trading, financial stability, employment growth, inflation and consumption, the envisaged growth rates are deemed attainable. In this endeavour, the ICTS sector is poised to play a significant role in not only ensuring its own growth by pursuing and harnessing new age technologies, but also to provide the requisite impetus in driving and modernising other sectors of the economy including SMEs. Growing intra-trade among South-South nations and Asian economic giants namely China, India, Japan, Hong Kong, Taiwan and Singapore is always considered a plus point for the Malaysian economy as it can mitigate external risks that are mainly concentrated in the Eurozone.

Nonetheless, economic growth can only be sustained provided the country continues to pay due attention to political stability, prudent financial management and monetary policies, developing a competent work force, embarking on commercial driven research, development and innovation as well as enhancing the quality of life of its people.

CHAPTER 03

SOCIAL MEDIA POLICY AS AN INTEGRAL OF HR PRACTICES: A DIGITAL ERA WORK CULTURE PERSPECTIVE

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PIKOM

1. Introduction

Use of social media at the workplace has become a controversial topic and highly debated in various forums. Some employers agree and others do not when their employees use social media while working. This controversy has become a human resource (HR) issue at various workplaces. This concern has to be viewed holistically from both the employers' and employees' perspectives as well as work governance and processes dimensions that are of a wider interest to an organization.

In regard to this contemporary issue, this chapter will attempt to highlight working definitions of associated terminologies, explain the features, describe characteristics of social media as well as highlight key challenges faced. The paper also provides some guidelines for enacting a social media policy at workplaces.

2. Working Definitions as per Wikipedia

In discussing the issue on developing a social media policy at workplaces, some sort of basic understanding is needed for at least three words, namely:-

- social media;
- web technology evolution and
- user generated content.

These three elements are intertwining as well as reinforcing each other as people are increasingly becoming "people-chip" in this new age of information and communications systems (Ramachandran, 2008).

a) Social Media

Social media is the term used for internet-based tools for creating, sharing, discussing and exchanging information and ideas among virtual communities and networks. It refers to user-generated information, opinion and other content shared over open digital networks (Toni, Halonen and Heinonen, 2008). Social media entails a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and which allows the creation and exchange of user-generated content (Kaplan and Haenlein). In the context of a working definition, social media may include, although not limited to:

- social networking sites (for example Facebook, Myspace, LinkedIn, Bebo, Yammer)
- video and photo sharing websites (for example Flickr, YouTube)
- blogs, including corporate blogs and personal blogs
- blogs hosted by media outlets (for example 'comments' or 'your say' feature on theage.com.au)
- micro-blogging (for example Twitter)
- wikis and online collaborations (for example Wikipedia)
- forums, discussion boards and groups (for example Google groups, Whirlpool)
- vodcasting and podcasting
- online multiplayer gaming platforms (for example World of Warcraft, Second Life)
- instant messaging (including SMS)
- geo-spatial tagging (Foursquare).
- Social media also includes all other emerging electronic/digital communication applications.

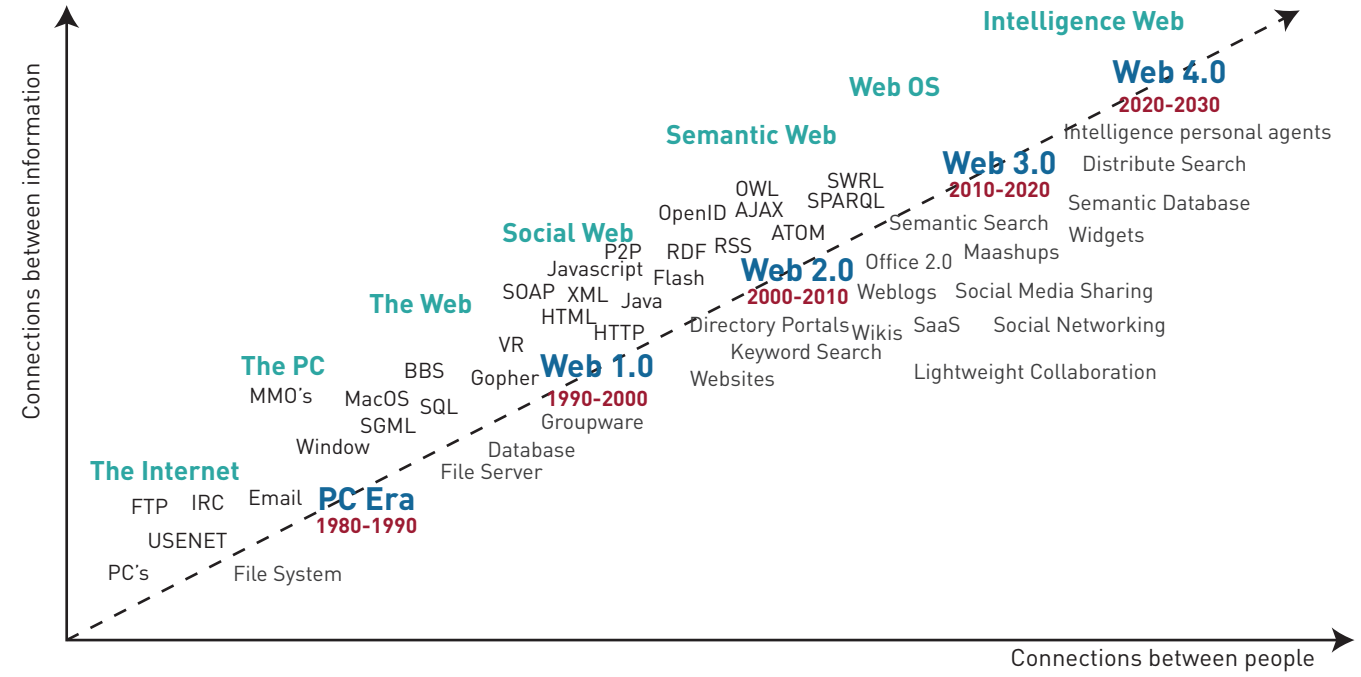
b) World Wide Web

From its inception in the early 1990s through to the foreseeable future, the World Wide Web has been an evolving phenomenon. Its evolution is in response to new technologies and the changing expectations of users. The Web as we know of today is quite different from the version that gained widespread recognition in the mid-1990s. Likewise, it seems that the Web 2.0 as we now know it could be transformed into something even more sophisticated, as experts begin to discuss the advent of Web 3.0 and, predictably, Web 4.0. The initial Web, often referred to as Web 1.0, existed between 1991 and 2003. It was fundamentally a 'read-only' Web, somewhere one went to access information on a "look but don't touch" basis.

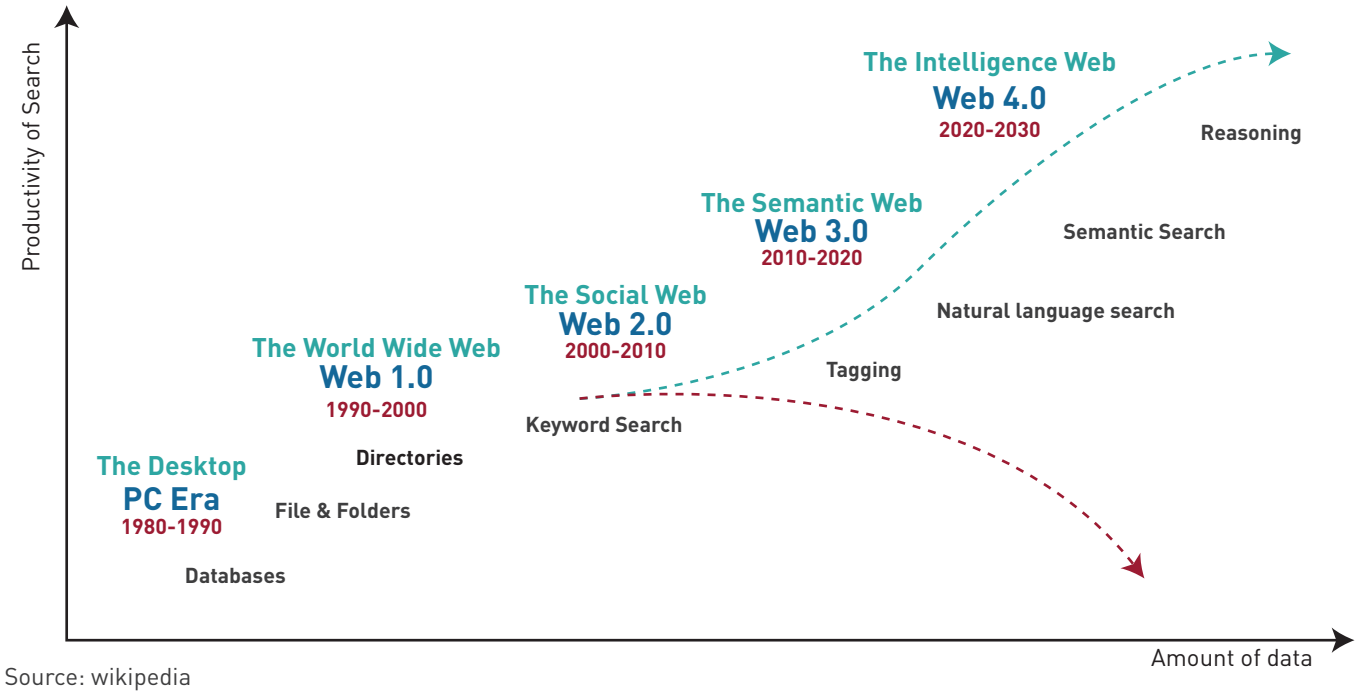
Web 2.0

Web 2,0, or also known as the 'read-write' web, started to evolve in 2004. As opposed to the static nature of Web 1.0, Web 2.0 strongly incorporated interaction and collaboration aspects. The term Web 2.0 was coined in 1999 by Darcy DiNucci and was popularized by Tim O'Reilly at the O'Reilly Media Web 2.0 conference in late 2004 (Graham, 2005 and O'Reilly, 2005).

Although Web 2.0 implies a new version of the World Wide Web, it refers to the collective changes in the way web pages are created and used instead of any technical upgrade. The World Wide Web inventor Tim Berners-Lee (2006) described the term Web 2.0 as jargon, as his original vision of the Web was "a collaborative medium, a place where we [could] all meet and read and write". Nonetheless, Web 2.0, in its technological advancements, allow users to interact and collaborate with each other thereby permitting them to generate content in a virtual community. This is in contrast to



Source: wikipedia



Source: wikipedia

websites where people are limited to the passive viewing of content. Examples of Web 2.0 include social networking sites, blogs, wikis, video sharing sites, hosted services, web applications, mashups and folksonomies. In other words, Web 2.0 is the social web providing a fundamental shift in the way people communicate, share their perspectives, opinions, thoughts and experiences. As such, the end user is not only a user of the application but also a participant by podcasting, blogging, tagging, curating with Red Sweater Software (RSS), social bookmarking, social networking, web content voting, etc.

Web 3.0

The term Web 3.0 is used to describe the evolution of the Web as an extension of Web 2.0. While an exact definition of Web 3.0 is hard to determine, most descriptions concur that the essential attribute is its ability to make connections and infer meaning, thus making the Web more 'intelligent'. Terms such as the semantic Web, or the intelligent Web, are being associated with Web 3.0 due to this characteristic. As succintly put by Nova Spivack, Web 3.0 is a connective intelligence; connecting data, concepts, applications and ultimately people.

Due to applications such as wikis, blogs and social media, users are now able to control the content of the Web instead of just viewing it. Thus from a 'read-write' web under Web 2.0, Web 3.0 offers us the 'read-write-execute' web where we can create and execute our own tools and software to manipulate and extract information, rather than using other people's software and websites.

Web 4.0

According to the futurist and business strategist Daniel Burrus, the third iteration of the Web is happening faster than the transition from Web 1.0 to Web 2.0 due to the increasing availability of processing power, bandwidth and storage, thus "creating a curve of exponential change." Burrus states that Web 4.0 is about "the ultra-intelligent electronic agent", an agent that will recognize the user because of the cameras and facial recognition technology.

c) User-Generated Content (UGC)

UGC covers a variety of media content available via an array of modern communication technologies. In particular, all digital media technologies are included, such as question-answer databases, digital video, blogging, podcasting, forums, review sites, social networking, social media, mobile phone photography and wikis. UGC entered mainstream usage in 2005, with its roots in web publishing and new media content production circles. It is used in a wide range of applications such as problem processing, news, gossip and research. This usage manifests the growth of media production due to new technologies that are accessible and affordable to the general public.

In addition to above stated media technologies, UGC also makes use of a combination of open source, free software, and flexible licensing or related agreements to further reduce the barriers to collaboration as well as enhances skill-building and discovery. As a result, more and more users have begun to flock to social media and "'content-based'" sharing sites. Occasionally UGC only comprises part of a website where the bulk of the content is created by an administrator while user reviews of products/services are submitted by regular users of the site.

Most often, UGC is partially or totally monitored by administrators to protect against offensive content or language, copyright infringement issues, or simply to ensure that the content is pertinent to the site's objective. As there has often been minimal or no charge for uploading UGC, the world's data centers are now filled with with exabytes of UGC that, in addition to creating a corporate asset (Schivinski and Dabrowski, 2013), may also contain data that can be regarded as a liability (Scott, 2010). In essence, the dawn of UGC denoted a change among media organizations from creating online content to providing tools for amateurs to publish their own content. UGC has also been characterized as 'Conversational Media', as opposed to the 'Packaged Goods Media' of the past century (Battelle, 2005). The former is a two-way process in contrast to the one-way distribution of the latter.

3. Social Media Usage

According to Nielsen, a leading global information and measurement company, internet users spend more time with social media sites than any other type of site (Nielson, 2012). And, the total time spent on social media in the U.S. across PC and mobile devices increased by 37% to 121 billion minutes in July 2012 compared to 88 billion minutes in July 2011 (Nielson, 2012). For content contributors, the benefits of participating in social media have gone beyond simply social sharing to building reputation and bringing in career opportunities and monetary income, as discussed in Tang, Gu, and Whinston (2012).

The following are just some of the notable trends in social media:

Social Technology Tools

- **Social technology tools:** Facebook remains the most-visited social network in the U.S. via PC (152.2 million visitors), mobile apps (78.4 million users) and mobile web (74.3 million visitors), and is multiple times the size of the next largest social site across each platform (Nielsen, 2012).

- **Diverse social networks:** As of 2012, Facebook has 152,226,000 unique PC visitors and 78,388,000 unique mobile app visitors. Twitter reported 37,033,000 unique PC visitors and 22,620,000 unique mobile app visitors. Pinterest reported 27,223,000 unique PC visitors and 14,316,000 unique mobile web visitors. Google+ reported 26,201,000 unique PC visitors and 9,718,000 unique mobile app visitors (Nielsen, 2012).

Content Development

- **Content development and uploading:** In four minutes and 26 seconds, 100+ hours of video

will be uploaded to YouTube (Socialnomics, 2012).

- **Information explosion:** Twitter processed more than one billion tweets in December 2009 and averages almost 40 million tweets per day (VentureBeat, 2012).

- **Competing content usage:** Social media has overtaken pornography as the No. 1 activity on the web. (Socialnomics, 2012)

Usage Demographics

- **Consumers:** Consumers continue to spend more time on social networks than on any other category of sites—roughly 20% of their total time online via personal computer (PC), and 30% of total time online via mobile (Nielsen 2012).

- **Youth as users:** 51% of people aged 25–34 used social networking in the office, more than any other age group (Nielsen 2012).

- **Aged population as users:** The number of social media users age 65 and older grew 100% throughout 2010, so that one in four people in that age group are now part of a social networking site (CBS News, 2010).

Threats

- **Nuptial patterns:** One out of eight couples married in the U.S. last year met via social media according to statistics released June 2011(Socialnomics (2012)

- **Divorce rates:** 1 in 5 divorces are blamed on Facebook.

Global benchmarking

- In the U.S. alone, total minutes spent on social networking sites have increased 83% year-over-year. In fact, total minutes spent on Facebook increased nearly 700% year-over-year, growing from 1.7 billion minutes in April 2008 to 13.9 billion in April 2009, making it the No. 1 social networking site for the month." (Nielson, 2012)
- Australia has some of the highest social media usage in the world. In usage of Facebook, Australia ranks highest, with over nine million users spending almost nine hours per month on the site (2013).http://en.wikipedia.org/wiki/Social_media - cite_note-28
- In a study conducted by the Masdar Institute of Science and Technology in Abu Dhabi, it was found that on average, any individual is just 12 hours of separation from another around the world, using social networking sites.

4. Key Distinctions between Traditional Media and Social Media

The electronic and print media has become the main source of information, education, news and other data for people in general.

Social media is different from traditional media, such as newspapers, television, and film, based on the fact that it is relatively cheaper and, more importantly, it is easily accessible by anyone. Traditional media usually requires a considerable amount of resources in order to publish information but this is not the case with social media where the entry barrier is next to non existent.

The following lists further characteristics that differentiate between the two media (Morgan, Jones and Hodges, 2012):

i. **Quality** - In traditional publishing—mediated by a publisher—the typical range of quality is substantially narrower than in niche, unmediated markets. The main challenge posed by content in social media sites is the fact that the distribution of quality has high variance: from very high-quality items to low-quality, sometimes abusive content (Agichtein et al, 2008);

ii. **Reach** – both traditional and social media technologies provide scale and are capable of reaching a global audience. Traditonal media, however, typically use a centralized framework for organization, production, and dissemination, whereas social media are by their very nature more decentralized, less hierarchical, and distinguished by multiple points of production and utility (Morgan, Jones and Hodges, 2012):

iii. **Accessibility** – the means of production for traditional media are typically government and/or corporate (privately owned); social media tools are generally available to the public at little or no cost (Morgan, Jones and Hodges, 2012):

iv. **Usability** – traditional media production typically requires specialized skills and training. Conversely, most social media production requires only modest reinterpretation of existing skills; in theory, anyone with access can operate the means of social media production (Morgan, Jones and Hodges, 2012):

v. **Immediacy** – the time lag between communications produced by traditional media can be long (days, weeks, or even months) compared to social media (which can be capable of virtually instantaneous responses) (Morgan, Jones and Hodges, 2012):

vi. **Permanence** – traditional media, once created, cannot be altered (once a magazine article is printed and distributed, changes cannot be made to that same article) whereas social media can be altered almost instantaneously by comments or editing (Morgan, Jones and Hodges, 2012):

5. Negative Impact of Social Media

Pundits, from various disciplines, have identified a number of negative influences that social media has, some of which are surmised below:

i. Exclusiveness

Tim Berners-Lee, the inventor of the World Wide Web, argues that most social networking sites are silos and thus do not allow users to move data from one site to another. He also warns against social networks that grow very big and become a monopoly as this tends to limit innovation (Berners, 2011).

ii. Disparity

Eric Ehrmann assesrts that social media in the form of public diplomacy creates a patina of inclusiveness that covers (Ehrmann, 2013) traditional economic interests that are structured to ensure that wealth is pumped up to the top of the economic pyramid, perpetuating the digital divide and post Marxian class conflict. He also states concern over the trend that finds social utilities operating in a quasi-libertarian global environment of oligopoly that requires users in economically challenged nations to spend high percentages of their annual income to pay for devices and services to participate in the social media lifestyle.

The phrase "Digital divide" was coined to describe the chasm that purportedly separates information technology haves from have-nots in the US – the have-not side users don't have much consumer power while the have side have the power. Money and labor go from the have-not to have. Neil Postman (1992) also contends that social media will increase an information disparity between winners, who are able to use the social media actively, and losers, who are not familiar with modern technologies.

iii. Trustworthiness

Large-scale collaborative co-creation is one of the main ways of forming information in the social network. However, its trustworthiness is hard to be judged due to the lack of information (Kittur, Suh, and Chi, 2008).

iv. Concentration

Nicholas Carr, the writer well known for his controversial article entitled "IT Doesn't Matter", had stated that "fast (Internet/social) media and deep slow thought don't mix well." Media are not just passive channels of information; instead, they supply the stuff of thought and can also shape the process of thought. However, social media seems to be chipping away human's ability to concentrate and contemplate.

v. Few Real Impacts

Malcolm Gladwell, the well known author of "The Tipping Point: How Little Things Make a Big Difference", pointed out that "the role of social media in protests and revolutions is grossly overstated. It (social media) makes it easier for activists to express themselves, and harder for that expression to have any impact." This is because "social networks are effective at increasing participation - by lessening the level of motivation that participation requires." In other words, "it succeeds not by motivating people to make real sacrifice but by motivating them to do the things that people do when they are not motivated enough to make a real sacrifice (Gladwell, 2012).

vi. Reliability

Evgeny Morozov, a Yahoo fellow at Georgetown University, argues that content uploaded to Twitter may have little relevance to non-Twitter users. On the article "Iran: Downside to the "Twitter Revolution"" in the magazine "Dissent" fall 2009 (Morozov, 2009), he states, "Twitter only adds to the noise: it's simply impossible to pack much context into its 140 characters (and) …. in a country like Iran, it's mostly pro-Western, technology-friendly and iPod-carrying young people who are the natural and most frequent users of Twitter. They are a tiny and, most important, extremely untypical segment of the Iranian population Even the United States, the birth-country of Twitter, has only 107.7 million accounts (Media Bistro, 2012) in Twitter. Indiana University dean and professor Matthew Auer casts doubt on the conventional wisdom that social media are open and participatory. He speculates on the emergence of "anti-social media" used as "instruments of pure control" (Auer, 2012).

vii. Ownership of Social media content

It is a continuing dispute when it comes to deciding the actual ownership of the content on a social media platform – the actual content is generated by users via social interactions, however the platform is hosted by a company. An added risk is the security of the information on the plaform, which can be leaked to third parties with economic interests in the platform, or parasites who comb the data for their own databases (Jones, 2005).

viii. Privacy

Certain information are captured via the social media platform without the users' knowledge or consent, thus invading the users' privacy. Entities such as law enforcement agencies and governments have been caught using such sensitive information (PRC, 2013). Additional privacy concerns regard the impact of social media monitoring by employers whose policies include prohibitions against workers' postings on social networking sites (PRC, 2013).

ix. Loneliness

There has been much speculation, on and off the Internet, about the meaningfulness of human interactions created by social media (PRC, 2013). Some of these views are summed up in an Atlantic article by Stephen Marche titled "Is Facebook Making Us Lonely?" Sherry Turkle explores similar issues in her 2011 book Alone Together (Turkle, 2011).

x. Addiction

Social media addiction has been certified as a medical condition in several clinics in the UK. One psychiatric consultant claims he treats as many as one hundred cases a year (RTE News, February 2013).

The Nexus Forces
Source: Gartner (June 2012)

xi. Harmful for Children

There seems to be a positive correlation between the usage of such media with threats such as cyber bullying, online sexual predators and the decrease in face-to-face interactions. Social media may expose children to images of alcohol, tobacco, and sexual behaviors (Ray, 2013).

6. Positive Impact of Social Media

Social media is not all about doom and gloom. Despite the various negative issues highlighted in the previous section, the growth of social media has been prolific and its impact on society, economy, and governance as well as on individual lifestyle is felt pervasively and ubiquitously in all spheres of life. It is a phenomenon that is quite unprecedented in human history.

"Consumerization" of IT Exerts Bottom-up Pressure

Due to advances in bandwidth, storage, and processing power, the devices an average consumer can buy has become quite powerful. This has led to the consumerization of the IT trend. Traditionally, any change in an organization flows from the top to the bottom, i.e. from the management to the employee. However, nowadays, with the consumerization of IT, this flow has been reversed, i.e. emplyoees are leading the charge for change. This alteration has become unsettling for the management since, for one, the change is coming from a direction other than the expected one and, secondly, the rate in which changes are coming is so high that the management is uncertain on how to handle it.

Reinforcement of Mobility, Social, Information and Cloud

As shown in Figure 1, (Gartner, 2012) the Nexus of Forces entails the convergence and mutual reinforcement of social, mobility, cloud and information patterns that create a plethora of new business and social opportunities. Social media is only the beginning in this journey.

Speedy Networking

In the book "Networked - The new social operating system" by Lee Rainie and Barry Wellman, finds a number of positive effects of social media and other internet based social networks. According to the book, social media is used to document memories, learn about and explore things, advertise oneself and form friendships. For example, communication via internet based services can be done more privately than in real life. As a concrete example of the positive effects of social media, the book points to the Egyptian revolution in 2011, where Egyptians used Facebook to organize meetings, protest actions, etc. (William, 2012). Indeed, social media is a very convenient tool for speedy networking and irresistibly hard to ignore when masses want to organize themselves for a cause.

Democratization of the Internet

Social media is seen as a channel to permit the democratization of the internet (Andreas, 2010) while also allowing individuals to advertise themselves and form friendships (Wellman, 2012).

7. Human Resources Practices at Crossroads

Recognizing the growing challenges of social media usage at the workplace, some employers have enacted social media policy and some do not intend to enact one at this juncture while others are still contemplating to have one. Those who want to have one for their organization are wondering what form and what shade the social media policy should be so that it is justifiable from both the employers' and employees' perspective. Initially, social media emerged as a powerful social network and means for expressing oneself online. When such rights are curtailed, employees tend to oppose company policies that unfairly limit their rights to express themselves online. Smart employers provide training for employees on what they should and should not share online.

As Social Media continues to grow, it has slowly and incrementally pervaded and seeped into work spaces and business environment, creating a variety of communications opportunities. Increasingly, social media is becoming an important tool for business. However, with this comes a blurring of the line between personal and professional life as well as increases risks for businesses.

Immediate Challenges

With the prolific use of social media, its mobility, its immediacy and many-to-many structure, employers need to pay attention. However, many issues around social media still remain unsolved and thus it poses contemporary HR issues in many organizations. The issues are complex and many are divided on their opinions on how to deal with them.

Primarily, one of the fundamental questions in a workplace is whether employees should have access to social media platforms. Some argue that access is disruptive and can decrease productivity, while others argue that social media is not distracting. What employers need to note is that a complete ban on social media access in the workplace probably will not work. The following three points out why this is the case:

- Firstly, Gen Y or millenials who are technology savvy, consider Internet and social media access a 'benefit' of employment. Therefore, it can be used as an incentive for retaining staff;
- Secondly, hand held devices make it harder for employers to control usage. How can employers stop employees using their iPhones?;
- And thirdly, there will always be distractions in the workplace. Humans are not robots so there will be a social element in their daily routine.

Employees need to be aware that what they post is public information whether their social media settings are set to 'private' or not. Social media is quite different than having a whinge with friends where only a handful of individuals will hear what is said. Once something is posted online, it is there for all to see and if it goes 'viral', managing the risks are almost impossible as the damage can be done within minutes.

The key issue is that employers cannot control what employees say on their personal social media platforms. So what is the solution? Balance, common sense, self-regulation and responsible as well as accountable behaviors are advisable.

Every workplace should have a Social Media Policy that makes it clear what is acceptable and unacceptable behaviour. A good social media policy can be extremely valuable in mitigating and managing risks and providing guidelines to employees and should be tailored to the culture of the workplace. As the prevalence of social media use continues to increase, employers need to communicate to their employees what their expectations are in respect to social media. Even though a policy may not stop an employee writing negative comments

about their employer, it does provide the employer with some flexibility in how to deal with the situation.

No one policy will work for all organizations. However, here are some general guidelines when implementing a Social Media Policy:

i. Implement a social media policy alongside your Internet and email policy

ii. Include a definition of social media - with so many platforms, your employees need to be aware exactly what you mean when you use the term 'social media'

iii. Include a description of social media behaviour - what is acceptable and what isn't? For example, when can social media be used - during breaks or at any time?

iv. Make sure employees are aware there is a policy and that it is accessible to them with training provided on the impact of the policy and the expectations of the employers with regards to this policy.

v. What are the consequences of breaking the social media policy? These must be documented and employees made aware of what will happen.

There is no doubt the use of social media in the workplace has become a hot issue. Social media is now part of the dynamic and changing world of communication in the 21st century. These issues need to be managed by employers, as they are genuine and here to stay. A blocking strategy, i.e. shut off access to social media platforms, is an overreaction that should be avoided, as employees will resent it. A collaborative approach to social media is more desirable and more in tune with a modern workforce.

Implementation Principle: 5 Rs of Social Media

The "5 Rs of social media" is a good starting point for employers looking to establish social media guidelines:

i. Reason. To use reasonable etiquette online, the same as one would do in the offline world.

ii. Represent self. Avoid anonymous profiles as these lead to negative content.

iii. Responsibility. Make sure that what is being said is factual, and that it does not infringe any legal policies that forbid revealing information that is considered confidential, private and/or sensetive from the company's point of view.

iv. Respect. What is said online is a permanent record, so avoid saying anything online that wouldn't feel comfortable saying to the whole office.

v. Restraint. Before posting anyting online, take a pause and reread the content. Do not post it if you do not want yourself associated forever with that particular thought or contribution forever.

8. Closing Inter-generational Gaps at Workplaces

Safeguarding line of privacy: Recognizing the increasing expectations, it is imperative that human resource practices reorganize HR principles, first by showing a positive attitude towards social media practices. In tandem, it is also equally important to avoid untoward incidences that create tension between the employees and employers. For instance, in the United States, some employers now ask job applicants for their social media passwords.

This is perceived as an invasion of the applicants' privacy and is considered as not only crossing the line of privacy but also an utter violation of human rights. And the company that requests such access will not only lose applicants' respect but also loses its public image and branding value that it would have built over the years. Word spreads quickly among the outraged, and an unpopular interview policy will turn off prospective future hires, as well as current candidates. More importantly, such companies also miss out on talent.

Fulfilling aspirations of new generation recruits: According to Cisco's "Connected World Technology" report, which is based on a global survey of nearly 3,000 college students and young professionals, 40% of them would accept a lower-paying job that offered flexibility regarding the choice of devices to use at work, access to external social media and the ability to work remotely, over a higher-paying job with less flexibility. Seventy percent of college students and young professionals are already in the habit of "friending" their colleagues, superiors or both on Facebook, according to this report.

So a human resources department that asks for passwords during

the interview process not only appears out of touch, but it also sacrifices a permanent spot in employees' minds as a favorable employer. Enlightened recruiters at companies know that building personal and professional networks is a sign of a high-performing professional, not an infantile practice that puts the company at risk. New generations of job seekers will always be coming up with new ways to hide aspects of their out-of-work personas. As we speak, millennial are planning ways to dodge these invasive interview tactics. For example, setting up a second account with a pseudonym for their 'real' profile.

Viewing social media users from business perspectives: Based on a research carried out with PepsiCo employees, on average, each employee had 130 friends in their Facebook account. With around 300,000 employees, PepsiCo sees a huge potential audience for responsibly sharing news about PepsiCo, its products and offers. According to the "2011 Social Media Marketing Industry Report", 88% of marketers find training in usage of social media tools, such as Facebook, Twitter, LinkedIn and blogs, an effective vehicle to gain business exposure. As can be seen, a progressive company such as PepsiCo is not viewing social media platforms such as Facebook negatively but rather as a training and marketing opportunity. In other words, employees on social media are seen as potential evangelists of the company brand.

Providing training: Instead of alarming prospective hires, companies should invest in training employees to use social media sensibly. Many forward-looking companies are already doing so with social media training becoming part of the corporate training curriculum for both new and current employees at leading companies such as Dell, Intel, Unisys Gap and PepsiCo.

9. Social media policy for employees

Acknowledgement: *Most of the policy statements and guidelines as well the structural presentation depicted in this section are extracted from the* ***Guidance for the use of social media in the Victorian public sector released by the Public Sector*** *Standards Commissioner of Australia.*

Recognizing the contemporary human resource imperatives, this section pertinently provides some guidelines for those organizations contemplating to enact a pro-social media policy entailing employers, employees and institutional governance processes as well as employees union.

Rationale for Policy Consideration

Undeniably, social media tools have evolved into an important tool at workplaces as it can be used to inform the world about the company's products/services; to provide information about programs and to create new channels to open up a two-way conversation and consultation.

Objective of Social Media Policy

The objective of a social media policy is to set the parameters for the use of social media, where it forms part of the employee's professional responsibilities; inform employees of their responsibilities when using social media in a personal capacity and to manage risks associated with the use of social media. It is essential that employees understand that comments published via social media platforms are treated the same way as public statements and should be made by an authorised spokesperson in the same way that comments are made in any public forum or to the media. The intention of this policy is to establish a culture of openness, trust and integrity in activities around web.

Scope of Implementation

The policy document explicitly should state that the Social Media Policy is applicable to all employees in the organization, including but not limited to permanent staff, executives, contractors, temporary staff and students on placements.

General Responsibilities as an Employee

In essence, employees should be aware of and understand their responsibilities pertaining to remaining apolitical, making public comments, maintaining public trust, using work resources, being open to scrutiny, ensuring fair and objective treatment as well as privacy and confidentiality, and finally safeguarding equity and diversity.

Social Media Definition

Before enacting the Social Media Policy, the definition of social media should be clearly spelled out so that everyone speaks the language with the same connotation and understanding. The working definition highlighted earlier can be used as a starting point.

Compliance Statement

Non-compliance with social media policy may constitute a breach of contract of employment or other contractual obligations, misconduct (under the company's relevant

discipline policy), sexual harassment, discrimination, or some other contravention of the law. Failure to comply with the policy may result in disciplinary action and, in more serious cases, may result in termination of employment.

Identifying Inappropriate Use

Where an employee becomes aware of inappropriate or unlawful online content or privacy breaches that relates to the company, or content that may otherwise have been published in breach of this policy, the situation and circumstances should be reported immediately to the company's staff who is in-charge of media relations or ethics and integrity or top management or CEO.

Statement of Policy

- **Professional use of social media**
  Before engaging in social media available outside the company, as a representative of the company, employees must become authorised to comment. Employees may not comment unless authorised to be a representative spokesperson of the company. To be authorised to comment or be an authorised spokesperson, employees must have the explicit approval from the company's management.

- **Rules of engagement**
  Authorised representatives must:

i. disclose that they are an employee/contractor of the company, and use only their own identity, unless authorised to use an approved official account;

ii. disclose and comment only on information classified as public domain information;

iii. ensure that all content published is accurate and not misleading and complies with all relevant company policies and other relevant requirements;

iv. ensure they are not the first to make an announcement (unless specifically given permission to do so);

v. comment only on their area of expertise and authority;

vi. ensure comments are respectful of the community in which they are interacting online;

vii. adhere to the terms of use for using the social media platform or website, and adhere to legislation including copyright, privacy, defamation, contempt of court, discrimination, harassment and any other applicable laws, and the company's Privacy Policy;

viii. should not post or respond to material that is offensive, obscene, defamatory, threatening, harassing, bullying, discriminatory, hateful, racist, sexist, infringes copyright, constitutes a contempt of court, breaches a court suppression order, or is otherwise unlawful;

ix. should not use or disclose any confidential or secure information;

x. should not comment or post any material that might otherwise cause damage to the company's reputation or bring it into disrepute.

- **Moderation of company produced social media**
  The account holder within an organization must ensure that a clear and unambiguous moderation policy is in place when inviting public comments to a company's website or social media platform. All company website activities (including any social media) must be approved by the person or the committee in-charge in the company prior to posting the information.

- **Personal use of social media**

i. The social media policy should not discourage nor unduly limit employees using social media for personal expression or other online activities in their personal life;

ii. Employees should be made aware of and understand the potential risks and damage to the company that can occur, either directly or indirectly from their personal use of social media and should comply with the organization's social media policy to ensure that the risk is minimised;

iii. Employees are personally responsible for content published in their personal capacity on any form of social media platform. When in doubt, employees can seek guidance from the relevant authority in the company on compliance;

iv. To avoid breaching of social media policy, employees must:
  - only disclose and discuss publicly available information;
  - ensure that all content published is accurate and not misleading and complies with all relevant company policies and other government requirements;
  - expressly state that stated

views are personal and are not representative of the company;
- behave politely and respectfully;
- adhere to the terms of use for using the social media platform or website, and
- adhere to legislation including copyright, privacy, defamation, contempt of court, discrimination, harassment and any other applicable laws, and the company's Privacy Policy.

v. The employee should also not
- post material that is offensive, obscene, defamatory, threatening, harassing, bullying, discriminatory, hateful, racist, sexist, infringes copyright, constitutes a contempt of court, breaches a Court suppression order, or is otherwise un lawful ;
- imply that they are authorised to speak as a representative of the company, nor give the impression that the views expressed are those of the company;
- use the identity or likeness of another employee, partner, customer or other member of the company;
- use their company email address or any company logos or insignia that may give the impression of official support or endorsement of their personal comments;
- use or disclose any confidential information or personal information obtained in their capacity as an employee or partner of the company;
- post material that is, or might be construed as, threatening, harassing, bullying or discriminatory towards another employee, partner or customer of the company;
- comment or post any material that might otherwise cause damage to the company's reputation or bring it into disrepute.

Reasonable and Unreasonable Personal Use

i. When accessing social media via the company's Internet, intranet and extranet, employees must do so in accordance with the department's Acceptable Use of Computer Services Policy, which requires employees to use these resources 'reasonably', in a manner that does not interfere with work, and is not inappropriate or excessively accessed. Examples of reasonable use include re-tweeting content from the account on a personal Twitter account or accessing and posting comments on matters relevant to the organization or participating in working groups or updating Facebook status and posting messages during lunch break.

ii. Company resources should not be used to access or post any material that is fraudulent, harassing, threatening, bullying, embarrassing, sexually explicit, profane, obscene, racist, sexist, intimidating, defamatory or otherwise inappropriate or unlawful.

iii. Employees should not use the company's Internet and computer resources to provide comments to third parties other than those authorised in the course of their official duties.

iv. It is not acceptable to spend time using social media that is not related to work unless it occurs in personal time (for example during meal breaks) or at times acceptable to the immideate supervisor/manager.

10. Stop Reacting and Start Anticipating

Unfortunately, most IT departments tend to be conservative. Not many anticipated the "Consumerization of IT" trend even though it was fairly easy to predict its arrival. When the trend materialized in their companies, most IT departments tried to manage it as a crisis instead of leveraging on it. They saw it as a meance and tried to shield the company.

The same can be said about Social Media in the workplace - instead of defending against it, companies should start taking advantage of it.

Conclusion

PIKOM has presented a framework for a Social Media Policy at the workplace. Organizations intending to develop a social media policy as an integral component of their HR practices may adopt the given framework freely by using the guidelines and contents depicted. Wherever necessary, the organizations may modify the framework to suit their organizational needs and interests. In enacting a Social Media Policy (SMP), it is also critical to ensure that the proposed policy terms, conditions and practices are consistent with other organizational rules and regulations as well as comply with human rights and responsibilities.

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CHAPTER 04

IT GOVERNANCE IN THE DIGITAL ECONOMY: C-LEVEL MANAGEMENT PERSPECTIVE

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EVOLVE – ENGAGE – ENTERPRISATION

Introduction

Back then when I first began to look at IT in an accidental situation where I was auditing in a new computerized environment in a hotel in London in 1978, and from almost a sure and secured career in Accountancy I began to have second thoughts even though I did not understand what was a computer system doing, its workings and how it produced results at lightening speed in an audit process that I was conducting with the required data produced which was more than enough for me and last but not least, the sheer size of the hardware had in fact amazed me beyond my wildest imagination.

I then realized that whatever is going to happen from hereon and against the advice from my family, friends and even my lectures to stay focus on the ACCA course, I switched from being an Accountant to my first engagement in IT systems & business and thus my new course and career in IT began with the Intercontinental Hotels Group in London. Soon apart from IT courses and training, my course in programming in BASIC & RPG began at the Control Data Centre in London and IBM Training Centre at Basingstoke, respectively, and so my interest and curiosity even grew further to appreciate this new finding. Still I was told that there was no future in the machines but I stayed on to move forward. Soon I was promoted to take on the job as a System Supervisor, a support role in managing the IT environment and its systems at Intercontinental Hotels both in London and Paris, and that would equal to in today's term, a position of a CIO (Chief Information Officer).

Over the next few years I soon learned that there was much more areas to be reckon and concerned with rather than just to the workings of the computer system. For instance we had to cope with the sheer amount of electronic data gathered overtime, inclusive of the sales data, customers database/history, popular rooms, popular restaurant dishes, providing the right information to the guests of the hotels through the systems on various cushiness / restaurants, streets finder, tourist destinations, prices of tickets to Broadway shows, travel details and more importantly at the end of the day keeping track of guest complains so that the next time around when reservations are made for these same guests, these complains would pop up on the screen to alert the hotel and highlight to the senior management so during check in, these guests would be greeted by the General Manager himself. Now we were on the right track in trying to fully use the system for its intent, purpose and once again we knew there were still unknowns in this new surrounding.

During one summer in Paris when the local electricity board was digging in the city, and in the process hit a power cable that sent a huge surge and the spike was so great that it literally baked the computer hardware brown and so no system to operate whilst guest were checking in and checking out and some were patronizing the various food and beverage outlets and there were confusion, pressures, anxieties, fears and worse of all, we were all together in a messy situation that we could not handle to manage, to say the least.

Not knowing how to cope in this situation and what else to do to calm things down we then declared an emergency situation as we were in a disaster mode. When we tried to revert to the manual systems and brought out the old mechanical machines to operate we faced two major crisis whilst being in this disaster mode and they were,

i. Nobody knew how to operate the business and transactions in a manual mode as they were all ill-equipped with the manual procedures

ii. While we were able to able to turn on the so called borrowed back up mechanical machines, once again no body knew how to operate as everyone had by now got so used to the computer system and overtime all previous processes were forgotten. Furthermore we also did not have any forms or documentation readiness on hand as to which ones to use and what process to follow and so there were complexities and confusion created everywhere

We were literally down for 3 consecutive days and obviously we had so much losses that were both expected and those unexpected but thank goodness that we did not have any reputational loss as a direct result of this disaster because the senior management team were in the forefront dealing to take care of the guests safety and needs. Furthermore, this was not a typical expected disaster or emergency situation such as a fire alarm ringing occurrence where previous drills and briefings were carried out to deal with it but this was a situation that was far beyond anyone's imagination.

Nonetheless we worked round the clock to ensure that guest safety was our number one priority whilst waiting for the hardware to arrive from California, USA, and in the meantime, we were trying to address the business and operational issues along side managing to put pieces of the data together at another hotel's back up system that happened to use a similar system and thanking them in the process.

This taught us five very important lessons and they were,

i. Disaster can occurred any time and such events are no respecter of any organisation and that we should have been ready always, regardless

ii. Despite the fact that the hotel was fully automated from front office to back office accounting, we did not document our new computerized process flow to identify weakness areas or single point of failures, understand the various datasets that were required in a disaster mode to run the operations at half strength with the bare minimum on hand and importantly identify vulnerable areas that can potentially bring down to hurt the business where it matters most and sadly there were no alignment of these processes to the systems either

iii. We also did not look at risk management and audit process and importantly mitigating factors to minimize our losses and what back up materials should have been in placed to be used, now that we were in a disaster mode

iv. We also did not understand the gravity of the situation because there were other minor disasters that occurred within the major disaster and a lot of the areas were compromised in terms of a security breach, access and there certainly was no people alignment either to the situation arising, roleplay & responsibilities

v. Last but not least, that our so called initial such plans would require periodic updating and briefing to bring the level of awareness to the entire staffing and the need to carry out drills and that we would require the internal & external auditors to check the plans to ensure that it had sufficient controls to manage risks that were listed and were auditable

We took advantage of the situation to look for opportunities or silver linings and after some detail deliberations over the next one year we sat down as a team all the way from the general manager down to every department head, supervisors to work out the following to ensure that we will never be in this situation ever again and the next time this happens, we will know what to do and how to handle the situation better and effectively and minimize all known risks to also cut our losses. And so the following was crafted to be part of the standard for the Hotel and eventually was adopted by the rest of the other hotels within the Hotel Group and they were,

i. Emergency Procedures Manual / Disaster Recovery
ii. Data & Information Requirement & Listing of Manual Forms
iii. Documentation Workflows / Process Flows (Manual Vs Systems)
iv. Access Control / Security Manual – Physical Areas
v. Audit Process / Back Up Process – Check & Balance
vi. Communication Tree – People to Call Upon (Roles & Responsibilities)

Sadly we never encounter another similar situation ever in comparison but what we gained from this event and experience was something that made us go to the next level and no matter what occurred subsequently, we hardly failed in our delivery of services to our guests, operations, management and the business.

So in some respect looking back then we also did not realize that we had in fact stepped into the boundaries of IT Governance in some respect unintentionally dealing with processes, systems, data and people and of course there is more to this subject matter.

Evolution in Reporting Line in IT Environment

Moving on back then the IT environment was known as EDP (Electronic Data Processing) and then this became to be known as MIS (Management Information System). Some organisations adopted to change this to be called EIS (Executive Information Systems) and finally today across the globe this is known as IT (Information Technology) Systems.

Along side this, the EDP Manager then became the MIS Manager who then got be known as IT Manager and finally with the development of the C-Level Management structure in organisations, this position changed to be known as CIO (Chief Information Officer). In some cases many large organisation has changed the title of the CIO to be called

as IT Director and this is largely due to the fact that the role play of the IT Director appears to have added responsibility where there is direct business engagement either at the Board level or at the Senior Management in the organisation. However in smaller organisations or in some Small Medium Enterprises, this position in IT is known as IT Executive.

The true crux of the matter remains the same in that no matter what title you are given or called by, your role play and position in managing the IT Systems will remain the same in your organisation, where IT systems are deployed and you simply have to provide utmost due care to ensure the systems are managed effectively and productively in your organisation and always running with making sure there is a complete alignment between the business, operations and the respective IT Systems.

Easily said than done and I agree with your thoughts here because the IT department cannot alone achieve this without the direct engagement of the CEO, COO, Business Unit Managers and in fact all the C-Level and second layer Managers as well.

And chances are none, and as seen from my past experiences the only time you are called upon is either when the organisation wants to move into a new business direction and wishes to know if IT is either ready or can be ready by a certain date, or when there is a serious problem with the system or the data that do not add up, accordingly to the spreadsheet experts that has produced the information for the business meetings. And to make matters worse you are caught in the middle of the serious business deliberation with the CEO overseeing the results and outcome of the reliability of the results (data) where a decision has to be made and you are to substantiate the results produced on a spreadsheet that you have no clue or idea as to the accuracy, integrity and reliability of the dataset and how it was extracted in the first place. Sounds familiar or maybe this only has happened to me.

The second common problem across organisations globally that I see where the involvement and engagement of IT in business is fundamentality limited in scope in as far this is concerned and working closely with the business to help drive operations to maintain good governance, is their reporting line.

Most IT Managers tends to report to the Finance Controller, nothing wrong with this setup and I fully respect all Financial Controllers, as I used to report to one as well, but unfortunately in the process their talents, involvement and contributions are shadowed by this default setting. And so you are only called upon when there are issues or something requires answering and as long as everything is running, you are happy, the Financial Controller is happy and life goes on but in the meantime there are developments of unseen under currents until its too late.

IT Department Getting the Blame: Is it fair?

Occasionally when you greet your Seniors or the CEO himself, he / she will acknowledge but at the same time will utter, "Oh by the way" I have heard that some of the business users are facing some IT problems and whether the IT department is aware of it or has this been resolved. Very often than not you have no idea what the CEO is making reference to and worse of all your Superior has also not informed you and once again this brings to mind the lack of clarity in the organisation as to what the real issue is and importantly, the root cause, be it the business, operations or the IT systems itself, and this sounds familiar to you or this only just has happens to me.

Moving forward over the years I have noted a number of times the IT department got blame for almost all issues arising in the business where IT systems are deployed regardless of the causes and source of the problem even though you were able to demonstrate that the cause came from an operational standpoint. And in this scenario the business unit in question will tell the CEO they do not understand about IT matters and no matter what you do to show fairness, chances are you will end up taking the heat. Sounds familiar or once again it only happens to me I guess.

Furthermore from my past experiences of the last thirty-three years having worked in a number of organisations both as a User and Supplier, respectively, in IT & business in various formats, industries, segments, economies and dealing with IT Systems and Vendors, I have to say that the problems that I have encountered, seen and heard of yester-years remains and appears to be the same till today, except that they come is different sizes and packages. As technology advances so do these challenges, to say the least and of course the added risks are also compounded in many folds that brings about complexities into the business flow.

And by the way, modifying the system to suit that business need that not mean it is resolved and I found out painstakingly that when you modify the system to fit such need, it could potentially create other operational problem elsewhere and you guess it right, IT gets the blame for not being vigilante in this regard. Sounds familiar and yes I had to take cover many times to escape the yelling for something not of my doing.

I must also state here that the landscape of IT business systems has changed drastically in many folds from what it used to be starting from the seventies to this day and as the respective industries are shaping up and so are the systems that have grown into being sophisticated systems with the advancement of technology. But one I thing I have learned from my past experiences and will perhaps stick to it always, in that, newer technology does not always mean that all the business problems will be resolved and sometimes these can add other complexities or create newer problems in your business and that could bring about greater challenges that you may not be able to handle and manage in your organisations, and not forgetting the cost that the organisation has to bear in the process.

Very often than not the Service Provider or the Vendor in question equally may not be in the position to help to address or offer assistance because in most instances they wear "blinkers" and can only see the movement of the processes through the very IT systems that they sold to implement and support and rightfully so, after all why and what prompted the organisation to opt to make the decision to purchase in the first place and what was it based upon and whose decision was it to select in the process. At the end of the day guess who will get the blame this time around for not doing enough ground work to support the overall decision? You guess it right, IT.

I have seen from passed experiences also, hearing from peers from the industry, speaking with various C-Level Executives of various organisations, a number of common lines that are usually and always shared are, "they have spend so much money on the new system and so called the state of the art and yet the organisation is facing so much more problems", end up having more staff than making reduction, not using all the features & functionalities and we only use 40% of the systems strength, during the demo everything looked good and was working, the company sent a very good salesman to demo and we got "conned" into believing, our neighbor is in a similar business using the same system and thought if it has worked for them and they are bigger than us, then it should have worked for our organisation, not yet start using already end up doing so much modifications to the system and we end up spending much more. But for all the above reasons I like this one better, IT did not do their job properly and did not put in enough effort into this otherwise we would not have been in this place or dilemma

But I sincerely believe in all this the organisation is at fault by not doing enough to size up as to where they really stand as to the state of readiness to move to the next level with newer technologies or systems to be implemented in their business. I look at this as disjointed instead of all coming together as one unit to look at this initiative inclusive of the Service Provider or the Vendor and all these has to move in tandem, inclusive of the IT department to be on the same level playing field and nobody here is indispensible or can work in silo position in isolation. And by the way I am also including documentation and defined processes with elements of risks management

So the question raised as to whether the organisation is in a ready mode or has readiness status to embraced new systems and new changes and processes to run and support the current and new business initiatives can only be answered by the organisation, keeping in mine in all this there must be workings of compliance, transparency, integrity and confidentiality in order to allow the organisation to move forward in any business direction that is desired.

I am also a huge believer of the fact that there is no one system that will fit all or famously quoted by many, "No One Size That Fits All" and so in order for the organisation to embrace new things it must be "compatible and fitting.".

Therefore, regardless of the size of the organisations and systems deployed the fact will remain in that you will need to ensure that there is an engagement of IT Governance initiatives in your organisation to create a blueprint that in turn will give you the strong foundation required which will also give the organisation an end-to-end visibility that spans across the enterprise to take on or add any new business development initiatives and in line to have new IT initiative or systems to follow suit in tandem.

In other words there must be alignment, engagement and some degree of empowerment that must go hand in hand so that

management, business users, IT and in some cases the Vendor can come together to jointly work through to understand the current process, gaps and then perhaps develop work around solutions in the absence of that required business feature or functionality to avoid adding complexities. However if it is found to be critical that the organisation must have this particular feature to function, then by all means do the next best thing, get the modification done but with specifics and do not forget to amend the process flow or the blueprint and documentation per se. Updates are important.

Here is another common pitfall that many organisations have been through and perhaps there will be newer ones too, who knows. I know of organisations whom have made huge modifications to the system that they have just purchased to suit the current business needs and after the modifications are done and delivered, and in the meantime the business user from this organisation has either left/resigned or moved on to take another position within the company and very often I hear these comments made and please examine this to be true for your selves or it only happens to me, and this is not an exhaustive list, namely

i. The User does not know what he/she really wants and can you tell us what to do uh!

ii. The User got it wrong and our business model changed and we do not operate this way anymore, oh you were not told is it, so sorry this modification is incomplete / useless now

iii. Yes, I have signed the specification but this is not what we meant and this is not what we have asked for in the first place. Oh by the way, we have a new Boss/Manager and he wants to examine this area and we will change some more

iv. Oh I did not know that this feature actually existed in the standard system and why did we ask to modify this program in the first place and no one told us, oh no wonder, the IT Manager has already left the organisation six months ago and he did not share this information with us

v. The department head has left and we also do not know why he / she asked and so sorry we do not want this modification anymore

vi. Oh good the modification is completed and by the way what about his function and that feature and how are we going to fully operate without it and so even though this is complete it cannot be used now and we wait

vii. Yes I want that feature and thank you for telling me and its good for the business please modify the system. Oh, its done! good but we are not ready to implement and maybe by the beginning of the year we will try to implement

viii. Oh I see, I did not know that you have modified the system to have this feature, two years ago and why no one told me and I have been using spreadsheets to get the results, and IT department must be shot

ix. I want One Button to press and for all the results to come out of the system at one go and I do not want to select so many options, wasting my time

Funny it may sound but on a serious note if this were comments made from an organisation with such attitude, aptitude of the employees, lack of controls and audit trails of business & IT, its going to be heading for a disaster mode or a dead end. With the lack of good governance and without proper monitoring as to what is really required and what is necessity for the business that has not been sanctioned or properly substantiated or effectively identified and the results will show that this organization will also be a victim of many resignations and each time new staff come in they will bring along with them the external old habits good or bad and will try to operate to integrate this within the unstructured perimeters and perhaps also bolt these to existence processes and functions that simply may not fit in but because or perhaps with their convincing power and lack in deeper understanding of the business sponsors they were able to get the approval to modify the system. Once they leave the ball starts all over again. Sounds familiar and it's just my luck as it only happened to me.

Let me then relate a real life story and mind you this happened in a developed European nation as I was engaged to work on a system selection process and finding out that the required criteria which were already set by the business users gave me some comfort. Although there were Standard Operating Procedures (SOP) in existence and it appeared to me during the discussions stages that the business users knew what they wanted and seem to be dictating and relating to processes in their respective business units was well received.

So to fast forward, I left and returned to Malaysia and my last passing remarks with them were, whatever you do, do not modify the system but used on an 'as is basis' for the next 6 months in its "Vanilla" (Original State) state and until you are absolutely certain that the business really requires it without which it would have serious ramifications, then please modify to include that feature or functionality to suit as required otherwise stay focus and changed your current ways to suit the way the systems is functioning.

I had an impetus to make this statement to advice them due to the fact after I had examined the current business pain points and issues arising from data disparities, data integrity reliability issues and working with legacy systems that no longer were supported and linking other third party systems, I did not want them to create a "trap" for themselves where they would fall in it at some point. Incidentally I left to focus on another major project and suspecting little of any mishaps was going to happen. But I could not say for sure whether they understood enough to take heed of my advice.

Four years later down the road I was called to the Board Meeting and the Audit Committee revealed to the meeting that they were not able to balance a huge amount of inventory balances and audit will not sign off the accounts if this was not resolved. Incidentally, what was quoted was staggering and I was requested to make the trip overseas to assist and try to resolve, trouble shoot and to find out why this was happening after the new system has been implemented over these years.

To cut the story short I discover the following and the findings shocked the entire Board and Senior Management,

i. It appeared my advice given 4 years ago was not heeded and the system audit showed that there was a lack of control and the business sponsors jointly requested 203 modifications which were agreed upon internally as it was justified and of course the Vendor was more than happy due to the fact that the cost came close to a million and likewise the maintenance fees on these modifications also compounded and the overall fees went up

ii. Most of the Business Sponsors who were in the project for a year when these modifications were carried out were no longer with the organisation and had moved on

iii. The current users who were new and in particular the business sponsors who were replaced did not know that some of these modifications actually existed in the system

iv. The system audit revealed a more severe and painful discovery. Of all the modifications that were carried out, the business was hardly using all but only 10% was known to most and only 2% was being actually used and sad to say most of it was simply forgotten. This was a sheer waste of energy, resource and company's valuable asset

v. The IT Manager only lasted for 6 months and he left the organisation and the remaining of the time the matter was handled by the Assistant IT Manager

vi. The business users started dwelling too much into using spreadsheets to extract results from the new system and they did not "trust" the data that was presented.

vii. Last but not least, the audit finding also showed that systems were disparate in nature with manual process in between to complete the transactions and they were not linked at all and for the entire naming and numbering conventions of inventory items also had contentious issues

viii. In the end this was brought down to a much lower acceptable and reality number that Audit could accept after a series of reworking and cleaning up process of data duplications, tightening up processes and such like and more importantly cutting through the unproductive silo areas and interfaces. Time wise it took close to 2 months

ix. In the end it was highly recommended, scrapped the existing modifications and reinstalled a new version of the application on an 'as is' basis and this strategy worked well which was also sanctioned and accepted by both the internal and external auditors.

Essence of Contemporary IT Governance - Compliance, Confidentiality, Integrity & Availability

In all the above the intent of sharing the various experiences with you was to simply bring home the

point and highlight the fact that every organisation regardless of its existence, economy and vicinity that it operates requires to operate under four main key headings, namely, **Compliance, Confidentiality, Integrity** & **Availability**, which are the ingredients to meet IT Governance and that would mean that whatever the organisations embarks upon to establish itself, whether in management & controls, processes & workflows, IT systems & policies, business models & polices, audit process (check & balance) and external linkages to third parties, that it must examine itself against the 4 areas mentioned above to reach status of maturity in and within the parameters and perimeters of the organisations.

Let us fast forward and today with the invent of the Internet and penetration of the Mobile Devices such as the Smart Phones, Tablets, IPads and Media Streams Devices such as the Kiosks, Digital Signages and other network avenues such as the Social Media Networks and newer offerings in Technology Services such as Cloud Computing, the whole business landscape and model of conducting various transactions using these Multi-Channel routes to expand the business in a new manner and horizon is shaping organisations and the respective industries as a whole and one cannot sit back and say, let me be a tradition business operator.

This will not simply work and if you are not in this act right now or at some point because the day will come where you will either have to swim with the flow or simply be left behind and in some instances perhaps sink with the disintegrated business structures and disparate processes and with no IT Governance.

Chances are if you remain to be where you are and the only way that you will be able to survive is the nature of your business that is so unique that it cannot be easily duplicated locally or elsewhere. Moreover if you remain to be traditional in your business model, you will feel the effect of the technological advancement tsunami effect from other businesses and organisations around you whom have advanced to embrace to remain in the current day business environment with a sound business foundation layout with IT Governance in the new Digital Economy.

In addition if the business decides to expand from its current boarders, three main factors will stand in as the main obstacle, that is, People, Process and the Productive Tools (IT Systems) and without the three being deployed in tandem hand in hand, you will not be able to survive the challenge and the impact. At the end of the day all this will boil down to people and as I always say in my famous quote;

"Business is About People and People is About Business"
- Stan Singh

Back To Basics

Against this background, like it or not we are living in a new Digital Economy today and it is very imperative and its non negotiable to recognize and understand that we are aware of our surroundings and environment that we exist as an organisation and business to adapt and adopt but not to camouflage. They say that sometimes when you camouflage situations and processes to suit various events, perhaps intentionally or unintentionally chances are that you will sooner or later forget its origin and overtime this will be forgotten for good and one day when you really need to know it will be too late to revert or recover. One has to understand that people come and go and in the interest of space here I am not able to elaborate further but there are number of case studies to show where previous successful business both traditional and non traditional type organisations have failed due to having huge gaps measures in processes, single point of failures, mismanagement of information, data disparity, lack of understanding of the need to align business & IT and timely key data required that was either forgotten or omitted due to heavy staff turnover, lack of vital control & access, business continuity and absence of good IT Governance when facing moments of crisis in their respective organisations.

I like one of the Chinese saying and in PinYin, this is spelt as Wei Ji (please refer to Diagram 1)

This can depict a state of the organisation where a major crisis has occurred and there is calamity all over but at the same time an opportunity exist or silver lining

Diagram 1

to pick up the pieces to move forward for the betterment of the organisation.

I have encounter in my past experiences dealing with a number of organisations that when there were crisis nothing has really changed despite the fact that an opportunity did exist for them and they failed to seize the opportunity but ended up finding someone or something to blame for in the final outcome. In the meantime, business suffered losses, operational looses in momentum and in some instances the organisations lost both its credibility and branding.

If you noted my past experiences that were shared above, there was always an existence of an opportunity in crisis mode to improve, change, remove, dilute, revamp, reengineer and reorganize situations to counteract in facing future crisis to move forward and to be in a better organisation.

IT Governance – Finding The Right Balance

So in all this let us examine what is IT Governance or the word Governance in general means and I have made some reference in the Oxford dictionary and this is what is listed.

> **"Governance in an organisation / Corporation... it is a way it is managed & administered...**

(that means, Activities, Methods, Principles, Controls, Regulates).

Lets look at Diagram 2

Host Of Services

Every organization seems to have a different view of what IT Governance is. To us, from a high level perspective it means assisting the enterprise in the following areas:

- **Organizational Development**
- **Organizational Change**
- **Business Goal to IT Objective Mapping**
- **Compliance**
- **Risk Management**

Diagram 2

From the above diagram one can easily see on a high level standing that the list consist of all the rightful elements and ingredients to initiate the start of an IT Governance initiative in a organisation. Obviously this is not an exhaustive list but suffice to note that this will provide a kick-start or jump start the process which will involve every level of the business and respective stake holders.

At the same time let's review what the IT Governance Institute has to say specifically about this subject matter. There are two parts and it depicts the notation that;

i. IT Governance is the Decision Right and Accountability Framework for encouraging desirable behaviors in the Use of IT

ii. IT Governance is the responsibility of Executives and the Board of Directors and consists of the Leadership, Organizational Structures and Process that ensure that the Enterprise's IT Sustains and Extends the Organizational's Strategies and Objectives

So in this regard the above clearly confirms that IT Governance is not an IT project per se or IT initiative or the IT department is solely responsible to implement this in an organisation even though it has the word "IT" in front and many organisations tends to inadvertently overlook or unintentionally make this mistake quite easily.

IT Governance is neither a product that you can buy to pick of the shelf to implement nor it can be copied from other outside organisations even though you may run similar type of businesses. The fact of the matter is that every organisation is different from one another's strategies and perspectives, and if you do this it will be a recipe for a disaster journey. I am very certain that in this regard, the organisation will fail in the audit process and where compliance, confidentially, integrity and availability are required to be adhered there will definitely be huge gaps to be concerned with.

Therefore every organisation must create a Value-Chain initiative or process to link everyone in their role and responsibility to be recon with in

terms of its branding, methodologies, workflow, good business practices, meeting audit and controls standards, value proposition to its customers and stakeholders, if it desires growth.

A number of years ago in one of the organisation where I was employed as their CIO and when IT Governance was brought up as a subject matter to be discussed at the Senior Officers Meeting, everyone looked at the IT Department to get this implemented and I was dumbfounded as to why me and how can I achieve the required results. Sounds familiar or this simply only has happened to me.

After a series of research and painstaking process I found out that this has nothing to do with IT although IT was just one component but the IT Governance (ITG) factor had to do with the entire Ecosystem System of the organisation that had a number of facets to consider illustrated in Diagram 3

I have listed various headings in Blue and Green wordings to give a better reading and understanding perspective and at the same time the areas of concerns or issues arising are also correspondingly listed in Red across to show definite areas that requires to be reviewed, addressed, revisit, revamp so on and so forth and whatever you do to break or undo any of the process to suit the organisation, always have the four key components in mind, that is, **Compliance, Confidentiality, Integrity** and **Availability** and all aligned measures either developed, created, produced or managed can be tested against these 4 components. Testing here simply would mean meeting the required level of acceptance where it can hold the organisation from all harm to mitigate risks and that every process or position involved will pass the audit requirement of check & balance

And so from this perspective the IT systems that comprises of the application and support infrastructure is only listed last to show that it is one of the required component in IT Governance and although it is listed as being last in the above diagram, it does not loose its significance at all.

So organisation in turn must engage itself from every level of the business and each business units to be fully engaged to play a supportive role but not in isolation or in silos but rather be part of the process flow where visibility of end-to-end results is clear all times to ensure that organisations that desire growth can make the necessary changes to adapt to the next level or leap frog in the Digital Economy.

At the same time if you were to examine Diagram 4 as we are now tearing each business unit or entity apart to see how the integration and links work, sadly you will discover to learn in this diagram that there are many broken processes already existing with huge gaps in one single department alone or business unit, and how is it possible then with such gaps and lack of control can safely tie this department to other department in the business and the organisation in wholesome.

This is a clear cut view and findings to immediately conclude that there is definitely an absence of a company's blueprint as it foundation that simply cannot dictate or show a smooth and clear integration with one to the rest business units and worse of all, how do you then define risks and single point of failures. Sad to say and I am afraid this organisation will not be able to excel to receive new business initiatives and deploy new systems to move forward.

If fact you should not attempt or **NEVER** bolt any process, new systems or other foundations on top

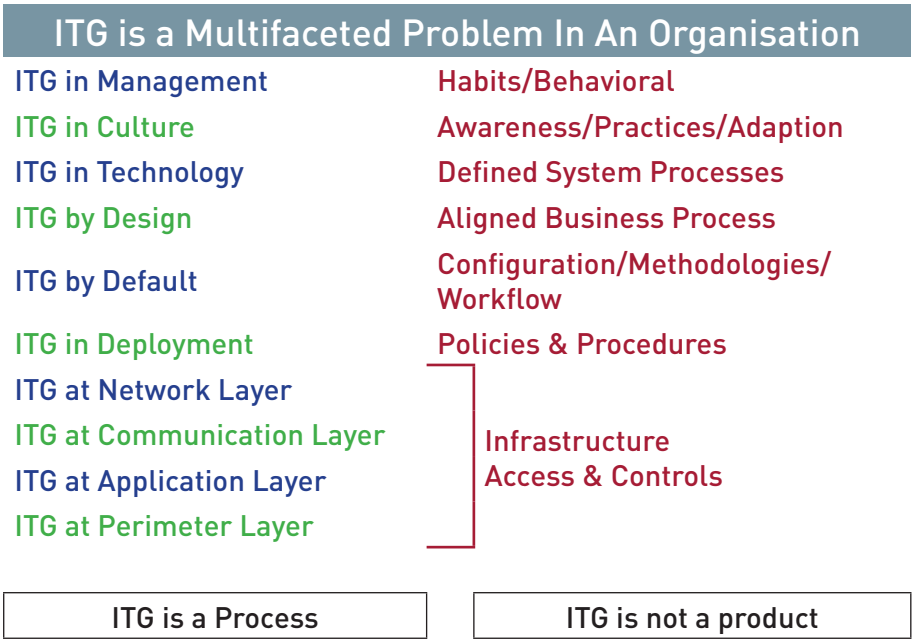


Diagram 3

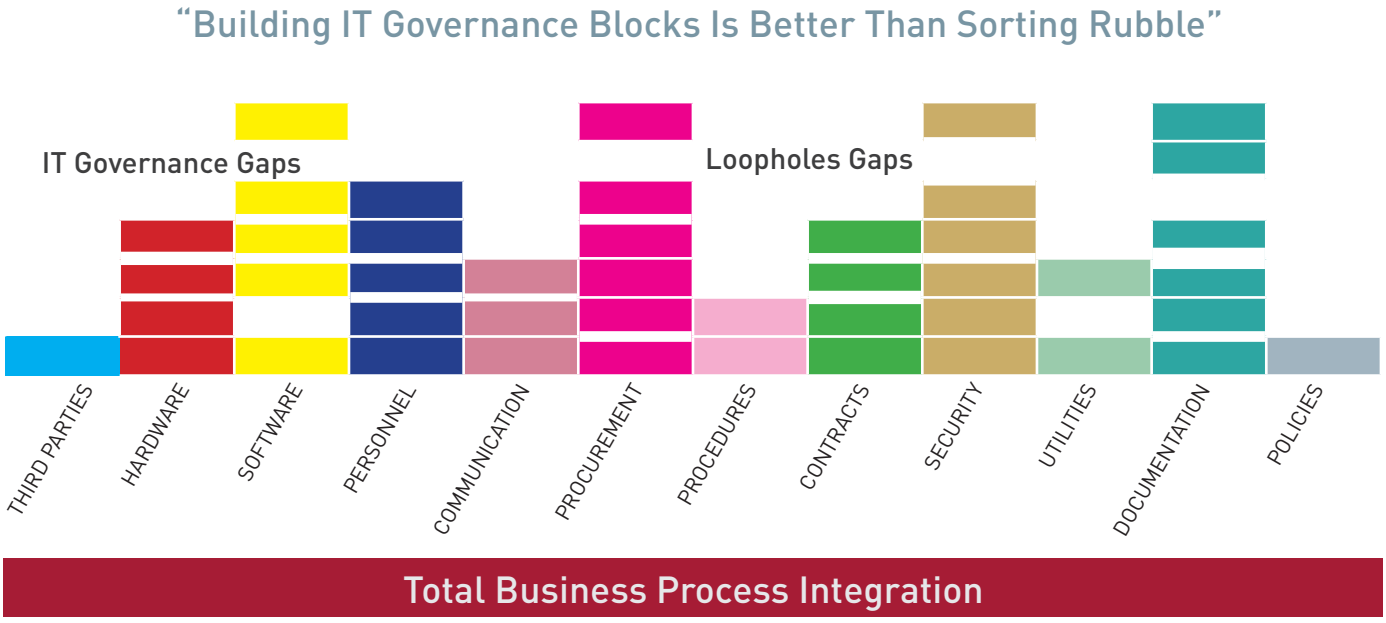


Diagram 4

if the bottom layer already has gaps, loopholes, single-point of failures, huge risks, broken audit pointers and such like as show below in diagram 4. This organisation is moving towards a disastrous journey and no one and not even the Vendor will be able to help the business to have or achieve sustainability. The only way forward is to back track and perhaps start all over again but taking the jump start initiative to begin the rightful journey with IT Governance initiatives.

Fill in the Loop Holes and Gaps

Please allow me share my thoughts my past experience once again just as I did to begin this journey as I was in a similar boat as depicted above. But only this time around I had the support of the Board, CEO and every business sponsor that came together to work hand in hand to plough through to move forward.

If this goes unnoticed and continues to happen or occur, the organisation will suffer serious consequences and there will be ramifications given the fact that you will not only have broken processes, but also disparity systems put in place to support the business environment but without a clear end-to-end objective and visibility of the business. Not forgetting the fact that there will be serious data contentions and data reliability issues and data integrity issues arising coming out of the shoots and as always, IT appears to get the blame in such scenarios.

Compliance, Integrity, Confidentiality and Availability

One major concern will creep into such environment where Compliance, Integrity, Confidentiality and Availability factors will loose its grip and many areas will be compromised as a direct result of the lack of IT Governance and this could mean the organisation will be in a vulnerable position to loose its Value-Chain and importantly, the precious commodity or asset, the Data. If your business environment is not water tight and well preserved, there will be damaging consequences. Let's take a look at this particular Diagram 5 that is listed below;

They say a person having a valid passport and carrying a valid boarding pass to board the aircraft and when he /she passes through the security metal gates with all censors and devices to detect what he / she is carrying that can be easily seen on the database, monitor and detected, but no systems and machine will be able to tell what is in his/ her mind and what will they do next.

That is why organisations have to watch their backs as well in dealing with internal employees and such like. Please do not get me wrong here and I am not saying or listing to indicate that all employees fall in this category, no certainly not. But nonetheless there are some who have done wrong to the very organisation that employed them in the first place and without ever being suspected.

Some get caught and others go unnoticed until it is too late to recover from a damaging situation that

The 80 / 20 Rule

"…….Some Say That 20% of the HACKING Into Corporate Business Is Carried Out From EXTERNAL Sources…. And…. what do you think?

…Others Say That Remaining 80 % Of Hacking, Security Violation, Business Sniffing, Data Pilferages & Physical Damage To Corporate Business Process & Systems Is Carried Out INTERNALLY…."

Do You Agree With This Statement??

THINK AGAIN!!!

Diagram 5

potentially could have reputational damages. This is exactly what I am referring to where the organisation has compromised its position due to lack of controls and such like.

In fact there are a number of case studies written to show this cause for concern and also cases are being reported occasionally in the newspaper. I know of organisations who have spend thousands of Ringgits putting in firewalls and safety locks to prevent outsiders coming in but little did they do, realize or know that sometimes the very enemy that requires to be watched over is within the four walls of the organisation.

Do you wonder why and how is it possible that sometimes information is already known to the competition even before you launch a new product and if you recognize this then you are in the right track to recognize that IT Governance must exist to put in better access and control. Here I am not making reference to the physical areas alone but beyond this and in fact the entire eco-system of the organisation, and in particular, vital pieces of data or information, which is the very bloodline of the organisation.

Identity Management issues

Let's look at another scenario of an organisation that has a serious crisis in Identity Management issues and lacks control in processing timely and important tasks, and this is not unique to IT department alone but the organisation itself should take the blame and please judge for yourself in **Diagram 6** to conclude whether your agree with me and that your organisation is not in this category ever and you have never come across such depiction of issues.

Alright in that case, once again perhaps this only happened to me.

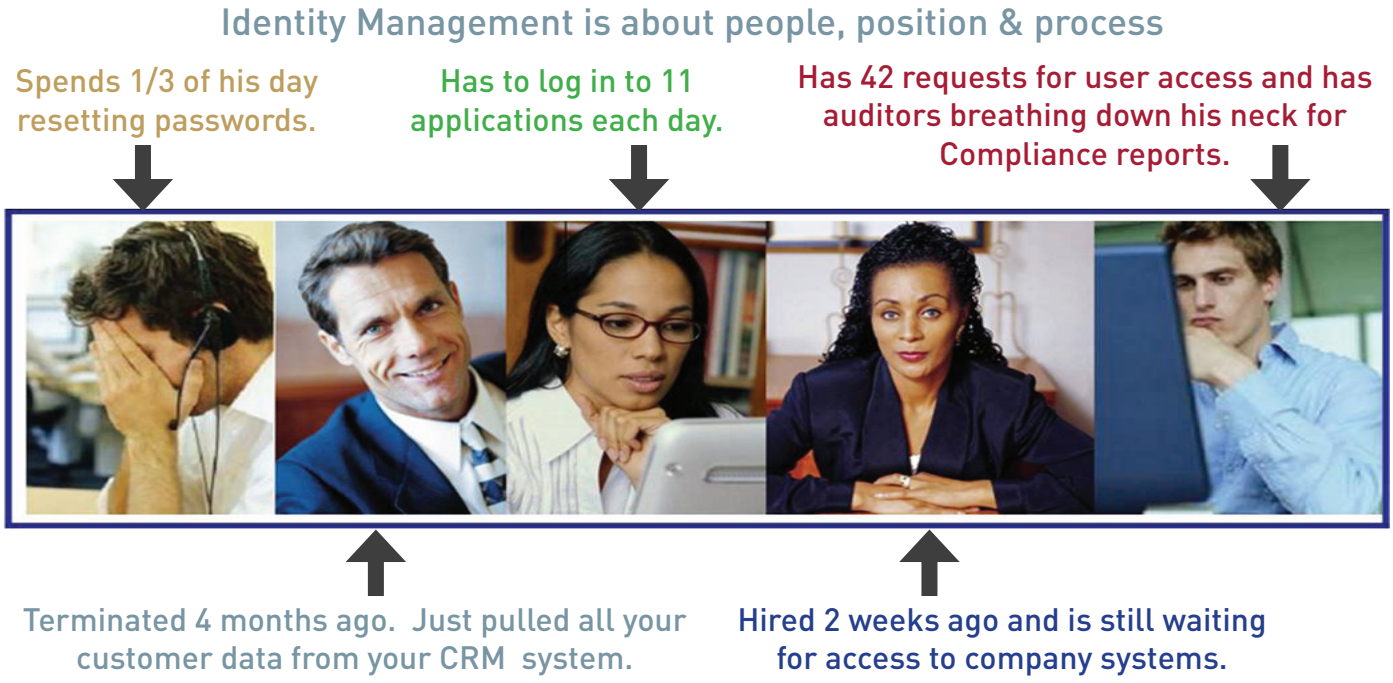


Diagram 6

Here it is and please examine each picture to read the content carefully and please ask yourself this very important and pertinent question as to how many department are at fault with this Identity Management issue arising or it was strictly a mismanagement or breakdown in the IT process and therefore the IT department must take the wrap. Your answers please……

Can you see where I am coming from and by the way those characters shown in the various photos are for illustration purposes only and do not resemble or belong to the same organisation or any organisation in reference. This is a very common mistake and can you easily identify the breakdown in the various departments respectively of which exist in many organisations even today in the absence of a good IT Governance process being put in place.

Please let me stop here and kindly ask for your answers as I have listed mine and they are, just so you know, IT Department, HR, Business Unit Manager, Audit Manager, IT Security Officer, IT Manager, A&P department or the CEO, and by the way the list can go on. As for me there is only one culprit, the organisation itself that has weak links and breakdown in processes.

SWOT Analysis

To further understand the gravity of knowing where the organisation stands before looking further at any standards for deployment or making changes or even reviewing to initiate IT Governance, lets take a look at this quadrant in Diagram 7 to understand the reality in that, you know what you know will always remain your Strength, and this is given so no issue here, and if

If You Do Not Recognise To Know Where You Are, You Cannot Do Or Receive New Things

Creating Value in Business is about the transformation and embedding of controls & measures in the organisation processes and the overall ECO landscape & system.

Its Not Just About IT

	Know	Don't Know
	STRENGTHS	**OPPORTUNITIES**
Know	• Competencies • Working Knowledge • Skills / Ability • Self Awareness	• Potential • Capability • Hidden Assets • Latent Advantage
	WEAKNESSES	**THREATS**
Don't Know	• Incompetence • Limitations • Shortcomings • Learning Needs	• Blind spots • Competitors • Disintermediation • Missed Opportunity

Diagram 7

you know what you don't know and this will be your Weakness that is still alright and acceptable because you can always fix the weakness to overcome future shortcomings.

Moving on, if you don't know what you know this will be an Opportunity lost. And sometimes through peer to peer networks, mentoring, networking with other third parties and by chance you get to hear areas that are important to you and so you learn to seize the opportunity to progress from this point on. However, lastly, if you don't know what you don't know this will be a Disaster to the organisation nobody will be able to help you in any way because it will be like being on a road to nowhere or listening to the sound on the track not knowing which direction the train will be coming or going.

Funny it may sound but the reality is that there are organisations that exist today that potentially operate in this manner and so when people come and go the unknown issues go deeper and unnoticed and overtime this will cause the organisation to suffer losses with negative reputational effects and there could be other consequential damages along the way.

The little headings inside the four boxes are examples and something that you can list it for yourself due to the fact that every organisation operates differently.

Now that we have seen a number of diagrams, illustrations and reasons that were shared and listed, let us now move closer to the next diagram as to what should an organisation do in order that they can start to look at IT Governance as an initiative for the next steps n their organisation.

Enterprise Management Framework and Business Technology Organization Process

In this next Diagram 8, I have listed key respective headings in the Enterprise Management Framework

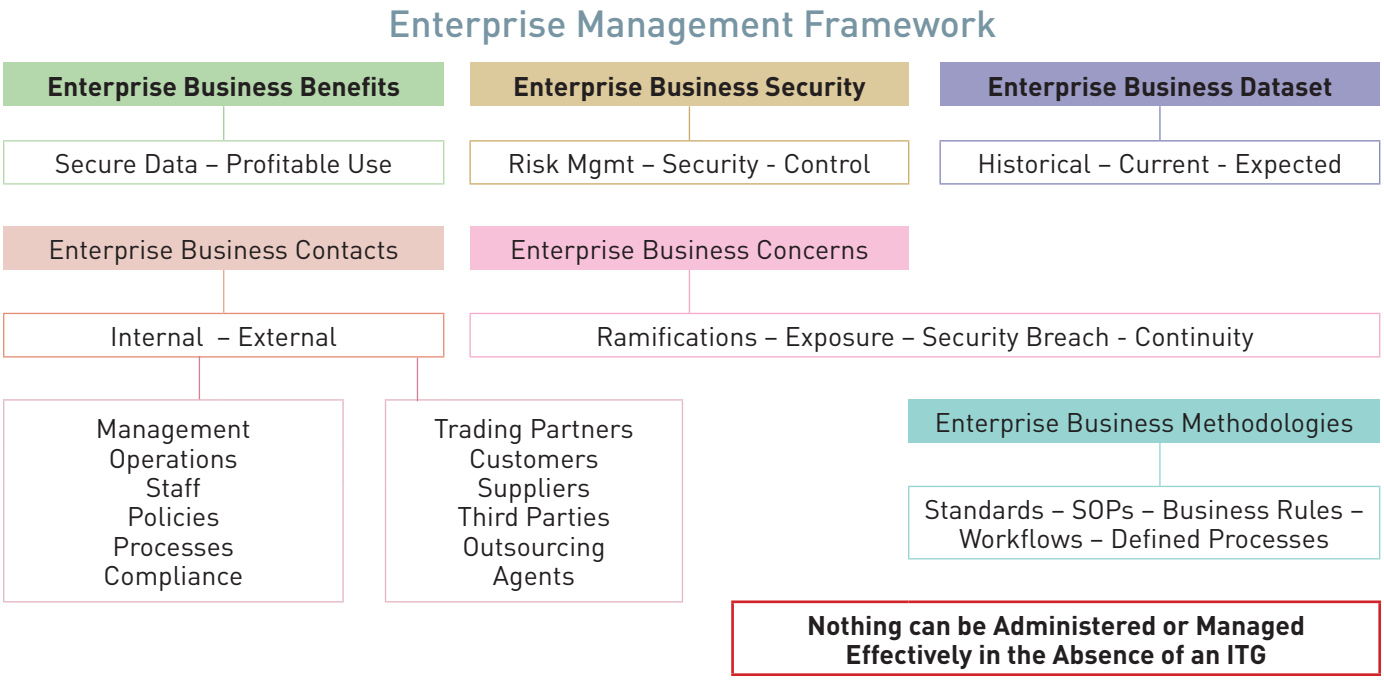


Diagram 8

What I have listed above in this diagram is to help you understand this with a panoramic snap short view to start the process to IT Governance and where to begin by sieving and combing through each area respectively to mark on the checklist as to whether the organisation has made any effort here or does it exist.

To make it easier I have also listed another relating Diagram 9 to bring in clarity by putting two diagrams (8 & 9) together and the key to note is to look at the following,

1. What are the Business Rules & Polices governing the entire business & workflow and management

2. What are the Core Business Functions and how are these inter-linked to the respective business units and are there single point of failures

3. How is the Core Data being identified and what process is deployed to divide and share data across the enterprise or external parties, if any, Customers & Suppliers and such like

4. Documentation on the policies governing processes and setups of conducting business within and to external sources

5. Whether the organisations has identified risks and mitigating factors and whether at the same time has develop Business Continuity Management process to counteract any adverse situation that may occur in the future

6. How is the physical aspect of the business premise protected from any harm coming from both internal or external intrusion and this could be related to forbidden areas, restricted areas and common places inclusive of allowing the use of the company's broadband or Internet access and restricting devices **(I know of organisations where not only you have to take off your shoes before entering but also your mobile phone/s must be left at the reception area before you enter the restricted area after you have been properly authorized)**

7. How are the business and various contracts secured and remember you will have non-disclosures in place with other organisations and in addition, how is the relationship with your Service Providers, Suppliers, Agents etc, managed and documented

8. Last but not least, the IT Manpower & Systems, is there a IT Policy & Procedures Manual created for the organisation, is every item properly tagged, licensed, system documentation, audit log files to show access and changes made in the database, infrastructure diagrams of the systems, network, logs to show who and what access has been made externally etc

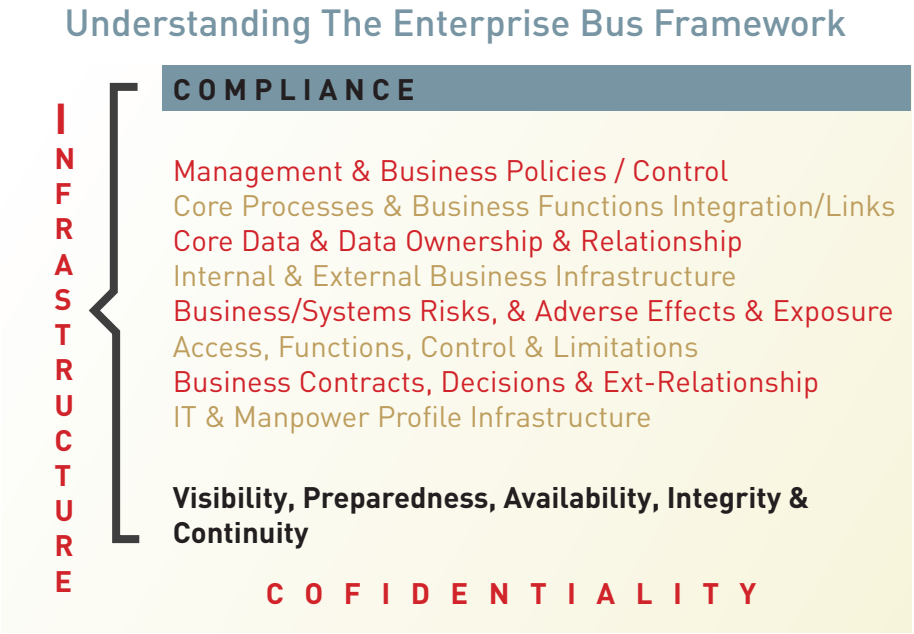


Diagram 9

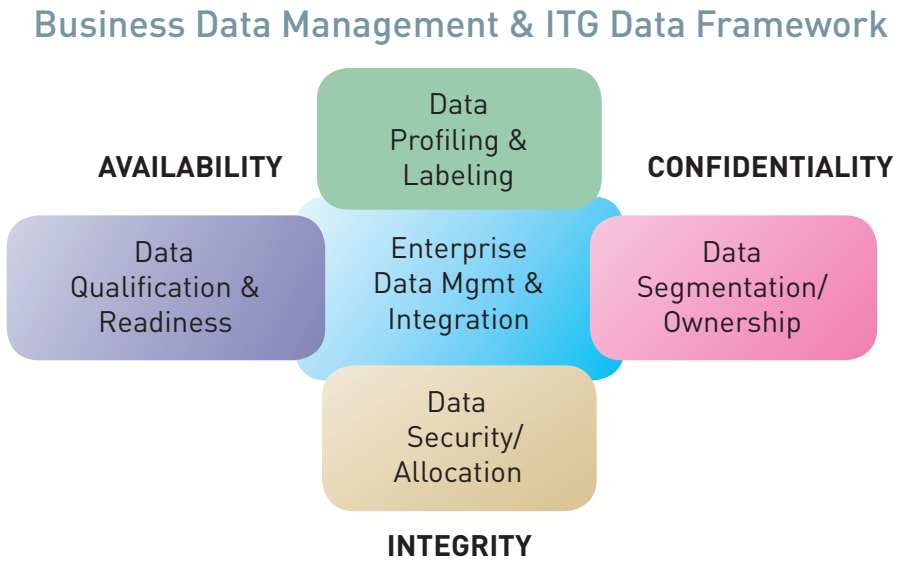


Diagram 10

These are the fundamentals that can stand the test to see if it meets Compliance, Confidentiality and that it also must have elements of visibility, preparedness, availability, integrity and business continuity

And so if you sum up the above categorically to look at a holistic picture this is what it should be as depicted in Diagram 9

Data Governance

Let me move on to raise another pertinent question and that is, out of the 3 Items mentioned here, being Money, Weapon and Data, and if you were to choose which one will you select as being most critical and most important to you and the answer is……

Data, definitely and rightfully so as Data is the life line of any organisation and with the right data being in hand one can do wonders with it and sometimes there are those and organisations who are prepared to pay so much just to have that Data or that piece of information.

Data is also the most important asset of any organisation but data itself is hopeless and perhaps has no value to it unless you know and can recognize its value and in that form that it exist.

And so the IT Governance of data is equally an important exercise as to how it is received, managed, stored, accessed, changed, shared, utilized and discarded.

The data initiative to ensure that you have complete control is depicted in the above Diagram 10 where various data components are listed as a subject matter concern to understand that the organisation need to look at this initiative from the various perspectives, namely, Enterprise Management that has links into Data Segmentation & Ownership, Data Security and Allocation, Data Qualification & Readiness and importantly Data Profiling and Labeling to ensure that the existence data regardless of its format is not compromised in the organisation.

For now lets move down to see how I have divided data into little areas under various headings in Diagram 11 to give you a different perspective so that the existence of data in the respective domains or folders can be managed and secured accordingly when you are considering working on the IT Governance initiative.

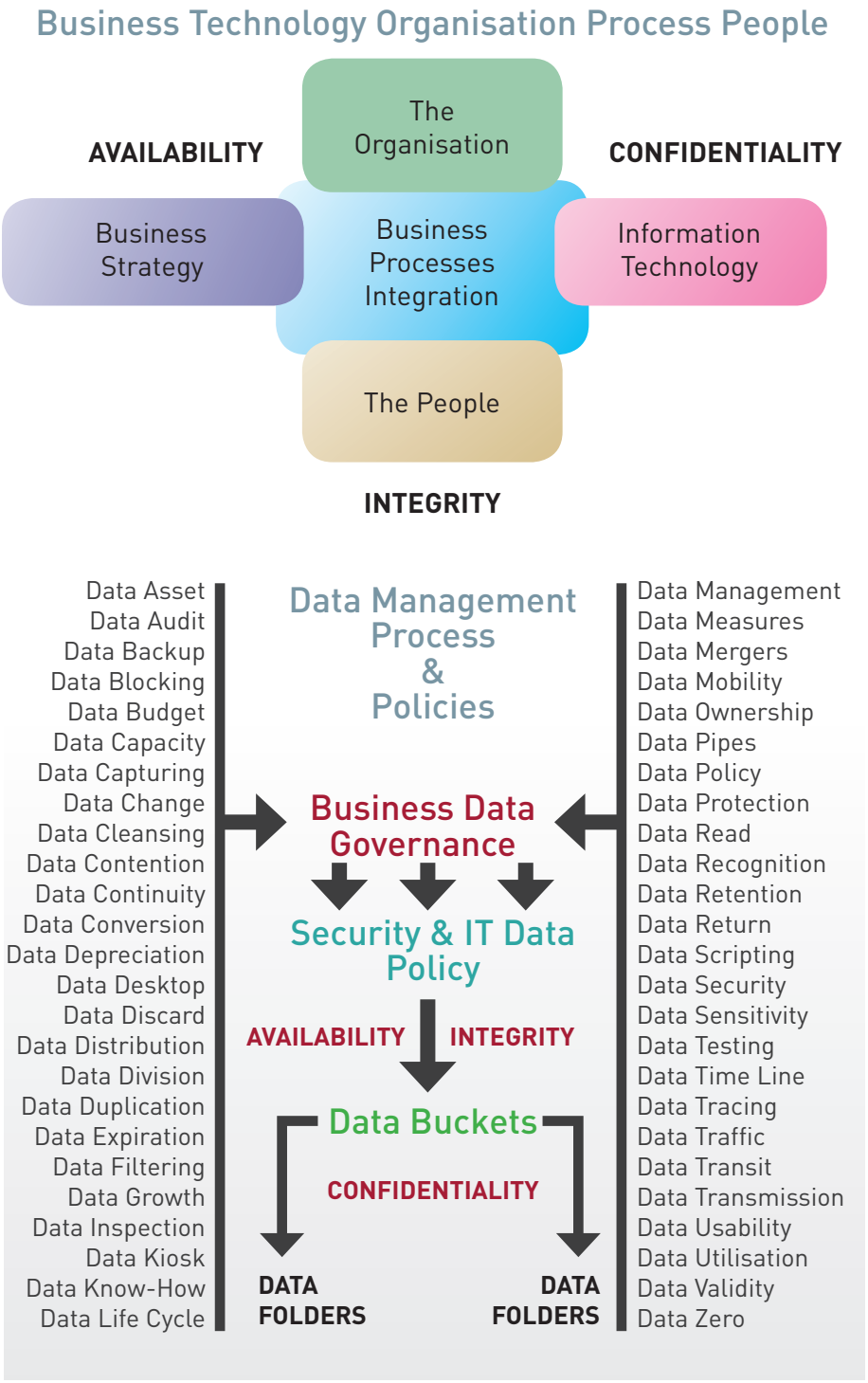


Diagram 11

I must admit that this is not an exhaustive list but suffice to provoke your thought process and in its entirety your organisation will be able to develop a policy that will govern your data usage and maximize the data potentiality in your operations and business, and most of all it is well protected.

I am also a firm believer in ensuring that organisation should embark in creating a Corporate Data Dictionary to house all data processes and whenever there are elements of doubts, that reference can be made for clarity.

I have included another Diagram 12 listed below to further elaborate transactional systems with back office accounting and so on so forth. If you carefully examine this piece of data and map across the modules and applications across all systems where it has an impact soon you will discover that when there are issues in the system, when auditing is trying to sieve through, on-demand management reporting and such like, it make life easy to select and identify and have the right findings and results on hand.

Unfortunately as noted previously that a number of organisations out there has not embraced Data Governance initiatives and incidentally this initiative also cannot stand on its own in a silo mode but rather the governance of data itself is one part of the entire IT Governance initiative.

Security and Management Governance

Equally the next Diagram 13 will also indicate that the security and management governance on data that the organisation has listed in the Data Dictionary requires periodic updating and changes are inevitable as business strategies get enhanced in Digital Economy so must every aspect of the documents that deals with the Corporate Data.

These pieces of data will soon be transposed into pieces of information that will be used for all business decision making exercise to strategise and perhaps dictate the organisations next critical move but if there is a lack in the management of these information with outdated tools then this will only further bring harm to the organisation. Review this diagram to see areas and how various key processes listed in

Red can affect those activities listed in the Blue box and importantly pay attention to tools that is applied today to protect the data can be obsolete tomorrow if it is not updated.

Enterprise Business Infrastructure

Having listed so much details and information above with various Diagrams, industry experiences and importantly my direct involvement in a number of situations across the globe, working hand in hand with various levels of management, taking charge of business units to function effectively and last but not least playing a key role as a Global CIO in a conglomerate and with 33 years of experience, I finally discovered whether you are a street vendor, a small medium enterprise setup or a major corporation or even a conglomerate, once you have set your path on IT Governance and the organisation is in ready mode, the following picture will emerge and this is depicted in Diagram 14 listed below.

There are a number of secrets that I would to share here with you and once again this is gathered and built from past experiences and if this is going to benefit the organisation then please use this as freely to bring in the benefits from it.

If you examine the above diagram carefully here there are four levels of management, namely Corporate, Business, Operations and Transaction listed in the hierarchy order respectively.

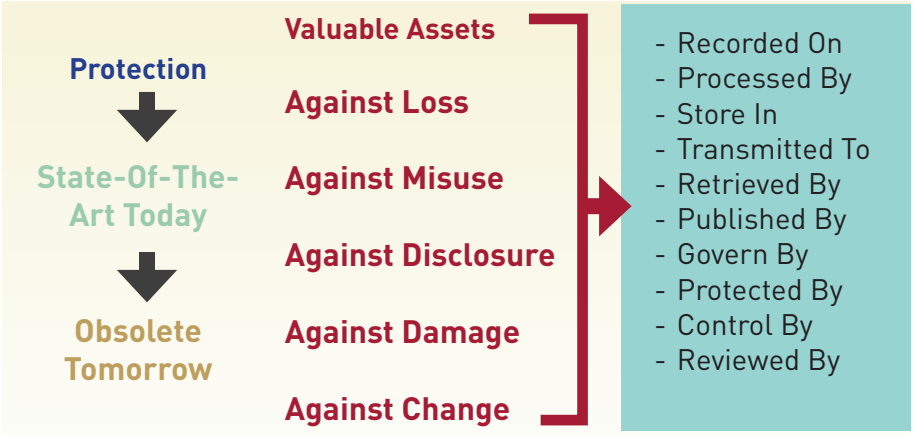
This in turn has 4 segments or bucket, namely, Structure, Ownership, Analysis and Reporting

Data Management Policies

- **Enterprise data management structure**
- **Data classification – for example:**
  - Unrestricted Data
  - Sensitive Data
  - Critical Data
- **Roles and responsibilities – for example**
  - Data Trustees
  - Data Stewards
  - Data Managers
- **Access rights and privileges – enterprise**

Diagram 12

What is Business Information Governance???



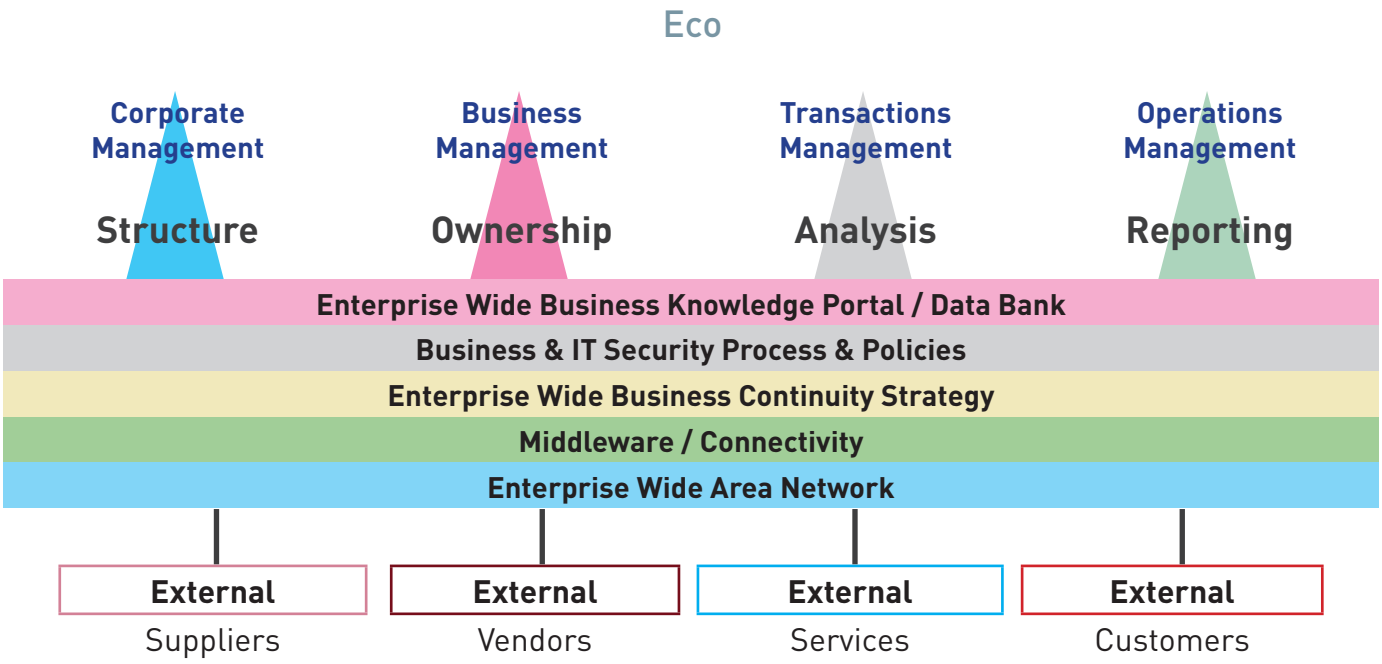
"The Emerging approach to Data Protection is not unlike the Guard walking the corporate corridors at night and testing the door handles" .. Stan SIngh

Diagram 13

What is Business Information Governance???

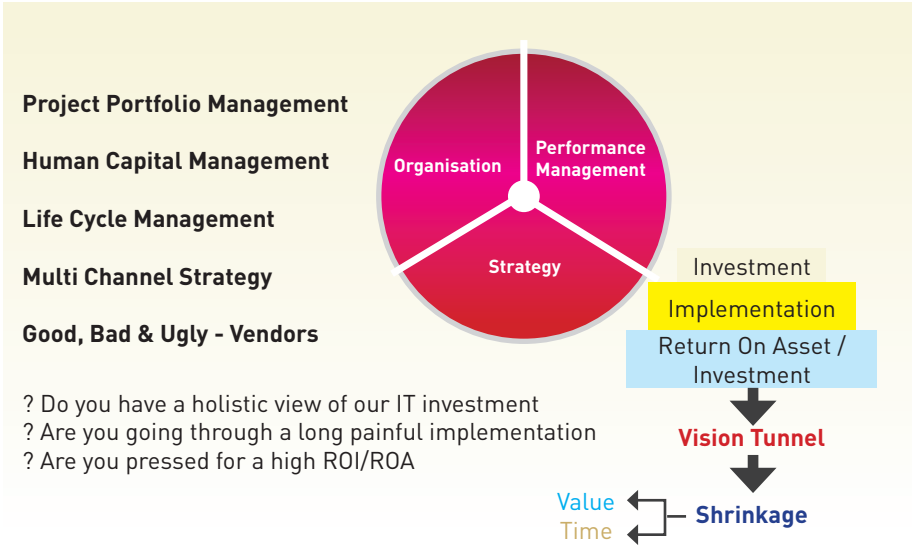
Structure	Ownership	Analysis	Reporting
Corporate Management	Strategies	Decisions	Consolidation
Identify			
Business Management	Objectives	Risk Mgmt	Result- TBL/BL
Define			
Operations Management	Processes	Controls	Check & Balance
Create			
Transaction Management	Transactions	Audit Trails	Daily Closing
Execute			

Diagram 14



and with it houses key roles and responsibilities under each column to ensure that this is carried out by the respective management areas.

Interesting there are 4 role play tasks listed under each management area respectively, namely, Identify, Define, Create and Execute and so when you look at this diagram in its entirety you will begin to see clear cut management process defined with clarity that IT Governance has been successfully adopted and implemented as part of the entire Eco-Structure of the Organisation.



Talking about the Eco-Structure to work effectively in the Digital Economy embedded with the elements of Compliance, Confidentiality, Integrity and Availability that has Continuity, here is the Diagram depicting exactly what has been said and defined.

Please note that there are various layers that is also embedded to ensure the foundation and structure of the various management levels is fully and effectively supported by the respected operating layers and areas that deals with IT Governance it its entirety. As mentioned previously this Diagram also shows both the internal and external links to ensure nothing is compromised in the Eco-Structure and journey of the organisation as it progresses to newer heights

Once again, feel absolutely free to omit or add as every organisation is different and will operate differently to function at various landscapes and strategies and as long as you have covered all that requires to be done so in the IT Governance initiative, your organisation will take a quantum leap forward to be engaged in the Digital Economy, productively.

IT Investments

As part of the overall IT Governance if the organisation is looking at areas to focus and perhaps looking purely at your IT investments and areas of concerns or have pain points that the organisations is desiring

to accomplish as part of the overall strategy then please look at pictorial perspective to identify whether the organisation has done enough to sustain and therefore can move forward in the respective areas listed below.

Please also pay special attention to the questions that I have put forth above in this diagram and in particular the shrinkage elements where there is loss in value over time and to understand that every activity is time based. And so the organisation must take advantage of its new foundation and setting to harness and be in line with the investment made in all IT implementation programs.

Over the years many organisations and peers in the industries have asked me areas of adverse conditions and why is Business Continuity so important as far as IT Governance is concerned.

IT Risk management

Their understanding of adverse conditions or disasters lies with all due respect in the following areas, namely, Fires, Floods, Lengthy Power Cuts, Natural Disasters and such like. Little did they realize that adverse conditions are many and I have enclose Diagram 15 to show some of the adverse conditions and please examine for your self whether you see it fit and they are;

I sincerely hope you will agree with me now that there are more adverse situations than ever imagined and this is not an exhaustive list.

As long as there is a strong IT Governance established in the organisation most of these adverse

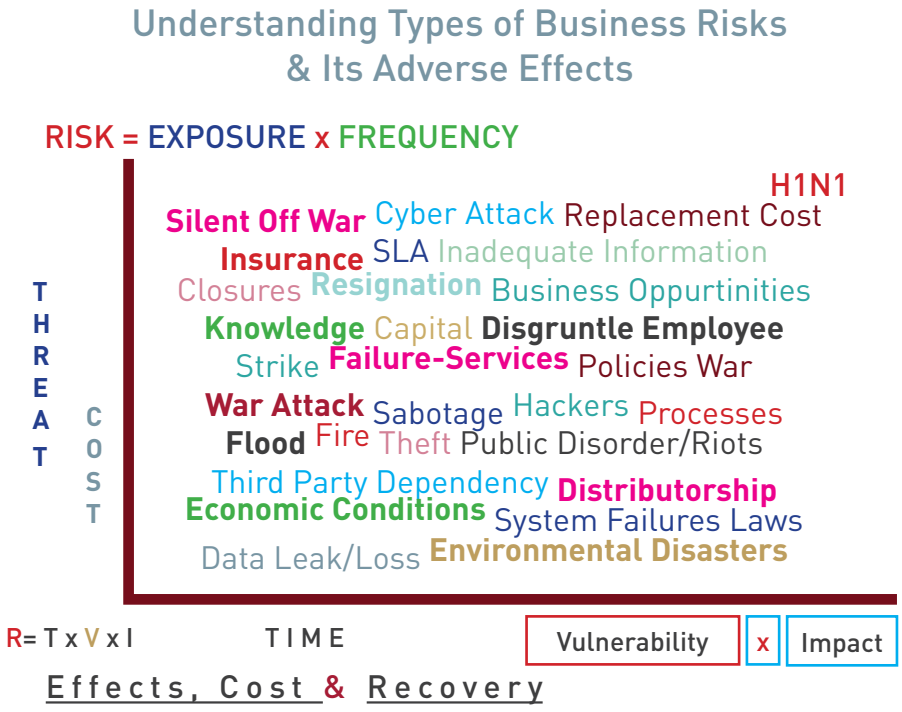


Diagram 15

conditions if not all can and will be dealt with in the most effective and productive manner. But of course there will be impact for certain but what matters is that the organisation is able to mitigate risk and major impact in dealing with various disasters.

Role of IT Governance in Business Continuity

An organisation with good IT Governance and with effective Business Continuity program being in place can minimize its impact in a number of areas as shown in the following Diagram 16 listed below;

So in all this what is the ultimate secret that we as an organisation can embrace to harness across the enterprise now that we have embarked on the IT Governance program to do the right thing all that is required for the organisation to have all passes against the health check listing and passing it with

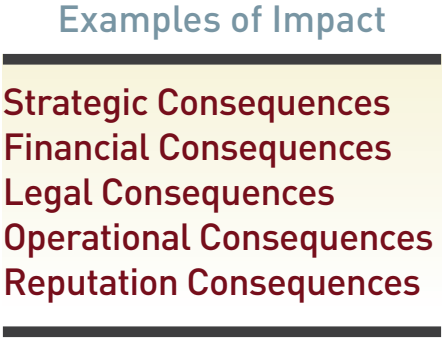


Diagram 16

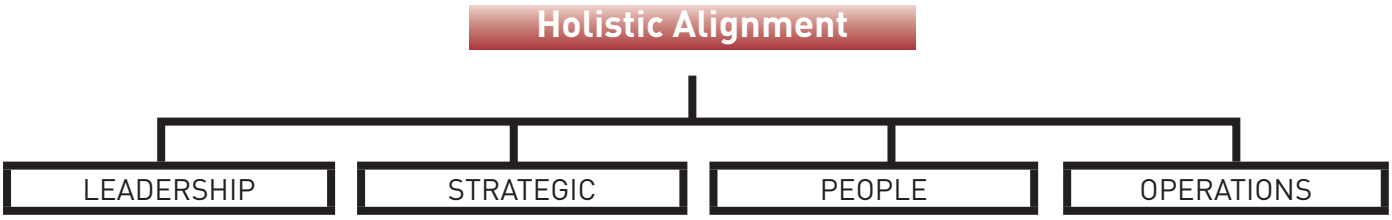
flying colors to face any adverse challenges and new challenges with add on revised business strategies in the new Digital Economy, the question is what if we still failed after all this is done and then what?

My answer to this question is simple, just do what Christopher Columbus did.

Who is he and what has that got to with my organisation. Once again I will say everything for he did everything right and please let me illustrate this to bring that understanding and then lets examine

Christopher Columbus

He did not know where he was heading before he left
He did not know where he was when he arrived
He did not know where he had been when he returned
Result: He discovered major geographies by chance



if this will work for your organisation in a manner he did.

You need to understand that Christopher Columbus was never a trained or experience sailor or captain of a boat, leave alone a ship.

Holistic Alignment

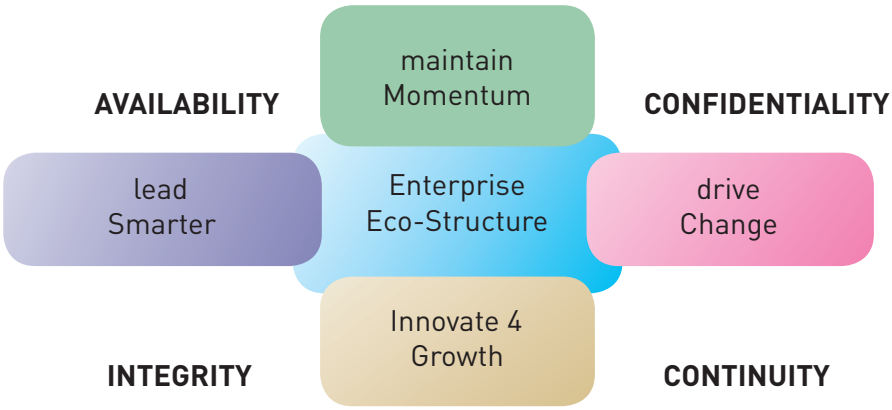
When he sets to sail the Atlantic Ocean this is what happened and sieve through the facts and then compare your self in the similar situation in your organisation, and they are,

The Atlantic Ocean is very unpredictable seascape environment with so many dangers lurking namely sudden storm, huge waves, icebergs, rough seas and the sheer size of the ocean and depth. It became the resting place to one of the great ocean liners, The Titanic.

He did not have all this facts on hand with him but his desirous and determination to sail despite the unknowns led to his success of discovering great geographies, America. He also did not have any idea how much resource to house in his ship such as food, clothing, safety gears etc and importantly how long would the journey take and simply because he did not know when and where all this will end. But he had with him something that most organisations failed to adopt or align, and that is Holistic Alignment in the following areas, namely, Leadership, Strategic, People and Operations.

He was able to hold everything in perspective and his success is also marked in a number of management discussions. So organisation must take that leap to start the IT Governance initiative even though you have no idea where to begin and so you will discover that along the way, you have discovered great geographies in your own turf as far as the organisation Eco Structure is concerned and when there is Holistic Alignment.

Corporate Wheel & Life Cycle



The Harvard Business School has adopted that an organisation should always have a slogan to ensure that not only it stands for the value of the organisation but these are action and task oriented words and therefore they have selected that an organisation should,

1. Drive the Change elements to move forward

2. Innovate for Growth and especially when the world embraces technological and business advancement

3. Lead Smarter the Team and those with roles and responsibilities and that the Leadership must take heed to ensure there is engagement and guidance & mentoring

"Without ITG you cannot progress in business what you do not plan, organise, prepare, set targets, forecast and build, if this is not implemented successfully in your organisation on an Enterprise level".

"...The result is like the wind, you can feel the adverse effect but do not which direction it came and will go next..."

4. Last but not least, I have added the forth component and that is, organisations then should Maintain the Momentum to ensure the corporate gears do not slow down or make a shift at the wrong timing or turning especially in the Digital Economy to take advantage of the Multi-Channel opportunities.

In the Diagram shown below and as depicted if nothing is ever initiated or carried out in isolation, the organisation will face the effects of the wind only this time around it will not know where it came and where it went and before you can count your damages and losses the next wind wave will make another pass and who knows what will happen this time around and especially if you leave to chance.

Are you one of these that describe your personality / character?

Gun Slinger
Cost Cutter
Overly Cautious
Leadership Quality
Tacky Keen
Business Minded
Strategist
Wear Bullet Proof Vest
Business Process Management Thinker / Governance
Works On-Demand
Provide Technical Assistance On Demand
Business CIO

C-Level Executives

once describe you best or do have peers or colleagues that would fit one of these depicted characters and if you are, you will need to change your identity to fit in the environment and be part of the good IT Governance Team and here is the list,

Conclusion

There are many characters in a given organisation and I wonder which

Finally, for me the work CIO in IT Governance does not mean Chief Information Office but what it really means is

CIO,in Governance
really is,
Create, Innovate & Optimise

CHAPTER 05

BUSINESS AGILITY GROWS WITH MOBILITY: AN INDUSTRY PERSPECTIVE

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PIKOM

Introduction

From the advent of the Internet, diffusion of contemporary ICT in households and businesses has been regarded as an enabler or a driver of economy and society. Now, with the onset of mobility, the way one works, does business transactions, undertakes communication and social interaction, plays and learns, are changing, and indeed, taking new shapes and shades every day. Institutionally, the roles, rules, rights and regulations are also being reviewed and adjusted for emerging structural changes. In the initial stages, only desktops or laptops were connected to the Internet and created 'anytime' ambience for interactivity, irrespective of geography, traditions and culture for people and as well for institutions.

When their connections are increasingly supported with wireless smartphones and tablets, communication, networking and transaction are not only confined to 'anytime' mode but also expanded to 'anywhere and anything' mode, thus increasing the agility and convenience factor in all spheres of life. Thus, businesses and lifestyles are increasingly becoming borderless, pervasive, ubiquitous and agile, giving rise to a plethora of new opportunities. These include, to name a few, cloud computing for small and medium businesses, mobile commerce supported with Internet banking and global payment schemes, social commerce leveraging upon social media technologies, big data analytics going beyond traditional database realms, new human resource practices like "bring you own device" (BYOD) work culture, increased net citizenry participation in governance processes and global networking providing expanded scope and coverage on education and lifelong learning opportunities. At the same time, new age technological advancements are not exempted from new threats and challenges. In particular, children are increasingly exposed to pornographic sites at a tender age, mirror websites in support of fraudulent practices add woe to businesses, unauthenticated user generated contents posing political challenges, et cetera. Taking cognizance of such changes occurring at an unprecedented rate, this chapter aims to elucidate major trends and features that are specifically associated with the mobility factor. This factor warrants due attention as it has been projected to bring greater impact in the near future. Therefore, it is imperative that businesses, society as well as individuals are fully aware of current mobility trends and, at the same time, are prepared in harnessing whatever the new age technology is bound to offer in the near future.

Mobility Convenience

Since the privatization of the telecommunication sector in the 1990s, the provision of telephony services underwent drastic changes. Specifically, the National Telecommunications Policy (NTP) of 1994 paved the way for the provision of seamless communication in the country. Through the establishment of Malaysian Communications and Multimedia Commission (MCMC) as a regulatory institution in 1998, the telecommunication market conditions were further streamlined with regard to guidelines for competition, interconnection charges, tariff rates, spectrum management, prevention of illegal or non-authorized use of equipment, transparency in the issuance of licenses and enforcement of compliance and network development, as well as public scrutiny processes. Such policy, regulatory and institutional streamlining stimulated the growth of the mobile telephony industry in the country. In particular, it increased the participation of foreign investments. It also eliminated the monopoly in the telecommunication sector when all telecommunication operators signed interconnection agreements for the provision of seamless communications with Telekom Malaysia (TM), which had been the incumbent and sole service provider. On the demand side, despite higher costs than fixed lines, an increasing number of the public opted for mobile phones. It can be seen from Figure 1 and Figure 2 that the number of subscribers for cellular phones has exceeded that of fixed lines since 2001. Indeed, the cellular market has been registering a compound annual growth rate (CAGR) of 17.4% in comparison to shrinkage of 6.2 % in the fixed line market during the period 2001-2011. The public preferred the convenience, flexibility and versatility of 'anywhere and anytime' communications and networking that comes with mobile devices. With the dawn of the new century, cellular's prolific growth rate has overtaken the traditional fixed line growth rate at the household level. This trend is easily understood because, prior to the introduction of mobile phones, the public had to wait in a long queue for delivery of fixed line telephony services under the slow and rigid bureaucracy of government agencies. When the telecommunication sector was liberalized, the private sector offered increased efficiency and enhanced service quality levels in

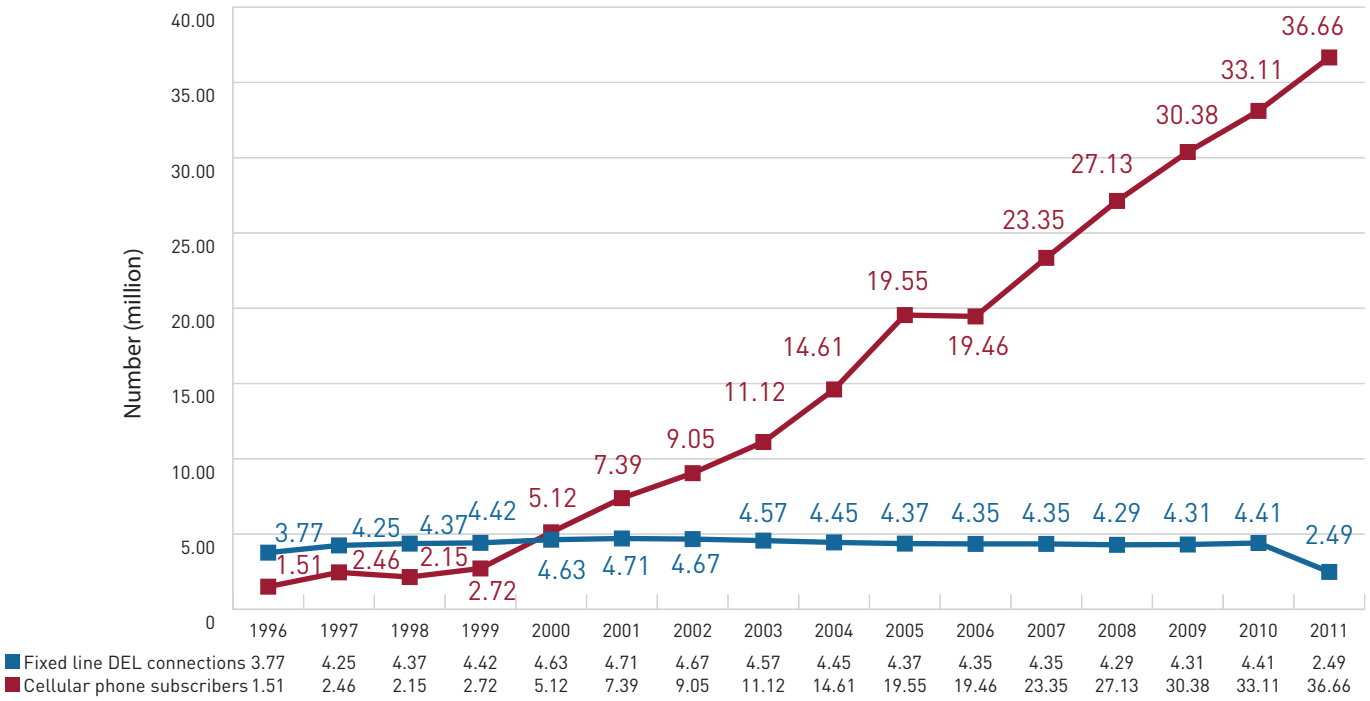

Figure 1: Fixed line and Cellular phone connections, 1996-2011
Source: Department of Statistics Malaysia, 2012 and PIKOM, 2012

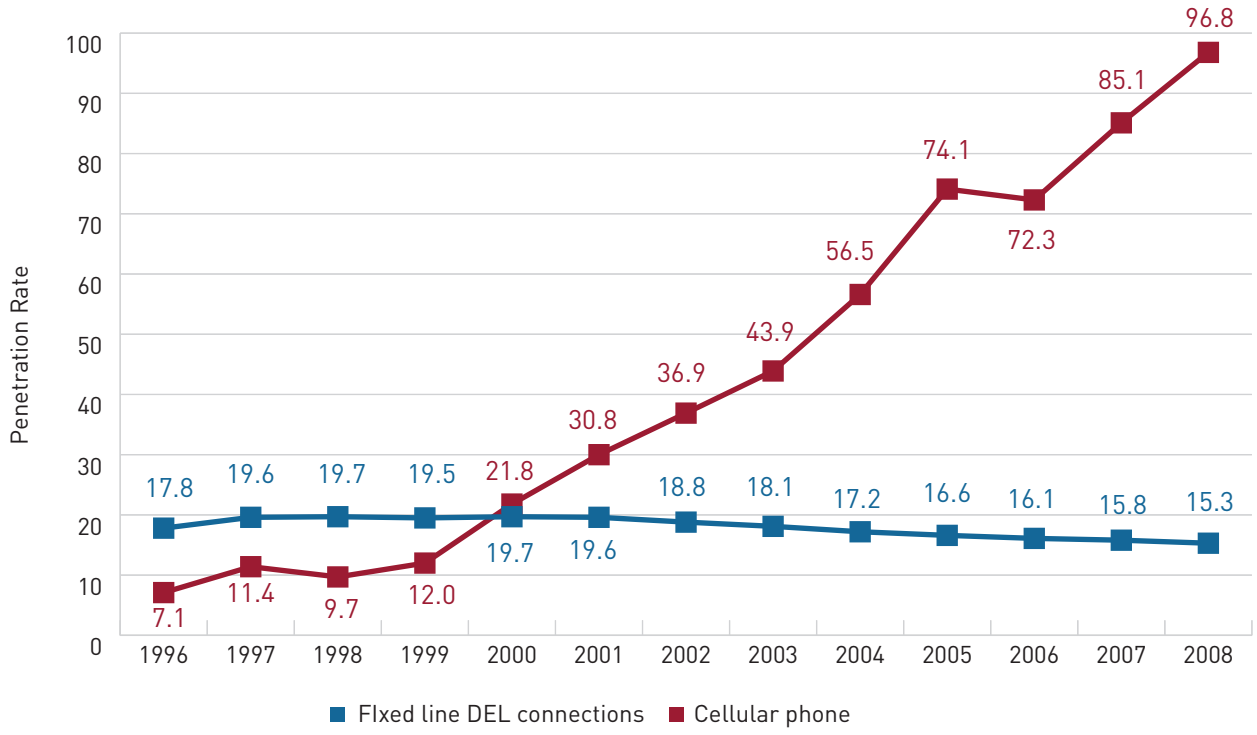

Figure 2: Penetration Rates of Fixed lines and Cellular
Source: MCMC, 2009 and earlier series, PIKOM

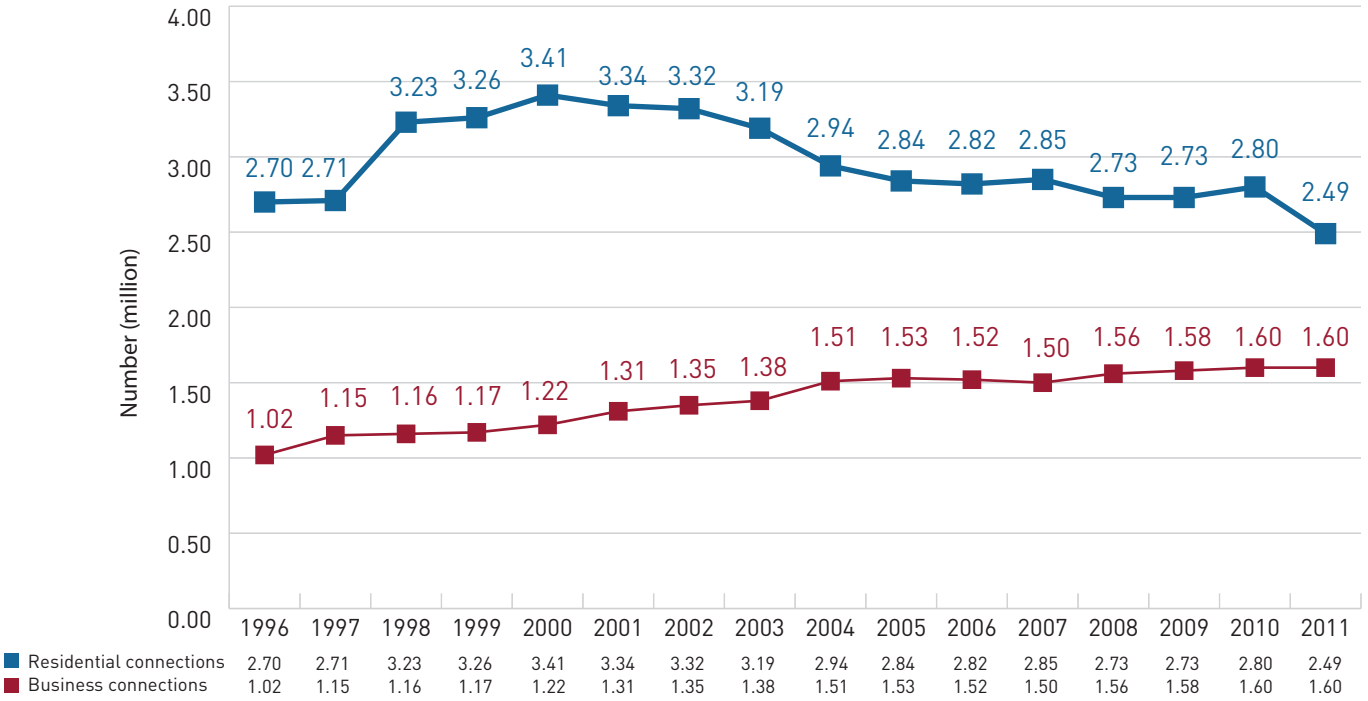

Figure 3: Fixed line connections by business and residential, 1996-2011
Source: Department of Statistics Malaysia, 2012 and PIKOM, 2012

cellular services. Today the country is experiencing a mobile phone penetration rate of about 137 mobiles phones per 100 people. AC Nielson has indicated that of this total, Malaysian smartphone penetration was at 27% in 2012 and projected to touch 60% in two years.

Businesses Increasingly Going Mobile

Despite the trend towards going mobile, in the preceding years the demand for fixed lines in the business sector has been registering continuous growth, indicating its relevance, usefulness and practicality over mobile devices. As shown in Figure 3, the number of fixed line residential subscriptions began to decline after the year 2000, where it had peaked at 3.41 million connections, and by 2011 it had drastically declined to 2.49 million at a CAGR of -2.8%. In comparison, the fixed line connections in the business sector registered an upward growth from 1.22 million connections in 2000 to 1.53 million in 2005 and thereafter it begun to fluctuate. Interestingly, the latest published statistics revealed that the number of fixed lines in the business sector has declined from 1.602 million connections in 2010 to 1.600 million connections in 2011 and poised to register further declines in the years ahead. Indeed, this trend is providing all the indications that, like in the household sector, businesses are also increasingly embracing mobile connections for their operations.

Generation Y Increasingly Going Mobile

The current Generation Y workforce is technologically savvy and their aspirations, motivations and expectations in the job market are different from the preceding baby boomer generation, known to us as Generation X. Sometimes, potential employers have a negative perception about Generation Y, who are psychologically considered coddled by their parents who proactively remove all obstacles and potentially negative experiences and, in addition, reward them with gifts and prizes for every little achievement or participation. However, in reality, the technological skills that the Generation Y has acquired since young have allowed this generation to multitask and find shortcuts in achieving tasks. Texting, instant messaging, social networking, and Web surfing have all made Generation Y workers more competent, efficient, and productive (if not, sometimes, overwhelmed). This generation also has no interest whatsoever in working in a cubicle because they feel advances in technology should let them choose to work from home, Starbucks, or anywhere there is a Wi-Fi connection. Additionally, the 'bring your own device' (BYOD) type of

work culture is gaining ground. For BYOD, the implementing organization needs to ensure that data security and user authentication is in place. More importantly, employees are connected to their offices at all times, especially with broadband connectivity that comes with adequate speed, quality and capacity critical for large file downloading and sharing, visual networking and tele-presence. Moreover, Generation Y workers have different perceptions on work ethics. They aspire for a flexible work environment so that they can shuffle their time between work, play and entertainment, as opposed to a rigid, disciplined environment promulgated by Generation X. Therefore, employers also need to be sensitive to technological demands of Generation Y, surmised as the mobile generation.

Prepaid Supports Mobile Payment Convenience

With the progression of time, the mode of payment for mobile phone services was also made easier with pre-paid subscriptions being much more popular than post-paid, as show in Figure 4. As defined by Wikipedia, a prepaid mobile phone service entails various models such as pay-as-you-go or pay-as-you-talk or pay-as-you-use. In this mode, credit is purchased in advance of service use. The purchased credit is used to pay for mobile phone services at the point the service is accessed or consumed. If there is no available credit then access to the requested service is denied by the mobile phone network. The alternative billing method is post-paid, where a user enters into a long-term or short term contract that defines the billing arrangement with a mobile network operator or carriage service provider (CSP). The pre-paid mode got hugely popular because the balance can be queried at any time and also topped up periodically. Users are able to top up their credit at any time using a variety of payment mechanisms such as through a credit or debit card, direct from bank account using ATM, purchasing a "top-up" or "refill" card at retail outlets, swipe card at a retail store or from other mobile phones on certain networks. The advantages of using a pre-paid includes the fact that cost can be controlled vide adopting low usage patterns or for emergency use only and that it often has fewer contractual obligations such as no early termination fee, freedom to change providers and/or plans and that it is possible to be used by those unable to take out a contract (i.e.

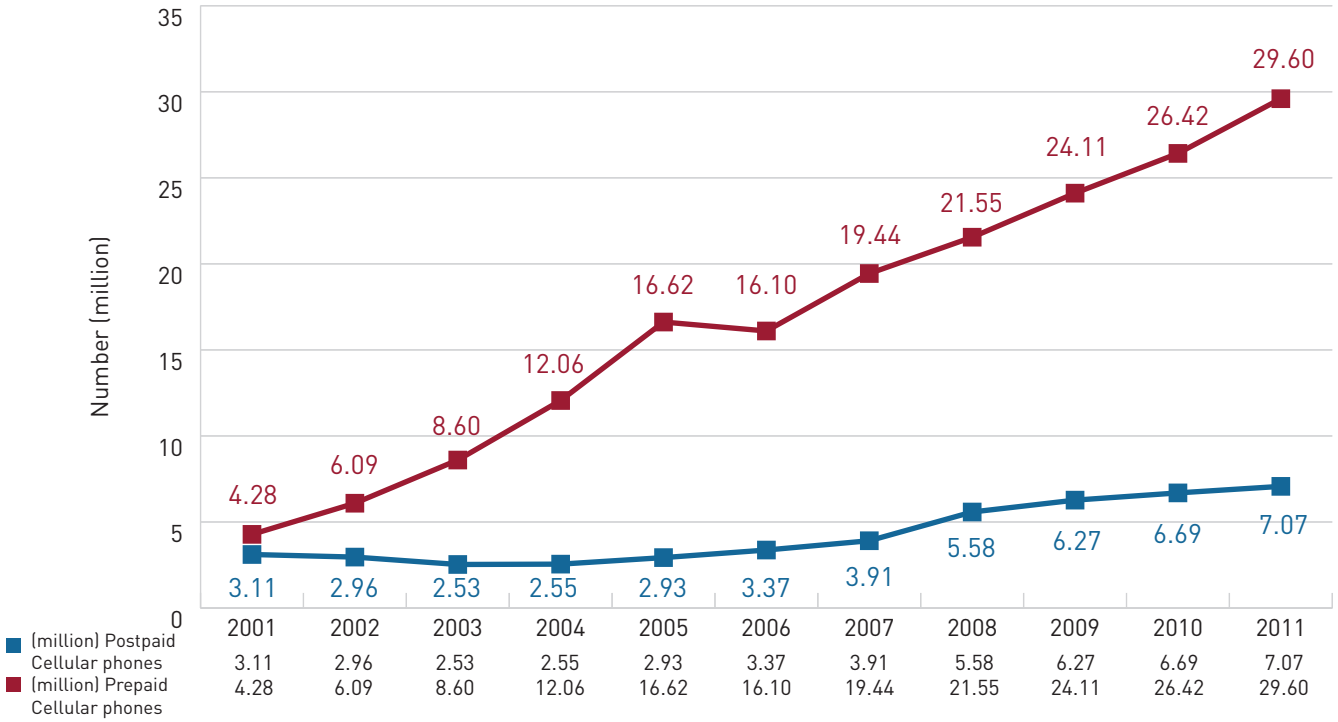

Figure 4: Post-paid and pre-paid cellular subscriptions, 2001-2011
Source: Department of Statistics Malaysia, 2012 and PIKOM, 2012

being underaged). Depending on the local laws, the prepaid mode may be available to those who do not have a permanent address, phone number, or credit card. This makes them popular amongst students or foreign workers away from their home towns as well as travelers.

However, the disadvantage is that pay-as-you-go customers pay more for their calls and SMS messages. In some cases they are limited in what they can do with their phone, especially calls to international or premium rate numbers, which may be blocked. Pre-paid customers may not be able to leverage upon roaming services unless they make prior arrangements with service providers, and even then, it comes with an exorbitant cost. Despite these limitations, as shown in Figure 4, the pre-paid mode is proliferating at an exponential rate, simply because customers are increasingly looking for convenience in making payments as opposed to the post-paid mode where there is compulsion to pay up the bill on a scheduled basis before the service is terminated. However, from the service provider's perspective, they will not know when a pre-paid customer leaves their network. In such cases, the service provider terminates the number upon realizing its dormant status over a fixed time period

From Dial-up to Broadband Connections

As acknowledged, the Internet started off with dial-up connections, which relied on the telephone network. Where traditional telephone access is widely available, dial-up remains useful. It used to be the only choice available for rural or remote areas, where broadband installations were not prevalent due to low population density and high infrastructure cost. Dial-up access may also be an alternative for users on limited budgets. The dial-up system also requires time to establish a connection, which typically may take up to several seconds depending on the location and to perform configuration for protocol synchronization before data transfers can take place. Cost of dial-up services can be higher if telephone connection charges and time-metered calls are added on. The other practical problem with dial-up access is the transient connection where either the user or ISP or phone company terminates the connection due to a number of reasons including an idle connection and limitations on the sharing of resources between the ISP and phone company. Thus, disconnections require reconnections, which in turn increases the cost and becomes an inconvenience for customers caused by the associated delays.

With progression of time, it is increasingly clear that broadband Internet access has been replacing dial-up access in many parts of the world, including Malaysia. At the initial stages of implementation, the Internet uptake among the Malaysian population grew only incrementally from 3.6 dial-up users per 100 inhabitants in 1996 to 15.6 dial-up users per 100 in 2008. The low uptake initially was attributed to a number of factors. First, the population simply lacked awareness and more so, the motivation to adopt a new technology. Second, the dial-up age lacked adequate application content, particularly indigenous contents to cater for the masses. Third, the wider public perception at that time was that PCs and the Internet gadgets were meant for young educated professionals only. Fourth, in ordinary households or small-medium businesses, usage of PCs and the Internet was considered to be costly. As reported in the Tenth Malaysia Plan, 40% of households are in the middle income group, earning between RM2,000 to RM4,000. For this group of people, the competing needs of food, housing, utilities, furnishings, health, transport and education became more important than spending on communication and recreational items. The Household Expenditure Survey (HES) 2009/10, as published by the Department of Statistics, revealed that a typical Malaysian household allocates, at most, 10.2% of its total expenditure, that is, between RM124 and RM101 for communication and recreation activities. Indeed, the current figures were lower than those quoted for the year 2005: 12.3% of total expenditure used for communication (RM246) and recreational (RM492) activities.

The amount stated in the 2009/2010 HES is considered far from adequate for purchasing computers and Internet services given that the same amount is also used for acquiring other leisure and entertainment services such as radio, television, cinema-going etc. The figure also indicates that the priority is shifting away from communication and recreation activities. Generally, it is conjectured that people tend to spend more on leisure and entertainment rather than on computers and the Internet, unless there is a compelling motivation to do so like educating children with ICT literacy, paying bills over the Internet or communicating with children studying abroad.
The data shown in Figure 5 reveals that the traditional dial-up subscriptions increased from

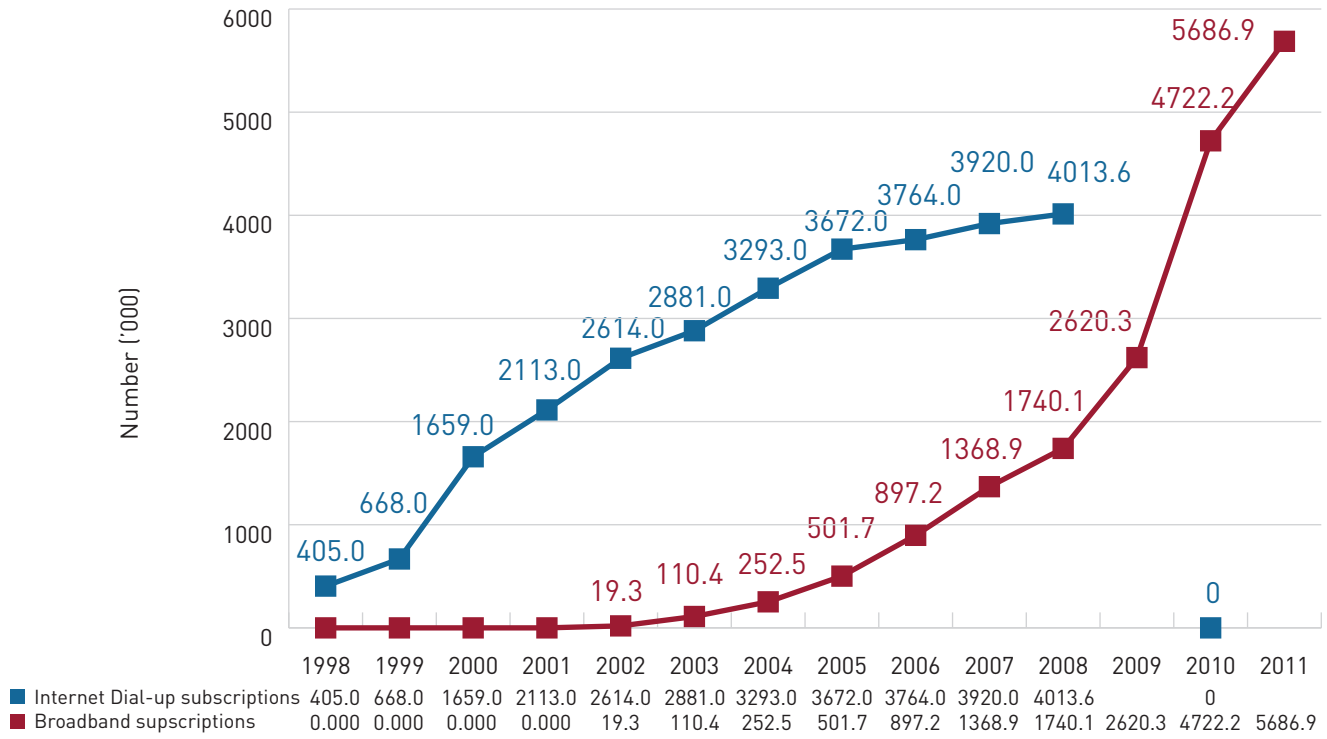

Figure 5: Internet Dial-up and broadband connections, 1998-2011
Source: Department of Statistics Malaysia, 2012 and PIKOM, 2012

0.4 million in 1998 to 4.0 million in 2008, registering a CAGR of 26%. But after 2008, the dial-up connection's market share has almost stagnated. On the other hand, the provision of broadband services only commenced in 2002 but grew at a CAGR of 33% per year since 2007 when the number of connections grew from 1.367 million to 5.687 million in 2011. The trends indicated that broadband is poised to grow even faster than dial-up in the near future. The Malaysian society realized the potential of broadband for improving the quality of life. Similarly, businesses, including SMEs, are cognizant of the role of broadband, in particular in e-commerce, in enhancing their competitive edge and comparative advantage. The expectations of users include downloading large documents and multimedia content in a short span of time. Businesses, government and citizens want to engage in e-commerce or online transacions with greater ease. Households increasingly demand Internet protocol TV (IPTV) with high definition and quality without any interruption in the service delivery for entertainment. Academicians and the research community at large aspire to high bandwidth and computing power for performing research, development and innovative activities. The creative content, multimedia and computer game sectors specifically have a high bandwidth requirement in order to develop and deliver their products and services.

Moving towards Mobile Internet – Anytime to Anywhere mode

Broadband Internet has a number of distinct advantages over dial-up. Specifically, broadband connections are "always on", thus avoiding the need to connect and disconnect at the start and end of each session. Unlike dial-up, broadband does not require exclusive use of a phone line and so one can access the Internet and, at the same time, make and receive phone calls without requiring a second phone line. In the recent past, many geographical areas used to be without high speed Internet connectivity despite the eagerness of potential customers.

This can be attributed to numerous factors such as low population density, remote location, or sometimes ISPs' lack of interest due to low profitability and the high cost to build the required infrastructure. Due to technological advancements, the market has shifted towards broadband starting with the digital subscriber line (DSL, originally digital subscriber loop) technology. In marketing terms, the DSL

Types of broadband Services	Average Capacity (GB)	Average Monthly Subscription Cost (RM)	Average Download speed (Mbps)
Fixed Broadband (FB)	5.0–120.0	49-249	0.4-20.0
Mobile Broadband (MB)	0.5-16.0	30-248	0.4-7.2
Mobile Internet (MI)	0.1-20.0	18-198	0.4-7.2

Table 1: Types of Broadband Service by Capacity, Cost and Speed
Source: ICT Strategic Review 2012/13, PIKOM

referred as asymmetric digital subscriber line (ADSL) provided Internet access by transmitting digital data over the wires of a local telephone network. DSL service is delivered simultaneously with wired telephone service on the same telephone line. This is possible because DSL uses higher frequency bands for data. At the customer's premise, a DSL filter enables simultaneous use of voice and DSL services.

Provision of wireless Internet services gained traction with the advent of Local Multipoint Distribution Service (LMDS) for transmitting voice, video, and data signals for short distances using microwave signals and Multichannel Multipoint Distribution Service (MMDS) that uses radio band technologies, which is suitable for industrial, scientific and medical needs. Like ADSL wired networks or cable modems, contemporary wireless networks are able to feature equivalent data rates and also able to support a symmetrical rate for downstream and upstream directions, which is most commonly associated with fixed wireless networks or stationary terrestrial wireless connection. As such today, some wireless Internet service providers (WISPs) can support download speeds of over 100 Mbit/s and have broadband wireless access (BWA) services capacity covering a range of 50 km from a single tower.

Provision of wireless Internet access for residential areas also has been made easy, where fixed wireless broadband services typically provide the necessary equipment to the customers and install a small antenna or dish somewhere on the roof. This equipment is usually deployed as a service and maintained by the company providing that service. Such fixed wireless services are increasingly making inroads into many rural areas where cable, DSL or other typical home Internet services are not available.

Many companies also have started using Business Wireless Internet alternatives especially in areas where there is difficulty in getting affordable Internet connections from terrestrial providers. Indeed, in coping up with the demand for wireless broadband, traditional broadcasters come under pressure to give up at least some spectrum that typically comes under their purview. With increasing market liberalization and versatility, the mobile phone service providers allow a more mobile version of Internet broadband access that allows consumers, who need to purchase a PC card, laptop card, or USB equipment, to connect their PC or laptop to the Internet via cell phone towers. At the moment, these connections can cost more for portable convenience as well as having speed limitations in certain locations.

Originally the word "broadband" had a technical meaning, but became a marketing term for any kind of relatively high-speed computer network or Internet access technology. According to the international standards, broadband means "having instantaneous bandwidths greater than 1 MHz and supporting data rates greater than 1.5 Mbit/s. Table 1 shows the provision of various types of broadband in Malaysia. As indicated in the table, provision of broadband is well above the set international standard.

The market is incrementally moving towards mobile Internet access, supported by numerous factors and features, some of which are dicussed below.

Mobile professionals and corporate executives are the classic users of mobile broadband services. The service allows users to make every moment count by providing internet access just about everywhere. But the realm is no longer the exclusive purview of high powered business types. It is now just as common for students and parents who are managing busy schedules to take advantage of the efficiencies of mobile internet service.

The emphasis has also shifted in the types of devices used. Laptop computers have always been major endpoints for the mobile broadband

experience but more and more smartphones are supplementing them or, for many users, replacing them altogether.

What constitutes mobile broadband also has evolved; any mobile internet connection is not regarded as mobile broadband if it does not meet the criteria for being 3G (3rd Generation). In other words, GPRS and EDGE networks of the recent past and which still exist do not qualify without major upgrades.

Initially, mobile internet had limitations for large data exchanges such as streaming audio or video, P2P file sharing, multimedia uploads and downloads, VoIP and automated feeds. However, with increasing number of Wi-Fi hotspots, larger and faster data transmissions are made possible. Convenience is increased with a large number of smartphones supporting Wi-Fi connections.

Almost all mobile broadband internet providers charge about the same monthly rate, so coverage is usually the deciding factor on which service is best to suit a consumer's needs. Many also require that the consumer has a voice plan with them as well, so that may also determine which service one selects.

Customers are increasingly concerned over the quality of service received in terms of capacity, speed and coverage. Customers are also concerned over fees such as activation fees, the cost of network cards, and Early Termination Fees in the event that a contract needs to be cancelled. Network speed for download and upload data transfer rates are other factors that the customer typically is concerned about.

Network coverage for mobile wireless broadband is made available easily where heavy populations are concentrated. Good coverage is also made available along major thoroughfares like interstate highways. However, due to cost constraints, mobile wireless broadband services in rural or remote areas are quite limited.

Market and Businesses RealignTowards Mobile Devices

Traditionally, PCs are connected to the Internet. The Internet or broadband mediated PCs are widely used at workplaces, besides being used at a personal level. Nonetheless, with the advancement of technologies in terms of speed, size, convergence, ubiquity, pervasiveness, user-friendliness etc., the boundaries between PC and cellular phone have blurred. As highlighted earlier, cellular phones today are connected to the Internet and their usage is not only confined to personal level communications but also for work related purposes, especially smartphones that have higher capacities in terms of storage and speed.

The release of several high-profile -- but low-cost -- tablets and the expansion of their capabilities has only accelerated the adoption of tablets at the expense of the traditional laptop and PC. The startling fact is that tablets and smartphones are projected to replace both desktops and laptops, as shown in Table 2. It can be seen in Table 2 that the share of the PC market had dropped from 16.1% in 2011 to 12.4% in 2012 and is projected to shrink to just 6.3% in 2017. Within this quintessential period, the PC market is poised to record an overall shrinkage rate of 5% by 2017. Similarly, the portable market's share had dropped from 21.5% in 2011 to 16.8% in 2012 and projected to decline further to 10.7% by 2017. However, laptops are expected to project positive growth of 19.3% over the period 2012-2017, indicating that laptops will still be in use in the near future. Significant rises in the

Devices (millions)	Shipments Units			Market share (%)			2012-2017 Growth Rate (%)
	2011	2012	2017	2011	2012	2017	
Desktop	145	148	141	16.1	12.4	6.3	-5.0
Portable PC	194	202	241	21.5	16.8	10.7	19.3
Tablet	72	128	352	8.0	10.7	15.7	174.5
Smartphone	491	722	1516	54.4	60.1	67.4	109.9
Total	**902**	**1201**	**2250**	**100.0**	**100.0**	**100.0**	**87.3**

Table 2: Market Distribution of Devices, 2011, 2012 and 2017.
Source : IDC's estimates for connected device sales extracted from websites

market share are demonstrated for the tablet and smartphone markets, which jointly constituted a market share of 62.4% in 2011 and 70.8% in 2012. Specifically, tablet's market share is projected to reach 15.7% in 2017 from its current level of 10.7% in 2012. In the same vein, the smartphone market share is projected to grow from 60.1% in 2012 to 67.4% in 2017. Overall, the device markets are projected to grow by 87.3% over the next five years.

After Apple launched the iPad in 2010, it did not take critics long to start asking if this new breed of one-panel touch tablets would kill the PC market as people opted for slates over clamshells. Now, after more than three years, the answer to that question is finally taking shape. Worldwide tablet shipments are expected to overtake desktop PCs in 2013 and laptops will suffer the same fate one year later, according to market research firm IDC. That would seem to be a pretty definitive case that PCs are about to be replaced by tablets.

While PC growth stagnates, tablet shipments will nearly triple between 2012 and 2017, going from 128.3 million to 352.3 million devices worldwide. By 2017, IDC predicts that tablet and PC shipments should be almost equally ubiquitous across the globe. It can be seen that business dynamics in the device markets are so fluid, as shown in Figure 6.; within a year Apple lost its market share significantly at the expense of Samsung and Amazon.com Inc.

IDC thought leadership posted "What happens after 2017? Will PCs continue on the same trajectory, maintaining the same market size, while becoming a smaller and smaller part of a larger connected device universe? Chances are good that the demand for PCs will begin shrinking in a more significant way, but it's also not clear what will happen to tablets beyond the next four years.

Beyond that, will the tablets of 2018 have the same basic capabilities as modern-day Android and iOS slates, or will they be more PC-like? Will 10-inch tablets merge with Ultrabooks, as some industry watchers predict? Or perhaps, as a recent Amazon patent suggests, cloud computing will turn the devices on your desk and in your pocket to nothing more than a dumb display that relies on remote servers for both processing and battery power. It's impossible to know what to expect on the distant horizon, but in the near future, the world will continue breathing life into PCs even while tablet sales surge. Are we living in a post-PC era?"

Web Based to Mobile Content

Traditionally, a Content Management System (CMS) is a computer program that allows publishing, editing and modifying content as well as maintaining it from a central interface. With the advent of the Internet, the core function and use of content

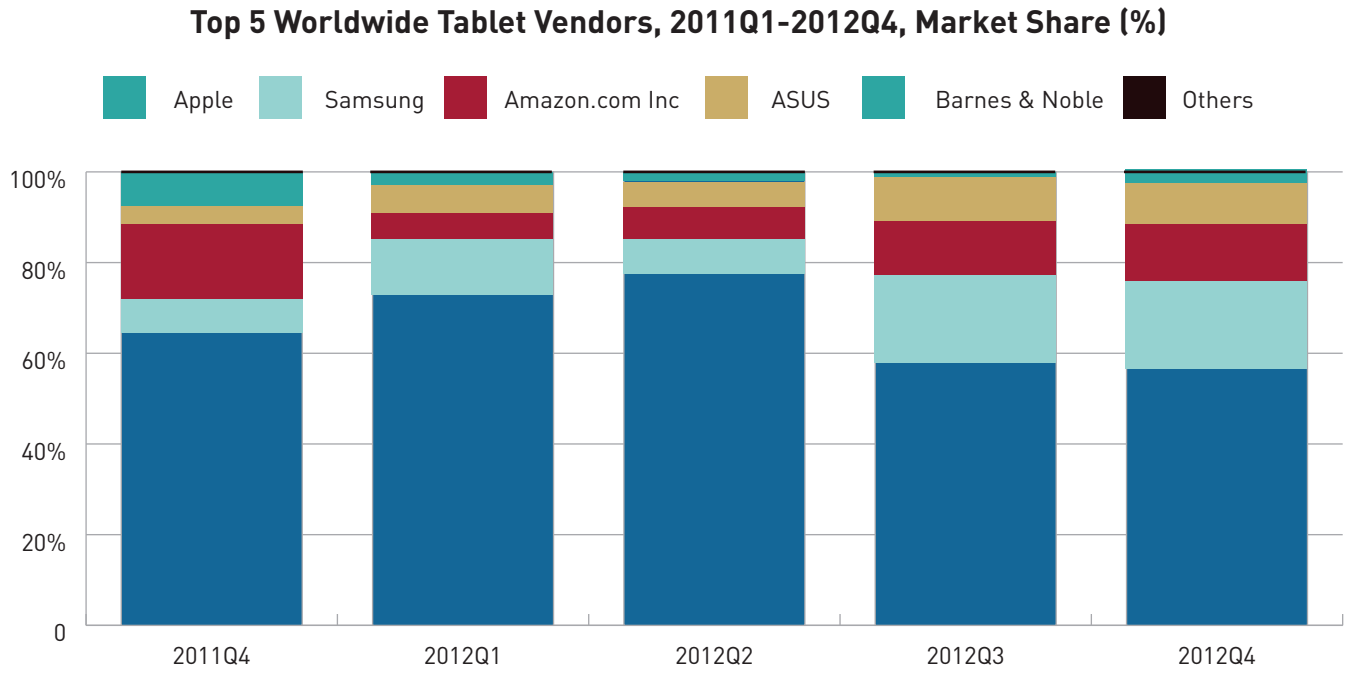

Figure 6: Market Dynamics of Tablets Vendors
Source: http://www.ecommercemilo.com/2013/06/the-state-of-mcommerce-malaysia-part1.html#.Uk0-v9IbCyg

management systems have evolved into web content management systems (web CMS) providing a bundled or a stand-alone application to create, manage, store and deploy content on web pages. The web presents content or static information in the form of text, embedded graphics, blogs, news, photos, video, audio and application codes. Over the years, web CMS have evolved to serve as a central repository supported with features such as storing, controlling, revising, semantically enriching and publishing contents such as movies, pictures, phone numbers, scientific data etc..

In practice, web CMS features vary widely from system to system and can be a simple one supporting basic features or a complex one supporting an enterprise web system that typically comes with advanced features and powerful functions as well as processes and procedures in managing workflows in a collaborative environment. Most web CMS have features such as web-based publishing, format management, revision and version controls, indexing, search, and retrieval. Web CMS allow user control over HTML-based content, files, documents, and even web hosting plans based on the system depth and the niche it serves.

From being web-based, CMS is increasingly taking the shape and shade of managing mobile content, which started off with Short Messaging Service System (SMS). It is still widely regarded as the main technology for communication, particularly used for sending mobile consumers messages, especially simple content such as ringtones and wallpapers. SMS is also ubiquitous, reaching a wider audience than any other technology available in the mobile space such as Multimedia Messaging Service (MMS), Bluetooth, mobile e-mail or Wireless Application Protocol (WAP) in its latest version. It is very popular among young people as it is extremely easy to use, which makes it adoption increase day by day. Though MMS and WAP are fast gaining popularity, SMS is still evolving with new applications being developed regularly. One such example is the introduction of applications where mobile tickets are sent to consumers via SMS, which contains a WAP-push that contains a link with a barcode.

Mobile applications, also known as mobile apps, have become a significant mobile content market since the release of the first iPhone from Apple in 2007. Prior to the release of Apple's phone product, the market for mobile applications (outside of games) had been quite limited. The bundling of the iPhone with an app store, as well as iPhone's unique design and user interface, helped bring a large surge in mobile application use. Google's Android platform for mobile content has further increased the amount of app content available to mobile phone subscribers. Some examples of mobile apps would be applications to manage travel schedules, buy movie tickets, preview video content, manage RSS news feeds, read digital version of popular newspapers, identify music, look at star constellations, view Wikipedia and much more.

The ability to send users notifications is the main advantage of mobile app. Therefore, it is not surprising that bigger online retailers are using mobile app to engage with their loyal customers. Conversion rates could be higher too on mobile app as compared to those coming from web.

Mobile music is becoming an integral part of the music industry as a whole. The International Federation of Phonographic Industries (IFPI) has projected mobile music to generate more revenue that online music in the years ahead. Currently sale of ringtones dominate the mobile music market. Mobile music comes in several different formats with the two most popular being Advanced Audio Coding (AAC) and MP3.

The earliest form of mobile music was monophonic ringtones that play one tone at a time followed by polyphonic ringtones which, on contrary, play several tones at the same time creating a more convincing melody. From ringtones the mobile music market explored playing clips of actual songs, which are preferred by record labels as it allowed them to gain a cut of the lucrative ringtone market revenue. Some companies promote cover-tones, which are ringtones that are recorded by cover bands to sound like a famous song. Recently ring-back tones have become available, which are played to the person calling the owner of the ring-back tone. Voice-tones are ringtones that play someone talking or shouting rather than music, and there are various types of ringtones of natural and everyday sounds.

As would be expected, monophonic and polyphonic ringtones are falling in popularity while ring-back tones are growing. A recent innovation is the sing-tone, whereby the user's voice is recorded singing to a popular music track and then "tuned-up" automatically to sound good. In addition to ringtones,

there are full track downloads, which are entire songs encoded to play on a mobile phone.

Mobile broadcast TV operates like a traditional television station and broadcasts its content over a different spectrum. This frees up the mobile network to handle calls and other data usage, and because of the "one-to-many" nature of mobile broadcast TV, the video quality is a lot better than that streamed over the mobile networks, which is a "one-to-one" system. The problem is that broadcast technologies don't have a natural up link, so for users to interact with the TV stream, the service has to be closely integrated to the carrier's mobile network. The main technologies for broadcast TV are DVB-H, Digital Multimedia Broadcasting (DMB) and Media FLO.

Since the late 1990s, mobile content has become an increasingly important market worldwide (Gartner statistics??). The South Koreans are considered the leaders followed closely by the Europeans. Based on current trends, mobile phone content will play an increasing role in the lives of millions across the globe in the years ahead, as users will depend on their mobile phones to keep in touch not only with their friends but with world news, sports scores, the latest movies and music, and more. Mobile phone software like Qik allows user to share their videos to their friends through emails, SMS and even social networking sites like Twitter and Facebook.

For remaining relevant and competitive in the market space, it is important to keep up with consumer confidence in using mobile content applications and services. This means, if a consumer has ordered a new wallpaper or ringtone, this has to work properly, in a speedy and reliable way.

E-Commerce to Mobile Commerce

Electronic commerce, commonly known as e-commerce, entails buying and selling of products or services over electronic systems such as the Internet and other computer networks. Traditionally electronic commerce leveraged upon components such as electronic funds transfer, supply chain management, electronic data interchange (EDI), inventory management systems, and automated data collection systems.

With the advent of the Internet, modern electronic commerce typically uses the World Wide Web at least at one point in the transaction's life-cycle, although it may encompass a wider range of technologies such as e-mail, mobile devices, social media, and the telephones as well. A typical electronic commerce process consists of the exchange of data to facilitate the financing and payment aspects of the business transaction. Variations in e-commerce included e-tailing or "virtual storefronts" on websites with online catalogues, sometimes gathered into a "virtual mall"; gathering and use of demographic data through Web contacts and social media; Electronic Data Interchange (EDI), the business-to-business exchange of data; e-mail and fax and their use as a media for reaching prospective and established customers (for example, with newsletters); business-to-business buying and selling and security of business transactions.

With advancements made in mobile technology, especially with the introduction of tablets and proliferation of cellular phones, many businesses are beginning to use mobile commerce as a more efficient way to communicate with their customers. The mobile commerce market has been growing since 1997 when the first two mobile-phone enabled Coca Cola vending machines were installed in the Helsinki area in Finland. The machines accepted payment via SMS text messages. The first mobile phone-based banking service was launched in 1997 by Merita Bank of Finland, also using SMS. The phrase mobile commerce was originally coined in 1997 to mean "the delivery of electronic commerce capabilities directly into the consumer's hand, anywhere, via wireless technology."(http://cryptome.org/jya/glomob.htm). According to BI Intelligence, in January 2013 29% of mobile users have now made a purchase with their phones in the United States. Bank of America has predicted USD67.1 billion in purchases will be made from mobile devices by European and U.S. shoppers in 2015.

In the early days of mobile commerce, in order to exploit its potential, mobile phone manufacturers such as Nokia, Ericsson, Motorola, and Qualcomm worked with carriers such as AT&T Wireless and Sprint to WAP-enable smartphones. Since the launch of the iPhone, mobile commerce has moved away from SMS systems and into actual applications. In addition, improvements in the capabilities of modern mobile devices make it prudent to place more of the resource burden on the mobile device.

More recently, brick and mortar business owners, and big-box

retailers in particular, have made an effort to take advantage of mobile commerce by utilizing a number of mobile capabilities such as location based services, barcode scanning, and push notifications to improve the customer experience of shopping in physical stores. By creating what is referred to as a 'bricks & clicks' environment, physical retailers can allow customers to access the common benefits of shopping online (such as product reviews, information, and coupons) while shopping in a physical store. This is seen as a bridge between the gap created by e-commerce and in-store shopping, and is being utilized by physical retailers as a way to compete with the lower prices typically offered by online retailers. A survey done in 2012 itself found that 41% of smartphone customers had purchased retail products with their mobile devices.

The shades of m-commerce practices include

- Mobile Money Transfer where money transfer is mainly done through the use of mobile phones;
- Mobile ATM has been specially engineered to connect to mobile money platforms and provide ATM-like facilities. With the introduction of mobile money services for the unbanked, mobile ATM offers an efficient way to roll out and manage distribution networks that can support cash-in and cash-out.
- Mobile banking allow their customers to access account information and make transactions, such as purchasing stocks, remitting money, etc.;
- Mobile brokerage offers stock market services via mobile devices and allows the subscriber to react to market developments in a timely fashion and irrespective of their physical location;
- Mobile commerce based on location-based services make use of the information on the location of the mobile phone user and allows for targeted offerings such as local discount offers, local weather and tracking and monitoring of people;
- Mobile ticketing allows tickets to be sent to mobile phones using a variety of technologies. Users are then able to use their tickets immediately, by presenting their mobile phone at the ticket counter. Mobile ticketing technology can also be used for the distribution of mobile vouchers, coupons, and loyalty cards. These items are represented by a virtual token that is sent to the mobile phone. A customer presenting a mobile phone with one of these tokens at the point of sale receives the same benefits as if they had the traditional token. Stores may send coupons to customers using location-based services based on the customer's proximity;
- Bulk of the content purchase and delivery consists of ring-tones, wallpapers, and games for mobile phones. The convergence of mobile phones, portable audio players, and video players into a single device is increasing the purchase and delivery of full-length music tracks and videos. The download speeds available with 4G networks make it possible to buy a movie on a mobile device in a couple of seconds;
- Mobile information services facilitates a wide variety of information services to be delivered to mobile phone users in much the same way as it is delivered to PCs. These services include news, stock quotes, sports scores, financial records and traffic reporting. Customized traffic information, based on a user's actual travel pattern, can be sent to a mobile device. This customized data is more useful than a generic traffic-report broadcast, but was impractical before the invention of modern mobile devices due to the bandwidth requirements;
- Mobile reverse auction solutions are gaining popularity. Unlike traditional auctions, the reverse auction (or low-bid auction) bills the consumer's phone each time they place a bid. Many mobile SMS commerce solutions rely on a one-time purchase or one-time subscription; however, reverse auctions offer a high return for the mobile vendor as they require the consumer to make multiple transactions over a long period of time;
- Mobile browser is a World Wide Web browser on a mobile device, which customers can shop online without having to be at their personal computer;
- Mobile purchase supports catalog merchants in accepting orders from customers electronically, via the customer's mobile device. In some cases, the merchant may even deliver the catalog electronically, rather than mailing a paper catalog to the customer. Some merchants provide mobile websites that are customized for the smaller screen and limited user interface of a mobile device;

- In-application mobile phone payments can be made directly inside of an application running on a popular smartphone operating system, such as Google's Android. Analyst firm Gartner expects in-application purchases to drive 41 percent of app store (also referred to as mobile software distribution platforms) revenue in 2016. In-app purchases can be used to buy virtual goods, news and other mobile content and is ultimately billed by mobile carriers rather than the app stores themselves.

- Mobile marketing and advertising refer to marketing collateral sent to mobile devices. Companies have reported that they see better response from mobile marketing campaigns than from traditional campaigns. The primary reason for this is the instant nature of customer decision-making that mobile apps and websites enable. The consumer can receive a marketing message or discount coupon and, within a few seconds, make a decision to buy and go on to complete the sale - without disrupting their current real-world activity.

- New technologies, such as WiMax, act to accelerate innovation in mobile commerce. Mobile devices are heavily used in South Korea to conduct mobile commerce. Mobile companies in South Korea believe that mobile technology has become synonymous with youth life style, based on their experience with previous generations of South Koreans. Research demonstrates that consumers of mobile and wire-line markets represent two distinct groups who are driven by different values and behaviors, and who exhibit dissimilar psychographic and demographic profiles. As a result, successful mobile commerce requires the development of marketing campaigns targeted to this particular market segment.

From Figure 7, we can see that Malaysians' top 3 activities on smartphones are (in order of usage): SMS - 91%; browse Internet - 71%; and social network - 69%. It is hard to argue that SMS usage will decrease in the future due to the adaption of instant messaging. The study also showed that Malaysians were one of the most active users when it comes to smartphones with an average of 6.4 hours spent in a week on just data usage, which means no voice or telephone calls were made during these times.

Figure 8 shows data on tablet usage in Malaysia. From this chart, we note Malaysians' top 3 activities on tablet are (in order of usage) : Browse Internet, Upgrade current device, and Apps Usage

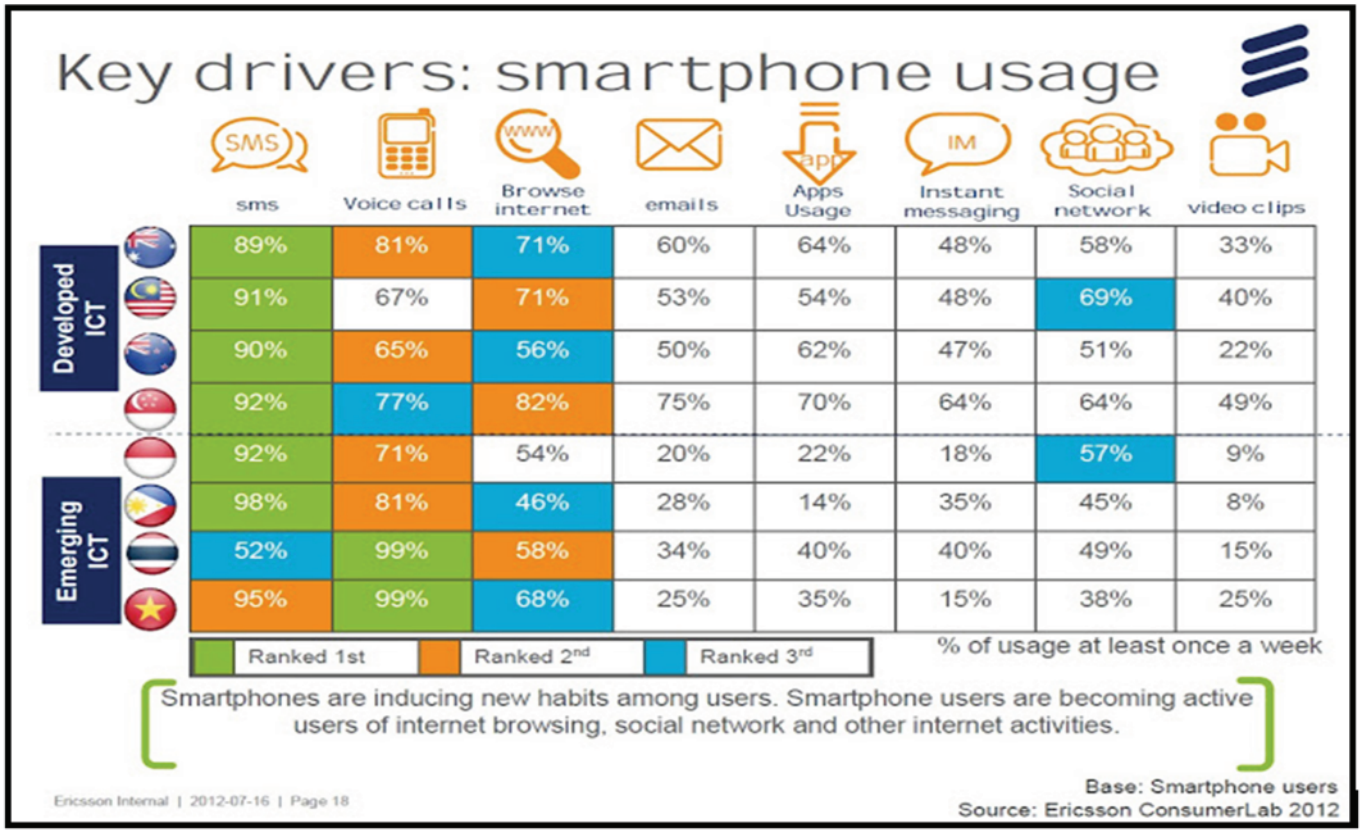

Figure 7 : Key drivers of Smartphone Usage

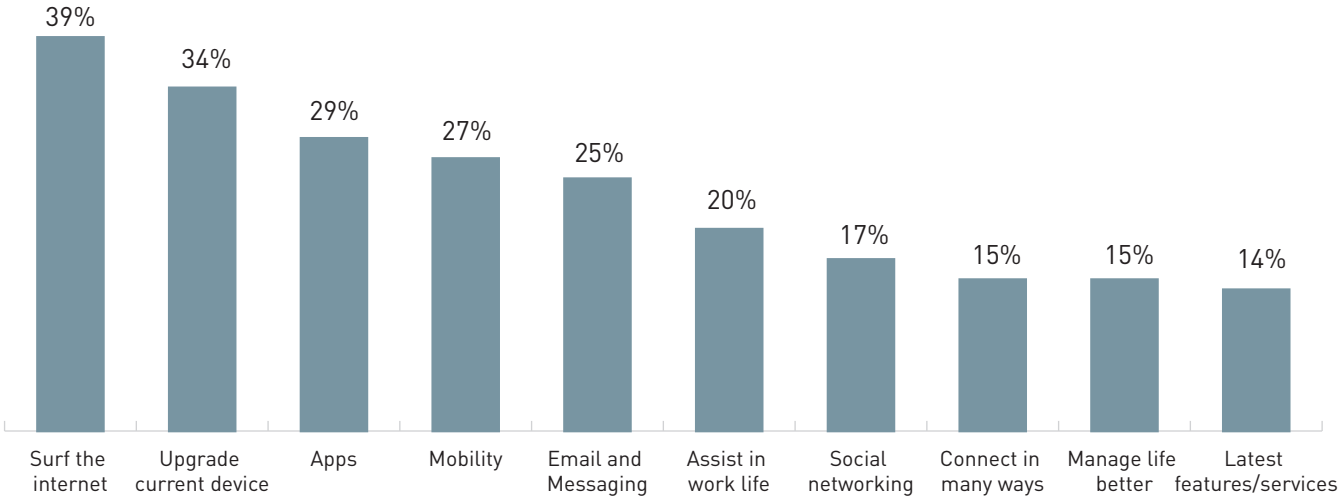

Figure 8: Tablet usage distribution in Malaysia
Source: http://www.ecommercemilo.com/2013/06/the-state-of-mcommerce-malaysia-part2.html#.Uk0_GtIbCyg

Mobile Talents

We are currently not only facing challenges with mobile technologies, which are bringing about unprecedented changes in the business and market landscapes, but also in the realm of mobile talents. One of the issues companies in the ICT sector, particularly in the services segment, is facing is how to retain critical talents. Competent talents, who are in demand, are likely to migrate to another country if there is no motivation to stay on in their current job. There could be many reasons attributed to talent migrations. Typically either pull-factors or push-factors operate when one decides to make such a move.

Among many others, one of the motivating factors considered in job related mobility is remuneration. Such loss of talents or job related migration is quite common in countries where the labour employment is tight, where unemployment rate is typically low. Such countries are also likely to experience low fertility and mortality rates, resulting in short supply of competent work force in adequate number for a fast growing economy. Malaysia is one such country in Asia where the unemployment rate has been low over the past two decades and plagued with issues of short supply of talented workforce and compounded by the fact that it is losing talent to its neighbouring or friendly countries in big numbers.

Table 3 below shows a comparative analysis of the remuneration earned by ICT professionals in selected Asian and English speaking countries. For the purpose of this benchmarking exercise, Malaysia assumes a scaling factor of one. The average remuneration earned by each country is compared against Malaysia, giving rise to a scaling factor that is free from bias caused by foreign exchange fluctuation. The median data published by PayScale for the year 2012 was used. All measurements are tallied in US dollars. The average value for each country is compiled after taking into consideration three variables, namely IT skills, company size and years of working experience. Two types of benchmarking scales were published, specifically one with purchasing power parity (PPP) that takes into account inflation rates and fluctuations in the foreign exchange rates and the other without PPP adjustment. Indeed, technically speaking, ambitious job seekers should use PPP adjusted figures when searching for overseas jobs.

Without any PPP adjustment, the results showed that more advanced Asian economies, in particular Hong Kong and Singapore, recorded average remunerations that were 2.25 to 2.54 times more than the average remuneration earned by Malaysian ICT professionals in 2012. Besides these two countries, China, Thailand and Vietnam offer higher remunerations for ICT professionals, offering 1.87, 1.36 and 1.20 times more than in Malaysia respectively. Comparatively, Indonesia, India and Philippines offer lower remunerations to their ICT professionals.

With PPP adjustment, which takes into account for inflation and foreign exchange rates as well as standard of living, the result showed that Hong Kong still ranked the highest paying nation in Asia for ICT professionals. However, the scaling factor is only 1.90, which is significantly lower than the non-PPP adjusted scaling depicted earlier. Similarly, the scaling

Country	IT Skill/ Speciality	Company Size	Years of Experience	Average Benchmark Scale	IT Skill/ Speciality	Company Size	Years of Experience	Average Benchmark Scale
	Benchmarking Scale: Malaysia=1.00 (Atlias Method)				Benchmarking Scale: Malaysia=1.00 (Purchasing Power Parity (PPP) Adjusted)			
Malaysia	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Singapore	2.25	2.23	2.31	2.26	1.74	1.72	2.06	1.84
Thailand	1.35	1.49	1.22	1.36	1.45	1.59	1.05	1.36
India	0.50	0.42	0.56	0.49	0.71	0.60	0.68	0.66
China	1.66	2.06	1.89	1.87	1.54	1.91	1.44	1.63
Philippines	0.15	0.39	0.47	0.44	0.45	0.40	0.46	0.44
Vietnam	1.10	1.10	1.41	1.20	1.61	1.62	2.39	1.87
Hong Kong	2.54	2.59	2.35	2.53	1.95	2.06	1.69	1.90
Indonesia	0.66	0.73	0.79	0.73	0.57	0.63	0.47	0.56
United Kingdom	2.67	2.41	2.45	2.51	1.38	1.24	1.79	1.47
Canada	3.25	2.96	2.95	3.05	1.57	1.48	2.16	1.72
New Zealand	3.08	2.74	2.75	2.86	1.74	1.55	2.25	1.84
Australia	4.08	3.52	3.59	3.76	1.80	1.60	2.31	1.90
USA	3.43	3.11	3.17	3.24	1.85	1.68	2.70	2.08

Table 3: Benchmarking salaries earned by ICT professionals of selected countries and Malaysia, 2012
Source: (http://www.PayScale.com/research/) and PIKOM

factors for Singapore and China lowered to 1.84 and 1.63 respectively. Surprisingly, Vietnam recorded a higher scaling value of 1.87, indicating a much more attractive nation in Asia for talent migration.

Malaysians are typically known to search for better opportunities beyond the shores of Asia. The distant lands that become attractive destinations for Malaysians are mostly English speaking countries, in particular United States of America, United Kingdom, Canada, Australia and New Zealand. Despite the distance, these countries have long diplomatic and trade ties with Malaysia. Moreover, English is a popular lingua franca among Malaysian businesses especially among the private sector and there has been always a natural attraction for Malaysians to do more businesses with such English speaking countries. These destinations are no exceptions for ICT Professionals as well, especially software developers and networking engineers who are in demand at all times globally.

Table 3 shows that the Australian and USA job markets offer the highest remuneration, 3.76 and 3.24 times more respectively without PPP adjustments than what a typical ICT professional in Malaysia can earn. But, taking into considerations of PPP adjustments, the USA becomes a higher paying destination than Australia, that is, 2.08 and 1.90 times respectively. Without PPP adjustments, Canada with its 3.05 scaling factor also appeared as an attractive destination for ICT jobseekers but the PPP adjusted value reducing to 1.72 suggested otherwise. Similarly, UK's scaling factor reducing from 2.51 without PPP adjustment to 1.47 PPP adjusted does not suggest it to be a very attractive destination as an ICT job market. Indeed, it can be seen that the cost of living and foreign exchange fluctuations have significant impact on the salaries earned and thus, becomes a crucial consideration factor for potential job seekers before making any decision on job related migrations.

If timely efforts are not taken in addressing job related talent migration, it will be harder for the industry and the nation as a whole to become globally competitive and productive. The challenge becomes more accentuated when employers lack strategy to entice employees to be loyal to the firm that they work for. When employers are hesitant to invest in training or equipping its workforce with the right skills and knowledge, job hopping becomes highly prevalent. To overcome this problem, the industry needs to put in place appropriate strategies and measures that can help to enhance staff loyalty. Obviously, competitive remuneration is one of the options for staff retention.

Mobility adoption as Next Point of Inflexion in Science, Technology and Innovation Advancements

It is clear that mobility adoption is becoming the next point of inflexion in the advancements of science, technology and innovation. The First Outline Perspective Plan (1970-1990) and Second Outline Perspective Plan II (1991-2000) together with the associated 5-year development plans have provided the requisite impetus for ICT manufacturing growth via foreign direct investment (FDI). With ICT manufacturing losing its competitive edge and comparative advantages to emerging markets, ICT services have been positioned to spearhead the nation's economic growth from the onset of the new Century, as spelled out in the Third Outline Perspective Plan (2001-2010). Specifically, with the introduction of the Internet, ICT adoption has been one of the mantras and key strategic thrusts not only in transforming businesses and lifestyles, but also the science, technology and innovation space and advancements.

The saga continues with mobility adoption becoming an unavoidable phenomenon in moving up the science, technology and innovation value chain. Indeed, as in the past, this warrants the attention of the policy formulators and mainstream implementers as well as development practitioners at all levels.

As stipulated in the Science, Technology and Innovation (STI) policy, today's competitive and rapidly changing world – impacted by multi-institutional, multi-disciplinary and global endeavours and trends - has to apply an integrated and holistic approach in responding to changing landscape. This is critical to remain relevant and sustain business continuity. Taking cognizance of the rapidly-evolving new age challenges, the Ministry of Science and Technology (MOSTI) is constantly in the process of reviewing and realigning its STI policy to meet the contemporary demands that are critical for economic and societal development. Generically, the policy is aimed at reshaping scientific and social research, development, and commercialization in addressing national priorities, challenges and new opportunities.

This requires nurturing and developing the right talents, more so retaining talents within the country that the job markets need. Otherwise, the country would continue to suffer in achieving its R&D and innovation capabilities if the migration of the tertiary educated workforce continues. The Government fully recognizes the need for stimulating and building the capability and capacity of the private sector including the small and medium sized enterprises in producing products, solutions, services and processes as well as private sector driven R&D, innovation and commercialization especially by locals.

The Government also acknowledges the need to enhance global connectivity, both physically and intellectually for the local scientific and research communities. As cited by the Academy of Science based on the evidence in the Royal Society of United Kingdom report, Malaysian professionals, intellectuals, researchers, academia and industry have been relatively inward looking and lacking global networking in science, technology and innovation activities. Addressing this issue warrants both the physical and intellectual dimensions. Physically, the country requires the provision of quality broadband not only for "today" but also in anticipation of "future" applications. Intellectually, the elements such as mindset, attitudes, values, confidence and self-esteem as well as awareness warrant due attention. Although the Government has gone through a number of iterations in reviewing and aligning its STI policy in the past, it cannot continue to rest on its laurels with the on-going upheavals in the technological dimension, and as rightly highlighted above, current STI policy may require further updates with the mobility factor affecting policy, businesses, lifestyle, research, development, patenting and commercialization as well as indicators production.

Conclusion

The foregoing depictions on disruptions in technology, market and business demand mind set change on the part of user communities, be it businesses or government agencies or citizens. Failing which, businesses may become irrelevant or may lose competitive edge competitive. Basically, the technology adopters need to ask this question "How can I use the technology to help me do the things I currently do better?" Adding new media and new technologies to existing practices will not change the mind-set. It simply is not good enough to spend money on new technologies and then to use it in old ways. New tools will not just help people do cognitive jobs more easily than they used to, but the usage of these tools will also lead to fundamental alterations in the way problems are solved. A lifelong learning perspective requires that we change mind-sets. It has to be invented and designed.

CHAPTER 06

FAST-TRACKING INDUSTRY INNOVATION THROUGH OPEN INNOVATION PLATFORMS: THE MIMOS EXPERIENCE

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Abstract

The adage ***'Big eats the Small'*** is passé. Now it is ***'Fast eats the Slow'!*** So how do you rapidly develop new products and move them into the market in double-quick time? The answer is 'open innovation.' To drive open innovation optimally, we advocate the concept of Open Innovation Platform. This serves as the lynchpin for pulling in and holding together both the research community and industry fraternity so that innovative products could be fast tracked to the market. One crucial barrier for new products is market acceptance. We advocate the process of 'technology industrialization' whereby product field-trials are carried out to address issues such product reliability and track record.

1.0 Introduction

One key factor for national economic growth is the export of technology-based products, solutions and services. The engines behind the creation of these export items are the industries. Are our domestic technology-based industries[1], in general, sufficiently competent to fight toe-to-toe in the global market arena? We believe not!

The malaise afflicting our industries could be categorized into four key areas viz., dearth of talent, and dependence on foreign technologies, weak market entry strategies and poor branding. Take the case of talent. We have more generalists than domain experts and of the latter, the majority resides in multinational companies (MNCs). We are not tapping the best talents abroad and to add fuel to fire, our ecosystem is not conducive to attract them.

It is even more telling in the technology area. We adopt a lot foreign technologies and generally lack in-country showcases of homegrown technologies. This is compounded with the lack of true product companies with the technology edge (novelty) to compete globally.
Going one step further, our products are too domestic-centric and are not fully compliant with global standards. Poor market entry strategies for new technologies and insufficient global distribution channels add to the woes.

And what is there to say about branding? We depend too much on foreign brands and do not have brand loyalty to local products. There is poor brand recognition for domestic products and a decided lack of concerted national brand strategies.

In this paper, we tackle the twin issues of technology and talent. In section 2.0, we give an overview of the Malaysian Innovation Ecosystem and in this context discuss the concept of open innovation platform (OIP) in section 3.0. We outline the 80/20 principle for addressing the talent issue in section 4.0 and go on to cover our experience in implementing the OIP strategy in section 5.0. In section 6.0, we summarize the 'plus points' of the OIP strategy and recommend the way forward.

2.0 Malaysian Innovation Ecosystem

2.1 National Innovation System and National Innovation Model

Innovation does not happen in isolation; it needs a conducive environment. The National Innovation System (NIS) serves this purpose; i.e., enable the continuous generation of world-

Figure 2.1: Generic National Innovation System

1 Our discussion in this paper is limited to ICT-related industries.

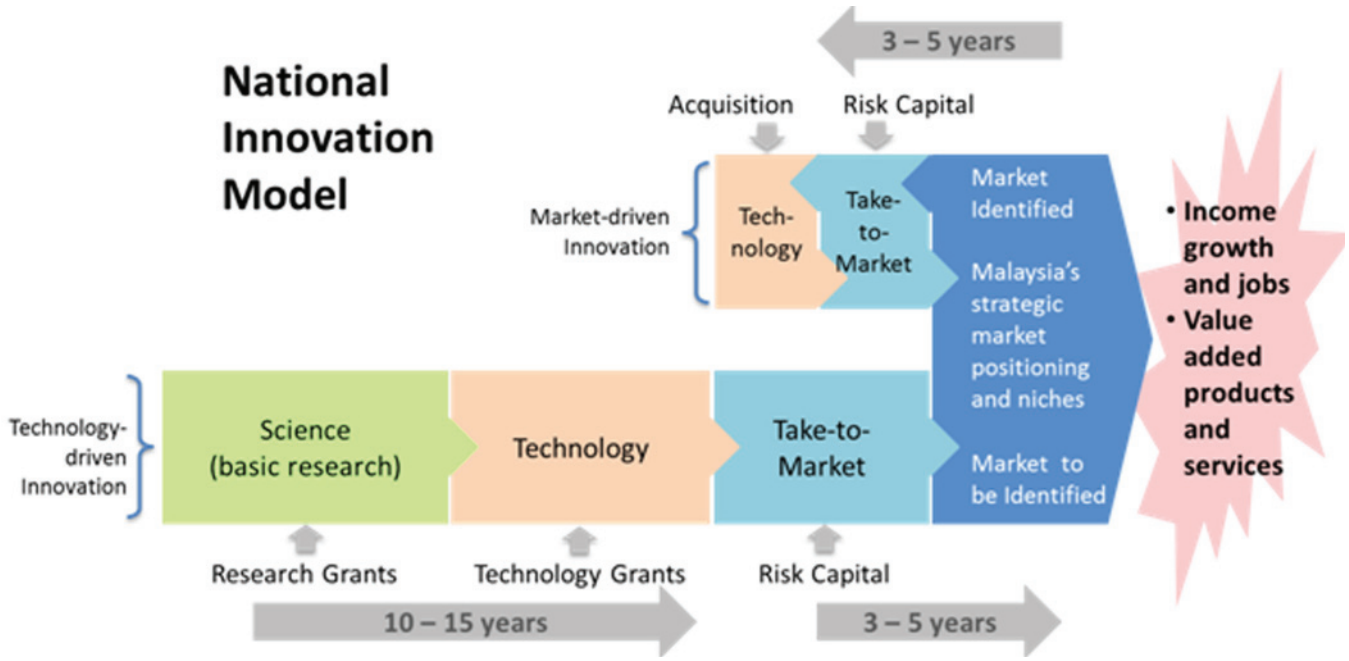

Figure 2.2: Malaysia's National Innovation Model

beating products, solutions and services. A NIS is simply a system of institutions working together to turn intellectual concepts into commercial products. Figure 2.1 illustrates this concept.

Figure 2.2 gives the National Innovation Model (NIM)[1]. This essentially is a combination of a technology-push (technology-driven) strategy and a market-pull (market-driven) strategy. In the technology-push approach, new technologies are developed based on technology trends, potential needs and novelty. Turn-around time to bring the technologies and associated products to market usually takes several years, depending on the technology type. On the other hand, in the market-pull approach, market needs drive technology and product development. Turn-around time is expected to be much shorter so as not to miss the commercialization 'windows-of-opportunity'. As a consequence, technology acquisition becomes a necessity in market-pull approach.

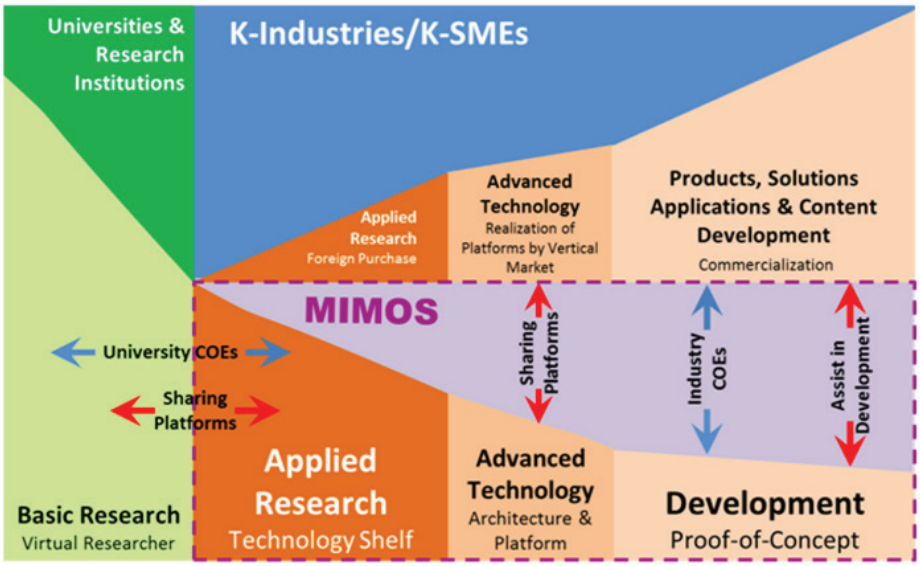

Figure 2.3: Malaysian ICT Ecosystem

2.2 Malaysian ICT Ecosystem

The prevailing state and structure of the Malaysian ICT Ecosystem (the research-development-commercialization (RD&C) framework for ICT), modeled along the principles of NIS and NIM, is given in Figure 2.3.

The diagram has been drawn from the perspective of MIMOS Berhad[2] and its possible interactions with universities and industry. The upper 'triangle' reflects, in general, how the local ICT industry operates: most companies including MNCs

2 MIMOS Berhad is a government-owned R&D company with the mission to help the local ICT industry grow and go global.

focus more on product and solution development activities as opposed to research activities. MNCs conduct their research elsewhere whereas the local players do not have the means to embark on research and development (R&D) activities. R&D requires heavy investment and success is not guaranteed. To help address this problem, MIMOS is focusing more on applied research and advanced technology (platform development) than on product development. The lower 'triangle' in the framework reflects this. The technologies and technology platforms developed will be transferred to industry recipients as the basis for product innovation. This reduction in 'technology risk' (i.e., high up-front investment cost) will enable more local industry players to move faster in the market space.

MIMOS does not do basic research. It works with the universities and research institutes (RIs) to tap their research outputs and relevant knowledge and turn them into useful technologies. In turn, the universities and RIs could expect to have their R&D outputs to reach the market eventually and creating real value. Thus, this mode of operation ensures that the RD&C activities of MIMOS will complement and not conflict with those of the local universities and ICT industry.

Collaboration is key to innovation but the link between universities, RIs and industry is still weak. The exchange of ideas, knowledge, intellectual properties (IPs), technologies and people amongst them is far from satisfactory. It has not reached the critical threshold to trigger continuous or, in other words, sustainable innovation.

2.3 Technology Platforms

You can see from figure 2.3 that the 'triangle' consists of three components viz., applied research (AR), advanced technology (AT) and development. AR is where you create new technologies and AT is where you develop technology platforms and incorporate technology components from AR into them. Development is where you use the platforms as the foundation to build 'vertical' applications or products.

It must be emphasized that the 'technology platform' strategy not only helps to reduce the 'technology risk' for the local industry players but also enables the rapid development of 'verticals' i.e. innovative applications (on the 'horizontal' platform).

Figure 2.3 A illustrates the technology platform concept. A technology platform would have a well-define standards-based interface to interact with the 'external' world

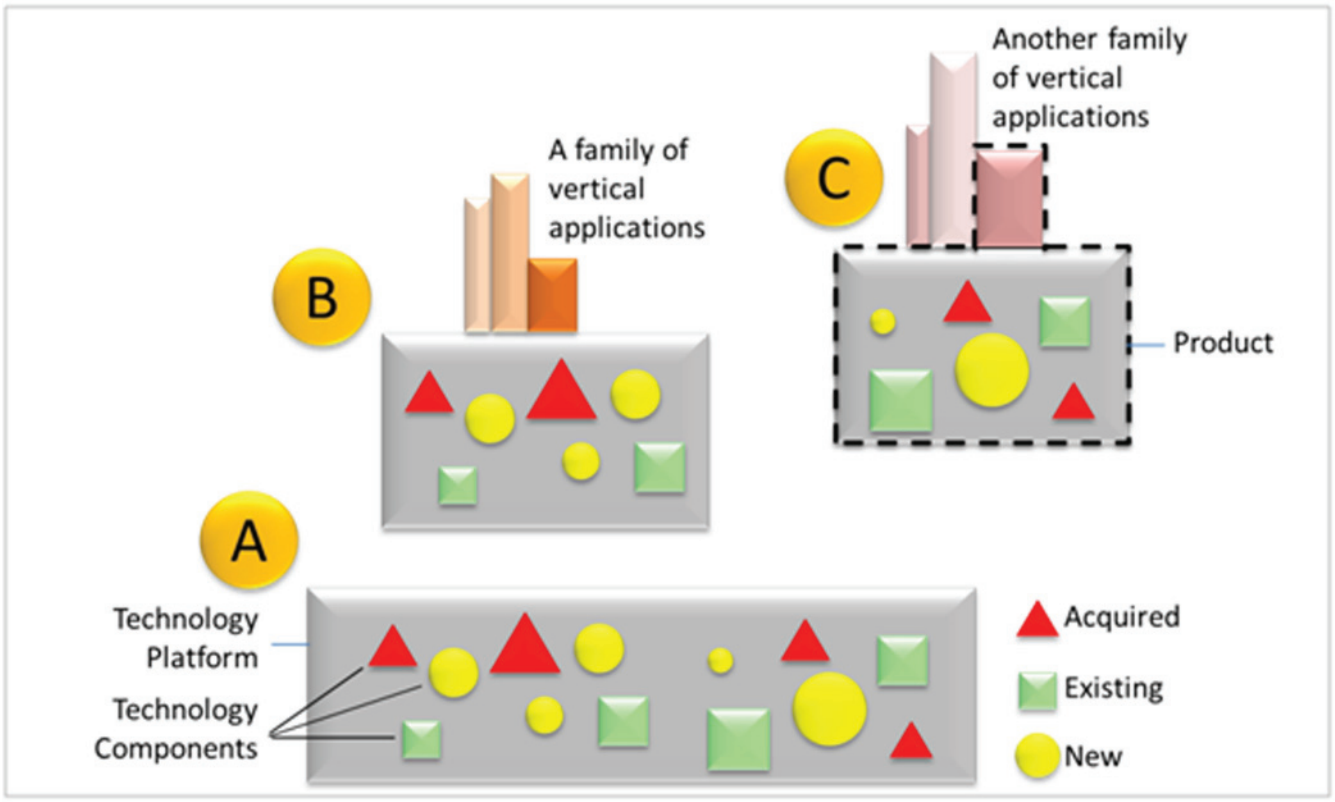

Figure 2.3: Technology Platform and Vertical Applications

and be composed of modular components. The components could be classified into existing, acquired and new. We will say more on this later in section 3.2.
The technology platform should be robust and sufficiently future-proof for a number of years. The longer 'shelf-life' of the platform would enable development of different sets of applications, allowing for a 'series of products' within the sets. The modularity and re-configurability of the platform would ensure that only relevant technology components are use and the final product is compact and not bloated. The graphics B and C in figure 2.3 demonstrate this.
Experience with local industry players indicates that generally they do not understand the platform concept; hence, there is a need to develop prototype vertical applications for demonstrating how it should be done.
Sometimes, because of the lack of relevant competencies by a technology recipient (TR), it may be necessary to work with the identified technology recipient and customize the vertical applications to ensure knowledge transfer.

3.0 Open Innovation Platform

3.1 Overview

Open innovation, according to Henry Chesbrough[2], is "the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively." The 'inflows' pertain to external ideas and technologies brought into the firm's own innovation process. The 'outflows' pertain to un-used and under-used ideas and technologies in the firm permitted to be incorporated into the innovation processes of others.

It therefore follows that an **open innovation platform** (OIP) is one which is designed to accommodate internal and external technologies to enhance its functionalities and hence, support the development of 'verticals' (products and applications) by any interested party. So, 'open innovation' happens at both the platform level as well as at the product/application level since anyone can contribute at these two levels.

Figure 3.1 shows the 'extended' Malaysian Innovation Model (e-NIM) incorporating the OIP concept. In this extended model, the OIP plays the critical role of enabling the practical realization of the NIM. It serves as the linchpin for both the technology-driven and market-driven innovations by bringing the key players in the innovation pipeline (universities, PRIs and Industry) to a common table for collaboration and co-learning.

Note that any number of strategic OIPs can be developed by an entity depending on what it is driving to deliver.

We strongly believe that the public research institute (PRI) is best-

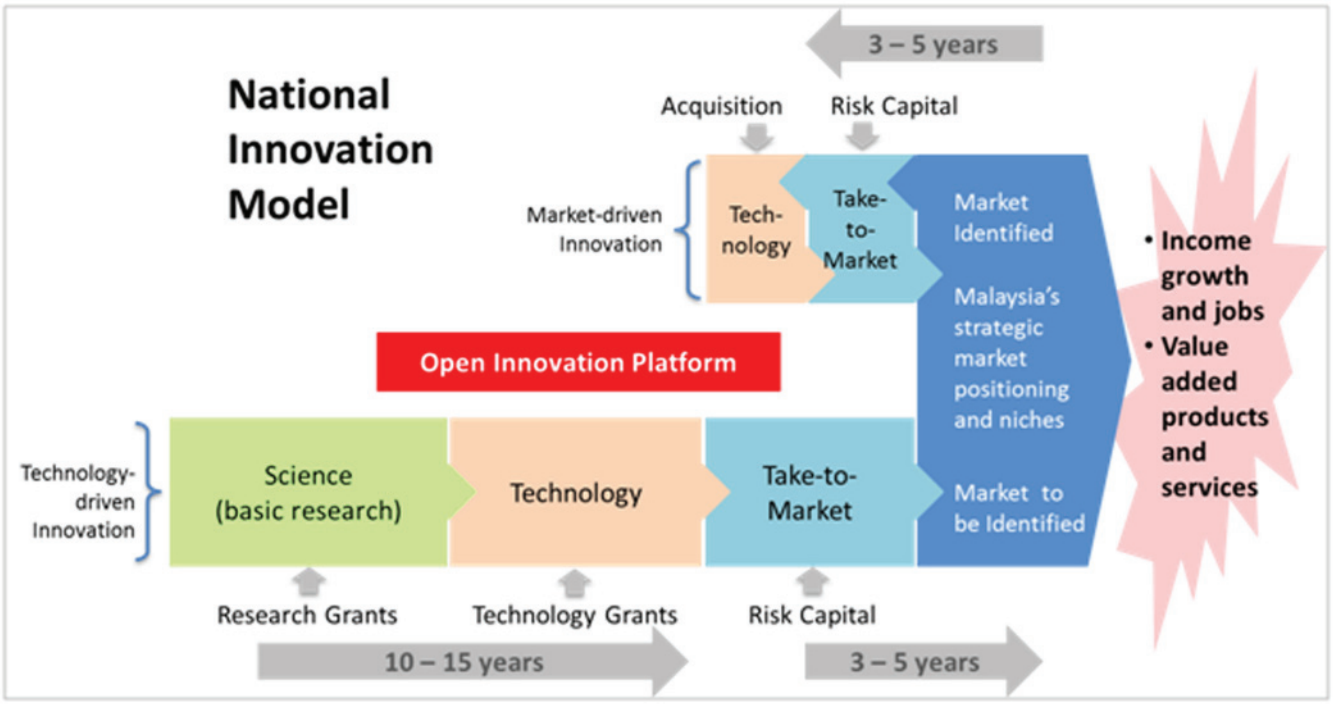

Figure 3.1: The extended NIM incorporating the OIP concept

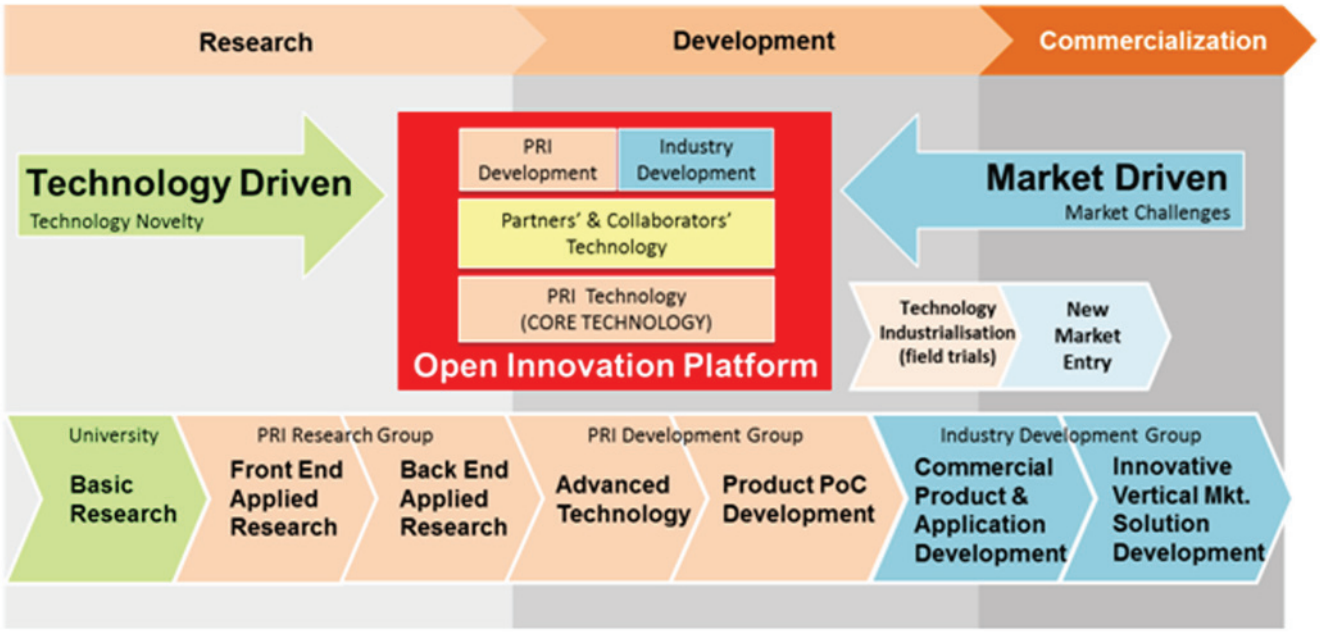

Figure 3.2: Open Innovation Platform and role play

placed to develop and drive the OIPs. By the nature of its activities, it is in the position to understand both emerging technologies and market challenges and possesses the right skill sets to craft the OIPs. Platform design needs very experienced system architects who have both deep technical knowledge and broad industry experience, having worked on many complex systems. They are able to draw out the core needs of a targeted family of products or solutions to design the platform to be modular and structurally sound.

Figure 3.2 shows the breakdown of the OIP in terms of role play. The core technology of an OIP comes from the PRI. Technologies from partners and collaborators (universities, RIs, firms) sit on top of the OIP core. The PRI could further develop the OIP or work on product proofs-of-concept (PoCs) to test the efficacy of the OIP. The industry could ride on the OIP to develop new products and solutions to create market value. Figure 3.2 also shows the RD&C (innovation) value chain and associated role play. We feel that basic research should be the forte of the universities (at least at this juncture[3]).

The PRI should mine the research outputs of the universities to translate them into viable technologies. The Front-End Applied Research (FEAR) is where ideas and concepts are researched, tested and validated, resulting in research (experimental) outputs. The Back-End Applied Research (BEAR) is where the research outputs are engineered into robust technology components, ready for use in an OIP.

Advanced Technology is where the OIP is designed and developed. The purpose of Product PoC Development is two-fold: one, test the functions and structural integrity of the platform; and two, provide the potential technology recipient (TR) from the industry with a sample working prototype to ease technology transfer.

Technology transfer is the point where an OIP or an OIP plus product prototype is handed over to the TR. And this is not a simple 'I throw over the wall; you catch and run with it,' game.

The OIP or OIP-cum-product prototype must be field tested to ensure product robustness, scalability, reliability as well as to build track record. Further, technology transfer to the TRs must take place in the true sense of the word, meaning the TR should become sufficiently knowledgeable to be able to independently use the platform to innovate new products and solutions.

3 Due to limited resources, especially talent and finance, it is best for the players in the RDnC value chain to specialize. The nation is now not at the point where all players can indulge in all three (RDnC) activities.

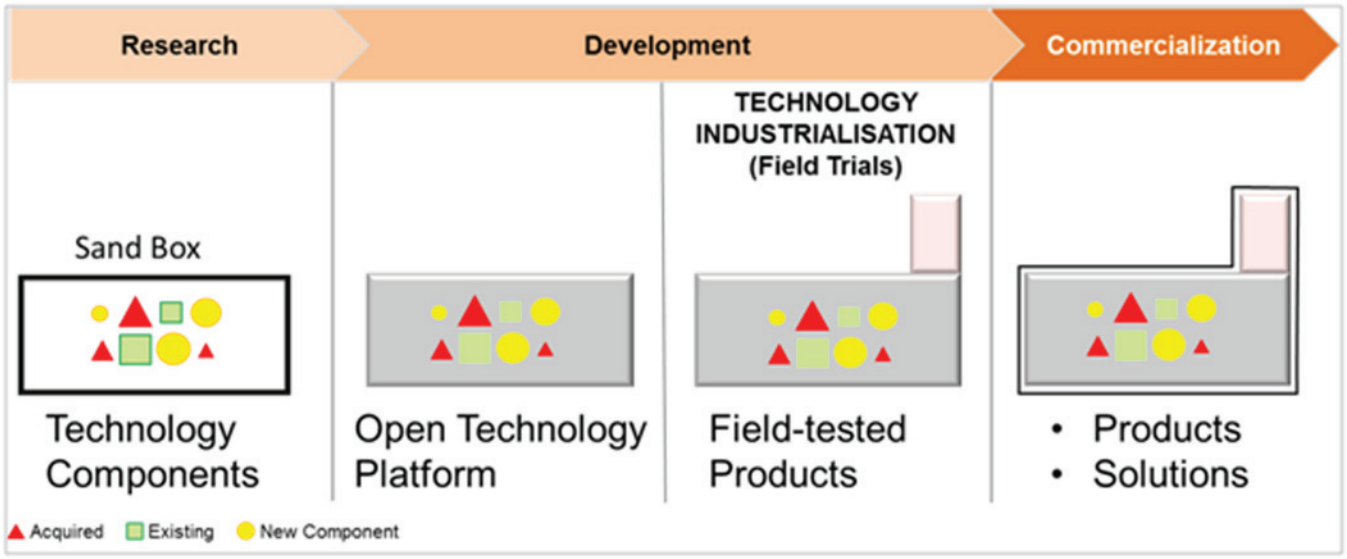

Figure 3.3: The Open Innovation Process in detail

For these reasons, commercial field trials are critical for successful technology transfer and product development. We call this phase as technology industrialization.

The 'technology savvy' TR could now go on to create more products and solutions targeting specific market segments. This is when the real value of the OIP and open innovation is finally realized.

3.2 Operational Details

Let us now delve a bit deeper into the RD&C value-chain and see how the open innovation process plays out.

As mentioned earlier, the end-game of the applied research is delivery of robust technology components. Whilst research is being undertaken, the technology components need an environment for testing their functionalities and features. For this purpose, an earlier version of the OIP is given to the researchers to 'play with' – hence, the term 'sandbox' (figure 3.3).

As mentioned earlier, there are three types of technology components viz., existing, acquired and new. Existing components, as you can guess, are components already tested and being used. Acquired refers to those that have been purchased (proprietary) or taken (open source) from elsewhere. New, obviously, refers to those that are currently being researched and developed. During testing and validation, it must be ensured that all these components work well together. This, therefore, is how an OIP works – its design is sufficiently modular to accommodate internally developed as well externally acquired technology components and function as an integrated whole.

The OIP serves as the base for the development of vertical applications, as explained earlier. Therefore, the OIP should be transferred to the TR for the purpose of developing the verticals. The testing of the ensuing product (platform plus vertical component) should be done in a 'real-environment' – i.e., one in which it would eventually be deployed in. This 'commercial field trial' is to ensure that customer requirements are met and all nitty-gritty issues ironed out. The failure or success of a product depends very much on this technology industrialization – for this is when the TR really gets to understand and apply the OIP for delivering a commercial-class product.

4.0 The 80/20 Principle for RD&C

In keeping with the open innovation paradigm, we advocate the tapping of external resources for ideas and intellectual properties (IPs) and for pushing technologies and products to market faster. Figure 4.1 illustrates this in the research and development realms.

When it comes to research, 80% of the work should be done by the universities and 20% by the PRI. The PRI should focus on applied research and source 80% of new knowledge and research outputs from the universities. This will help the PRI to focus on its core work of translating research into technology.

Likewise, with respect to development, the PRI should focus 80% on designing, developing and delivering strategic technology

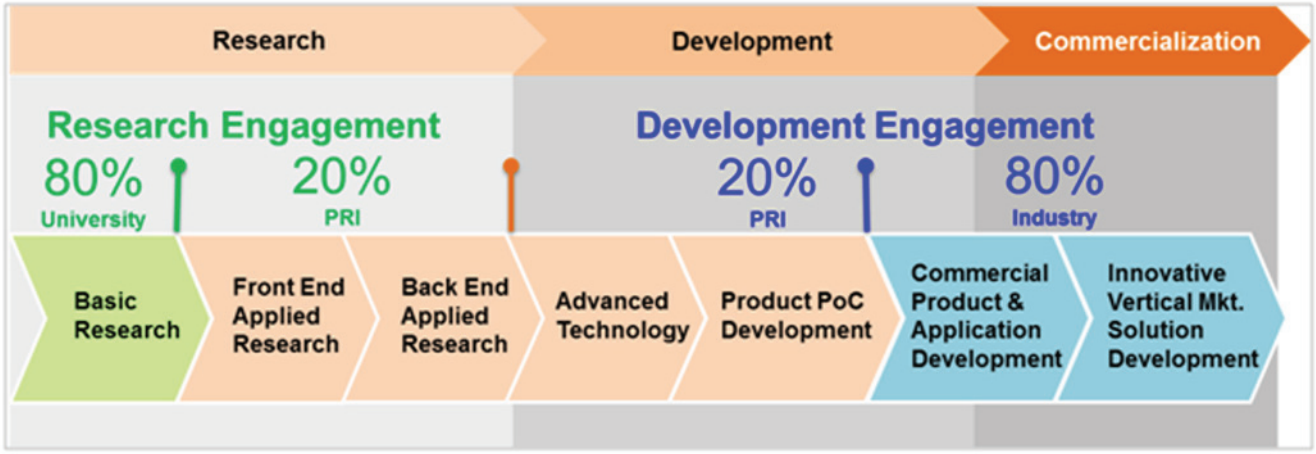

Figure 4.1: Applying the 80/20 principle for RDnC

platforms and 20% on product prototyping. The 80% work of developing verticals and delivering commercial class products and solutions should fall on the shoulders of the industry. And during the technology transfer process of technology industrialization, a lot of learning takes places, primarily by the TR. This leads to the development of industry 'domain experts'.

In this way, the 80/20 principle enhances the open innovation process by allowing the key actors/players along the innovation value-chain to specialize and focus on what they do best to deliver greater value. This way of working also helps to address the issue of the lack of talent to some extent.

5.0 OIP in Practice

At MIMOS, we actively use the OIP model in all our R&D activities. We have ten research laboratories and a number of associated development centers. These, the laboratories and centers, work hand-in-hand to ensure that the applied research carried out is relevant and timely for use by the development teams.

The handshake and smooth flow from applied research to platform and from platform to (product) development is managed through a customized stage-gate process.

We are also engaging with universities to 'push' the OIP concept. A case in point is the use of our sensor technology platforms as 'sandboxes' to research novel sensors. Collaborating with University of Malaya, we have been able to develop ammonia (NH3) body metabolite sensors within a short period of twelve months riding on our Interdigitated Electrode (IDE) sensor platform. A number of universities (viz., UM, UKM, USM, UiTM and UTM) are also involved in researching different types of sensors using our nanotechnology-based sensor platform. We are in the process of getting more universities, both public and private, to subscribe to the OIP mode of carrying out research and avail themselves of all the OIPs that we have developed.

Going from the research end to the commercialization end, the norm for technology transfer has been for potential technology recipients to take our technology platforms (and in many instances, our product prototypes as well) to develop vertical applications or products. During technology industrialization (i.e., on site technology or product testing), customer feedback has helped us to refine our platforms through improving existing features or adding new ones.

A case in point is the PERKESO ICT Project (Ministry of Human Resource) which is aimed at revamping the current service delivery system for greater efficiency and effectiveness. This project involves the use of a number of our technology platforms (stitched into a bigger 'framework'[4]) by a number of vendors offering specific verticals towards the final integrated solution. During the process of product development or customization, the

4 A Framework is a platform-of-platforms comprising several integrated technologies and platforms and is used to develop solutions (using more than one OIP). It sets the standards for the various OIPs and vendor verticals to co-exist and interoperate harmoniously.

need arose for the addition of several new platforms to the framework. The modular 'open' nature of the platforms and framework made this task relatively easy.

Our experience in operationalizing the OIP strategy in-house as well as with both the universities and industry has given us the assurance that we are on the right track with respect to galvanizing the RD&C communities to accelerate technology development and commercialization.

6.0 Summary and Way Forward

Responding to the four challenges facing our local industry i.e., technology, talent, market and branding as outlined in the introduction earlier, in this paper we have attempted to provide answers to overcome the twin issues of technology and talent by advocating the use of the Open Innovation Platform (OIP) strategy.

We have discussed in some detail the concept of OIP for rapid product development via technology industrialization in the context of the Malaysian Innovation Ecosystem. To address the talent issue, we advocated the application of the 80/20 principle to ensure that the right talent works on the right areas, and that the right collaboration engagement takes place to ensure optimum productivity. We also covered our experience and success in implementing the OIP strategy.

We have emphasized that 'technology industrialization' is critical for breaking the market acceptance barrier for new products. Successful 'technology industrialization' would need the following 'components' or features:

- an open innovation platform;
- public institute and grant alignment;
- experiential learning (by technology recipient from PRI);
- effective development processes; and,
- commercial trial-sites.

The OIP strategy confers many benefits to the stakeholders involved. Benefits to the universities would include:

- Greater potential for commercialization of research results because of better alignment to market needs
- Better chance for research success thanks to stable ready environments (platforms) for carrying out research;
- Improved speed to market of research outputs due to faster product prototyping and development; and,
- Increased depth in research capability and domain expertise through specialization.

Benefits to PRIs would include:

- More-marketable technologies due to better market-orientation;
- Wider field for tapping research novelties and IPs due to close collaboration with multiple universities;
- Better rate of technology adoption due to easier accommodation of customer (technology recipient) requests for changes and additions to platforms; and,
- Greater relevancy of technology platforms due to continuous university and industry inputs;

And finally, benefits to industry would include:

- Accelerated development of 'portfolios of products' due to robust technology platforms with longer 'shelf life';
- Increased speed and lower costs in bringing products to market since the technology platforms give a jump-start;
- Better export potential since products are based on IP-protected indigenous technologies; and,
- Greater ability to compete in the international market as a result of new features in product offerings through continuous support from universities and PRIs.

To realize these benefits, the three stakeholders should leverage the existing RD&C grant schemes appropriately. For example, 80% of the research grant (science fund) should be used for research based on OIPs and 20% for new breakthrough research. Similarly, 80% of the pre-commercialization grant (techno fund) should be given to PRIs and industries to showcase home grown products and solutions. The remaining 20% could be used for seeking market/customer inputs for new technology platforms.

Note that the national Economic Transformation Program (ETP), Government Transformation Program (GTP) and Digital Malaysia projects could be used as the vehicles to showcase homegrown technologies and products. These showcases would enable local vendors to improve their products, build confidence and track records – which are necessary ingredients to compete in the global market.

In this way, the government could help to create a ready domestic market for local technologies and products and kick-start the local industry and enable it to eventually go global.

Since IP is critical for product credibility, value and positioning as well as for competing in the global marketplace, the players in the RD&C game should seek ways to utilize the current grant schemes or request for special funds to protect their 'crown jewels'.

In summary, the OIP strategy enables:

- Market-oriented R&D;
- Focused and directed R&D;
- Close collaboration between universities, PRIs and industry;
- Exploitation of government R&D investments in universities and PRIs by industry;
- Greater speed in moving a concept to commercialization; and,
- Increased growth in competency (talent) due to role and goal clarity.

The listed 'plus points' speak for themselves as to the efficacy of the OIP strategy to galvanize the RD&C communities towards becoming powerful innovation teams able to continuously deliver novel technologies and innovative products.

That said, however, the greatest challenge we see in implementing the OIP strategy is in building solid trust amongst the stakeholders so that they could 'see' as one and work as one!

We throw this challenge to the PRIs to take up, and drive the OIP strategy in their respective technology areas to fast-track industry innovation.

Appendix

1. MOSTI, Malaysia.
2. http://www.forbes.com/sites/henrychesbrough/2011/03/21/everything-you-need-to-know-about-open-innovation/

CHAPTER 07

CYBER SECURITY AS A CENTRAL STRATEGY TO NATIONAL SOVEREIGNTY AND ECONOMY

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Introduction

Digital revolution has changed the way we capture data, generate information and produce knowledge. It has also fundamentally changed the rules of our activities. Digital technologies have provided unprecedented opportunities for Malaysia to utilize Information and Communications Technology (ICT) and Internet to national advantage across governments, industries and societies. Hence, it helps to spur innovation, and it is the main driver for a nation to progress and to prosper. The Government has invested in nation-wide ICT systems by building the infrastructure, institutions and applications to improve its functions and delivery of critical services to the citizens. We have also seen how the industry has been investing in technology-enabled initiatives to remain competitive as well as innovating how it functions its planning and decision-making processes, marketing and improving operational efficiency, and exploring new business opportunities.

The rapid development of ICT infrastructure and networks combined with the adoption of online activities like e-commerce and online banking have accelerated Malaysia's journey to the age of digital economy. These driving forces are powered by the increased broadband penetration and business trends that will transform businesses and organizations, in turn leading to new wealth creation. In today's globalized economy, people keep demanding the best services, which are available and can be accessible from anywhere. With regard to Digital Malaysia, the Government aims to transformation and advance the nation towards a developed digital economy. The major driving factor of such transformation and advancement is our ability to exploit ICT to both national and regional advantages. Many services are now being integrated and automated in online environment across the country.

Moving Towards Digital Economy

The Economic Transformation Program (ETP) has set a target to transform Malaysia into a high-income nation by 2020 with a Gross National Income (GNI) target of RM1.7 trillion by 2020. Malaysia will continue to progress up the value chain, moving to more services-oriented economy in line with the structure of most high-income nations. Our migration towards globalized economy has provided unprecedented opportunities for the nation to utilize the related benefits of digital technologies and their increased capability to national advantage.

Despite uncertain global economic conditions in 2012, Malaysia has attracted RM162.4 billion in direct investments; but what is infinitely more important is the quality of those investments and jobs being driven by the ensuing digital transformation. Investors are looking to Malaysia to provide the right environment for their enterprises in these industries to prosper. In this regard, Malaysia has gained an enviable reputation as a global and regional hub for manufacturing and services, attracting investments that will accelerate the country's shift to high value-added, high technology, knowledge intensive and innovation-based industries. Such situation indicates that Malaysia is on track to become a high-income nation driven by high technology, knowledge-based and capital-intensive industries.

New Demands For Cyber Security

Nokia Siemens Network reported that by 2015, five billion people would be connected in a global community brought closer together by voice and, increasingly data communications. The Internet's users worldwide are about 2.4 billion and Asia contributes the highest Internet population with almost 1.8 billion users. In Malaysia, the number of Internet users was already about 17.7 million people in 2012.

According to the International Organisation of Employees (2013), the Asian region is increasingly becoming the world's economic center of gravity, altering the regional geopolitical order and forcing business and government to adopt new strategies. Asia's successful navigation of economic activities has also further strengthened the importance of the region to the global economy. It has now become the most important political, economic, strategic and socially diverse and dynamic region.

No doubt that nation benefits from the advancement of today's digital technologies and Internet have enabled us to gain new knowledge and acquire wealth creation. However, the widespread use of

1 Malaysia 2012 Investment Performance –Investment for Transformation, Malaysian Investment Development Authority

ICT and high Internet connectivity has introduced new cyber security challenges. The ubiquitous digital technology that permeates the daily lives of individuals, businesses and government is not without their challenges and downsides. Indeed, digital revolution has opened up new demands for cyber security in order to protect the various different ICT infrastructure and networks, information systems, services and information that we have produced and used.

The nation's cyber security landscape has evolved in fairly dramatic ways. Cyber threats are rapidly changing and encroaching into every sphere of human activities. Malaysia's increasing dependency on cyber space has become a significant risk, hence there is a need for a higher level of security and information assurance due to our increased interaction in cyber space. In view of this, the Government has already realized the importance of having a secure, resilient and trusted cyber environment. The demand for cyber security encompassing people, process and technology is rather critical and it will continue to grow in many more years to come.

Our efforts in enhancing cyber security posture is in line with the Digital Malaysia initiative that has been launched to begin the transformation into a digital economy with emphasis on innovation, creativity and productivity. The increase in communication networks and connectivity has multiplied the potential for knowledge sharing and wealth creation, as well as providing ample opportunities for enhancing prosperity among citizens and businesses. Digital transformation aims to make a conscious effort to use ICT to transform life and work of the people where the goal of such an effort is more than the mere deployment of technology. Rather it is about preparing the nation to meet the cyber security challenges of a globalized digital economy.

Hence, the incorporation of cyber security as a central strategy into Malaysia's digital initiatives is paramount in order to support us to achieve a truly digital nation through the deliveries of state-of-the-art cyber security solutions, hence completing the National Transformation Agenda.

Cyber Security Landscape

Digital economy benefits all of us, whist at the same time bringing some new security challenges in the forms of cyber threats. The use of multi-systems and platforms in diverse networking environment makes out ICT systems complex, and this situation complicates our security. There is no direct method to connect disparate security applications and systems. Malaysia is utilizing ICT in order to progress and advance. Cyber security is a great concern for Malaysia due to its increased dependency on cyberspace, alongside a growing array of cyber threats and vulnerabilities that adds a new element of risks to national security, and the citizens' safety and privacy.

Digital technologies that we depend in order to prosper also pose various different cyber threats. Incapacity of any of critical ICT infrastructure would cause a chain reaction that can lead to a devastating impact on the nation. Such impact will also deteriorate the confidence among the users, industries and foreign investors towards the nation. It is a reality today that cyber threats are changing rapidly with complexity and sophistication.

It is foreseeable in the future that the nation will continue to deal with cyber threats in parallel with the rapid development of ICT systems together with increase of network connectivity and Internet users. Other than technical threats, the exploitation of ICT has introduced content-related threats. Such threats refer to any offensive and abusive contents such as hate speeches, radical and offensive statements, seditious and defamatory contents that can threaten national security and social harmony. Cyber threats and their significant risks on national security would remain as the major security concerns of the nation as it is not immune from cyber attacks in highly interconnected environment.

Cyber Crimes

In Malaysia, cybercrime hit 31,492 cases from 2010 to 2012 with an estimated loss of RM241 million. Whereas in 2012 alone, Malaysian victims lost RM1.6 billion due to scam with 18,386 cases mainly involving love and parcel scam as well as phishing and hacking. At the international front, the 2012 Norton Cybercrime Report stated that the scale of consumer cyber crime hits 556 million victims per year, which is more than the entire population of European Union and equivalent to 1.5 million victims per day. Based on the report, 42% of direct financial loss came from fraud, whereas theft and money loss contributed 17%. Cyber crimes will continue to grow and they can also spread throughout smart communities as long as criminals can have financial gains from the computer systems.

Acts of Aggression and Hostile Activities In Cyber Space

The global community acknowledges the existence of hostile activities and act of aggression conducted by nation states, state-sponsored and non-state actors. Such activities can refer to anything from cyber espionage, malicious software (malware) infection and system intrusion and to high-scale cyber attacks targeting critical systems being done with technical complexity and sophistication. It is believed that such acts of aggression are committed with diverse political, economic and strategic motives to achieve cyber dominance. Internet revolution has also created the phenomenon towards "digital hacktivism". During the period of 15-19 June 2010, Malaysia has witnessed cyber attacks on her cyber space by a group of hacktivism known as "Anonymous". The attacks codenamed "Operation Malaysia" have captured the headlines of mainstream media. During the 5-day period, 210 Malaysian websites were defaced by the "Anonymous" group. The group is regarded by experts as politically motivated, high profile and sophisticated.

In view of this, Advanced Persistent Threat (APT) is one of the most common technological threats the world faces today. Targeted attacks by APT are becoming more and more widespread, and APT is seen as the modern electronic versions of covert intelligence operations with sophisticated combination of multiple targeting methods, tools and techniques in order to reach and compromise target and maintain access to it. APT is also conducted through continuous monitoring and interaction in order to achieve the defined objectives combined with high capability, intent and a level of coordinated human involvement.

Sophistication of Malware

The world has seen how Stuxnet targeted the operations of industrial systems, specifically the ones that run nuclear facilities. Duqu was designed to gather intelligence data and to set a pre-cursor for a future attack. The world also witnessed the emergence of Flame, a sophisticated spyware believed to be part of a well-coordinated cyber espionage operation committed at a level of state. We have also seen Shamoon that stole information and took data from the targeted systems. One unusual characteristic, however, is that it could overwrite the master boot record (MBR) on infected machines, effectively rendering them useless. These malware are evolutionary and they provide an insight into the future state of the ever-changing cyber threat landscape. Protecting against such malware attacks also pose a key challenge to the nation in globalized digital economy.

Misuse of Social Media

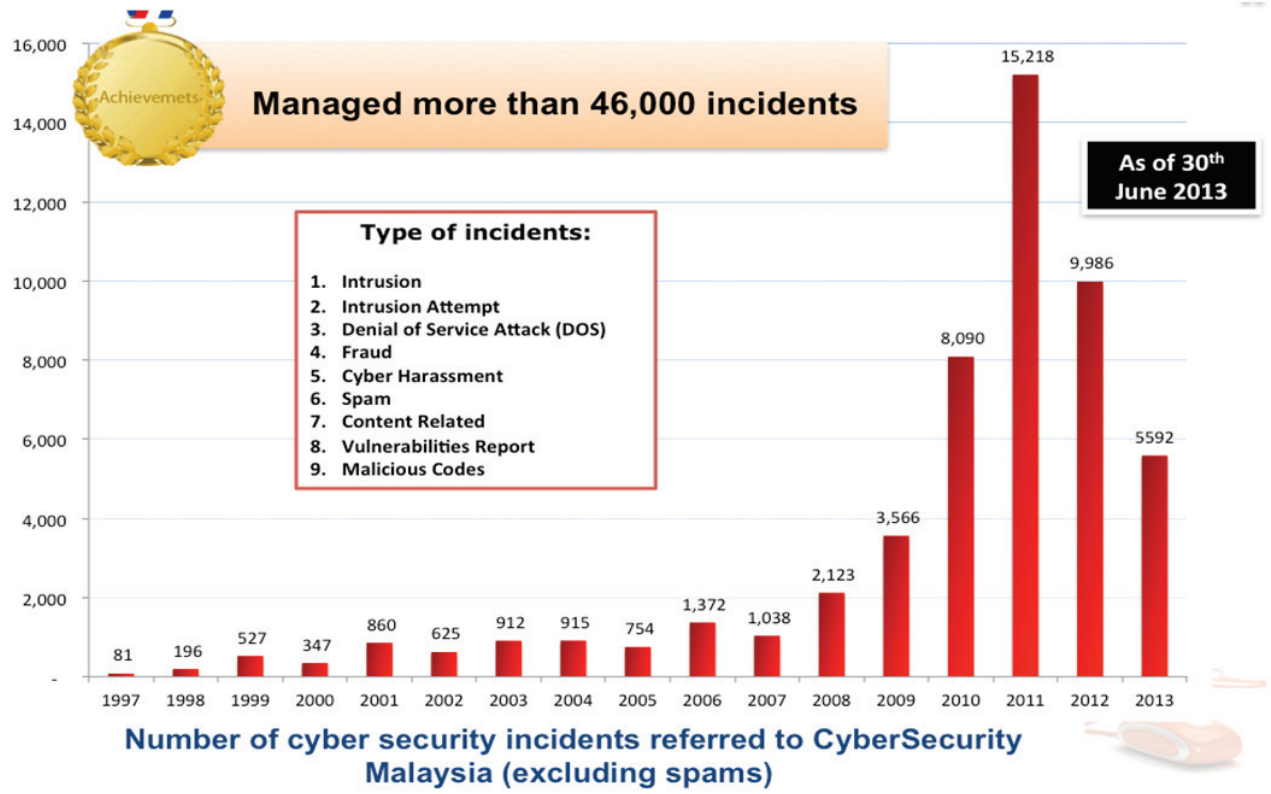
The rise of social media shows that the Government has to do more to protect its residents. Internet users today are spending more time on social networks, hence exposing themselves to various risks posed by content-related threats. The misuse of Internet for sedition and defamatory contents can undermine the perception of the population transforming the moderates into radicals, and radicals to extremists.

In Malaysia, it is estimated that 85% of Malaysian online population are Facebook users which is about 13.5 million people, and we are ranked 18th in the world. Many of the actors in foiled plots have been discovered among others, to threaten national security and social harmony under the pretext of so-called freedom of speech. No doubt that social media is a powerful tool to promote peace and stability, whilst at the same time it can be also misused by irresponsible groups to undermine national security and public safety.

Cyber Incidents Referred to CyberSecurity Malaysia

According to CyberSecurity Malaysia, an agency under the purview of the Ministry of Science, Technology and Innovation (MOSTI), there is an uphill trend in the number of cyber incidents being referred to the agency. The incidents have increased substantially from 8,090 in the year 2010 to 25,204 incidents in the year 2011 and 2012. As for 2013, there were 5592 incidents reported as of 30 June 2013. Cyber harassments, denials of service, fraud, intrusions and malicious codes are amongst the constantly reported incidents.

Based on 2011 and 2012 statistics, fraud was the largest reported category of incidents with an average of 37.5% followed by intrusion, 32%. The figures in 2011 surpassed 2010 figures by 7,128 whereas, from January to September 2012, 7905 incidents have been reported. Cyber harassments, denials of service, fraud, intrusions and malicious codes are amongst the constantly reported incidents. Whereas, malicious software (malware) is among the largest reported category of incidents. The rise of cyber incidents referred to CyberSecurity Malaysia also indicates that the users are now aware of potential dangers posed by cyber incidents and the need to report such incidents. CyberSecurity Malaysia has been analyzing the current cyber-security landscape that provides an insight into what the future may hold for conflict in the digital environment.



The Cyber Security Market In Malaysia And Global Environment

The governments and businesses worldwide continue to invest heavily to protect ICT infrastructure and information systems. The global cyber-security market has grown steadily in the past few years to reflect the rapidly changing cyber threat environment. It was estimated to be worth about $60 billion (£38.5 billion) in 2011, with growth rates of 10% being predicted for the next three to five years, according to a November 2011 PricewaterhouseCoopers report. Global Industry Analysts Inc. put a headline figure on the sector of $80 billion (£51.3 billion) by 2017. Visiongain also estimates around $60 billion (£38.5 billion) for the 2012 market, and approximates the more limited cyber-warfare sector at $15.9 billion (£10.2 billion). [2]

Global Cyber Security spending was approximately $60 billion in 2011 and is expected to grow at close to 10% every year over the next 3 to 5 years. The United States accounts for over half of the total. The next largest market is Japan, followed by the United Kingdom. In most countries, the private sector accounts for the majority of cyber security spending. The main drivers of the cyber security market are:

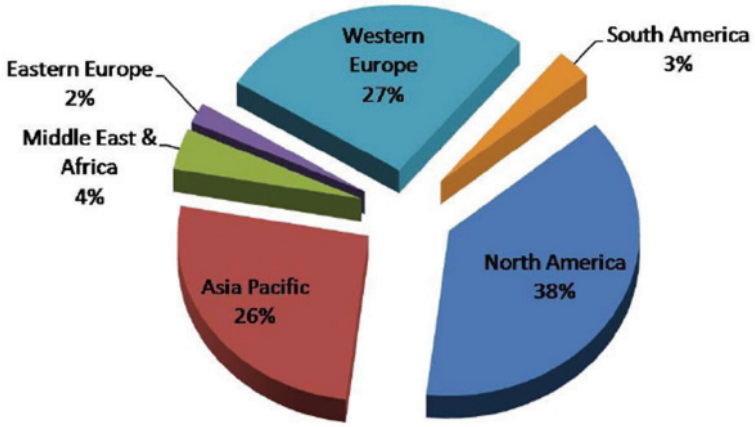
- Increasing cyber threats, both from new actors and new threat vectors (the paths that attacks can take).
- Greater vulnerabilities due to the more pervasive use of technology, particularly mobile devices and cloud computing.
- Increasing awareness by organizations and consumers of the threats and potential threats.
- Changes in technology driving product and service innovation of security solutions.

- Increasing regulation particularly those enforcing the requirement to secure personal data.
- Changes in outsourcing; some organizations are increasingly relying on partners for security, whilst others are growing internal security spending to maintain greater levels of control. [3]

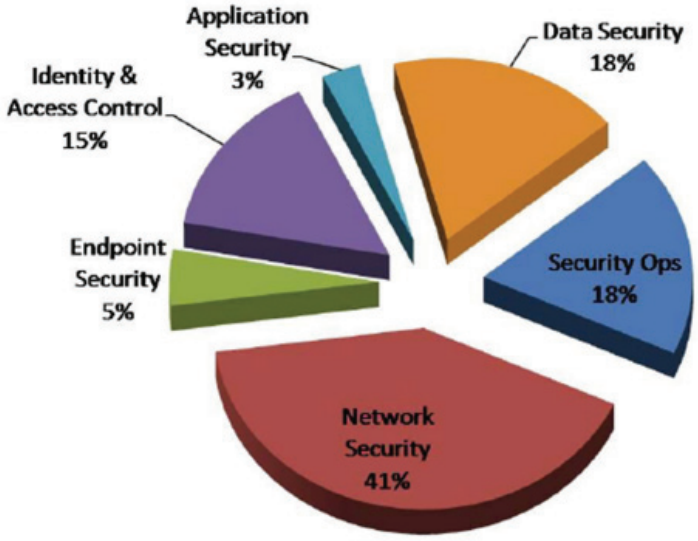
There are considerable variations in security spending across various regions. Generally, ICT spending

2 Reference: The Growing Cyber-Security Market, RUSI Defense Systems, Summer 2012
Source: http://www.rusi.org/downloads/assets/RDS_201206_Aaron.pdf

3 Reference: Cyber Security M&A Decoding deals in the global Cyber Security industry, Cyber Security M&A review, November 2011. Source: http://www.pwc.com/en_GX/gx/aerospace-defence/pdf/cyber-security-mergers-acquisitions.pdf



Cyber Security Market: Spending by Regions, 2010
Source: Frost & Sullivan



Cyber Security Market: Spending by Solution Segments, 2010
Source: Frost & Sullivan

globally has increased dramatically in the last decade; with Malaysia's cyber security-related spending has equally increased at a higher pace. Organizational spending on ICT security has increased by 50% in the last three years.

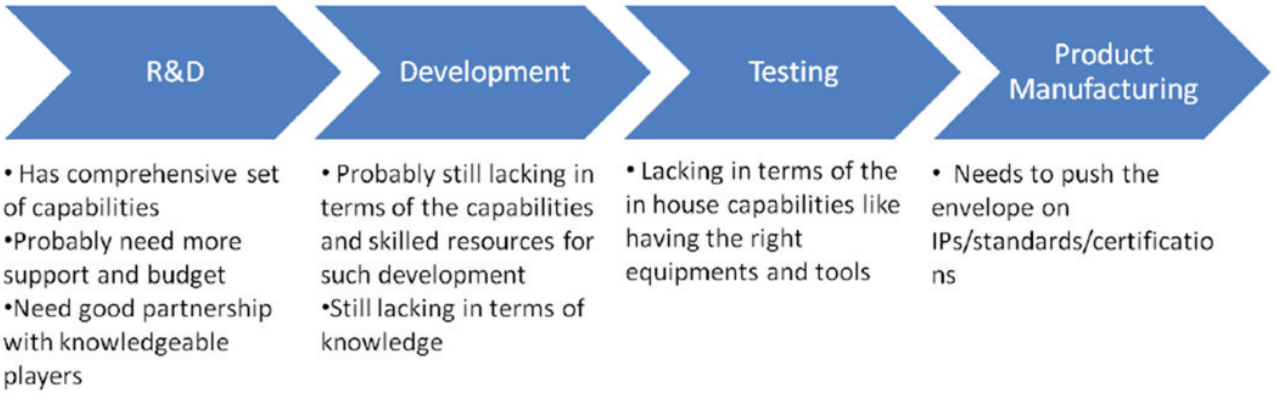
The current spending on information protection also seems to indicate that cyber security market for network security, security operations and data security are the highest areas of expenditure. Moving forward, identity and access control, followed by data security will be the fastest growing segments.

With a long-term goal of achieving cost effective solutions, companies and governments are observed to be increasingly funding R&Ds. Driven by the increase in the dependence on information, the cyber security market will witness an unprecedented growth in the next decade. Aggressive product innovation and improvement will drive wider adoption of cyber security solutions.

It is expected that governments and militaries will drive this market as early adopters, followed by the commercial sector once the products and solutions are tested and much more accessible and affordable.[4] The ICT security products markets in Asia Pacific excluding Japan (APEJ) is expected to grow at an annual rate of 11.66 percent and to reach US$5.79 billion by 2017, according to IDC's recent research. In 2012, the revenue for security products (hardware and software) market in APEJ amounted to US$3.34 billion, a 12.33 percent increase from 2011.[5]

Market for Security in Malaysia is currently estimated to be nearly RM745 million. According to Frost & Sullivan, out of this amount, the Malaysian market for cyber security was RM414 million in 2011. Frost & Sullivan also cited that cyber security is the biggest segment of the security market in Malaysia and forecasted a growth of 24% Compound Annual Growth Rate (CAGR). The key market drivers for cyber security in Malaysia is the significant focus in the various government departments encouraging offices to use computers coupled with the thrust on cyber security, both network and end-point security. The key drivers are namely:

4 Reference: Mega Trends: Asia Pacific Market Insights, Frost & Sullivan, 2011
Source: http://frost-apac.com/download/megatrends.pdf
5 Reference: The growth of security products market in APEJ, Computerworld Malaysia, 4 June 2013
Source: http://www.computerworld.com.my/resource/security/the-growth-of-security-products-market-in-apej/



Cyber Security Market Value Chain

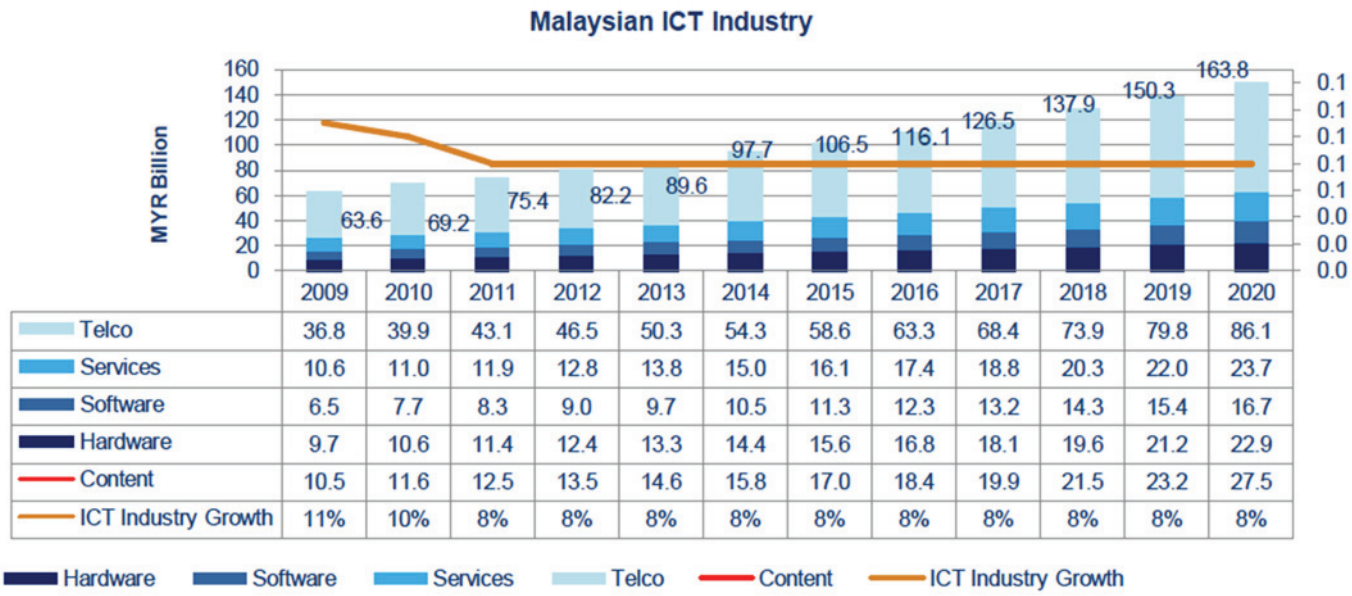
Cyber Security Market Ecosystem

- Antivirus: High potential in public sector as well as large enterprise
- Intrusion prevention system: Growing due to cloud adoption and as an add on to the firewall
- Next Generation firewall: High potential due to increase in demand for application layer control and visibility features

Compared to other nations, Malaysia has a well-developed cyber security industry that has the potential to provide global solutions. Around 10% of local ICT revenue and 30% of export IT revenues is derived from cyber security products and services. However there is still vast potential to develop the cyber security industry. Adoption of international standards and best practices will catalyst further adoption of ICT technology to enable Malaysia to be a high technology nation. Malaysia already has good international cyber security credibility, but is yet to fully capitalize on business opportunities. Strengthening capability and innovation in cyber security industry has the potential to spill over to ICT and non-ICT areas e.g. software, networking, service industry, and e-commerce. Local industry has the opportunity to participate in the sectors identified as part of the Critical National Information Infrastructure (CNII).

Malaysian ICT industry as a whole was estimated to have stood at RM75.4 billion in 2011, and is set for steady growth of 9% over the coming years. [6]

6 Reference: MOSTI Final Report of Review of National Strategic ICT Roadmap and Technology Roadmaps, Frost & Sullivan, 2012



Malaysian ICT Industry 2009-2020 (RM Billion)
Source: Frost & Sullivan Analysis, excluding semiconductors Base Year 2010

Based on the analysis of CyberSecurity Malaysia, the local information security industry is expected to contribute about RM3 billion to Malaysia's Gross National Income (GNI) by 2015. Currently, the segment has a market size of RM1 billion, and ICT export value of RM300 million.[7] Also, the proposed Global Cyber Ssecurity Alliance (GCSA), set to be a platform for Malaysia and other countries to exchange ideas and expertise, is expected to further strengthen the local cyber security marketplace. [8]

Cyber Security As A Central Strategy

No doubt that the utilization of digital technologies plays an increasingly important role in Malaysia's digital progress. Its emphasis on innovation, creativity and productivity will help enhance the nation's prosperity. Such progression reflects specifically our journey towards becoming an innovative digital economy in ways that will benefit the country and the citizens. Anyone responsible for cyber security has reason for concern, as the journey towards becoming digital economy is not without its security challenges.

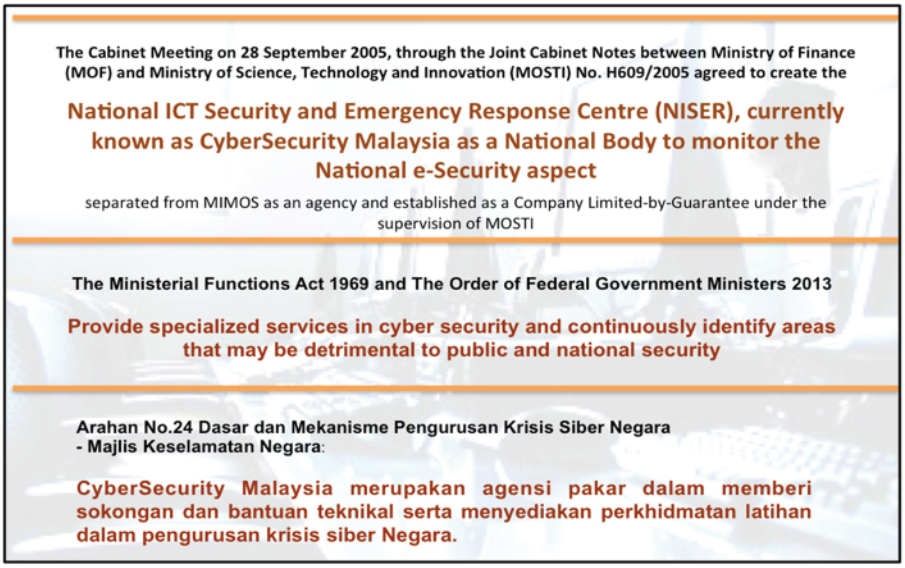
National Cyber Security Policy

The Malaysian government has adopted the National Cyber Security Policy (NCSP) in 2006, a comprehensive cyber security approach namely to ensure a secure, trusted and resilient ICT domain as a critical factor in safeguarding the nation's e-sovereignty and economic prosperity. This is achieved through ensuring the resiliency of the Critical National Information Infrastructure (CNII), which is vital to the nation. CNII's incapacity or destruction would have a devastating impact on national defense and security, national economic strength, national image, government ability to function and public health and safety.

Collectively, such cyber security posture will promote productivity, national sustainability, social harmony and well-being, as well as wealth creation. To this end, innovation in both the technical and operational aspects play a key role in cyber security strategic approach, more so as the rapid pace of technological change requires that it always stays in lock-step with the evolution of emerging threats and challenges.

NCSP recognizes the critical and highly interdependent nature of the CNII and aims to establish a comprehensive program and a series of frameworks that will ensure the effectiveness of cyber security controls over vital assets. Through NCSP, Malaysia can take a

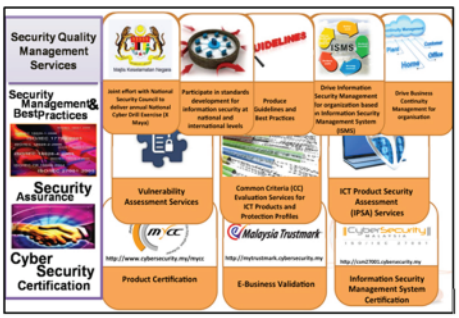
7 Reference: Information security to bring RM3 bln to GNI, Borneo Post Online, 25 August 2011
Source: http://www.theborneopost.com/2011/08/25/information-security-to-bring-rm3-bln-to-gni/
8 Reference: GCSA boon for IT security sector, TechCentral, 29 August 2011
Source: http://techcentral.my/news/story.aspx?file=/2011/8/29/it_news/20110829141712&sec=it_news



proactive position in handling local and global cyber security issues. Hence, Malaysia will be better placed, to meet the challenges and opportunities that technological advancement brings, and subsequently, to achieve its objective of becoming an advanced nation in the year 2020.

Digital Malaysia is a cornerstone of the National Transformation Policy as Malaysia is taking a quantum leap to take advantage of today's digital age. By supporting the creation of a cohesive and holistic approach to achieve a truly digital nation, Digital Malaysia completes the National Transformation Policy. In this regards, NCSP is important to secure and support Digital Malaysia's initiatives.

With cyber security initiatives being put in place, it will play an increasingly important role in Malaysia's digital progress, by enhancing the security of Malaysia's cyber environment. It is crucial specifically for our journey towards becoming an innovative digital economy in ways that will benefit the country and the citizens.



CyberSecurity Malaysia

The Cabinet Meeting on 28 September 2005, through the Joint Cabinet Notes between Ministry of Finance (MOF) and Ministry of Science, Technology and Innovation No. H609/2005 agreed to create the National ICT Security and Emergency Response Centre (NISER), currently known as CyberSecurity Malaysia as a National Body to monitor the National e-security aspect. In addition, as stated under the Ministerial Functions Act 1969 and The Order of Federal Government Ministers 2013, the function of CyberSecurity Malaysia is to provide specialized cyber security services and continuously identify possible areas that may be detrimental to public and national security.

As a provider of specialized services on cyber security, CyberSecurity Malaysia has instituted a broad range of innovation-led programmes and initiatives to help reduce the vulnerability of ICT systems and networks, nurture a culture of cyber security, enhance personnel skills

and competency, and strengthen Malaysia's self-reliance in cyberspace which are vital in a globalized economy.

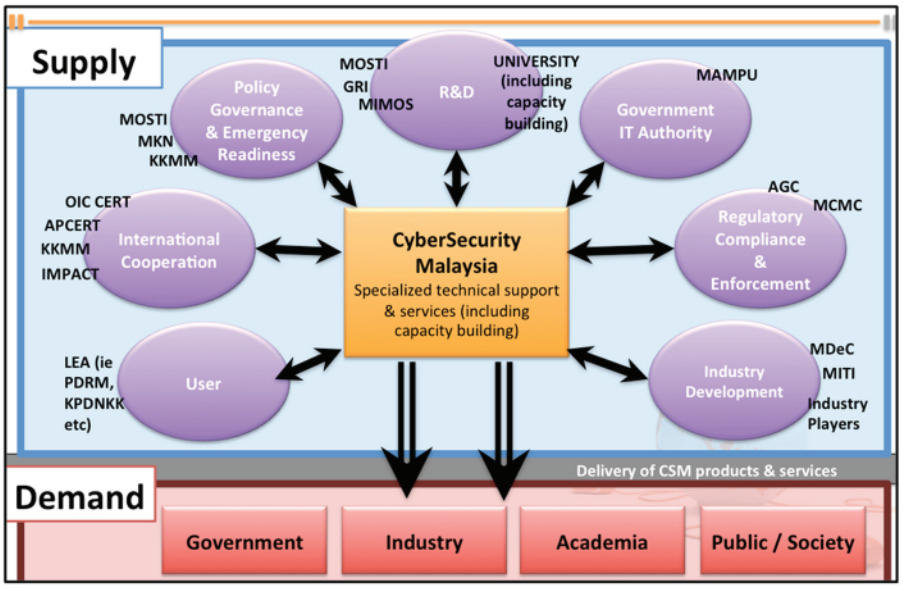
Cyber Security Innovative Approach – The Way Foward To Address Evolving Cyber Threats

Cyber threats are revolutionary and our cyber security initiatives should be equally evolutionary and innovative in order to keep pace and be relevant with the technological changes. These initiatives include policy research, technical research and development, public awareness and outreach, and facilities to provide advice, assistance and expertise to individuals and businesses.

Cyber Security Through Public-Private-Partnership

Cyber security is not just a technology issue. The sustainability of our cyber security in today's globalized economy also relies on inter-agency cooperation, public-private partnership and global alliance. Due to borderless nature of cyber space and transnational cyber threats, cyber security requires close collaborations between security practitioners, industrial players, academicians, organizations, experts and researchers for the exchange of information about threats, vulnerabilities and security best practices. The collaborations intends to provide a framework for both empirical and theoretical concepts of knowledge whilst the interdisciplinary collaboration will imply a rethinking of security challenges in the digital environment.

The first priority for the domestic cyber security is to implement an effective cyber security strategy and policies, and to extend all possible supports to the other entities in their legitimate requests for cyber security co-operation. No Government can work alone in maintaining cyber security and thus, there is a need for Public-Private Partnership. This can be realized by bringing together various cyber security experts to share, elaborate and debate various relevant cyber security issues and challenges, as well as to examine likely security risks in coming up with an effective cyber security strategy. In addition, the partnership is to further explore suitable co-operation that may lead to strategic collaborative programs. As the way forward, the Government, industry, academia and individual experts should continue the discussion on cyber security that will enable collective actions, the setting and measuring of goals and implementation within those areas, and other related priorities. This is a clear demonstration of Public-Private Partnership where the government and non-governmental entities within the cyber security eco-system can work together in terms of exchange of ideas as well as sharing information, experience and expertise.



It is imperative to view the underlying eco-system as one would view other domains, in that all the necessary supply and demand endpoints must be properly identified and acted upon accordingly. With regard to cyber security, rather than just serving as the subject matter expert for the government entities, CyberSecurity Malaysia is also uniquely positioned at an interchanging point that can bridge both the supply and demand side of the eco-system. This is achieved due to the fact that CyberSecurity operates itself as a company limited by guarantee and thus enables it to react to issues and propositions and to foster cooperation at a much faster pace.

For the same reason, CyberSecurity Malaysia is often at the forefront in providing specialized technical support and services, including capacity building, in the area of cyber security to several government ministries and agencies. Such services include mediating inter-agency collaborations in crucial areas such as cyber security regulatory compliance and enforcement with the Law Enforcement Agencies

(LEA), and taking the task of attending to their requirements by lending its expertise in various investigative works that includes the extraction and preservation of digital evidences. To promote the local industry growth in cyber security, CyberSecurity Malaysia is also supporting the local cyber security R&D and industry development through various collaborative initiatives with relevant agencies.

Cyber Security Center of Excellence

The CyberSecurity Malaysia's analysis on the evolving state of cyber security reveals that threats continue to grow and the risks multiply in parallel with the development of digital technology. Meanwhile, there are continuous challenges of understanding threats and risks, and cyber-protection amongst organizations. In view of this, to further drive the national cyber security initiatives, cyber security should be poised to provide leadership and specialized services to the related user segments.

This can be realized through the establishment of National Centre of Excellence (CoE) focusing on exploring cyber security new areas as well as developing more proactive and innovative measures in mitigating cyber threats that are expected to rise exponentially in the coming years. To achieve this end, there will also be the need to cater for the best in class talents via the development of qualified and internationally certified cyber security professionals; and to foster smart partnerships with local and international cyber security players that share the same goals and aspiration.

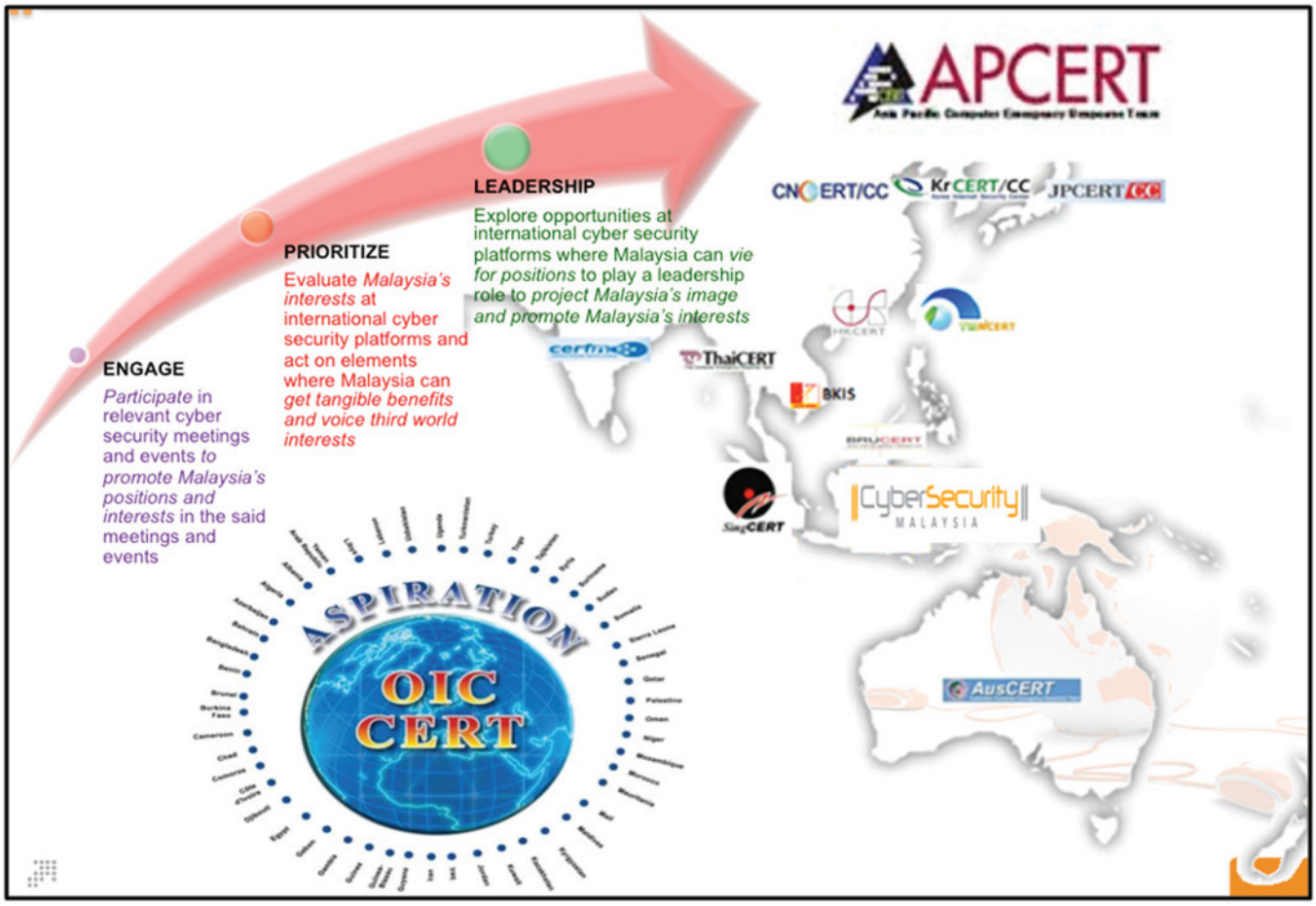
Apart from above, cyber security transformation strategy also needs to

be in place to steer the move towards internationalization by encouraging the adoption of new strategic business and sustainable model that is well prepared and accommodates for the challenges of an increasingly borderless world. Correspondingly, the cyber security community will need to promote for the Intellectual Properties (IP), standardized process, methodology and delivery model as the competitive edge for corporations and ensure that all the necessary regulations and provisions are in place in order for them to thrive.

Enhancing Global Collaborative Efforts

Recognizing cyber threats as trans-border in nature, Malaysia has also strengthened international cooperation with global key players in cyber security. As an agency responsible for ensuring the nation's e-security, CyberSecurity Malaysia is committed in cultivating and promoting international cooperation with various international organizations namely the Organization of Islamic Cooperation - Computer Emergency Response Team (OIC CERT) and the Asia Pacific - Computer Emergency Response Team (APCERT). Currently, CyberSecurity Malaysia is the chair of the OIC-CERT since year 2009; the secretariat of the OIC-CERT starting in 2013 until 2015; and a member of the APCERT steering committee since 2003.

Current global collaborative efforts taken by Malaysia via CyberSecurity Malaysia have been in line with the objectives of such engagements in which the aim was to initially set out to participate in relevant cyber security forums, conferences, meetings and events in order to promote Malaysia's position and interests. This is later to be followed by looking back at the nation's interests at international



cyber security platforms and act upon elements where Malaysia can promote our ideas; and eventually arrive at a solidified stage where Malaysia can vie for positions to play a leadership role and project Malaysia's image and promote for the interests of Malaysia and at the same time for the region, affiliations and organizations that it subscribes to.

Conclusion

Cyber threats are growing in sophistication in parallel with digital revolution and they would remain as global security concerns in years to come. Malaysia has already expressed a great concern about enhancing cyber security posture in line with the Digital Malaysia initiative towards the nation's transformation into a digital economy. There is no doubt that cyber security will spur innovation, creativity and productivity in order to multiply the potential for knowledge sharing and wealth creation, as well as providing ample opportunities in enhancing prosperity among citizens and businesses.

Digital transformation is more than mere deployment of technology. Rather it is about preparing the nation to meet the cyber security challenges of a globalized digital economy. Hence, the incorporation of cyber security as a central strategy into Malaysia's digital initiatives is paramount in order to achieve a truly digital nation. It is done through the formulation of a more innovative and evolutionary cyber security approach in order to keep abreast with the rapidly changing cyber threat environment. Such approach includes, amongst others, the enhancement of Public-Private Partnership that reflects a close collaboration and combination amongst the good talents from the Government and private sectors to imply a rethinking of new security challenges.

Whilst at the same, as part of global community, Malaysia should continue to strengthen its international cooperation to respond to global cyber challenges. With such holistic approach, we hope to be able to operate within and benefit from the advantages of a secure, resilient and trusted digital environment, hence realizing the country's shift to digital economy with high value-added services, high technology, knowledge intensive and innovation-based industries.

CHAPTER 08

INTERNET SECURITY THREAT REPORT 2013

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Introduction

Symantec has established some of the most comprehensive sources of Internet threat data in the world through the Symantec™ Global Intelligence Network, which is made up of approximately 69 million attack sensors and records thousands of events per second. This network monitors threat activity in over 157 countries and territories through a combination of Symantec products and services such as Symantec DeepSight™ Threat Management System, Symantec™ Managed Security Services and Norton™ consumer products, and other third-party data sources.

In addition, Symantec maintains one of the world's most comprehensive vulnerability databases, currently consisting of more than 51,644 recorded vulnerabilities (spanning more than two decades) from over 16,687 vendors representing over 43,391 products.

Spam, phishing, and malware data is captured through a variety of sources, including the Symantec Probe Network, a system of more than 5 million decoy accounts; Symantec.cloud and a number of other Symantec security technologies. Skeptic™, the Symantec.cloud proprietary heuristic technology, is able to detect new and sophisticated targeted threats before reaching customers' networks. Over 3 billion email messages and more than 1.4 billion Web requests are processed each day across 14 data centers. Symantec also gathers phishing information through an extensive antifraud community of enterprises, security vendors, and more than 50 million consumers.

Symantec Trust Services provides 100 percent availability and processes over 4.5 billion Online Certificate Status Protocol (OCSP) look-ups per day, which are used for obtaining the revocation status of X.509 digital certificates around the world.

These resources give Symantec's analysts unparalleled sources of data with which to identify, analyze, and provide informed commentary on emerging trends in attacks, malicious code activity, phishing, and spam. The result is the annual Symantec Internet Security Threat Report, which gives enterprises, small businesses, and consumers the essential information to secure their systems effectively now and into the future.

Executive Summary

Threats to online security have grown and evolved considerably in 2012. From the threats of cyberespionage and industrial espionage to the widespread, chronic problems of malware and phishing, we have seen constant innovation from malware authors. We have also seen an expansion of traditional threats into new forums. In particular, social media and mobile devices have come under increasing attack in 2012, even as spam and phishing attacks via traditional routes have fallen. Online criminals are following users onto these new platforms.

The most important trends in 2012 were:

Small Businesses Are the Path of Least Resistance for Attackers

Last year's data made it clear that any business, no matter its size, was a potential target for attackers. This was not a fluke. In 2012, 50 percent of all targeted attacks were aimed at businesses with fewer than 2,500 employees. In fact, the largest growth area for targeted attacks in 2012 was businesses with fewer than 250 employees; 31 percent of all attacks targeted them.

This is especially bad news because based on surveys conducted by Symantec, small businesses believe they are immune to attacks targeted at them. However, money stolen from a small business is as easy to spend as money stolen from a large business. And while small businesses may assume that they have nothing a targeted attacker would want to steal, they forget that they retain customer information, create intellectual property, and keep money in the bank. While it can be argued that the rewards of attacking a small business are less than what can be gained from a large enterprise, this is more than compensated by the fact that many small companies are typically less careful in their cyberdefenses. Criminal activity is often driven by crimes of opportunity. With cybercrimes, that opportunity appears to be with small businesses.

Even worse, the lack of adequate security practices by small businesses threatens all of us. Attackers deterred by a large company's defenses often choose to breach the lesser defenses of a small business that has a business relationship with the attacker's ultimate target, using the smaller company to leap frog into the larger one.

Additionally, small businesses and organizations can become pawns in more sophisticated attacks. Driven by attack toolkits, in 2012 the number of Web-based attacks increased by one third and many of these attacks originated from the compromised websites of small businesses. These massive attacks increase the risk of infection for all of us. But even more nefariously, as reported in our Elderwood white paper last year, the websites of small businesses and organizations are even being used in targeted attacks. Supplementing their phishing attacks, cyberespionage gangs now hijack these websites, lying in wait for their targets to visit so that they can infect them. This type of attack, called a watering hole, is another way attackers leverage weak security of one entity to defeat the strong security of another.

Malware Authors Act as Big Brother

If you think someone is violating your privacy online, you are probably right. Fifty percent of mobile malware created in 2012 attempted to steal our information or track our movements. Whether they are attacking our computers, mobile phones or social networks, Cyber-criminals are looking to profit by spying on us. Their ultimate goal is to make money. Their method is to learn our banking information, the phone numbers and email addresses of our friends and business associates, our personal information, and even how to become us by stealing our identity.

But the most ominous example of malware authors knowing all about us is in targeted attacks. Creating successful targeted attacks requires attackers to learn about us. They will research our email addresses, our job, our professional interests, and even the conferences we attend and the websites we frequent. All of this information is compiled to launch a successful targeted attack. Once on our devices, the attacker's tools are designed to pull as much data as possible. Undiscovered targeted attacks can collect years of our email, files, and contact information. These tools also contain the ability to log our keystrokes, view our computer screens, and turn on our computers' microphones and cameras. Targeted attackers truly act as an Orwellian incarnation of Big Brother. Those jobs most targeted for attack in 2012 were knowledge workers who create the intellectual property that attackers want (27 percent of all targets in 2012) and those in sales (24 percent in 2012). Interest in targeting the CEO of an organization waned in 2012; those attacks decreased by 8 percent.

With Mobile, It's Not the Vulnerability that Will Get You

As expected, the amount of mobile malware in 2012 continues to rise. 2012 saw a 58 percent increase in mobile malware families compared to 2011. The year's total now accounts for 59 percent of all malware to-date. With a 32 percent increase in the number of vulnerabilities reported in mobile operating systems, it might be tempting to blame them for the increase. However, this would be wrong. In the PC space, a vulnerability drives attacks as new vulnerabilities are incorporated into commonly available toolkits. The more they're used, the faster they spread. This is not occurring in the mobile space. Today, mobile vulnerabilities have little or no correlation to mobile malware. In fact, while Apple's iOS had the most documented vulnerabilities in 2012, there was only one threat created for the platform. Compare this to the Android OS; although only thirteen vulnerabilities were reported, it led all mobile operating systems in the amount of malware written for the platform.

Vulnerabilities likely will become a factor in mobile malware, but today Android's market share, the openness of the platform, and the multiple distribution methods available to applications embedded with malware make it the go-to platform of malware authors.

Zero-day Vulnerabilities Available When Attackers Need Them

Zero-day vulnerabilities continue to trend upward; 14 were reported in 2012. In the last three years much of the growth in zero-day vulnerabilities used in attacks can be attributed to two groups; the authors of Stuxnet and the Elderwood Gang. In 2010, Stuxnet was responsible for 4 of the 14 discovered zero-day vulnerabilities. The Elderwood Gang was responsible for 4 of the 14 discovered in 2012. The Elderwood Gang also used zero-day threats in 2010 and 2011, and they've used at least one so far in 2013.

Attackers use as many zero-day vulnerabilities as they need, not as many as they have. And Stuxnet and Elderwood make for an interesting contrast in the strategy of their use. Stuxnet remains the aberration, using multiple zero-day exploits in one attack. From what we know today, it was a single attack that was directed at a single target. Multiple zero-day exploits were used to ensure success so they would not need to attack a second time.

By contrast the Elderwood Gang has used one zero-day exploit in each attack, using it continually until that exploit becomes public. Once that occurs they move on to a new exploit. This makes it seem that the Elderwood Gang has a limitless supply of zero-day vulnerabilities and is able to move to a new exploit as soon as one is needed. It is our hope that this is not the case.

Attribution Is Never Easy

Some targeted attacks make no attempt to stay undetected. A piece of malware named Shamoon was discovered in August. Its purpose was to wipe computer hard drives of energy companies in the Middle East. A group calling itself the "Cutting Sword of Justice" claimed responsibility. Throughout 2012, DDoS attacks were launched against financial institutions. A group called Izz ad-Din al-Qassam Cyber Fighters claimed responsibility.

These attacks and others appear to be classic cases of hacktivism. However, proving attribution and motive are not easy, even when someone claims responsibility. There has been much speculation, some reportedly from the intelligence community, that the Cutting Sword of Justice and the Qassam Cyber Fighters are fronts for a nation state. Complicating what appeared to be simple hactivism even further is the FBI's warning to financial institutions that some DDoS attacks are actually being used as a "distraction." These attacks are launched before or after cybercriminals engage in an unauthorized transaction, and are an attempt to avoid discovery of the fraud and prevent attempts to stop it.

2012 Security Timeline

01 January

Data breach:
24 million identities stolen in data breach at Zappos apparel company.

Malcode:
A scam involving malicious browser plug-ins for Firefox and Chrome is discovered.

02 February

Botnet:
Kelihos botnet returns, four months after being
taken down.

Mobile:
Google announces Google Bouncer, an app scanner for the Google Play market.

03 March

Botnet:
Researchers take down new variant of the Kelihos botnet, which reappears in a new form later in the month.

Hacks:
Six individuals are arrested as alleged members of the hacking collective LulzSec.

Botnet:
Security researchers take down key servers for the Zeus botnet.

Data breach:
A payment processor for a number of wellknown credit card companies, including Visa and MasterCard was compromised, exposing details of 1.5 million accounts.[1]

Mobile:
A non-malware-based scam involving the Opfake gang is found that targets iPhone users.

04 April

Mac:
Over 600,000 Mac computers are infected by the OSX.Flashback Trojan through an unpatched Java exploit.

Mac:
A second Mac Trojan is discovered, OSX.Sabpab, which also uses Java exploits to compromise a computer.

05 May

Social networking:
Scammers are discovered leveraging social networks Tumblr and Pinterest.

Malware:
The cyberespionage threat W32.Flamer is discovered.

Certificate Authorities:
Comodo, a large Certificate Authority, authenticated and issued a legitimate codesigning certificate to a fictitious organization run by cybercriminals. This was not discovered until August.

06 June

Data breach:
LinkedIn suffers data breach, exposing millions of accounts.

Malware:
A Trojan by the name of Trojan.Milicenso is discovered, which causes networked printers to print large print jobs containing illegible characters.

07 July

Botnet:
Security researchers disable the Grum botnet.

Malware:
Windows malware is discovered in Apple's App Store, embedded in an application.

Mac:
A new Mac threat called OSX.Crisis opens a back door on compromised computers.

Botnet:
DNS servers, maintained by the FBI in order to keep computers previously infected with the DNSChanger Trojan safe, are shut off.

Malware:
A Trojan used to steal information from the Japanese government is discovered after being in operation for two years.

Malware:
A second printer-related threat called W32.Printlove, which causes large print jobs to print garbage, is discovered.

08 August

Hacks:
Reuters news service suffers a series of hacks resulting in fake news stories posted on its website and Twitter account.

Malware:
Crisis malware is discovered targeting VMware® virtual machine images.

Malware:
W32.Gauss is discovered. The scope of the threat is concentrated in the Middle East, in a similar way to W32.Flamer.

Certificate Authorities:
Comodo incident from May discovered and
details published.

09 September

Malware:
A new version of the Blackhole attack toolkit, dubbed Blackhole 2.0, is discovered.

Botnet:
Security researchers disable an up-and-coming botnet known as "Nitol."

Mobile:
A vulnerability is discovered in Samsung's
version of Android™ that allows a phone to be remotely wiped.

DDoS:
FBI issues warning about possible DDoS attacks against financial institutions as part of a "distraction" technique.[2]

10 October

Malware:
A ransomware threat distributed through Skype IM is discovered.

Data breach:
Customer data is stolen from Barnes & Noble payment keypads.

Attackers are discovered using a DDoS attack as a distraction in order to gather information that allowed them to later steal money from a targeted bank.

11 November

Hacks:
Burglars found using a known exploit in a brand of hotel locks to break into hotel rooms.

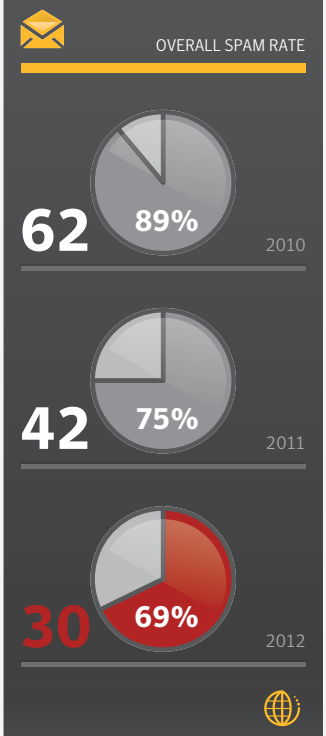
12 December

Malware:
Infostealer.Dexter Trojan horse discovered targeting point-of-sale systems.

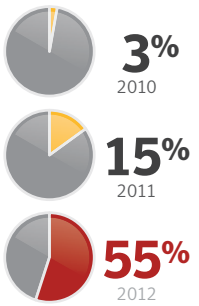
Hacks:
Attackers exploit a vulnerability in Tumblr, spreading spam throughout the social network.

2012 in numbers

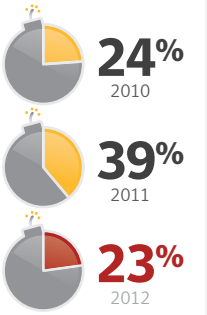
Estimated Global Email Spam Per Day
(in billions)



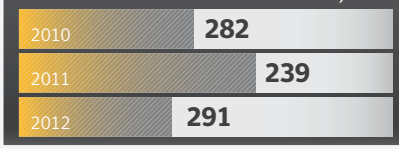
% of All Spam with Dating & Sexual



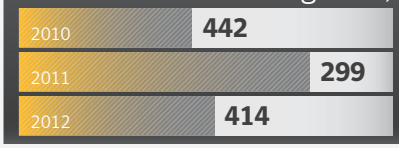
% of All Email Malware as URL



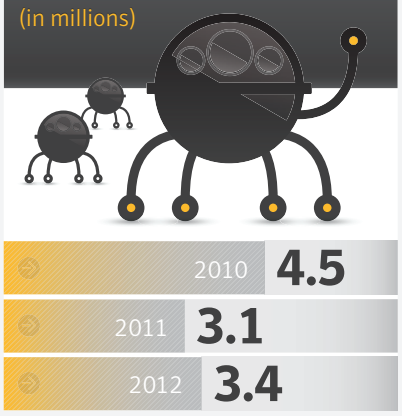
Overall Email Virus Rate, 1 In:



Overall Email Phishing Rate, 1 In:

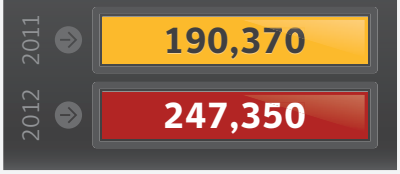


Bot Zombies
(in millions)

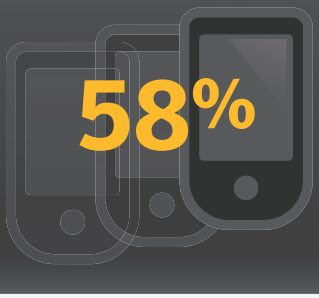


New Zero-Day Vulnerabilities

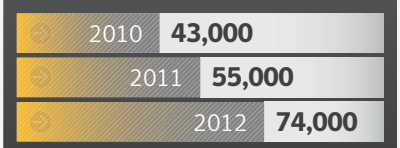
Web Attacks Blocked Per Day



Mobile Malware Families Increase
2011–2012



New Unique Malicious Web Domains



TARGETED ATTACKS HACKTIVISM AND DATA BREACHES

Introduction

"Just as nuclear was the strategic warfare of the industrial era, cyberwarfare has become the strategic war of the information era," says U.S. Secretary of Defense Leon Panetta.[3] Cyberespionage and cybersabotage are already a reality.

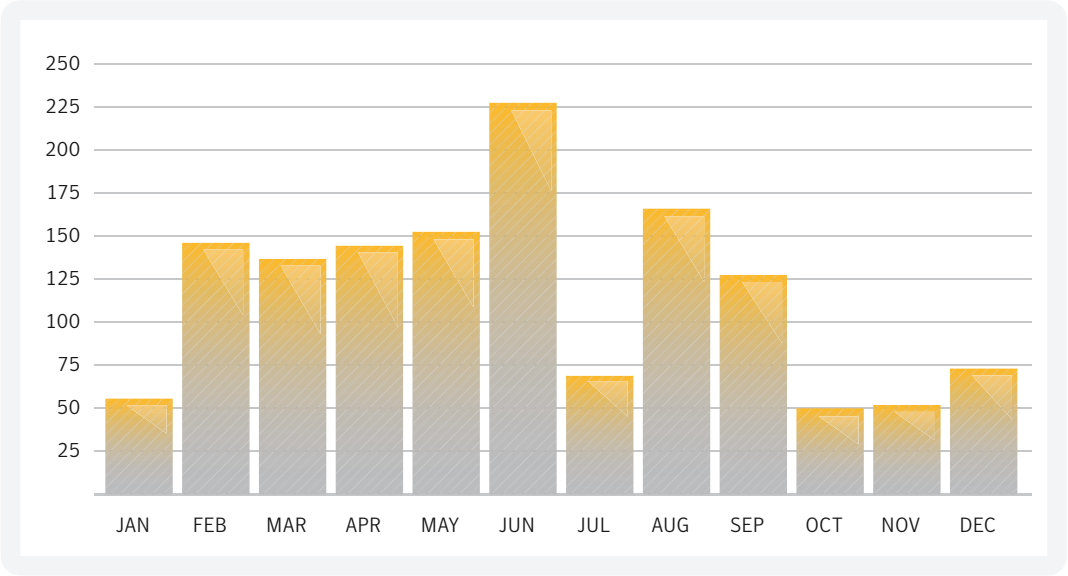
Outside the realm of states and their proxies, corporate spies are using increasingly advanced techniques to steal company secrets or customer data for profit. Hactivists with political and antibusiness agendas are also busy.

The string of media revelations about security breaches this year suggests that the business world is just as vulnerable to attack as ever

At a Glance

- Targeted attack global average per day: 116.
- Increasing levels of industrial espionage and data theft.
- More insidious targeted attacks, with new "watering hole" attacks and sophisticated social engineering.
- Fewer big data breaches, but the median number of identities stolen per breach has increased by 3.5 times.

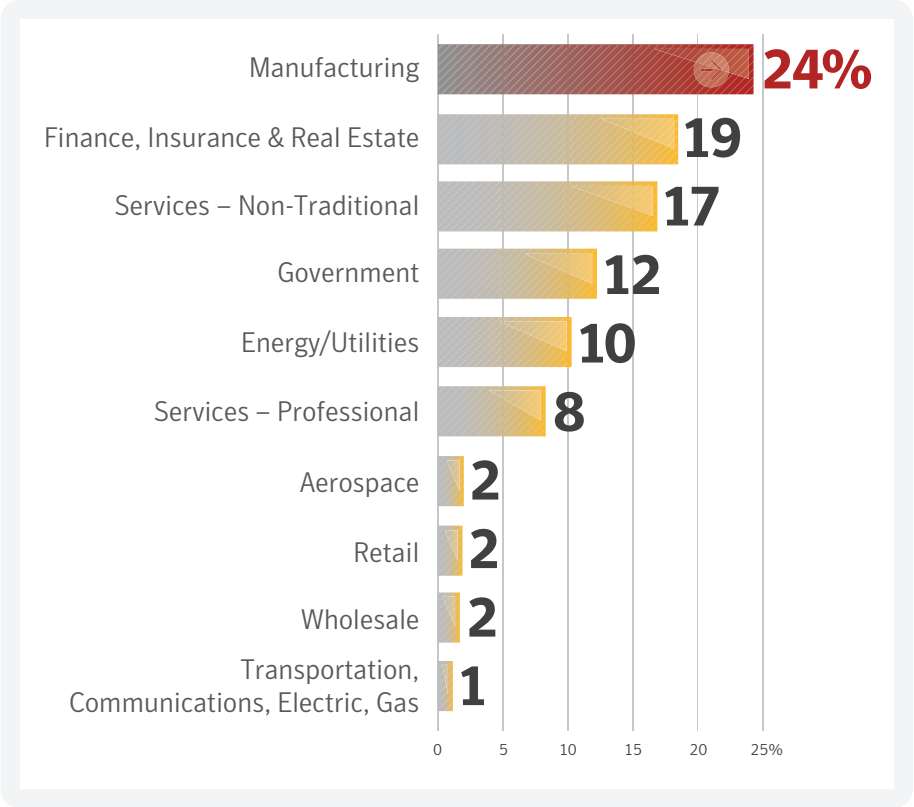
Data



Targeted Attacks Per Day in 2012
Source: Symantec

We witnessed one large attack in April against a single client that more than doubled the number of attacks per day for that month; and while events like this are extremely rare, we have not included it in this calculation in order to portray a more realistic outlook. This incident would have skewed the global annual average number of attacks per day from 116 to 143.

This client was a large banking organization, who had not previously been a Symantec customer, and approached Symantec for help to remove an existing infection. The infection was removed; however, a large wave of targeted attacks followed as the attackers sought to regain access, ultimately failing.

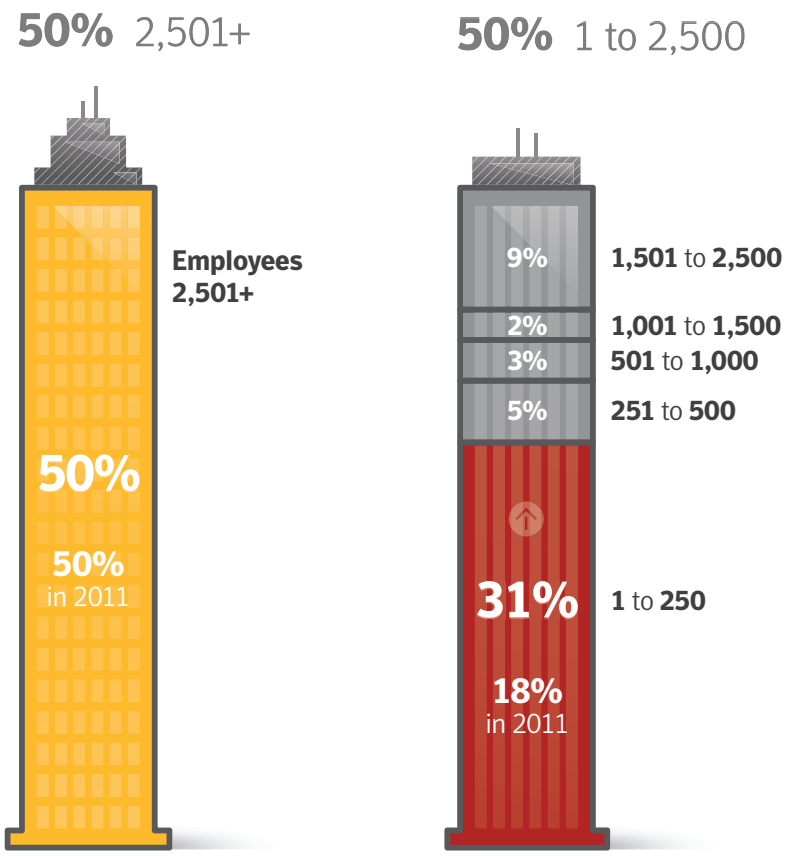


Manufacturing was the most-targeted sector in 2012, with 24 percent of targeted attacks destined for this sector, compared with 15 percent in 2011. Attacks against government and public sector organizations fell from 25 percent in 2011, when it was the most targeted sector, to 12 percent in 2012. It's likely the frontline attacks are moving down the supply chain, particularly for small to medium-sized businesses. (Categories based on Standard Industrial Classification codes.)

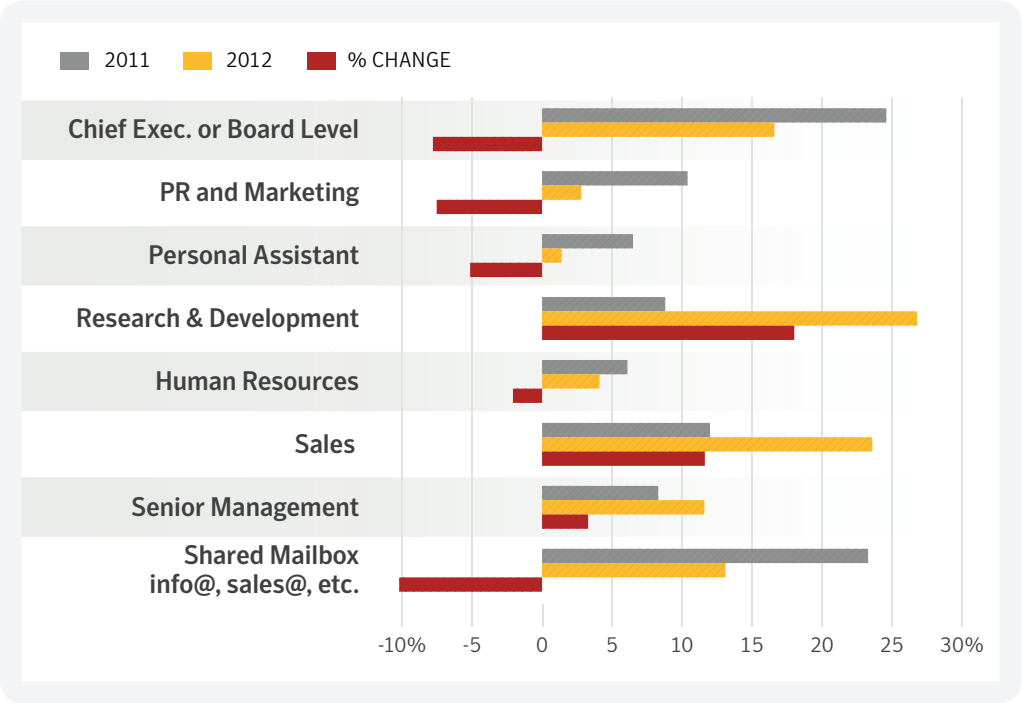
Top 10 Industries Attacked in 2012
Source: Symantec

Organizations with 2,501+ employees were the most targeted with 50 percent of targeted attacks destined for this size of organization, almost exactly the same percentage as in 2011. The volume of targeted attacks against organizations with 2,501+ employees doubled compared with 2011, although its overall percentage remains the same at 50 percent.

Targeted attacks destined for Small Business (1 to 250 employees) accounted for 31 percent of all attacks, compared with 18 percent in 2011, an increase of 13 percentage points. The volume of attacks against SMBs increased threefold, compared with 2011, resulting in its percentage almost doubling from 18 percent to 31 percent.



Attacks by Size of Targeted Organization
Source: Symantec



In 2012, the most frequently targeted job role was in R&D, which accounted for 27 percent of attacks (9 percent in 2011). The second most notable increase was against sales representatives, probably because their contact details are more widely available in the public domain, with 24 percent of attacks in 2012 versus 12 percent in 2011. In 2011, C-level executives were the most targeted, with 25 percent, but this number fell to 17 percent in 2012.

Targeted Attack Recipients by Role in 2012
Source: Symantec

DDoS Used as a Diversion

In September, the FBI issued a warning to financial institutions that some DDoS attacks are actually being used as a "distraction." These attacks are launched before or after cybercriminals engage in an unauthorized transaction and are an attempt to avoid discovery of the fraud and prevent attempts to stop it.

In these scenarios, attackers target a company's website with a DDoS attack. They may or may not bring the website down, but that's not the main focus of such an attack; the real goal is to divert the attention of the company's IT staff towards the DDoS attack. Meanwhile, the hackers attempt to break into the company's network using any number of other methods that may go unnoticed as the DDoS attack continues in the background.[4]

Data Breaches

The overall number of data breaches is down by 26 percent, according to the Norton Cybercrime Index,[5] though over 93 million identities were exposed during the year, a decrease of 60 percent over last year. The average number of identities stolen is also down this year: at 604,826 per breach, this is significantly smaller than the 1.1 million per breach in 2011.

So why are the number of breaches and identities stolen down in 2012? For starters, there were five attacks in which more than 10 million identities were stolen in 2011. In 2012 there was only one, which results in a much smaller spread from the smallest to the largest data breach. However, the median number—the midpoint of the data set—increased by 3.5 times in 2012, from 2,400 to 8,350 per breach.

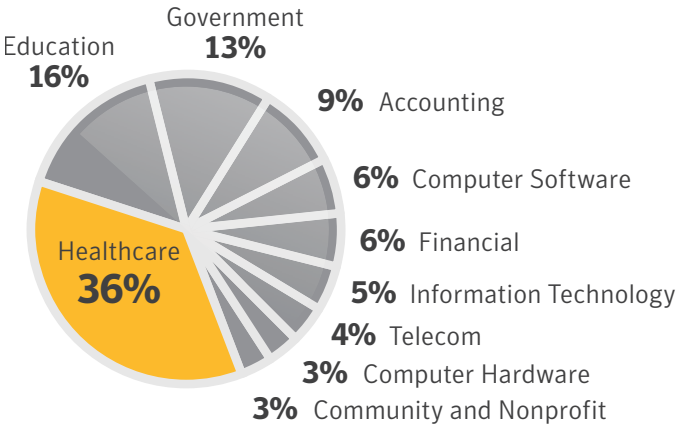
Using the median is a useful measure because it ignores the extremes, the rare events that resulted in large numbers of identities being exposed, and is more representative of the underlying trend.

Part of the wide difference between data breaches in 2011 and 2012 is likely down due to a concerted effort by the notorious hacker groups Anonymous and LulzSec to publicize hacks during 2011—something that was not seen to the same extent in 2012. It's possible that companies are paying more attention to protecting customer databases or that hackers have found other, more valuable targets, or that they are still stealing the data but not being detected.

Healthcare, education, and government accounted for nearly two-thirds of all identities breached in 2012. This suggests that the public

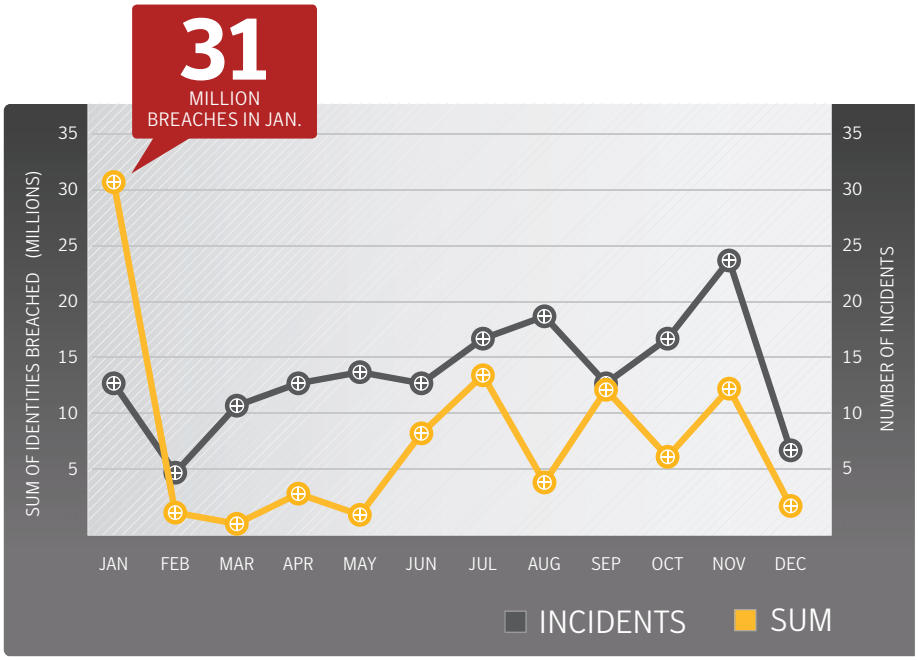
sector should further increase efforts to protect personal information, particularly considering how these organizations are often looked upon as the custodians of information for the most vulnerable in society. Alternatively, this could indicate that the private sector may not be reporting all data breaches, given how many public sector organizations are required by law to report breaches.

The vast majority (88 percent) of reported data breaches were due to attacks by outsiders. But it is safe to assume that unreported data breaches outnumber reported ones. Whether it is lost laptops, misplaced memory sticks, deliberate data theft by employees or accidents, the insider threat also remains high. To illustrate this point, the UK Information Commissioner's Office fined and prosecuted more businesses because of insider slipups than because of outsider attacks. Most SMBs should worry about someone in accounts just as much as they should worry about an anonymous hacker.



Data Breaches by Sector in 2012
Source: Symantec

At 36 percent, the healthcare industry continues to be the sector responsible for the largest percentage of disclosed data breaches by industry.



Timeline of Data Breaches
Source: Symantec

January saw the largest number of identities stolen in 2012, due to one breach of over 24 million identities, while the numbers of the rest of the year mostly fluctuated between one and 12 million identities stolen per month.

The average number of breaches for the first half of the year was 11, and rose to 15 in the second half of the year– a 44 percent increase.

Analysis

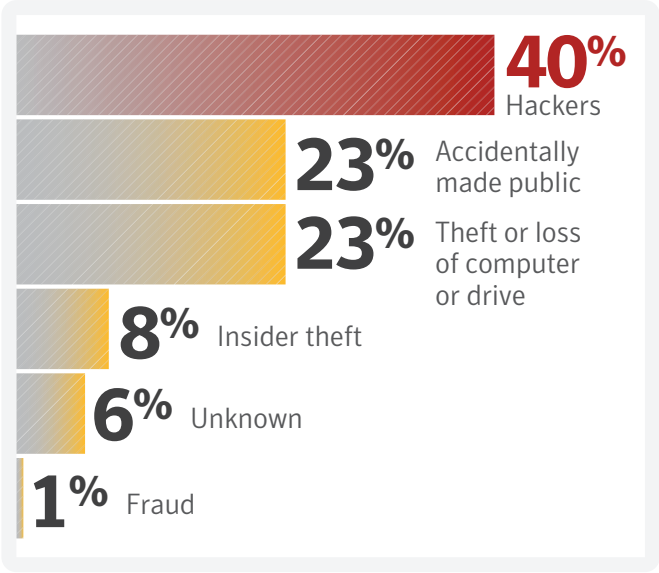
Cyberwarfare, Cybersabotage, and Industrial Espionage

Targeted attacks have become an established part of the threat landscape and safeguarding against them has become one of the main concerns of CISOs and IT managers. Targeted attacks are commonly used for the purposes of industrial espionage to gain access to the confidential information on a compromised computer system or network. They are rare but potentially the most difficult attacks to defend against.

Country	Average Cost Per Capita
U.S.	$194
Denmark	$191
France	$159
Australia	$145
Japan	$132
UK	$124
Italy	$102
Indonesia	$42

Average Cost Per Capita of a Data Breach[6]
Source: Symantec

At US$194, the United States is the country with highest in cost per capita, with Denmark a close second at $191 per capita.



Top Causes of Data Breaches in 2012
Source: Symantec

Hackers continue to be responsible for the largest number of data breaches, making up 40 percent of all breaches.

It is difficult to attribute an attack to a specific group or a government without sufficient evidence. The motivation and the resources of the attacker sometimes hint to the possibility that the attacker could be state sponsored, but finding clear evidence is difficult. Attacks that could be state sponsored, but appear to be rare in comparison with regular cybercrime, have often gained more notoriety. They can be among the most sophisticated and damaging of these types of threats. Governments are undoubtedly devoting more resources to defensive and offensive cyberwarfare capabilities. In 2012, it was still unlikely that most businesses would encounter such an attack, and the greatest risk comes from the more prevalent targeted attacks that are created for the purposes of industrial espionage. Increasingly, small to medium-sized businesses (SMB) are finding themselves on the frontline of these targeted attacks as they have fewer resources to combat the threat and a successful attack here may subsequently be used as the springboard to further attacks against a larger organization to which they may be a supplier.

Malware such as Stuxnet in 2010, Duqu in 2011, and Flamer and Disttrack in 2012 show increasing levels of sophistication and danger. For example, the malware used in the Shamoon attacks on a Saudi oil firm had the ability to wipe hard drives.[7]

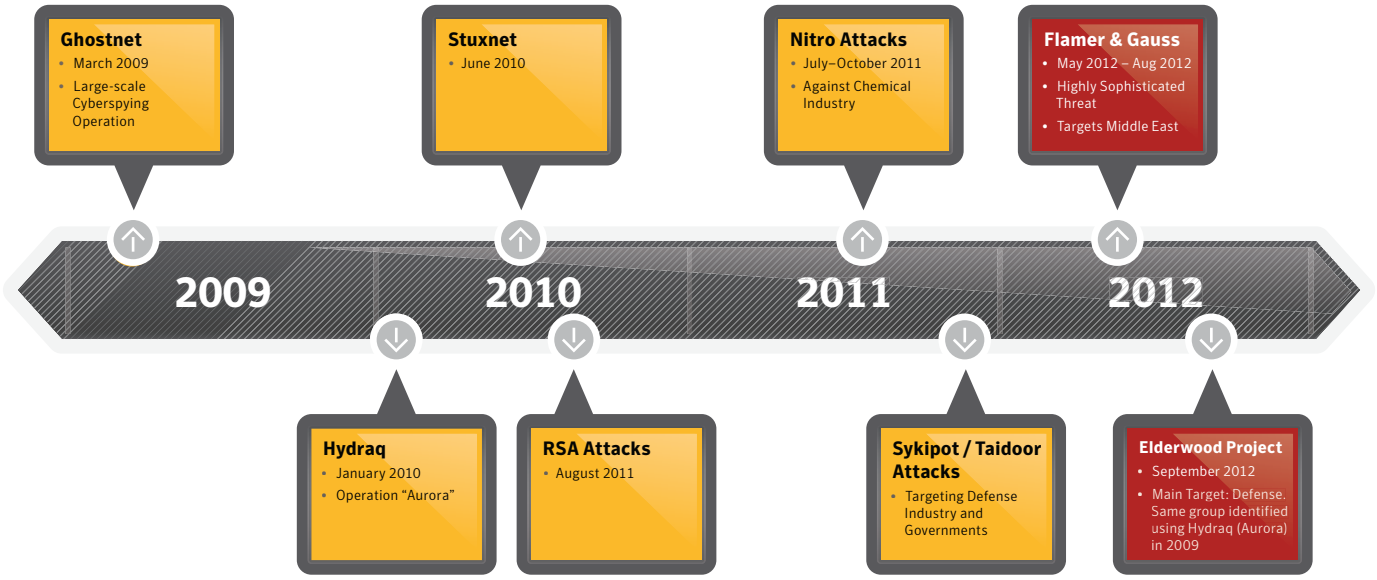
The same techniques used by cybercriminals for industrial espionage, may also be used by states and state proxies for cyber attacks and political espionage. Sophisticated attacks may be reverse-engineered and copied so that the same or similar techniques can be used in less discriminate attacks.

A further risk is that malware developed for cybersabotage may spread beyond its intended target and infect other computers in a kind of collateral damage.

Advanced Persistent Threats and Targeted Attacks

Targeted attacks combine social engineering and malware to target individuals in specific companies with the objective of stealing confidential information such as trade secrets or customer data. They often use custom-written malware and sometimes exploit zero-day vulnerabilities, which makes them harder to detect and potentially more infective.

Targeted attacks use a variety of vectors as their main delivery mechanism, such as malware delivered in an email, or driveby downloads from an infected website the intended recipient is known to



Timeline of Targeted Attacks[8]
Source: Symantec

frequent, a technique known as a "watering hole" attack.

APTs are often highly sophisticated and more insidious than traditional attacks, relying on highly customized intrusion techniques. While targeted attacks are growing increasingly more common, the resources required to launch an advanced persistent threat campaign means they are limited to wellfunded groups attacking high-value targets.

Symantec saw a 42 percent increase in the targeted attack rate in 2012 compared with the preceding 12 months. While the manufacturing industry has become the main target accounting for 24 percent of attacks, we also saw a wide range of companies coming under attack, not only large businesses, but increasingly SMBs as well. In 2011, 18 percent of targeted attacks were aimed at companies with fewer than 250 employees, but by the end of 2012, they accounted for 31 percent.

Social Engineering and Indirect Attacks

Attackers may be targeting smaller businesses in the supply chain because they are more vulnerable, have access to important intellectual property, and offer a stepping stone into larger organizations. In addition, they are also targeted in their own right. They are more numerous than enterprises, have valuable data, and are often less well-protected than larger companies. For example, an attacker may infiltrate a small supplier in order to use it as a spring board into a larger company. They might use personal information, emails, and files from an individual in such a smaller company to create a well-crafted email aimed at someone in a target company.

In 2012, we saw a big increase in attacks on people in R&D and sales roles compared to the previous year. This suggests that attackers are casting a wider net and targeting less senior positions below the executive level in order to gain access to companies. The increase in attacks has been particularly high overall in these two areas. Still, attacks in other areas, such as back-office roles, are still a significant threat.

Attackers continue to use social engineering techniques in targeted attacks. For example, messages impersonating EU officials, messages that appear to come from security agencies in the United States and target other government officials, or messages that piggyback announcements about new procurement plans from potential government clients such as the U.S. Air Force. This shows extensive research, a sophisticated understanding of the motivation of recipients, and makes it much more likely that victims will open attachments that contain malware.

Watering Hole Attacks

The biggest innovation in targeted attacks was the emergence of watering hole attacks. This involves compromising a legitimate website that a targeted victim might visit and using it to install malware on

their computer. For example, this year we saw a line of code in a tracking script[10] on a human rights organization's website with the potential to compromise a computer. It exploited a new, zero-day vulnerability in Internet Explorer® to infect visitors. Our data showed that within 24 hours, people in 500 different large companies and government organizations visited the site and ran the risk of infection. The attackers in this case, known as the Elderwood Gang, used sophisticated tools and exploited zero-day vulnerabilities in their attacks, pointing to a wellresourced team backed by a large criminal organization or a nation state.[11]

Recommendations

Assume You're a Target.

Small size and relative anonymity are not defenses against the most sophisticated attacks. Targeted attacks threaten small companies as well as large ones. Attackers could also use your website as a way to attack other people. If you assume you are a potential target and improve your defenses against the most serious threats, you will automatically improve your protection against other threats.

Defense in Depth.

Emphasize multiple, overlapping, and mutually supportive defensive systems to guard against single-point failures in any specific technology or protection method. This should include the deployment of regularly updated firewalls, as well as gateway antivirus, intrusion detection, intrusion protection systems, and Web security gateway solutions throughout the network. Endpoints must be secured by more than signaturebased antivirus technology

Web Injection Process Used in Watering Hole Attacks[9]
Source: Symantec

Educate Employees.

Raise employees' awareness about the risks of social engineering and counter it with staff training. Similarly, good training and procedures can reduce the risk of accidental data loss and other insider risks. Train staff about the value of data and how to protect it.

Data Loss Prevention.

Prevent data loss and exfiltration with data loss protection software on your network. Use encryption to protect data in transit, whether online or via removable storage.

VULNER ABILITIES, EXPLOITS AND TOOL KITS

Introduction

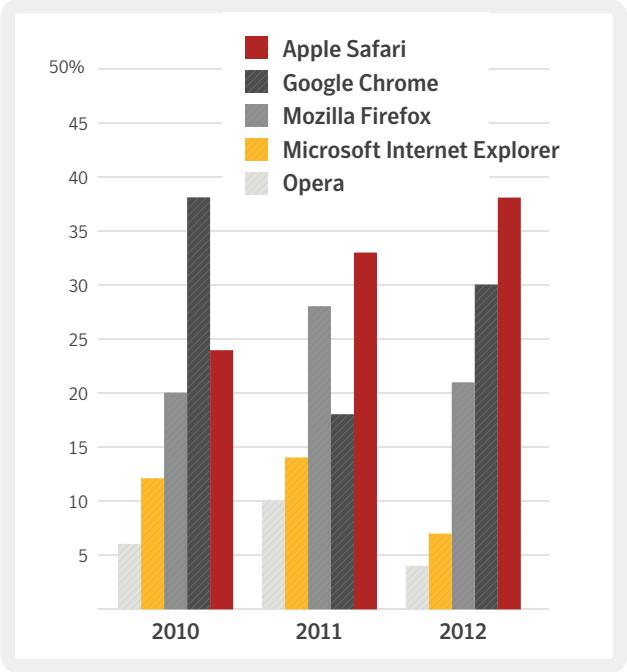
Recent research by the Ponemon Institute suggests that the cost of cybercrime rose by six percent in 2012 with a 42 percent increase in the number of cyberattacks. The cost is significant with businesses incurring an average cost of $591,780.[12] Given the increase availability of vulnerabilities and exploits it comes as no surprise that the cybercriminals have increased their ability to make a profit.

Quite a few diverse skills are needed to find vulnerabilities, create ways to exploit them, and then run attacks using them. Fortunately for the cybercriminal, a black market exists where these skills can be purchased in the form of toolkits. Hackers find and exploit and or sell vulnerabilities. Toolkit authors find or buy exploit code and incorporate it into their "products." Cybercriminals in turn buy or steal the latest versions of toolkits which allow them to run massive attacks without the trouble of learning the skills needed to run the whole operation.

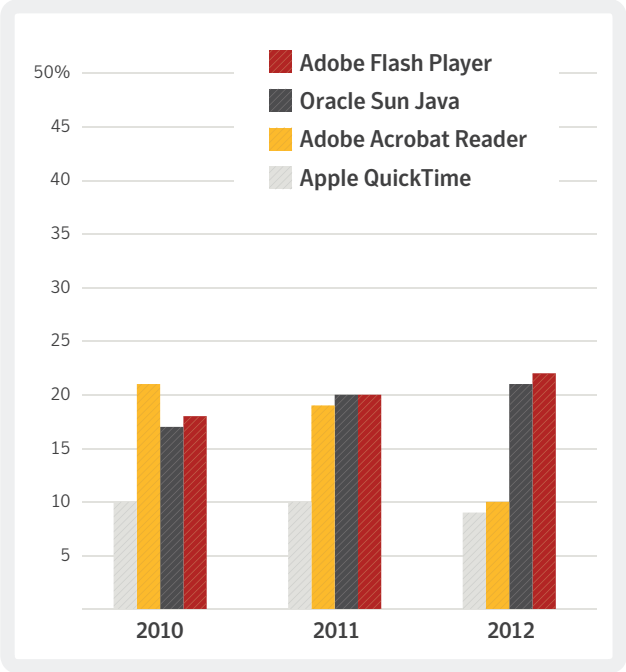
At a Glance

- Usage of zero-day vulnerabilities is up, from 8 to 14 in 2012.
- There is an increasingly sophisticated black market serving a multi-billion dollar online crime industry.
- These vulnerabilities are later commercialized and added to Web-attack toolkits, usually after they become published publicly.
- In 2012, drive-by Web attacks increased by one third, possibly driven by malvertising.
- Around 600,000 Macs were infected with Flashback malware this year.
- The Sakura toolkit, which had little impact in 2011, now accounts for approximately 22 percent of Web-based toolkit attacks, overtaking Blackhole during some points of the year.

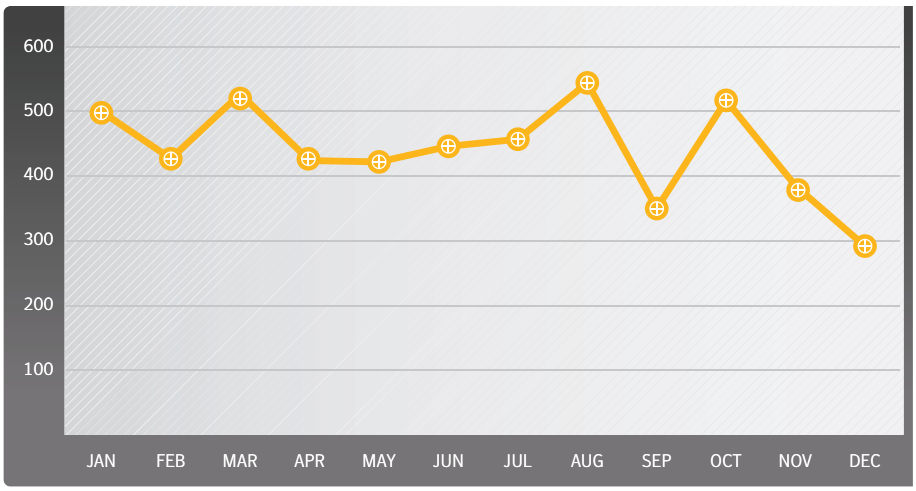
Data



Browser Vulnerabilities 2010 – 2012
Source: Symantec

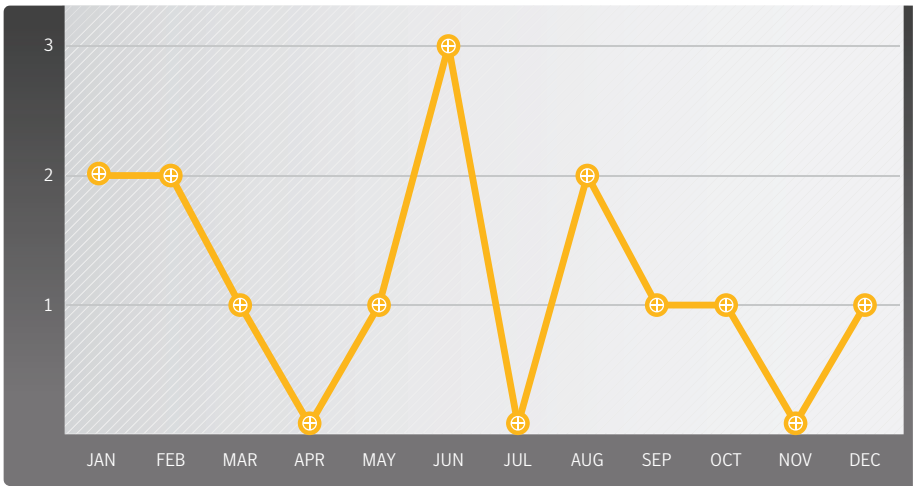


Plug-in Vulnerabilities 2010 – 2012
Source: Symantec



Total Vulnerabilities
Source: Svmantec

- There were 5,291 vulnerabilities reported in 2012, compared with 4,989 in 2011.
- Reported vulnerabilities per month in 2012 fluctuated roughly between 300 and 500 per month.
- In 2012, there were 85 public SCADA (Supervisory Control and Data Acquisition) vulnerabilities, a massive decrease over the 129 vulnerabilities in 2011.
- There were 415 mobile vulnerabilities identified in 2012, compared with 315 in 2011.



Zero-day Vulnerabilities
Source: Symantec

- A zero-day vulnerability is one that is reported to have been exploited in the wild before the vulnerability is public knowledge and prior to a patch being publicly available.
- There were 14 zero-day vulnerabilities reported in 2012.
- There were up to 3 zero-day vulnerabilities reported each month.

Analysis

Web-based Attacks on the Rise

We have seen the number of Web-based attacks increase by almost a third. These attacks silently infect enterprise and consumer users when they visit a compromised website. In other words, you can be infected simply by visiting a legitimate website. Typically, attackers infiltrate the website to install their attack toolkits and malware payloads, unbeknown to the site owner or the potential victims.

The malware payload that is dropped by Web-attack toolkits is often server-side polymorphic or dynamically generated, rendering enterprises that rely on signature-based antivirus protection unable to protect themselves against these silent attacks. A hidden piece of JavaScript™ or a few lines of code linking to another website can install malware that is very difficult to detect. It then checks the system of each visitor for browser or operating system vulnerabilities until it finds one that is likely to succeed and it uses that to install malware on the visitor's computer.

These attacks are successful because enterprise and consumer systems are not up to date with the latest patches for browser plug-ins, such as Adobe's Flash Player® and Acrobat Reader®, as well as Oracle's Java™ platform. While a lack of attentiveness can be

blamed for consumers remaining out of date, often in larger companies, older versions of these plug-ins are required to run critical business systems, making it harder to upgrade to the latest versions. Such patch management predicaments, with slow patch deployment rates, make companies especially vulnerable to Web-based attacks.

It's important to note that the volume of vulnerabilities doesn't correlate to increased levels of risk. One single vulnerability in an application may present a critical risk to an organization, if exploited successfully. Analysis of risk from vulnerabilities exploited in Web-based attack toolkits is an area that Symantec will explore further in 2013.

The key is that it's not the latest zero-day vulnerability that is responsible for the widespread success of Web-based attacks. The rate of attacks from compromised websites has increased by 30 percent, while the rate of discovery of vulnerabilities has only increased by 6 percent. In a nutshell, it's older, non-patched vulnerabilities that cause most systems to get compromised.

The Arms Race to Exploit New Vulnerabilities

We have witnessed an increase in zero-day vulnerabilities this year. There were 14 unreported vulnerabilities first seen being used in the wild in 2012. This is up from 8 in 2011. Overall, reported vulnerabilities are up slightly in 2012, from 4,989 in 2011 to 5,291 in 2012. Mobile vulnerabilities are also up, from 315 in 2011 to 415 reported in 2012.

Organized groups, such as the team behind the Elderwood attacks, have worked to discover new weaknesses in everyday software such as Web browsers and browser plug-ins. When one vulnerability becomes public, they are able to quickly deploy a new one, which speaks to the sophistication of the groups creating vulnerabilities.

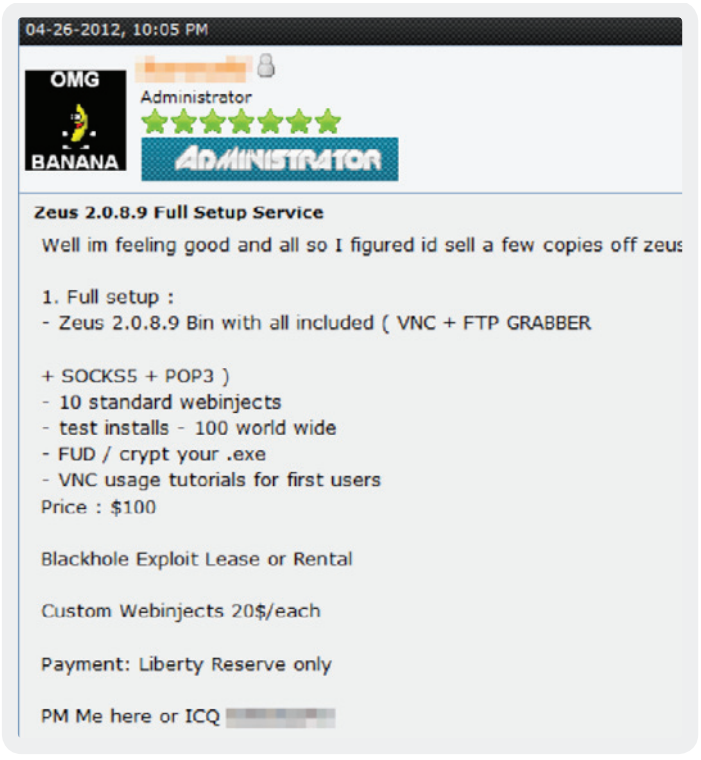
There is an arms race between Internet criminals and legitimate software developers. Criminals' ability to quickly find and exploit new vulnerabilities is not matched by software vendors' ability to fix and release patches. Some software companies only patch once a quarter; others are slow to acknowledge vulnerabilities. Even if they do a good job with updates, companies are often slow to deploy them.

While zero-day vulnerabilities present a serious security threat, known (and even patched) vulnerabilities are dangerous if ignored. Many companies and consumers fail to apply published updates in a timely way. Toolkits that target well-known vulnerabilities make it easy for criminals to target millions of PCs and find the ones that remain open to infection. In fact, the vulnerabilities that are exploited the most often are not the newest.

Malvertising and Website Hacking

How does a hacker add his code to a legitimate website? Toolkits are available that make it easy. For example, in May 2012, the LizaMoon toolkit used a SQL injection technique to affect at least a million websites.[13] Other approaches include:

- Exploiting a known vulnerability in the website hosting or content management software
- Using phishing, spyware, or social engineering to get the webmaster's password



Online advertisement for a malware toolkit.

- Hacking through the Web server backend infrastructure, such as control panels or databases
- Paying to host an advertisement that contains the infection

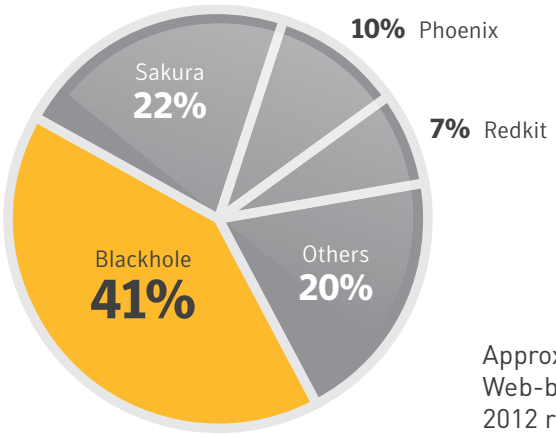
This last technique, known as malvertising, means that legitimate websites can be impacted without even being compromised. This form of attack appears to be very common. Using experimental scanning software (see "Website Malware Scanning and Website Vulnerability Assessment" later in this section), Symantec found that half of the tested sites were infected by malvertising.

Malvertising opens an avenue of attack that hackers can use to compromise a website without having to directly hack the website itself. Using these malicious ads allows them to silently infect users, often installing dynamically created malware that antivirus alone is unable to detect.

A sign of the seriousness of the problem is that Google and other search engines scan for malware and blacklist sites that contain malware. There have been occasions when prominent advertising networks have fallen prey to malvertising, impacting some of the biggest names in online media.[14] Situations like this can have a serious impact on websites whose bottom line often depends on revenue, even diminishing their credibility in the eyes of their readers. With dozens of advertising networks and constantly rotating adverts, tracking malvertising and preventing it is a huge challenge.

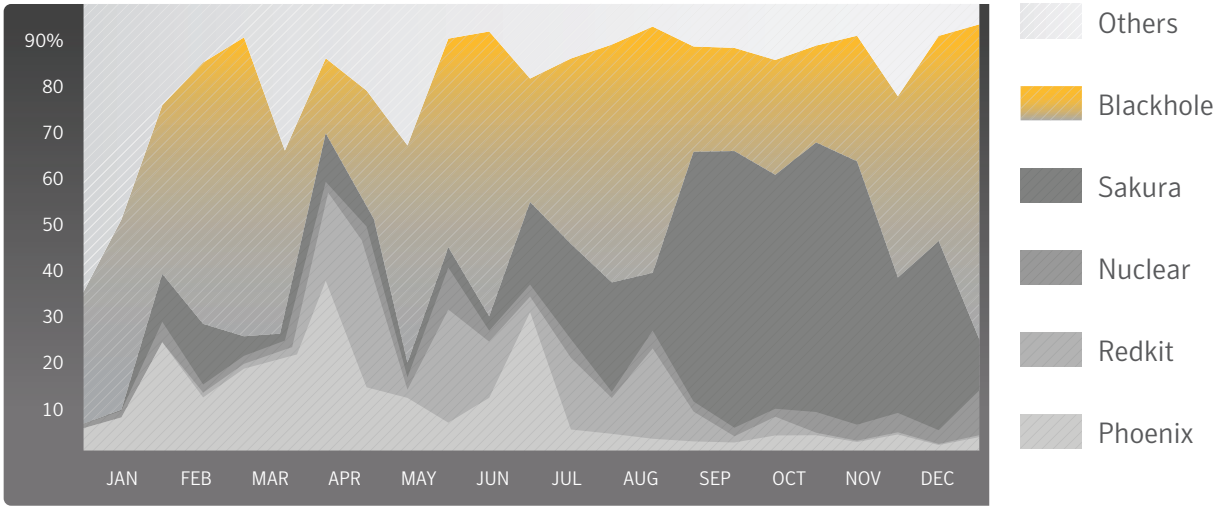
Web Attack Toolkits

It's one thing to discover new vulnerabilities, but another matter to implement a way to exploit them. Criminal entrepreneurs turn them into toolkits that less sophisticated users can buy and



Top Web Attack Toolkits by Percent
Source: Symantec

Approximately 41 percent of Web-based toolkit attacks in 2012 related to the Blackhole toolkit, compared with 44 percent in 2011. The Sakura toolkit was not in the top 10 for 2011, and now accounts for approximately 22 percent of Web-based toolkit attacks, overtaking Blackhole at some points in the year.



Web Attack Toolkits Over Time
Source: Symantec

use. Like commercial software, they even include support and warranties. Authors accept payments using online payment services with anonymous numbered accounts.

Attack toolkits exist for creating a variety of malware and for attacking websites. The popular Blackhole toolkit is a notorious example. This updating strategy suggests that it has a kind of brand loyalty and that the authors are building on that in the same way that legitimate software vendors do with their updates and new editions.

Blackhole continued to make its presence felt in 2012, making up for 41 percent of all Web-based attacks. We also saw the release of an updated version of the toolkit, dubbed Blackhole 2.0, back in September. However, Blackhole's overall dominance may have begun to decline, as another Web attack toolkit surpassed Blackhole during a few months in the latter half of 2012. Sakura, a new entrant to the market, at its peak made up as much of 60 percent of all toolkit activity, and 22 percent of overall toolkit usage in 2012.

Website Malware Scanning and Website

Vulnerability Assessment In 2012, Symantec's Trust Services (formerly VeriSign) technology scanned over 1.5 million websites as part of its Website Malware Scanning and Vulnerability Assessment services. Over 130,000 URLs were scanned for malware each day, with 1 in 532 of websites found to be infected with malware. The most common form of compromise was for the use of drive-by downloads.

Furthermore, in assessing potentially exploitable vulnerabilities on websites, over 1,400 vulnerability scans were performed each day. Approximately 53 percent of websites scanned were found to have unpatched, potentially exploitable vulnerabilities (36 percent in 2011), of which 24 percent were deemed to be critical (25 percent in 2011). The most common vulnerability found was for cross-site scripting vulnerabilities.

The Growth of Secured Connections

One of the ways to judge the growth of usage for SSL is to monitor the change in statistics for OCSP (Online Certificate Status Protocol, which is used for obtaining the revocation status of a digital certificate) and CRL (Certificate Revocation List) lookups. When an SSL secured connection is initiated, a revocation check is performed using OCSP or CRL and we track the number of lookups that go through our systems. This is a growth indicator for the number of SSL secured sessions that are performed online. This implies that more people are going online and using secured connections (for example, representing a growth of eCommerce transactions on the Web). It also may show the impact of the adoption of SSL more widely, in more places and for more uses, such as the growing use of Extended Validation SSL Certificates, which trigger browsers to indicate whether a user is on a secured site by turning the address bar green, and for "Always On SSL" (adopted heavily through 2012 by social networks, search services, and online email providers). Further, it may be a result of devices other than traditional desktops and laptops that enable online access; for example, smartphones and tablets.

In 2012, Symantec identified the average number of OCSP lookups grew by 31 percent year on year between 2011 and 2012, with more than 4.8 billion lookups performed each day in 2012. The high-water-mark of OCSP lookups was 5.8 billion in a single day in 2012. It is worth noting that OCSP is the modern revocation checking methodology.

Additionally, Symantec's CRL lookups increased by 45 percent year on year between 2011 and 2012, with approximately 1.4 billion per day, and a high-water-mark of 2.1 billion. CRL is the older lookup technology that OCSP supersedes.

Norton Secured Seal and Trust Marks

In 2012, more consumers were visiting websites with trust marks (such as the Norton Secured Seal) in 2012. Based on analysis of the statistics from Symantec's own trust marks, we saw an 8 percent increase in 2012. The Symantec trust mark was viewed up to 750 million times a day in 2012 as more online users are necessitating stronger security to safeguard their online activities.

Stolen Key-signing Certificates

2012 continued to show that organizations large and small were susceptible to becoming unwitting players in the global malware distribution network. We've seen increased activity of malware being signed with legitimate code-signing certificates. Since the malware code is signed, it appears to be legitimate, which make it easier to spread.

Malware developers often use stolen code-signing private keys. They attack Certificate Authorities and once inside their networks, they seek out and steal private keys. In other

cases, poor security practices allow them to buy legitimate certificates with fake identities. For example, in May 2012, Comodo, a large Certificate Authority, authenticated and issued a legitimate code-signing certificate to a fictitious organization run by cybercriminals.[15]

Recommendations

Use a Full Range of Protection Technology.

If the threat landscape was less advanced, then file scanning technology (commonly called antivirus) would be sufficient to prevent malware infections. However, with toolkits for building malware-on-demand, polymorphic malware and zero-day exploits, antivirus is not enough. Network-based protection and reputation technology must be deployed on endpoints to help prevent attacks. And behavior blocking and scheduled file scanning must be used to help find malware that avoid preventative defense.

Protect Your Public-facing Websites.

Consider Always On SSL to encrypt visitors' interactions with your site across the whole site, not just on the checkout or sign-up pages. Make sure you update your content management system and Web server software just as you would a client PC. Run vulnerability and malware scanning tools on your websites to detect problems promptly. To protect these credentials against social engineering and phishing, use strong passwords for admin accounts and other services. Limit login access to important Web servers to users that need it.

Protect Code-signing Certificates.

Certificate owners should apply rigorous protection and security policies to safeguard keys. This means effective physical security, the use of cryptographic hardware security modules, and effective network and endpoint security, including data loss prevention on servers involved in signing code, and thorough security for applications used to sign code. In addition, Certificate Authorities need to ensure that they are using best practices in every step of the authentication process.

Adopting an Always On SSL approach helps to safeguard account information from unencrypted connections and thus render end users less vulnerable to a man-in-the-middle attack.

Be Aggressive on Your Software Updating and Review Your Patching Processes.

The majority of Web-based attacks exploit the top 20 most common vulnerabilities. Consequently, installing patches for known vulnerabilities will prevent the most common attacks. It's essential to update and patch all your software promptly. In particular, with risks like the Flashback attacks that used Java, it's important to run the latest version of that software or do without it altogether. This is equally true for CIOs managing thousands of users, small business owners with dozens of users, or individual users at home.

Update, patch, and migrate from outdated and insecure browsers, applications, and browser plug-ins to the latest available versions using the vendors' automatic update mechanisms, especially for the top software vulnerabilities being exploited. Most software vendors work diligently to patch exploited software vulnerabilities; however, such patches can only be effective if adopted in the field. Be wary of deploying standard corporate images containing older versions of browsers, applications, and browser plug-ins that are outdated and insecure. Consider removing vulnerable plug-ins from images for employees that have no need for that software. Wherever possible, automate patch deployments to maintain protection against vulnerabilities across the organization.

SOCIAL NETWORKING MOBILE AND THE CLOUD

Introduction

Online criminals and spammers are less interested in email as an infection vector than they were. Why? Because social media is becoming so popular and it gives them many new ways to steal people's identities or personal information and infect their computers with malware.

Social media combines two behaviors that are useful for criminals: social proof and sharing. Social proofing is the psychological mechanism that convinces people to do things because their friends are doing it. For example, if you get a message on your Facebook wall from a trusted friend, you're more likely to click on it.

Sharing is what people do with social networks: they share personal information such as their birthday, home address, and other contact details. This type of information is very useful for identity thieves. For example, your social media profile might contain clues to security questions a hacker would need to reset your password and take control of your account.

People are spending more time online, and the most popular activity is for social networking. Furthermore, younger users are more commonly using mobile devices to access the Internet and social media applications.[16]

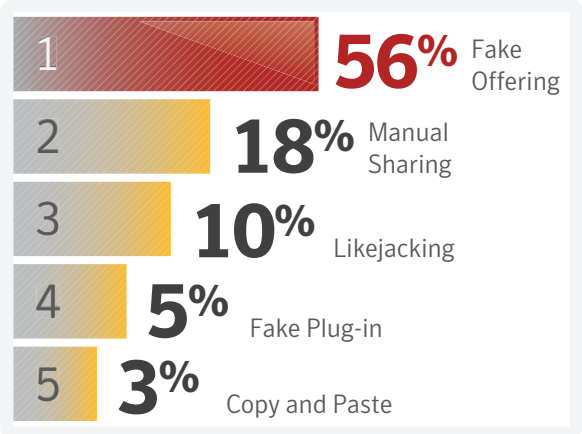
Moreover, many mobile applications frequently rely on cloudbased storage, and without an Internet connection are often limited in their functionality. Many more people and businesses are routinely using cloud-based systems, sometimes without even realising it.

The bank robber Willie Sutton famously explained why he robbed banks: "Because that's where the money is." Online criminals target social media because that's where the victims are.

Facebook users can report potential Facebook phishing scams to the company through the following email address: phish@fb.com.

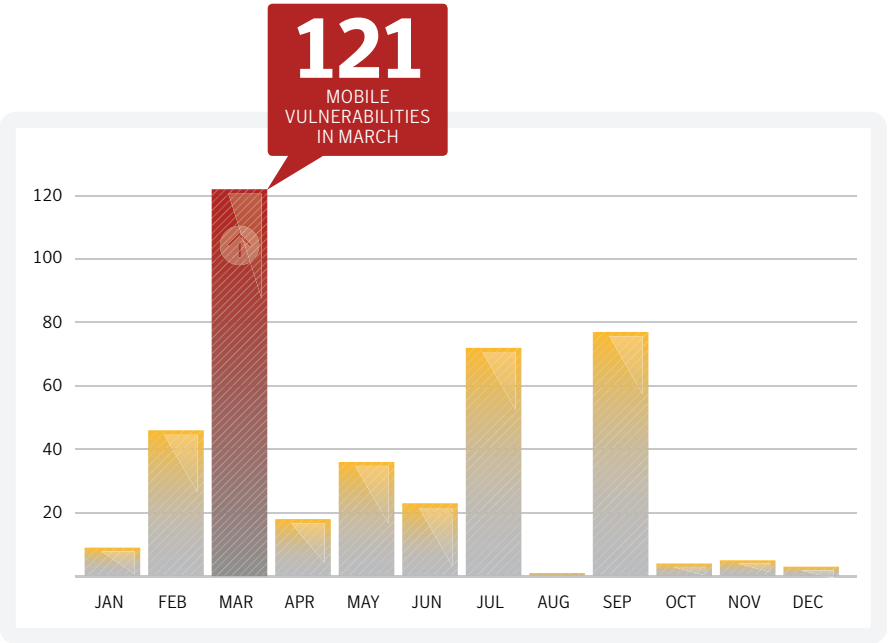
At a Glance

- Scammers continue to use social media as spam and phishing tools, including newer sites such as Pinterest and Instagram.
- Mobile malware has increased significantly in 2012 with new threats such as mobile botnets.
- Thirty-two percent of all mobile malware steals information from the compromised device.
- Fast-growing trends towards cloud computing, bring your own device, and consumerization create additional risks for businesses.



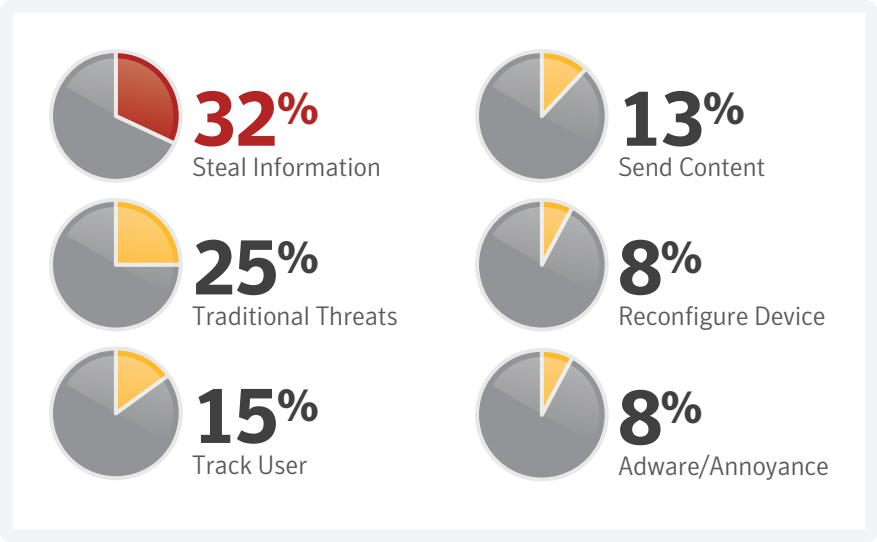
Top 5 Social Media Attacks in 2012
Source: Symantec

- **Fake Offering.** These scams invite social network users to join a fake event or group with incentives such as free gift cards. Joining often requires the user to share credentials with the attacker or send a text to a premium rate number.
- **Manual Sharing Scams.** These rely on victims to actually do the hard work of sharing the scam by presenting them with intriguing videos, fake offers or messages that they share with their friends.
- **Likejacking.** Using fake "Like" buttons, attackers trick users into clicking website buttons that install malware and may post updates on a user's newsfeed, spreading the attack.
- **Fake Plug-in Scams.** Users are tricked into downloading fake browser extensions on their machines. Rogue browser extensions can pose like legitimate extensions but when installed can steal sensitive information from the infected machine.
- **Copy and Paste Scams.** Users are invited to paste malicious JavaScript code directly into their browser's address bar in the hope of receiving a gift coupon in return.



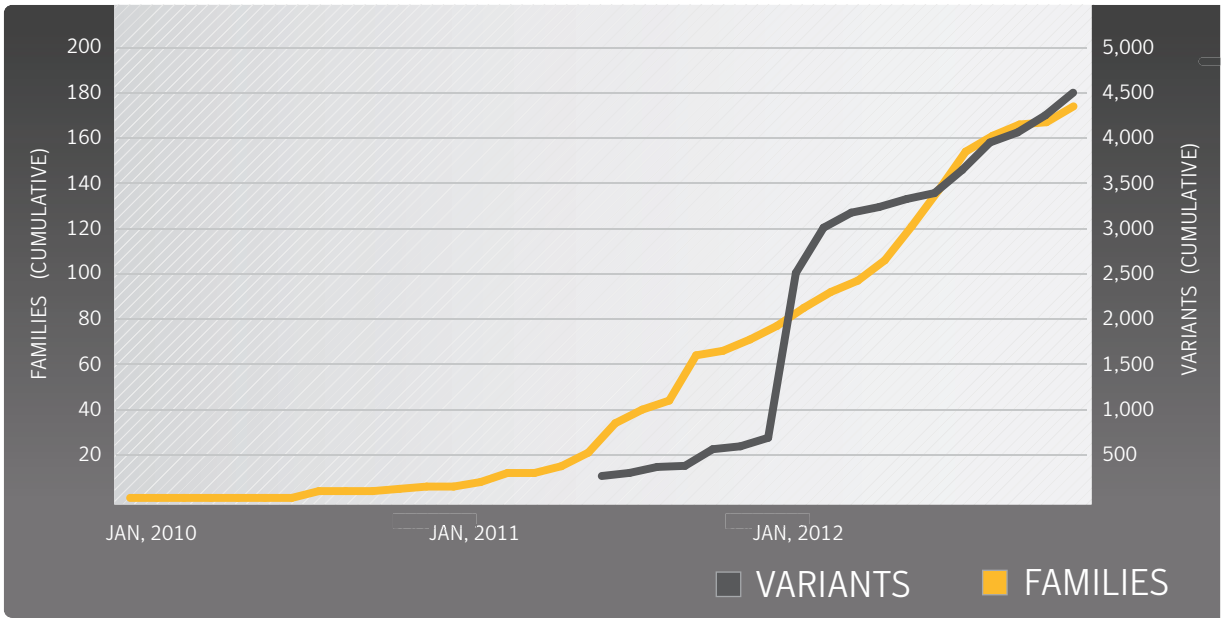
Mobile Vulnerabilities
Source: Symantec

- March was the most active month of 2012, with 121 vulnerabilities reported.
- There were 415 mobile vulnerabilities identified in 2012, compared with 315 in 2011.



Mobile Threats in 2012
Source: Symantec

Information stealing tops the list of activities carried out by mobile malware, with 32 percent of all threats recording some sort of information in 2012.



Cumulative Mobile Android Malware, Families and Variants 2010 to 2012
Source: Symantec

- 2012 saw a 58 percent increase in mobile malware families compared to 2011. The year's total now accounts for 59 percent of all malware to-date.
- At the same time the number of variants within each family has increased dramatically, from an average ratio of variants per family of 5:1 in 2011 to 38:1 in 2012. This indicates that threat authors are spending more time repackaging or making minor changes to their threats, in order to spread them further and avoid detection.

Device Type	Number of Threats
Android malware	103
Symbian malware	3
Windows Mobile malware	1
iOS malware	1

Mobile Threats by Device Type in 2012
Source: Symantec

In contrast to vulnerabilities, Android was by far the most commonly targeted mobile platform in 2012, comprising 103 out of 108 unique threats

The vast majority of vulnerabilities on mobile systems were on the iOS platform. However, the higher number of vulnerabilities is not indicative of a higher level of threat, because most mobile threats have not used software vulnerabilities.

Platform	Documented Vulnerabilities
Apple iOS	387
Android	13
BlackBerry	13
Nokia	0
LG Electronics	0
Windows Mobile	2

Mobile Vulnerabilities by OS
Source: Symantec

Analysis

Spam and Phishing Move to Social Media

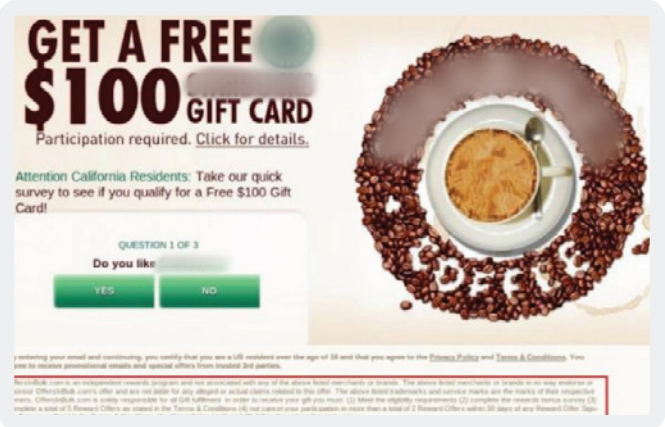
In the last few years, we've seen a significant increase in spam and phishing on social media sites. Criminals follow users to popular sites. As Facebook and Twitter have grown in popularity for users, they have also attracted more criminal activity. However, in the last year, online criminals have also started targeting newer, fast-growing sites such as Instagram, Pinterest, and Tumblr.

Typical threats include fake gift cards and survey scams. These kinds of fake offer scams account for more than half (56 percent) of all social media attacks. For example, in one scam the victim sees a post on somebody's Facebook wall or on their Pinterest feeds (where content appears from the people they follow or in specific categories) that says "Click here for a $100 gift card." When the user clicks on the link, they go to a website where they are asked to sign up for any number of offers, turning over personal details in the process. The spammers get a fee for each registration and, of course, there's no gift card at the end of the process.

Another trick is to use a fake website to persuade a victim to reveal their personal details and passwords; for example, their Facebook or Twitter account information. These phishing scams are insidious and often exploit people's fascination with celebrities such as professional athletes, film stars, or singers. We have seen an increase in phishing scams that target specific countries and their celebrities.

In 2012, we have seen ever more threats targeted on social media websites as well as more and more

Typical social media scam.



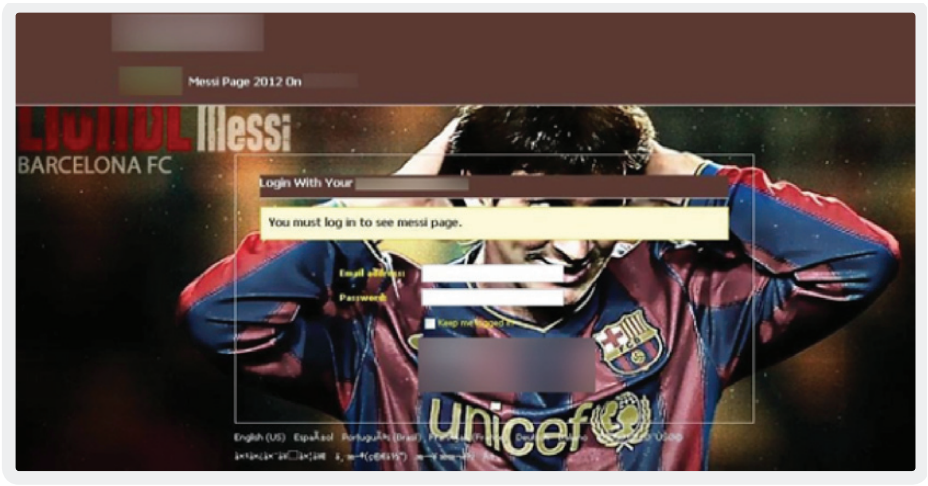
Fake website with bogus survey.

new channels and platforms opening up, especially those that are available only as mobile applications. It is likely that these mobile social channels will become more targeted in 2013, especially those that are aimed specifically at teenagers and young adults, who may not know how to recognize such attacks and may be a little freer with their personal details.

Mobile Threats

In the last year, we have seen a further increase in mobile malware. This correlates with increasing numbers of Internetconnected mobile devices. Android has a 72 percent market share with Apple® iOS a distant second with 14 percent, according to Gartner.[18] As a result of its market share and more open development environment, Android is the main target for mobile threats.

We also documented a similar spam campaign on the popular photo-sharing app Instagram.[17]



Phishing site spoofing a social networking site promoting soccer star Lionel Messi.

Typically, people use phones to store personal information and contact information and increasingly they have high-speed Internet connections. The smartphone has become a powerful computer in its own right, and this makes these attractive devices to criminals. They also have the added advantage of being tied to a payment system—the owner's phone contract—which means that they offer additional ways for criminals to siphon off money from the victim.

We've seen a big rise in all kinds of mobile phone attacks:

- **Android threats** were more commonly found in Eastern Europe and Asia; however, during the last year, the number of Android threats in the rest of Europe and the United States has increased.

- **Privacy leaks** that disclose personal information, including the release of surveillance software designed to covertly transmit the owner's location.[19]

- **Premium number** fraud where malicious apps send expensive text messages. This is the quickest way to make money from mobile malware. One mobile botnet Symantec observed used fake mobile apps to infect users and by our calculation the botmaster is generating anywhere between $1,600 to $9,000 per day and $547,500 to $3,285,000 per year.[20]

- **Mobile botnets.** Just as spammers have linked networks of PCs into botnets to send out unwanted email, now criminals have begun using Android botnets the same way.[21] This suggests that attackers are adapting techniques used on PCs to work on smartphones.

Historically, malware infected smartphones through rogue app markets and users sideloading apps directly onto their devices. However, legitimate app stores are not immune. In 2012, we saw rogue software masquerading as popular games on the Google® Play market, having bypassed Google's automated screening process.[22]

Businesses are increasingly allowing staff to "bring your own device" (BYOD) to work, either by allowing them to use personal computers, tablets, or smartphones for work, even subsidizing their purchase. Even when companies provide their own equipment, the trend towards consumerization means that companies often turn to consumer technology, such as file-sharing websites, and devices, such as consumer laptops or tablets, to reduce costs. These two trends open the door to a greater risk to businesses from mobile devices because they often lack security features such as encryption, access control, and manageability.

We have seen far more vulnerabilities for the iOS platform, which makes up 93 percent of those published, than for Android in 2012, but yet Android dominates the malware landscape, with 97 percent of new threats.

While seemingly contradictory at first, there is a good reason for this: jailbreaking iOS devices. In order to install applications that are not available on the Apple App Store, a user must run an exploit against a vulnerability in the software. While not the safest approach from a security standpoint, this is the only way to install applications that are not available through the Apple App Store.

In contrast, the Android platform provides the option to install apps from unofficial markets by simply changing settings in the operating system. Since no exploit is needed, the same incentives aren't present as there are on iOS. Android users are vulnerable to a whole host of threats; however, very few have utilized vulnerabilities to spread threats.

While Android clocks in with 103 threats in 2012, this number may appear small compared to other estimates on the scope of the mobile threat landscape. Many estimates

are larger because they provide a count of overall variants, as opposed to new, unique threats. While many of these variants simply undergone minor changes in an attempt to avoid antivirus scanners detecting them, Symantec counted at least 3,906 different mobile variants for the year.

There's an important distinction between old and new Android versions regarding security features. Google added a feature in Android version 4.x to allow users to block any particular app from pushing notifications into the status bar. This came in response to feedback from users of older versions, annoyed by ad platforms that push notifications to the status bar.

Also, due to the rise of threats that silently send premium text messages—Android.Opfake, Android.Premiumtext, Android.Positmob, and Android.Rufraud, for instance—Google added a feature in Android 4.2 to prompt the user to confirm sending such premium text messages. This can be very helpful in protecting most users.

However, at around 10 percent market penetration at the end of 2012,[23] Android 4.2 devices account only for a small percentage of the total devices out there. The Android ecosystem makes it harder to keep everyone up to date. Google released the official platform that works out of the box only on Nexus devices—Google's own branded device. From there each manufacturer modifies and releases its own platform, which is in turn picked up by mobile network operators who also customize those platforms.

This makes it impossible for any change coming from Google to be quickly available to all in-field devices. Any change to the platform requires thorough testing by each manufacturer and then each operator, all adding to the time needed to reach users.
Having so many device models also multiplies the amount of resources all these companies have to allocate for each update, leading to infrequently released updates or in some cases no updates for older devices.

For most exploits in the OS, Google released quick fixes; however, users still had long waits before they received the fix from their network operators. Some exploits are not in the original OS itself but in the custom modifications made by manufacturers, such as the exploit for Samsung models that appeared in 2012. Samsung was quick to fix it, but the fix still had to propagate through network operators to reach users.

Tighter control from Google over the platform can solve some of the "fragmentation" issues, but this could affect the relationship it has with manufacturers. A cut-off point for older Android users could help to mitigate the risk, but it is usually the manufacturers that do this.

Cloud Computing Risks

The cloud services market was expected to grow by 20 percent in 2012, according to Gartner.[24] Cloud computing promises businesses a way to enhance their IT without heavy upfront capital costs and, for smaller businesses, it offers access to enterprise-class business software at an affordable price. On a fundamental level, it offers huge and growing economies of scale as Internet bandwidth and processing power continue to increase rapidly.

Cloud computing offers some potential security benefits, especially for smaller companies without dedicated IT security staff. Well-run cloud applications are more likely to be patched and updated efficiently. They are also more likely to be resilient, secure, and backed up than on-premises systems.

However, cloud computing presents some security concerns, too:

- **Privacy.** Well-run cloud companies will have strong policies about who can access customer data (for example, for troubleshooting) and under what circumstances. Information should only be entrusted to a third party over the Internet where there is sufficient assurance as to how that data will be managed and accessed.

- **Data Liberation.** Cloud computing businesses make it easy to get started, and reputable companies make it easy to extract your data (for example, archived emails or customer records) if you want to change providers. Before entrusting their data to a cloud provider, potential users should fully evaluate the terms and conditions of extracting and recovering that data at a later date.

- **Eggs in One Basket.** As we have seen from large-scale data breaches in the last few years, attackers tend to go where they can score the most data for the least effort. If a cloud services provider stores confidential information for a large number of customers, it becomes a bigger target for attackers. A single breach at a cloud provider could be a gold mine of personal data for an attacker.

- **Consumerization.** Companies face a significant risk of accidental

or deliberate data loss when their employees use unapproved cloud systems on an ad-hoc basis. For example, if company policies make it difficult to email large files to third parties, employees may decide to use free online file sharing applications instead. The risk is that these systems may fall short of company standards for security. For example, one popular file-sharing site left all its user accounts unlocked for four hours.[25] In addition, where employees use unauthorized cloud applications for their work, such as social networking sites for marketing purposes, they open up the company to attack from Webbased malware.

- **Infrastructure.** Although not in the wild, there is a theoretical risk that in a virtualized, multi-tenant architecture, a malicious user could rent a virtual machine and use it to launch an attack against the system by exploiting a vulnerability in the underlying hypervisor and use this to gain access to other virtual machines running in the same environment. Consideration should also be given to data encryption within the virtual machine to minimize the risk from unauthorized access to the physical hard disks.

Recommendations

Social Media Threats Are a Business Issue.

Companies are often unwilling to block access to social media sites altogether, but they need to find ways to protect themselves against Web-based malware on these and other sites. This means multi-layer security software at the gateway and on client PCs. It also requires aggressive patching and updating to reduce the risk of drive-by infections. Lastly, user education and clear policies are essential, especially regarding the amount of personal information users disclose online.

Cloud Security Advice.[26]

Carry out a full risk assessment before signing up. Secure your own information and identities. Implement a strong governance framework.

Protect Your Mobile Devices.

Consider installing security software on mobile devices. Also, users need to be educated about the risks of downloading rogue applications and how to use their privacy and permission settings. For company-provided devices, consider locking them down and preventing the installation of unapproved applications altogether.

MALWARE SPAM AND PHISHING

Introduction

Malware, spam, and social engineering continue to be massive, chronic problems. Although they have been around for a long time, attacks continue to evolve and they still have the potential to do serious damage to consumers and businesses.

In addition, they hurt everyone by undermining confidence in the Internet. These chronic threats do not get much news coverage because they are "background noise" but that doesn't mean that they are unimportant. A useful comparison is the difference between plane crashes and car crashes. A single plane crash makes the national news, but the daily death toll on the roads goes unreported despite killing significantly more people each year.[27]

The popularity of ransomware is an example of all these themes. It permanently locks people out of their computer unless they pay a swinging "fine" to the perpetrators. It's corrosive to trust, expensive to remedy, and reveals a new level of ruthlessness and sophistication.

The numbers are telling. In one example, malware called Reveton (aka Trojan.Ransomlock.G), was detected attempting to infect 500,000 computers over a period of 18 days. According to a recent Symantec survey of 13,000 adults in 24 countries, average losses per cybercrime incident are $197.[28] In the last 12 months an estimated 556 million adults worldwide experienced some form of cybercrime.

At a Glance

- With ransomware, malware has become more vicious and more profitable.
- Email spam volumes fall again, down 29 percent in 2012, as spammers move to social media.
- Phishing becomes more sophisticated and targets social networking sites.

Irreversible ransomware locks people out of their computer unless they pay a "fine," which in most cases does not unlock the computer.

Data

Spam

Spam rates declined for a second year in a row, dropping from 75 percent in 2011 to 69 percent of all email in 2012. In 2011 we were reluctant to call this decrease in spam a permanent trend. Botnets can be rebuilt, new ones created. But several factors appear to be keeping spam rates lower than in previous years.

The takedowns of spam botnets continued in 2012. In March 2012 a resurrected Kelihos botnet was taken down for a second time. In July the Grum botnet was taken down. While both were significant spam botnets and contributed to the reduction in spam, undoubtedly email spammers are still feeling the pain of botnet takedowns from 2011.

Additionally, pharmaceutical spam continues to decline, apparently unable to recover from the loss of the major players in the online pharmaceutical business.[29] Given advancements in anti-spam technology, plus the migration of many users to social networks as a means of communication, spammers may be diversifying in order to stay in business. This is not to say that the problem of spam has been solved. At 69 percent of all email, it still represents a significant amount of unwanted messages.

As email spam rates continue to decline, we see the same social engineering techniques that have been used in email spam campaigns increasingly being adopted in spam campaigns and being promoted through social networking channels.

Top 5 Activity for Spam Destination by Geography

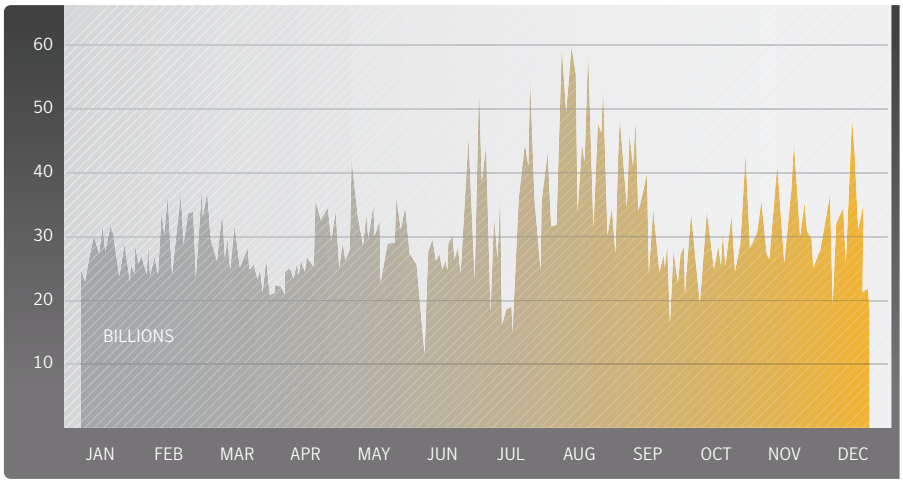
Country	%
Saudi Arabia	79%
Bulgaria	76%
Chile	74%
Hungary	74%
China	73%

Top 5 Activity for Spam Destination by Industry

Industry	%
Marketing/Media	69%
Manufacturing	69%
Recreation	69%
Agriculture	69%
Chemical/Pharmaceutical	69%

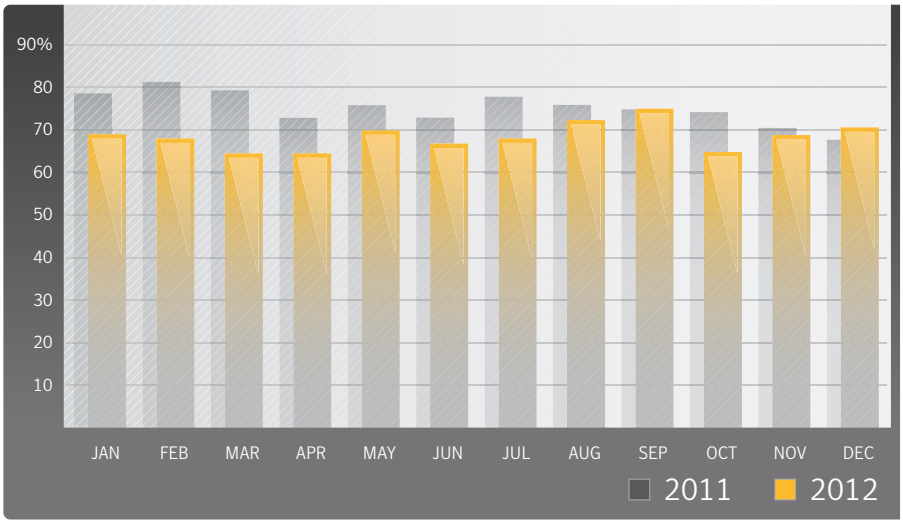
Top 5 Activity for Spam Destination by Company Size

Organization Size	%
1-250	68%
251-500	68%
501-1,000	68%
1,001-1,500	69%
1,501-2,500	69%
2,501+	68%



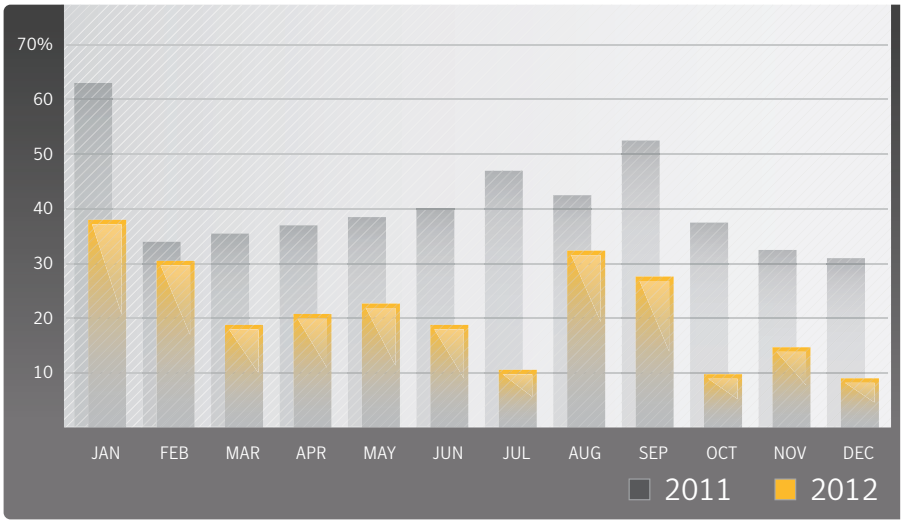
Global Spam Volume Per Day in 2012
Source: Symantec

- Spam volumes were highest in August.
- The estimated projection of global spam volumes decreased by 29 percent, from 42 billion spam emails per day in 2011, to 30 billion in 2012.



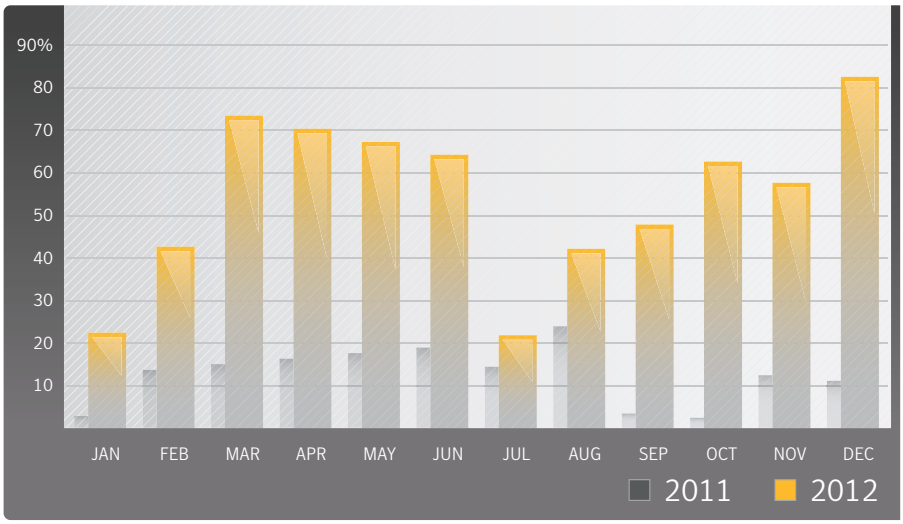
Global Spam Rate – 2012 vs 2011
Source: Symantec

The overall average global spam rate for 2012 was 69 percent, compared with 75 percent in 2011.



Pharmaceutical Spam – 2012 vs 2011
Source: Symantec

- Pharmaceutical spam makes up 21 percent of all spam, but was overtaken by the Adult/Sex/Dating category, which now makes up 55 percent of spam.
- Pharmaceutical spam in 2012 declined by approximately 19 percentage points compared with 2011.



Adult/Sex/Dating Spam – 2012 vs 2011
Source: Symantec

- Adult/Dating spam in 2012 increased by approximately 40 percentage points compared with 2011.
- This suggests an almost direct correlation between the decline in pharmaceutical spam and the increase in dating spam.
- The proportion of adult/sex/dating spam was greater in 2012 than for pharmaceutical spam in 2011, but the actual volume of adult/sex/dating spam in 2012 was lower than for pharmaceutical spam in 2011, since overall spam volumes were lower in 2012 than in the previous year.

Phishing

Email phishing rates are also down this year, from one in 299 emails in 2011 to one in 414 in 2012.

The decline in the use of email as a method to spread spam and carry out phishing attacks does not likely indicate a drop in activity by attackers. Rather, it appears that we are seeing a shift in activity from email to other forms of online communication, such as social networks.

Top 5 Activity for Phishing Destination by Industry

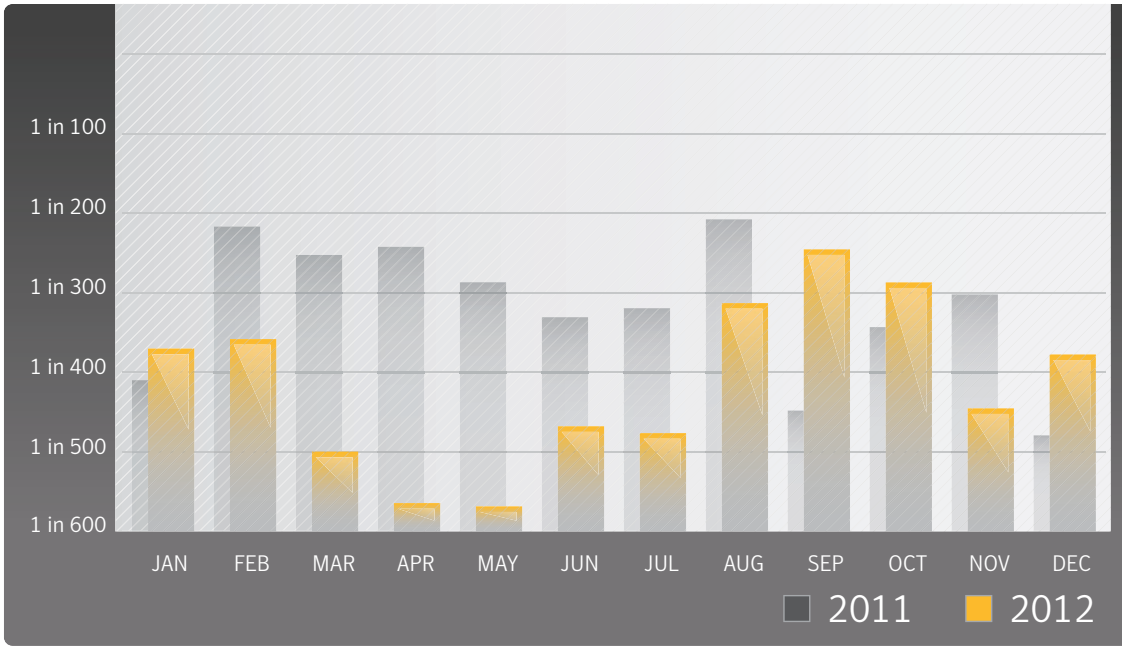
Industry	1 in
Public Sector	1 in 95
Finance	1 in 211
Education	1 in 223
Accommodation/Catering	1 in 297
Marketing/Media	1 in 355

Top 5 Activity for Phishing Destination by Geography

Country	1 in
Netherlands	1 in 123
South Africa	1 in 177
United Kingdom	1 in 191
Denmark	1 in 374
China	1 in 382

Top 5 Activity for Phishing Destination by Company Size

Company Size	1 in
1-250	1 in 294
251-500	1 in 501
501-1,000	1 in 671
1,001-1,500	1 in 607
1,501-2,500	1 in 739
2,501+	1 in 346



Phishing Rate – 2012 vs 2011
Source: Symantec

- Phishing rates have dropped drastically in 2012, in many cases less than half the number for that month in the previous year.
- The overall average phishing rate for 2012 was 1 in 414 emails, compared with 1 in 299 in 2011.

Malware

One in 291 emails contained a virus in 2012, which is down from one in 239 in 2011. Of that email-borne malware, 23 percent of it contained URLs that pointed to malicious websites. This is also down from 2011, where 39 percent of email-borne malware contained a link to a malicious website.

Much like the drop in spam and phishing rates, a drop in emails that contain viruses does not necessarily mean that attackers have stopped targeting users. Rather, it more likely points to a shift in tactics, targeting other online activities, such as social networking.

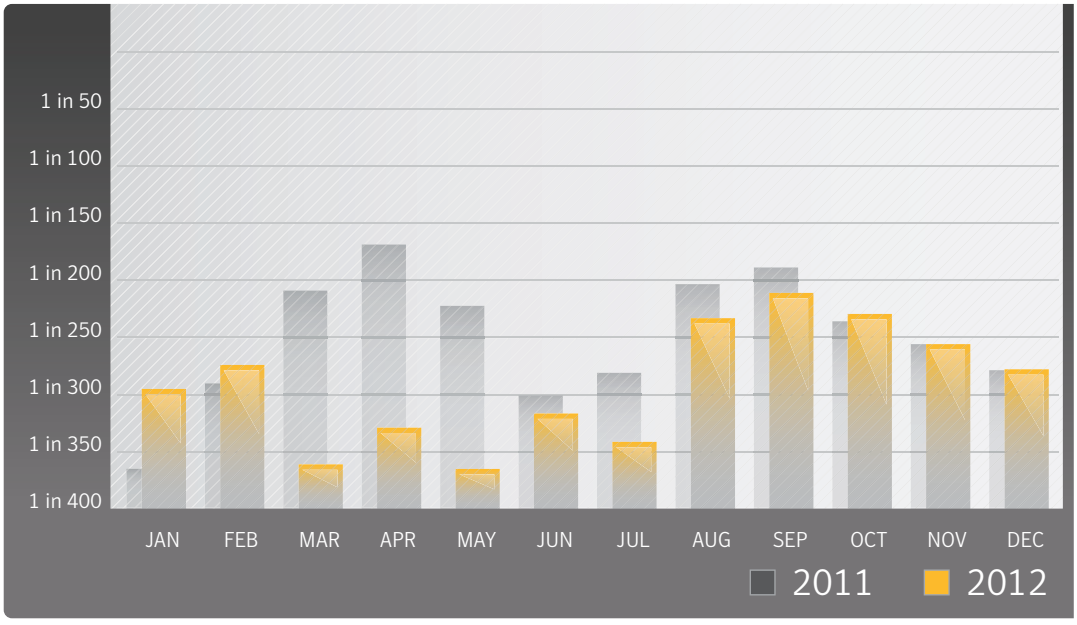
Top 5 Activity for Malware Destination by Geography

Country	1 in
Netherlands	1 in 108
Luxembourg	1 in 144
United Kingdom	1 in 163
South Africa	1 in 178
Germany	1 in 196

Industry	1 in
Public Sector	1 in 72
Education	1 in 163
Finance	1 in 218
Marketing/Media	1 in 235
Accommodation/Catering	1 in 236

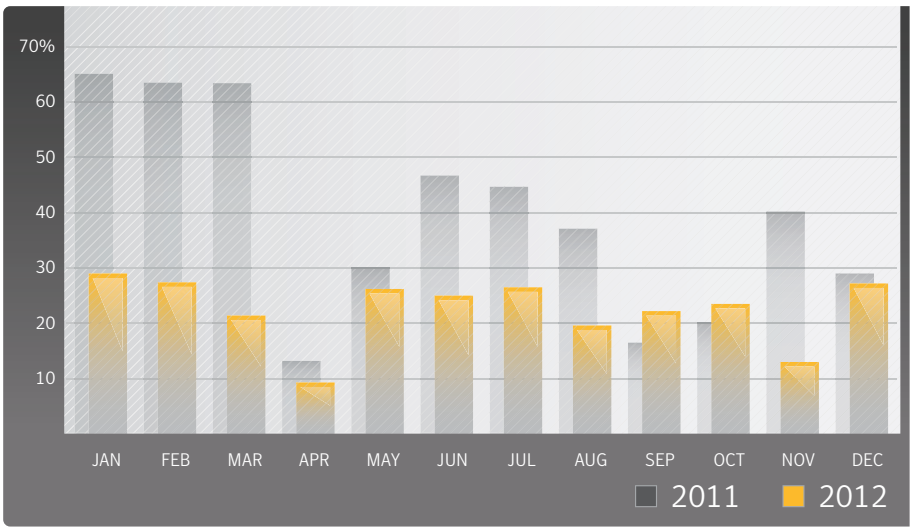
Top 5 Activity for Malware Destination by Company Size

Company Size	1 in
1-250	1 in 299
251-500	1 in 325
501-1,000	1 in 314
1,001-1,500	1 in 295
1,501-2,500	1 in 42
2,501+	1 in 252



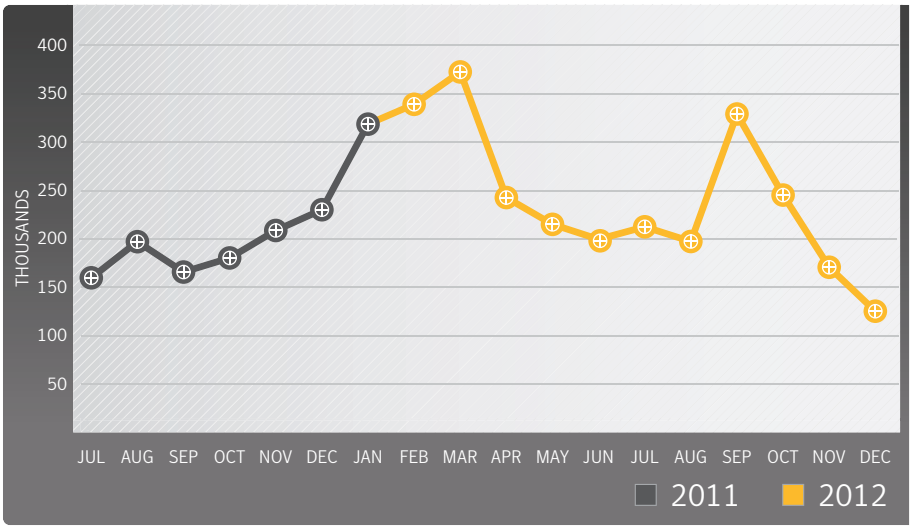
Proportion of Email Traffic in Which Virus Was Detected – 2012 vs 2011
Source: Symantec

- Overall numbers declined, with one in 291 emails containing a virus.
- In 2011, the average rate for email-borne malware was 1 in 239



Proportion of Email Traffic Containing URL Malware – 2012 vs 2011
Source: Symantec

- Emails that contained a malicious URL dropped significantly in 2012. In some months it was more than half the rate as it was that month in 2011.
- In 2012, approximately 23 percent of email malware contained a URL rather than an attachment, compared with 39 percent in 2011.



Website Malware Blocked Per Day
Source: Symantec

- In 2012, approximately 247,350 Web-based attacks were blocked each day.
- In 2011, this figure was approximately 190,370 per day. This represents an increase of 30 percent.

Website Exploits by Type of Website

Based on Norton Safe Web data, the Symantec technology that scans the Web looking for websites hosting malware, we've determined that 61 percent of malicious sites are actually regular websites that have been compromised and infected with malicious code.

We see Business, which covers consumer and industrial goods and service sectors, listed at the forefront this year. This could be due to the contribution of compromised sites from many SMBs that do not invest in appropriate resources to protect them. Hacking, which includes sites that promote or provide the means to carry out hacking activities, jumped to second, though it didn't appear in the top 15 in 2011.

Although the Technology and Telecommunication category, which provides information pertaining to computers, the Internet and telecommunication, ranks third this year, it sees 5.7 percent of the total compromised sites, only a 1.2 percent drop from 2011. Shopping sites that provide the means to purchase products or services online remain in the top five, but Shopping sees a drop of 4.1 percent.

It is interesting to note that Hosting, which ranked second in 2011, has moved down to seventh this year. This covers services that provide individuals or organizations access

to online systems for websites or storage. Due to this increase in reliable and free cloud-based hosting solutions, provided by the likes of Google, Dropbox and others, we see usage moving away from unreliable hosting solutions, which could have contributed towards the drop. Blogging has also experienced a significant drop in 2012, moving down to fourth position. This could support the theory that people are moving towards social networking and exchanging information through such networks. Malware developers find it easy to insert malicious code in such sites and spread them using various means.

Rank	Top Domain Categories that Got Exploited by # of Sites	# of Infected Sites/Total # of Infected Sites
1	Business	7.7%
2	Hacking	7.6%
3	Technology and Telecommunication	5.7%
4	Blogging	4.5%
5	Shopping	3.6%
6	Known Malware Domain	2.6%
7	Hosting	2.3%
8	Automotive	1.9%
9	Health	1.7%
10	Educational	1.7%

Website Exploits by Type of Website
Source: Symantec

Analysis

Macs Under Attack

Historically, Mac users have felt less vulnerable to malware than PC users. As Apple has gained market share, Macs have become a more attractive target. In fact, 2012 saw the first significant Mac malware outbreak. The Flashback attack exploited a vulnerability in Java to create a cross-platform threat.[30] It was incorporated into the Blackhole attack toolkit and used by criminals to infect 600,000 Macs,[31] which is approximately one Mac in 100.

Rank	Malware Name	%
1	W32.Sality.AE	6.9%
2	W32.Ramnit.B	5.1%
3	W32.Downadup.B	4.4%
4	W32.Virut.CF	2.2%
5	W32.SillyFDC	1.1%
6	W32.Mabezat.B	1.1%
7	W32.Xpaj.B	0.6%
8	W32.Changeup	0.6%
9	W32.Downadup	0.5%
10	W32.Imaut	0.4%

Top 10 Malware in 2012
Source: Symantec

Like more and more attacks in 2012, as discussed in the "Web Attack Toolkits" section, it spread when users visited infected websites. Although the Flashback malware was mainly used for advertising click fraud, it had other capabilities, such as giving hackers remote access to infected computers.[32] Because most Mac users do not have antivirus software, the chances of detection, once infected, were small.

Does this indicate that hackers are going to start paying further attention to Macintosh computers as a platform to target? Not necessarily. While Mac users may encounter an occasional threat here or there, the vast majority of what they encounter is malware aimed at Windows computers. In fact, of all the threats encountered by Symantec customers who used Mac computers in the last quarter of 2012, only 2.5 percent of them were actually written specifically for Macs.

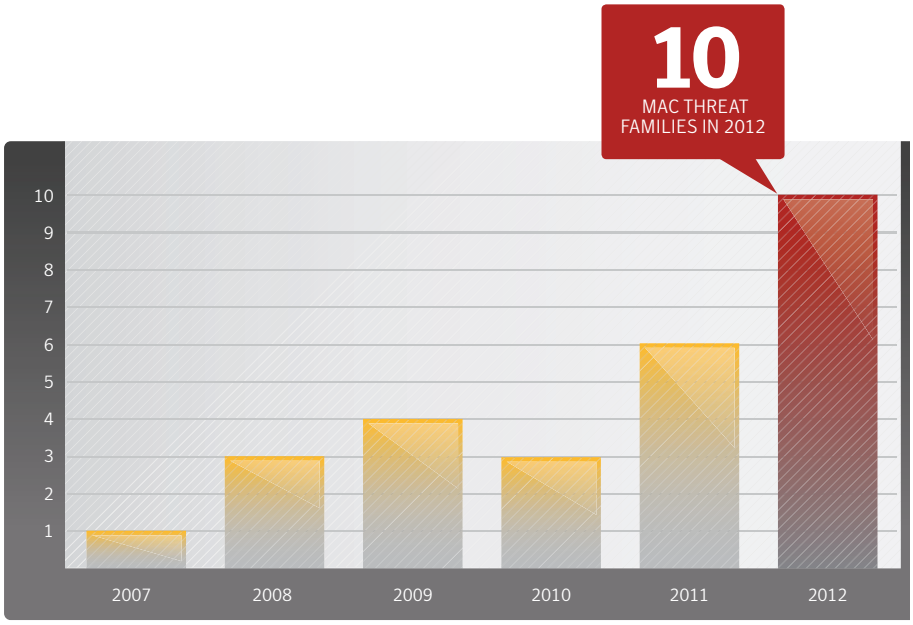
This isn't to say that Macs are a safer alternative to PCs; as we've seen, they're just as susceptible to attacks. There were more threats created specifically for the Mac in 2012 than in years past and the trend appears to be rising.

Rise of Ransomware

Ransomware became a bigger challenge in 2012 as its popularity among malware authors increased. Unlike scareware, which encouraged you to buy fake antivirus protection, ransomware just locks your computer and demands a release fee. The malware is often quite sophisticated, difficult to remove, and in some cases it persists in safe mode, blocking attempts at remote support.

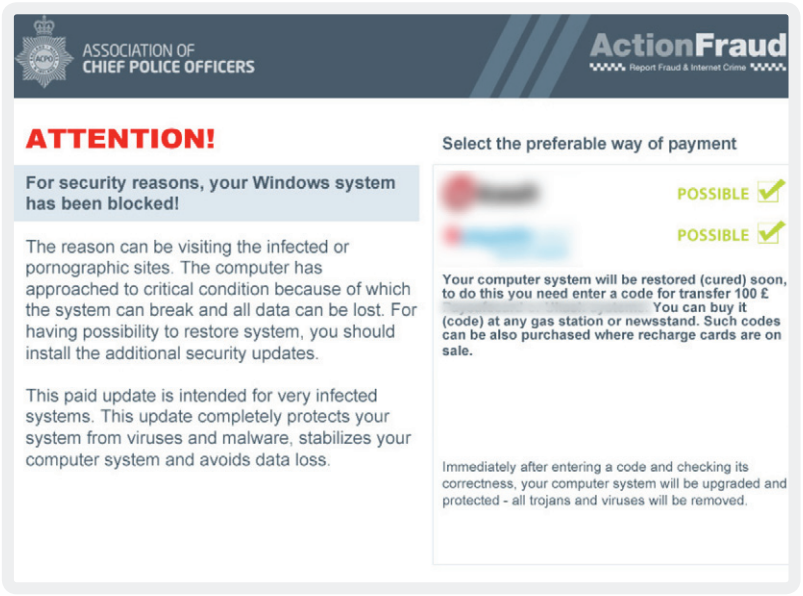
Victims usually end up with ransomware from drive-by downloads when they are silently infected visiting websites that host Web attack toolkits. This ransomware is often from legitimate sites that have been compromised by hackers who insert the malicious download code. Another source of infection is malvertisements where criminals buy advertising space on legitimate websites and use it to hide their attack code, as discussed in the malvertisement section.

The perpetrators use social engineering to increase the chances of payment. The locking screen often contains a fake warning from local law enforcement and the ransom is presented as a fine for criminal activity online. In some cases, ransomware also takes a photo of the victim using a webcam and displays this image in the locking screen, which can be unnerving for victims.



Mac-specific Threats by Year
Source: Symantec

There were more unique threats for OS X in 2012 than any year previously.



Typical ransomware locking screen showing a fake police warning.

Criminals use anonymous money transfer systems or prepaid credit cards to receive the payments. The ransom typically ranges between $50 and $400. In many cases, payment doesn't unlock the computer.

Symantec monitored a ransomware command and control server and saw 5,300 computers infected. About three percent of victims paid the ransom, which netted the criminals about $30,000.

Long-term Stealthy Malware

Internet criminals are also making money from malware that stays hidden on the victims' computers. Operating in botnets with many thousands of computers acting collectively, these stealthy programs send out spam or generate bogus clicks on website advertisements (which generate referral income for the site owners). These techniques don't generate rapid returns like ransomware; however, they are much less likely to be discovered and, thanks to clever coding, are more difficult to remove. Consequently, they can generate a constant stream of revenue over time.

Email Spam Volume Down

After decreases in 2011, this year saw a further reduction in the volume of email spam from 76 percent of all email messages to 69 percent. There are several reasons for this. First, law enforcement action has closed down several botnets, reducing the number of messages being sent.[33] Second, spammers are increasingly redirecting their efforts to social media sites instead of email. Lastly, spammers are improving the quality and targeting of their spam messages in an effort to bypass filters and this has led to a reduction in the overall numbers being sent.

Advanced Phishing

While spam has declined slightly in 2012, phishing attacks have increased. Phishers are using very sophisticated fake websites—in some cases, perfect replicas of real sites—to trick victims into revealing personal information, passwords, credit card details, and bank credentials. In the past they relied more on fake emails, but now those emails coupled with similar links posted on social media sites are used to lure the victim to these more advanced phishing websites.

Typical fake sites include banks and credit card companies, as you'd expect, but also popular social media sites. The number of phishing sites that spoofed social network sites increased 123 percent in 2012.

If criminals can capture your social media login details, they can use your account to send phishing emails to all your friends. A message that seems to come from a friend appears much more trustworthy. Another way to use a cracked social media account is to send out a fake message to someone's friends about some kind of emergency. For example, "Help! I'm stuck overseas and my wallet has been stolen. Please send $200 as soon as possible."

In an attempt to bypass security and filtering software, criminals use complex website addresses and nested URL shortening services. They also use social engineering to motivate victims to click on links. In the last year, they have focused their messages around celebrities, movies, sports personalities, and attractive gadgets such as smartphones and tablets. The number of phishing websites that used SSL certificates in an attempt to lull victims into a false sense of security increased by 46 percent in 2012 compared with the previous year.

We saw a significant (threefold) rise in non-English phishing in 2012. In particular, we saw a significant increase in South Korea. The non-English languages that had the highest number of phishing sites were French, Italian, Portuguese, Chinese, and Spanish.

Recommendations

Protect Yourself Against Social Engineering.

For individuals as well as for businesses, it's essential that people learn to spot the telltale signs of social engineering, which can include undue pressure, titillation or a false sense of urgency, an offer that is literally too good to be true, bogus "officialese" in an attempt to make something look authentic (for example, lengthy reference numbers), implausible pretexts (for example, a Microsoft "representative" calls to tell you that your computer has a virus), and false quid-proquo offers (for example, receive a free gift when you provide personal or confidential information).

Avoid Ransomware.

Avoid marginal websites and, in particular, pirate software and adult sites. Do not install unsolicited plug-ins or executables if prompted to do so, even on legitimate websites. Consider using advertising blocker software in your browser. Ensure that your computer is up to date with the latest patches and updates to increase your resistance to drive-by Web infections. Keep backups and recovery disks so you can unlock your computer in an emergency. And, of course, have effective, up-to-date security software.

Think Before You Click.

That unsolicited email from a known acquaintance, such as your mother or coworker, may not be legit. Their account may have been compromised, if they've fallen for a social engineering trick.

Antivirus on Endpoints Is Not Enough.

On endpoints (desktops/laptops),

signature-based antivirus alone is not enough to protect against today's threats and Web-based attack toolkits. Deploy and use a comprehensive endpoint security product that includes additional layers of protection, including:

- Endpoint intrusion prevention that protects against unpatched vulnerabilities from being exploited, protects against social engineering attacks, and stops malware from ever making it onto endpoints;
- Browser protection for protection against obfuscated Webbased attacks;
- Heuristic file-based malware prevention to provide more intelligent protection against unknown threats;
- File and Web-based reputation solutions that provide a risk-and-reputation rating of any application and website to prevent rapidly mutating and polymorphic malware;
- Behavioral prevention capabilities that look at the behavior of applications and malware and prevent malware;
- Application control settings that can prevent applications and browser plug-ins from downloading unauthorized malicious content;
- Device control settings that prevent and limit the types of USB devices to be used.

LOOKING AHEAD

"Never make predictions," said a wise man, "especially about the future." But we can extrapolate from this year's data to speculate on future trends in the hope that this will help organizations and individuals protect themselves more effectively. Looking ahead, here are our priorities and concerns for the coming year:

More State-sponsored Cyber Attacks

The last few years have seen increasingly sophisticated and widespread use of cyber attacks. In peacetime, they provide plausible deniability; in wartime, they could be an essential tool. Cyber attacks will continue to be an outlet where tensions between countries are played out. Moreover, in addition to state-sponsored attacks, non-state sponsored attacks, including attacks by nationalist activists against those whom they perceive to be acting against their country's interest, will continue. Security companies and businesses need to be prepared for blowback and collateral damage from these attacks and, as ever, they need to make strenuous efforts to protect themselves against targeted attacks of all kinds.

Sophisticated Attack Techniques Trickle Down

Know-how used for industrial espionage or cyberwarfare will be reverse-engineered by criminal hackers for commercial gain. For example, the zero-day exploits used by the Elderwood Gang will be exploited by other malware authors. Similarly the "opensourcing" of malware toolkits such as Zeus (also known as Zbot), perhaps in an effort to throw law enforcement off the trail of the original authors, will make it easier for authors to create new malware.

Websites Will Become More Dangerous

Drive-by infections from websites will become even more common and even harder to block without advanced security software. Criminals will increasingly attack websites, using malvertising and website attack kits, as a means of infecting users. Software vendors will come under pressure to increase their efforts in fixing vulnerabilities promptly. Users and companies that employ them will need to be more proactive about maintaining their privacy and security in this new social media world.

Social Media Will Be a Major Security Battleground

Social media websites already combine elements of an operating system, a communications platform, and an advertising network. As they go mobile and add payment mechanisms, they will attract even more attention from online criminals with malware, phishing, spam, and scams. Traditional spam, phishing, and malware will hold steady or decline somewhat; however, social media attacks will grow enormously. As new social media tools emerge and become popular, criminals will target them. Further, we think that the intersection of smartphones and social media will become an important security battleground as criminals target teenagers, young adults, and other people who may be less guarded about their personal data and insufficiently security-minded to protect their devices and avoid scams.

Attacks Against Cloud Providers Will Increase

So far, the very big data breaches have occurred in businesses that collect a lot of personal data, such as healthcare providers, online retailers or games companies. In 2013 we expect to see a variety of attacks against cloud software providers.

Increasingly Vicious Malware

Malware has advanced from being predominantly about data theft and botnets (although both are still very common) through fake antivirus scams to increased ransomware attacks in 2012. We expect to see these attacks become harder to undo, more aggressive, and more professional over time. Once criminals see that they can get a high conversion rate from this kind of extortion, we may see other manifestations, such as malware that threatens to and then actually deletes the contents of your hard disk. This was the case of the Shamoon attacks that occurred in August and erased data from the infected computer. Essentially, if it is possible, someone will try it; if it is profitable, many people will do it.

Mobile Malware Comes of Age

Just as social media is becoming the new "operating system" for computers, mobile phones and tablets are becoming the new hardware platform. Tablet adoption and smartphone market penetration will continue and this will attract criminals. What has evolved over a decade on PCs is emerging more rapidly on smartphones and tablets. We'll see ransomware and drive-by website infections on these new platforms in the coming year. For businesses that use these new devices or allow employees to bring their

own to work, this will present a serious security problem in 2013.

Persistent Phishing

Identities are valuable, so criminals will continue to try to steal them. Phishing attacks will continue to get smarter and more sophisticated. For example, we'll see more perfect site replicas and SSL-encryption phishing sites. Phishing will become more regional and it will appear in a wider variety of languages, making it harder to block and more effective. It will continue its spread on social media websites where it will exploit the medium's virality and trusted messaging.

Endnotes

1. See http://krebsonsecurity.com/2012/03/mastercard-visa-warn-of-processor-breach/.
2. See http://www.ic3.gov/media/2012/FraudAlertFinancialInstitutionEmployeeCredentialsTargeted.pdf.
3. Aviation Week & Space Technology, October 22, 2012, 82.
4. See http://www.ic3.gov/media/2012/FraudAlertFinancialInstitutionEmployeeCredentialsTargeted.pdf.
5. The data for the data breaches that could lead to identity theft is procured from the Norton Cybercrime Index (CCI). The Norton CCI is a statistical model that measures the levels of threats including malicious software, fraud, identity theft, spam, phishing, and social engineering daily. Data for the CCI is primarily derived from Symantec Global Intelligence Network and for certain data from ID Analytics. The majority of the Norton CCI's data comes from Symantec's Global Intelligence Network, one of the industry's most comprehensive sources of intelligence about online threats. The data breach section of the Norton CCI is derived from data breaches that have been reported by legitimate media sources and have exposed personal information, including name, address, Social Security numbers, credit card numbers, or medical history. Using publicly available data the Norton CCI determines the sectors that were most often affected by data breaches, as well as the most common causes of data loss.
6. See http://www.symantec.com/content/en/us/about/media/pdfs/b-ponemon-2011-cost-of-data-breach-global.en-us.pdf.
7. See http://www.symantec.com/connect/blogs/shamoon-attacks.
8. Internet Security Threat Report, April 2012, "Targeted Attacks," 16.
9. See http://www.symantec.com/content/en/us/enterprise/media/security_response/whitepapers/the-elderwood-project.pdf.
10. See http://www.symantec.com/connect/blogs/cve-2012-1875-exploited-wild-part-1-trojannaid.
11. See http://www.symantec.com/content/en/us/enterprise/media/security_response/whitepapers/the-elderwood-project.pdf.
12. See http://www.symantec.com/connect/blogs/cost-cybercrime-2012.
13. See http://www.symantec.com/connect/blogs/lizamoon-mass-sql-injection-tried-and-tested-formula.
14. See http://www.symantec.com/connect/blogs/danger-malware-ahead-please-not-my-site.
15. See http://www.securityweek.com/comodo-certificates-used-sign-banking-trojans-brazil.
16. See http://blog.nielsen.com/nielsenwire/social/2012/.
17. See http://www.symantec.com/connect/blogs/instaspam-instagram-users-receive-gift-card-spam.
18. See http://www.gartner.com/it/page.jsp?id=2237315.
19. See http://en.wikipedia.org/wiki/FinFisher and http://www.nytimes.com/2012/08/31/technology/finspy-software-is-trackingpolitical-dissidents.html?_r=1.
20. See http://www.symantec.com/connect/blogs/androidbmaster-million-dollar-mobile-botnet.
21. See http://www.symantec.com/connect/blogs/androidbmaster-million-dollar-mobile-botnet.
22. See http://news.cnet.com/8301-1009_3-57470729-83/malware-went-undiscovered-for-weeks-on-google-play.
23. See http://developer.android.com/about/dashboards/index.html.
24. See http://www.gartner.com/it/page.jsp?id=2163616.
25. See http://www.wired.com/threatlevel/2011/06/dropbox/.
26. For more advice about cloud adoption, see https://www4.symantec.com/mktginfo/.
27. In the United States, for example, the NTSB reports that 472 people died in aircraft accidents in 2010 compared with 32,885 in highway accidents. See http://www.ntsb.gov/data/index.html.
28. See http://www.symantec.com/about/news/release/article.jsp?prid=20120905_02.
29. See http://www.npr.org/blogs/money/2013/01/15/169424047/episode-430-black-market-pharmacies-and-the-spam-empire-behindthem.
30. See http://www.symantec.com/security_response/writeup.jsp?docid=2012-041001-0020-99.
31. See http://www.symantec.com/connect/blogs/flashback-cleanup-still-underway-approximately-140000-infections.
32. See http://www.symantec.com/connect/blogs/both-mac-and-windows-are-targeted-once.
33. See http://krebsonsecurity.com/tag/planet-money/.

About Symantec

Symantec protects the world's information and is a global leader in security, backup, and availability solutions. Our innovative products and services protect people and information in any environment—from the smallest mobile device to the enterprise data center to cloudbased systems. Our world-renowned expertise in protecting data, identities, and interactions gives our customers confidence in a connected world. More information is available at www.symantec.com or by connecting with Symantec at go.symantec.com/socialmedia.

More Information

- Symantec.cloud Global Threats: http://www.symanteccloud.com/en/gb/globalthreats/.
- Symantec Security Response: http://www.symantec.com/security_response/.
- Internet Security Threat Report Resource Page: http://www.symantec.com/threatreport/.
- Norton Threat Explorer: http://us.norton.com/security_response/threatexplorer/.
- Norton Cybercrime Index: http://us.norton.com/cybercrimeindex/.

CHAPTER 09

CONNECTED GENERATION: PERSPECTIVES FROM TOMORROW'S LEADERS IN A DIGITAL WORLD-INSIGHTS FROM THE 2012 IBM GLOBAL STUDENT STUDY

Anthony Marshall and Christine Kinser
www.ibm.com/iibv

IBM Institute for Business Value

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"We stand on the precipice of a paradigm shift into a fully connected society. We must not be afraid to embrace change. Those who can manage this will survive; those who don't will perish." – United States student, age 30

Introduction

Markets, societies, businesses and governments are undergoing seismic shifts resulting from today's highly connected world. These shifts have led to some daunting challenges. However, one notable opportunity for today's organizations to meet these challenges is by recruiting, managing and retaining a new generation of employees with distinct experiences and values. Given that members of the millennial generation will soon bear responsibility for moving organizations toward successful outcomes, it is important to understand their particular capabilities, expectations and needs. It is also important to anticipate opportunities to capitalize on the differing perspectives that will inevitably emerge from divergent but overlapping generational viewpoints.

With this in mind, we conducted the second biennial IBM Global Student Study in conjunction with the 2012 IBM Global CEO Study.[1] We surveyed 3,400 college and university students worldwide to better understand the opinions, perceptions and aspirations of our future employees, customers, leaders and citizens (see Research Methodology sidebar). We compared the views of these students, who included undergraduate and graduate students in various fields of study, to those of CEOs.

The 2012 IBM Global Student Study reveals a pool of talent with diverse capabilities, substantially prepared to lead in a hyperconnected environment. It also points to areas where students feel unprepared by their education and to some critical organizational imperatives the next generation of leaders have yet to fully consider.

"The whole world is crossing through a transition state. Power is being shifted from one economy to another." – India student, age 22

Forces of the future

Concerns with the economy and its impact on job prospects appear to have impacted students' assessments of the external pressures affecting organizations. In the 2012 Student Study, we found that students viewed market and macroeconomic factors as the top-two forces likely to make an impact on organizations over the next five years. This contrasts with the 2010 Student Study, in which students were more concerned with issues of globalization and technology.[2]

In 2012, the 1,709 CEOs we interviewed have de-emphasized economic and market issues, stressing instead the impact of technology and human capital on their organizations (see Figure 1). In fact, CEOs for the first time cited technology as the most important external force. For students in 2012, however, technology ranked third, lower than it did two years ago.

Growing up with social and mobile technology at their finger tips, students have already integrated technology into their world view. When thinking about major forces, students are much more preoccupied with the impact of the economy on the job market. Indeed, many of the challenges that are top-of-mind for CEOs may seem like a distant abstraction to students eager to begin their careers in a challenging economic environment.

Research Methodology
For our 2012 Student Study, we surveyed more than 3,400 students from around the world – 54 percent from growth markets and 46 percent from mature markets. We included both graduate and undergraduate students engaged in various fields of study. The majority of student respondents were under age 26, with 40 percent age 21 to 25 and 39 percent under age 21. Only 21 percent were older than 25. Males were overrepresented at 63 percent, with 37 percent female.

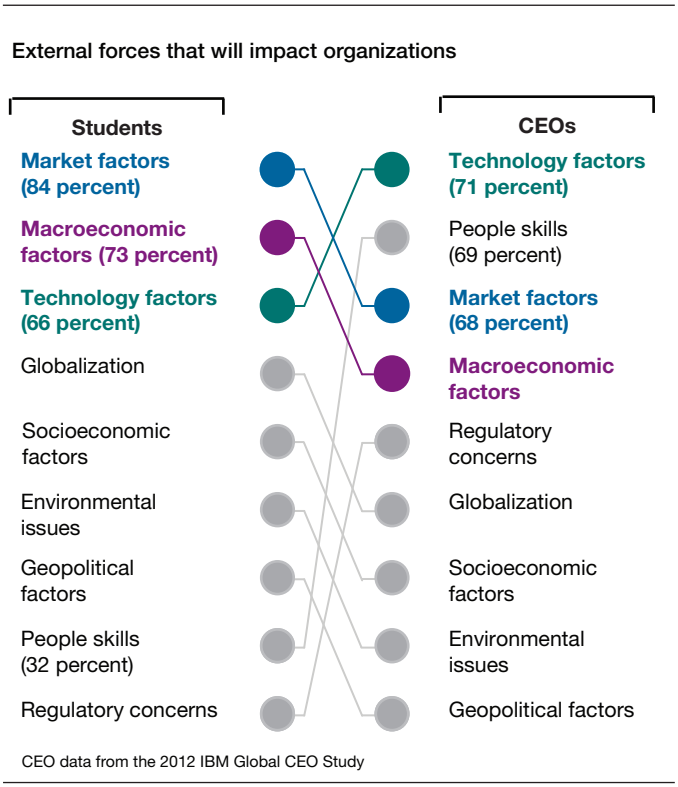

Figure 1: Students believe economic and market factors will have the most impact on organizations, while CEOs cite technology and people.

Navigating connectivity

"The CEOs of tomorrow need to be completely open with their intentions... Their actions have to be bold if they want to change the norm. Since boldness and risk go hand-in-hand, they must be risk tolerant." – United States student, age 21

Everywhere we look, we see new evidence that the hyperconnected environment in which we now live fundamentally changes how people engage with each other. Digital, social and mobile spheres are quickly converging – connecting customers, employees and partners to organizations and to each other.

As a result, employees are beginning to be empowered as part of open, less rigidly controlled organizations. Customers are increasingly engaged as individuals rather than market segments – anywhere and at any time. Partners are becoming ever-more important to strategy development and everyday operations.

CEOs now see technology as more than a driver of efficiency. They view it as an enabler of collaboration and relationships, the essential components that foster creativity and innovation. CEOs are looking to employees, customers and partners to connect in a way that fundamentally differentiates individual experiences and, by extension, provides strategic advantage for their organizations.

The CEO Study found that CEOs, especially those from outperforming organizations, expect demands for organizational transparency and openness to increase.[3] Operational controls, which are so important in areas such as regulatory compliance, have also helped drive standardization and efficiency improvements. Many CEOs believe the measures they put in place during the global economic crisis are adequate for today. Instead of doubling down on control, a significant proportion of CEOs, especially the outperformers, are now prepared to make bold moves toward greater transparency, connectivity and openness to help stimulate creativity, innovation and growth.

Students indicated even higher expectations for openness than CEOs. As these students enter the workforce, organizations will be under even more pressure to "open up" sooner rather than later. Collaboration, innovation, communication and creativity are all enhanced and expanded in more open environments. Nonetheless, CEOs understand very well the need to maintain the right balance and walk a fine line between too much control and too much openness. Too much openness can jeopardize security, confidentiality and intellectual property. Too little openness can strangle the forces that create genuine competitive advantage. The 2012 Global CEO Study suggests that CEOs understand this tension and increasingly seek to identify and pursue the optimal balance between organizational openness and operational control.

While students will likely press for more rapid movement toward transparency, both students and CEOs agree on the need for less top-down control. In the new organizational environment, where information is open and values and purpose are clearly articulated and understood, employees will have

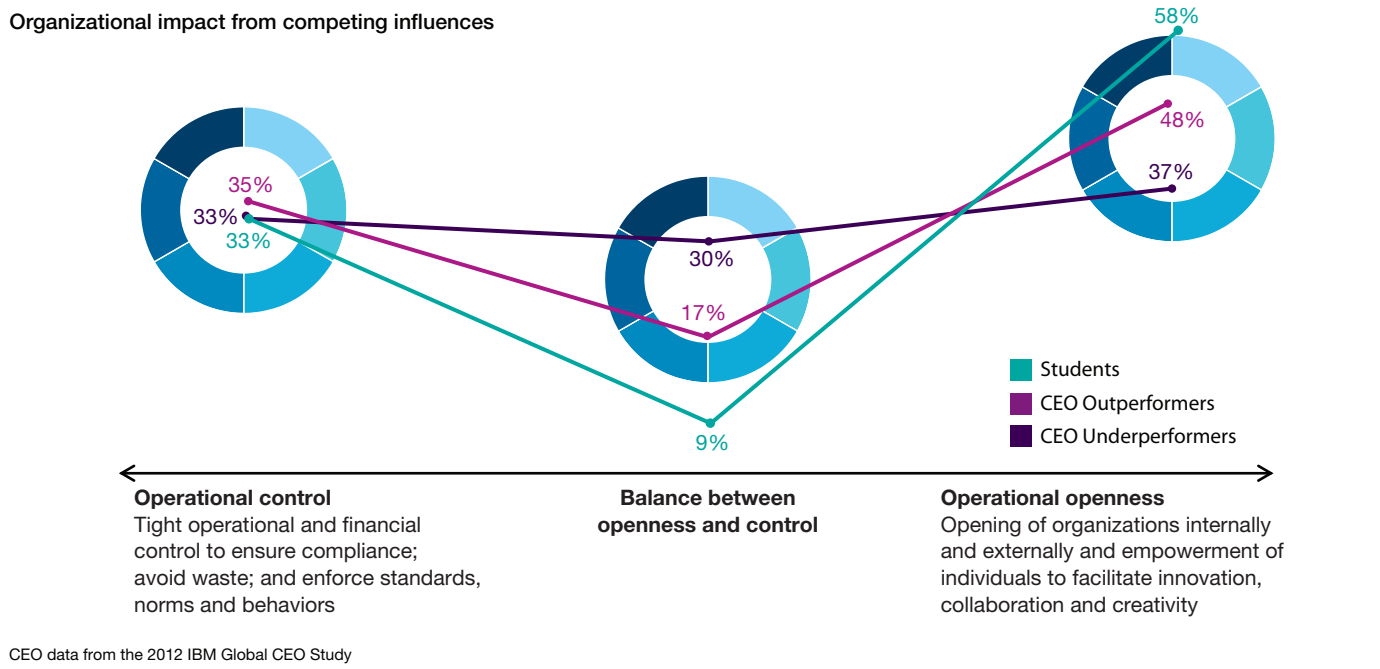

Figure 2: While both students and CEOs believe increased openness will impact organizations, the students view it as a stronger influence.

the ability to make decisions more independently and respond more quickly.

Opening the paradigm

Future employees will expect and insist on more open organizations, requiring leaders to find creative ways for managing difficult shifts in the dynamics of organizational culture. Fifty eight percent of students and 44 percent of CEOs (48 percent of outperformers and 37 percent of underperformers) said that openness is a key imperative (see Figure 2). As students join the workforce, their expectations are likely to drive organizations beyond their current "comfort zones." As a result, issues of control and ownership will need to be confronted, addressed and resolved.

"I believe the biggest risk is not being ready or open for change." – United States student, age 25

Digital customer

"Social media will continue to grow, both on a personal and organizational level. The Internet is now the new place where business relationships are formed." – United States student, age 21

Although business leaders are acutely aware of the pervasive influence of new digital channels, students view them as even more important. Only 56 percent of CEOs use Web sites and social media for customer relationships today, compared to 70 percent of students who believe organizations should do so. Today, CEOs believe face-to-face interaction is the most important tool in building customer relationships, while students cite social media and Web sites. Both students and CEOs do agree, however, that traditional media falls behind both face-to-face interaction and social media/Web sites (see Figure 3).

While CEOs view face-to-face interaction as the dominant method

Regional comparisons: Significant variation in student opinion and sentiment was evidenced across major geographic regions.
Top areas of divergence in student opinion
The table represents the top questions for which there was the most variation according to geographic region. For each question and answer, we have listed the percent of respondents who picked that answer for each region and highlighted the highest and lowest percentages. The question for which there was the most variation related to characteristics that contribute to a successful employee. Almost half of the respondents in Japan selected disruptive, while only 3 percent did in India, resulting in a 1400 percent variation.

of engaging with customers today, they predict the future landscape will look drastically different. In looking ahead to the next three to five years, CEO expectations of social media and Web sites were as high as those of students (see Figure 4). However, they still place more value on the importance of face-to-face interactions than students. Clearly the face-to-face channel will remain – it is, after all, the most interactive. But both students and CEOs, however, predict social media will soon displace traditional marketing communication in building and deepening relationships with customers.

As CEOs move ahead toward these digitally enabled relationships, they have a vast pool of expertise among the millennials they hire. And, in all likelihood, they will increasingly expect the millennial generation to help lead the shift toward social and other types of interactive media. Virtual versus "real life"

While it may be difficult for business leaders who learned social media as adults to intuit just how millennials use and experience social media as digital natives, data from the 2012 Student Study provides some insight. Students both understand and incorporate a balanced view of social media in their daily lives.

Five out of ten students said they interact online with people they don't already know – in other words, they use social media to reconfigure and expand their social networks into totally new areas. In fact, even before finishing college, students are joining professional social networks such as LinkedIn to establish and benefit from professional relationships.

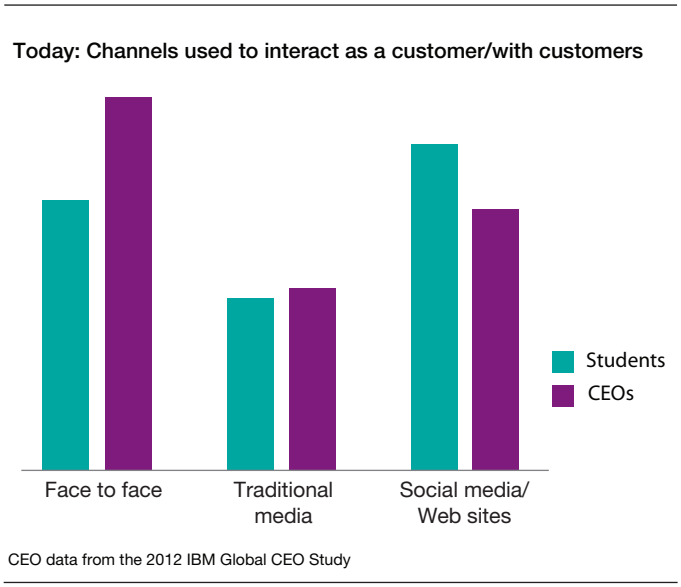

Figure 3: Today, students prioritize social media and Web sites over face-to-face interaction with customers.

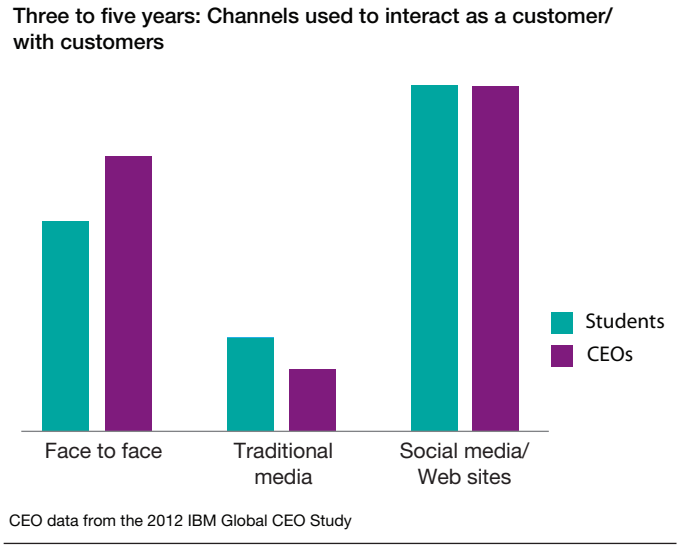

Figure 4: Both students and CEOs believe that the most important channel for customer interaction in the future will be social media/Web sites.

"Social media is a toxic love... It allows one to access anything from anywhere in a matter of seconds. Yet... no true friendship, relationship, interest, job, or awareness can develop and flourish from social media alone." – United States student, age 18

Students are moving past the "personally social" and seeing the connection between social media and global citizenship (see Figure 5). A majority of them, 61 percent, said that social media helps increase their awareness of the world. They believe that "compared to older generations, social media has made me more aware of global issues and how I can make a difference in the world." Nearly half of students said social media has given them a

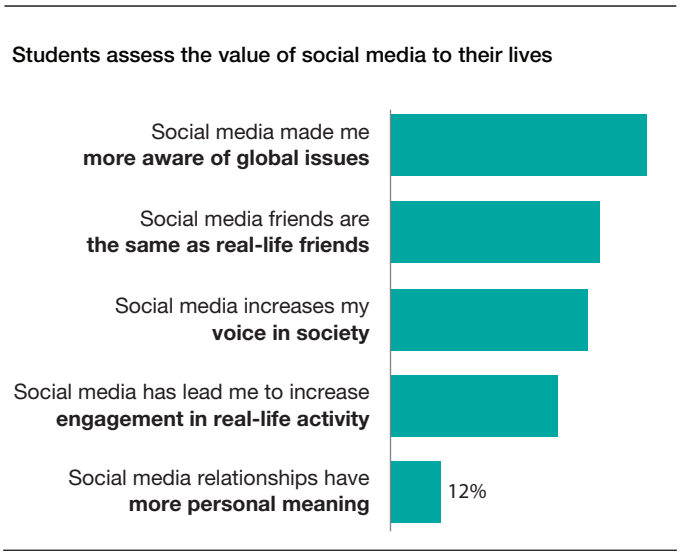

Figure 5: While social media is expanding students' awareness of global issues, "social" friends do not fully displace real-life relationships.

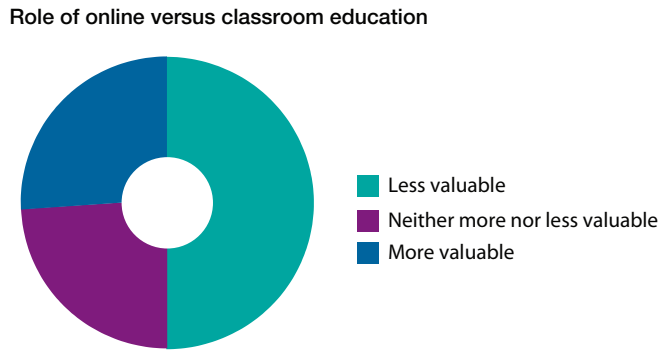

Figure 6: When it comes to education, students prefer classroom education over online education.

more powerful voice in society (47 percent) or helped them increase their engagement in real-life activity (40 percent). Living up to its promise, social media is exposing students to alternative ideas, philosophies and life experiences. It is also giving them an opportunity to exert influence in a much more interconnected world.

"Social Media has allowed my generation and others to feel more involved... Any successful organization will take full advantage of social media and the ways it touches populations." – United States student, age 22

Classroom to go

When reflecting on customer relationships, students see more value in digital channels than face-to-face interaction. But when it comes to their own education, they still prefer traditional classrooms. Only 26 percent of students said that online education is more valuable than the classroom (see Figure 6).

"Increased access to (college) education is the value of online education programs, not necessarily their competitiveness with physically attending class." – United States student, age 18

Even so, many colleges and universities are grappling with the role of digitally enabled education. Disruptive business models, such as Open University and Udacity (online educational organizations) are creating impetus for colleges and universities to incorporate online educational experiences in ways that go beyond incremental enhancements to traditional courses.[4]

Globally, 50 percent of students found online education less valuable than classroom education. However, the picture changes if you look at students in emerging versus mature markets. Students in emerging markets were almost twice as likely as those in mature markets to find more value in online education (38 percent versus 20 percent). In circumstances where access to traditional college is limited, online education can create unique value.

Customer centricity

"Understanding the new customer: social media + data explosion = high level of service and product customization." – Brazil student, age 26

Organizations today are awash in data and information about customers and markets. Across all parts of their organizations – from finance to marketing to operations – CEOs are eager to use this data to gain insights for competitive differentiation. But successfully acting on insights often requires significant organizational change.

Students have a bigger appetite for organizational change than

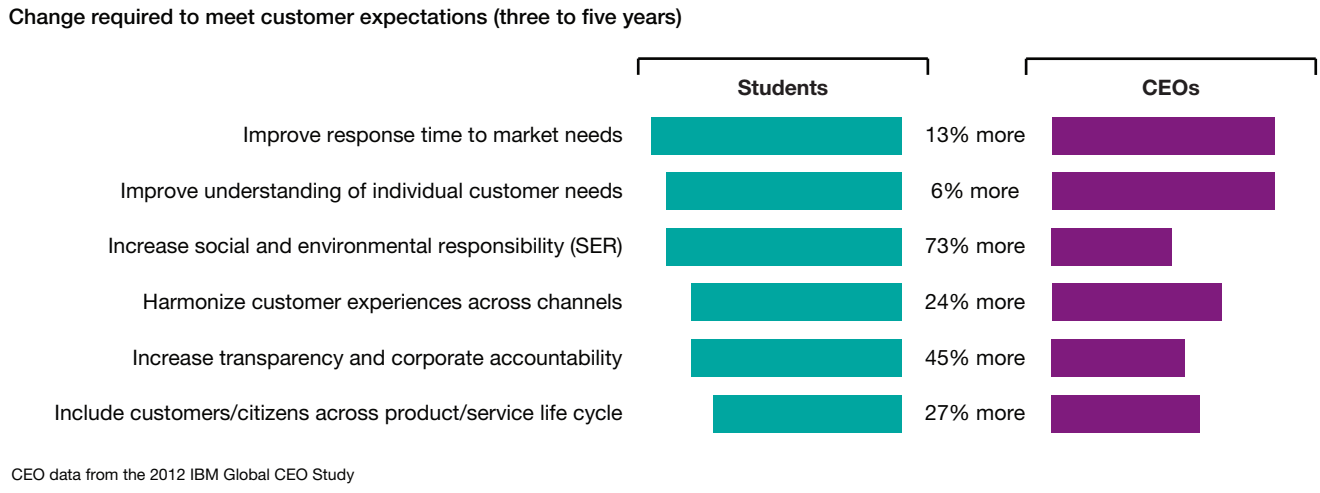

Figure 7: Although students and CEOs have somewhat similar beliefs about future customer expectations, students are far more focused on corporate responsibility.

CEOs across all areas of customer engagement. In the creation of a consistent customer experience across channels – phone, face to face or digital – students were 24 percent more likely to support change than CEOs. Improving response time to market needs was also a higher priority among students.

For students, improving social and environmental responsibility (SER) ranked second only to improving response time as customer concerns, whereas CEOs ranked it the lowest of six factors – a disconnect also found in the 2010 Student Study (see Figure 7). According to our 2012 study, students are 73 percent more likely to support change to increase social and environmental responsibility than CEOs.

Perhaps CEOs believe that their organizations have already addressed social and corporate issues through development of explicit policies and strategies over the past decade. Students of today are the customers and citizens of the future who will inherit the world left by current generations. Given the deep and sustained concern expressed by successive generations of students, CEOs may be underestimating the importance of social and environmental responsibility in their business models, operations and articulated values.

Future leaders

"The employer-employee relationship has changed over the years. The relationship, which was once based on loyalty and job security, is now based on flexibility and continuous development of skills." – Kenyan student in Switzerland, age 26

Both students and CEOs were asked about personal characteristics for success in the workforce. Four qualities – communicative, collaborative, flexible and creative – rose to the top of the list for both groups (see Figure 8). This cross-generational alignment will likely help lessen "culture shock" as students join the workforce.

Today's students have grown up with rapid change as a way of life. Many have seen the impact of economic, social, political and technological forces on the lives of their parents and friends. Accordingly, students almost intuitively understand the need to constantly reinvent themselves, be open and responsive to constant change, and learn from others' experiences. These top-ranked characteristics make it possible for employees to contribute to organizational success in a connected and rapidly changing economy. They will also help the employees and leaders of tomorrow become "future-proof" – they will be able to continuously adapt by acquiring skills and capabilities that may not yet exist today. They will be able to use these evolving capabilities whenever and wherever they are needed.

Cultural imperatives

"The most effective tactic for attracting, retaining and rewarding the best people is providing flexibility for employees to balance their life and work responsibilities." – India student, age 25

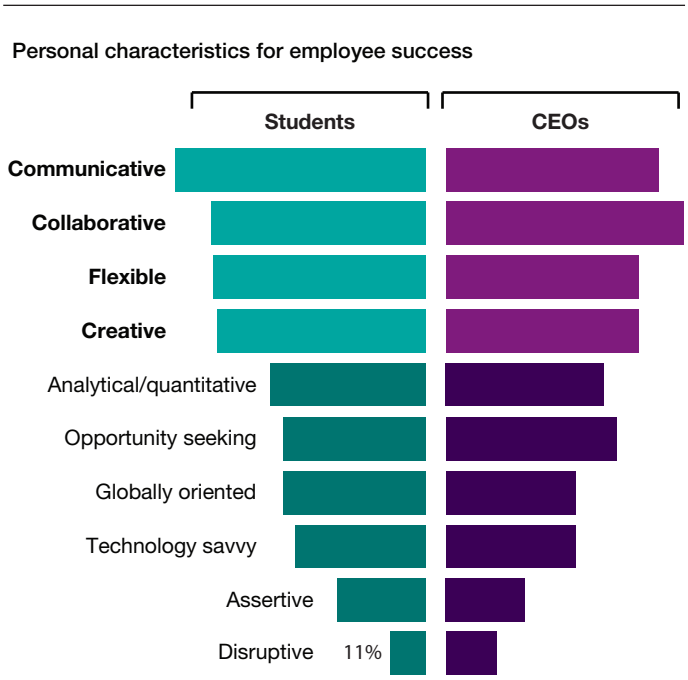

Figure 8: Students identify the same top-four characteristics of personal success in the workforce as CEOs.

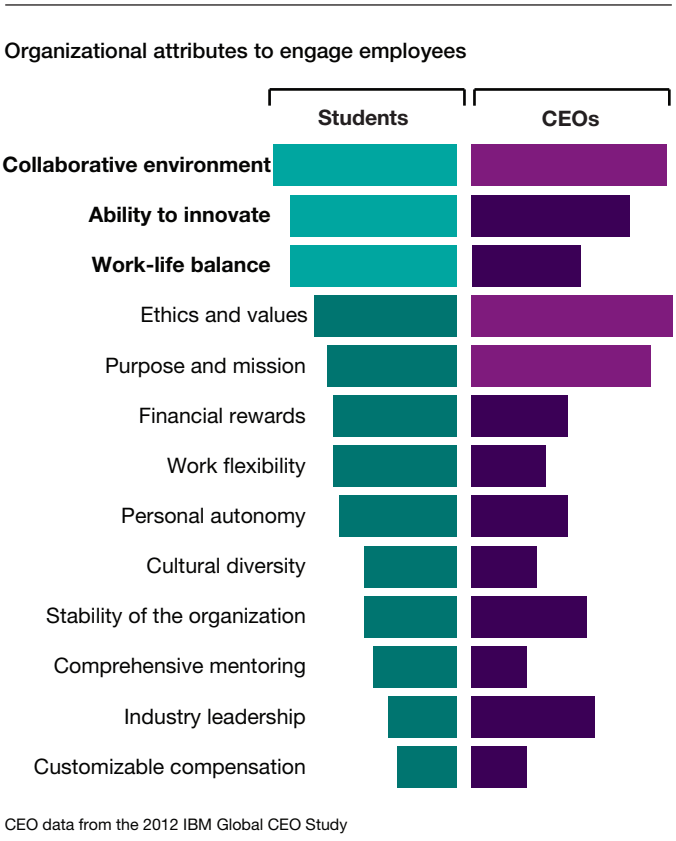

Figure 9: Students are more focused on work-life balance than CEOs, while CEOs place more emphasis on ethics/values and purpose/mission.

When considering employee engagement, both students and CEOs agree that a collaborative environment is important. In fact, collaborative environment was ranked the most important attribute to engage employees by students and the second highest by CEOs. However, there were disconnects in ranking for many of the other employee engagement aspects (see Figure 9).

For example, students place a much high priority on work-life balance. A larger percentage of students also said they value an environment that affords them the flexibility and autonomy necessary to innovate.

In addition, students ranked a culture of ethics and values perpetuated by organizations fourth out of thirteen traits needed to engage employees – while CEOs ranked it first. Similarly, students ranked purpose and mission fifth, while CEOs ranked it third.

These differences between students and CEOs run counter to widely held beliefs about the millennial generation, to whom ethics, values and purpose are ascribed as critically important. Do students take ethics and values for granted? Does lack of work experience and no deep understanding of modern organizations leave students unaware of the extent to which ethics and values underpin and support flatter, more open organizations? Or alternatively, does the millennial generation's concern with work-life balance and drive to innovate simply eclipse other workplace concerns? Most likely, students' appreciation for the role of ethics within organizations will deepen once they experience full-time employment.

"...While boomers usually view long hours as evidence of loyalty and hard work, Gen Y tends to try to have more work-life balance... They expect to leverage technology to work efficiently instead of staying late in the office to get it all done." – India student, age 22

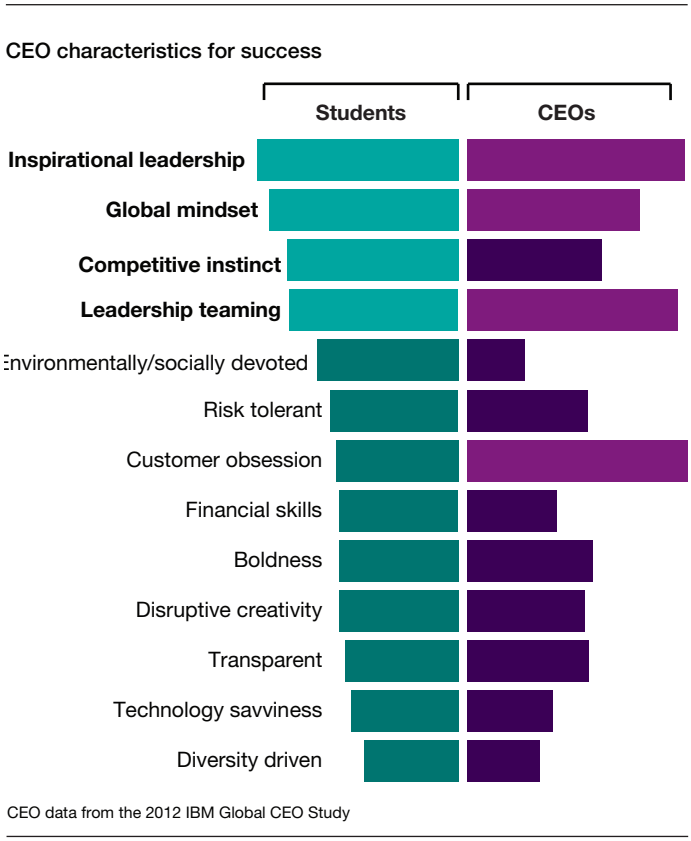

Figure 10: Although CEOs rank customer obsession as the number-one trait for CEO success, students view it as far less important.

Leadership imperatives

Although students and CEOs agree that inspirational leadership is an important trait for a CEO, they ultimately think about leadership in fundamentally different ways. For example, among CEOs, customer obsession was the top-ranking characteristic for a successful CEO. However, despite having strong views about what customers are prioritizing in the connected world, such as increased demand for responsiveness, students ranked the importance of a CEO possessing a customer obsession seventh out of thirteen factors (see Figure 10).

"Corporations must be socially responsible and accountable... After the recent corporate scandals, people want to know businesses will be accountable for their actions." – United States student, age 20

Instead, students ranked environmentally and socially devoted fifth in importance to CEO success, while CEOs themselves ranked it last. Since social and environmental responsibility also ranked lowest among CEOs in terms of customer needs, the disconnect in CEO success factors between CEOs and students suggests that CEOs are perhaps not fully attuned to the social values and environmental commitment of students or, alternatively, students may not yet fully understand day-to-day business imperatives.

Educating for success

"Businesses need to have a greater influence on what and how tertiary (college) education is provided – with more tangible skills and work-place experience given greater focus." – New Zealand student, age 21

Just as we did during the inaugural IBM Student Study in 2010, we asked students about the extent to which their formal education prepares them for working life across multiple dimensions. Overall, students believe their education has equipped them with the skills needed for future employment.

Collaborating with others, for example, is identified by CEOs as the number one trait they seek in employees, with 75 percent calling it critical. CEOs will not be disappointed: more than seven out of ten students said that their formal education has prepared them to be effective collaborators. In a contemporary education setting, students spend much of their time sharing assignments, exercises and case studies, while also collaborating closely on extracurricular projects. Technology is another area where students said they were well prepared by their formal education. Nearly two-thirds of students, 65 percent,

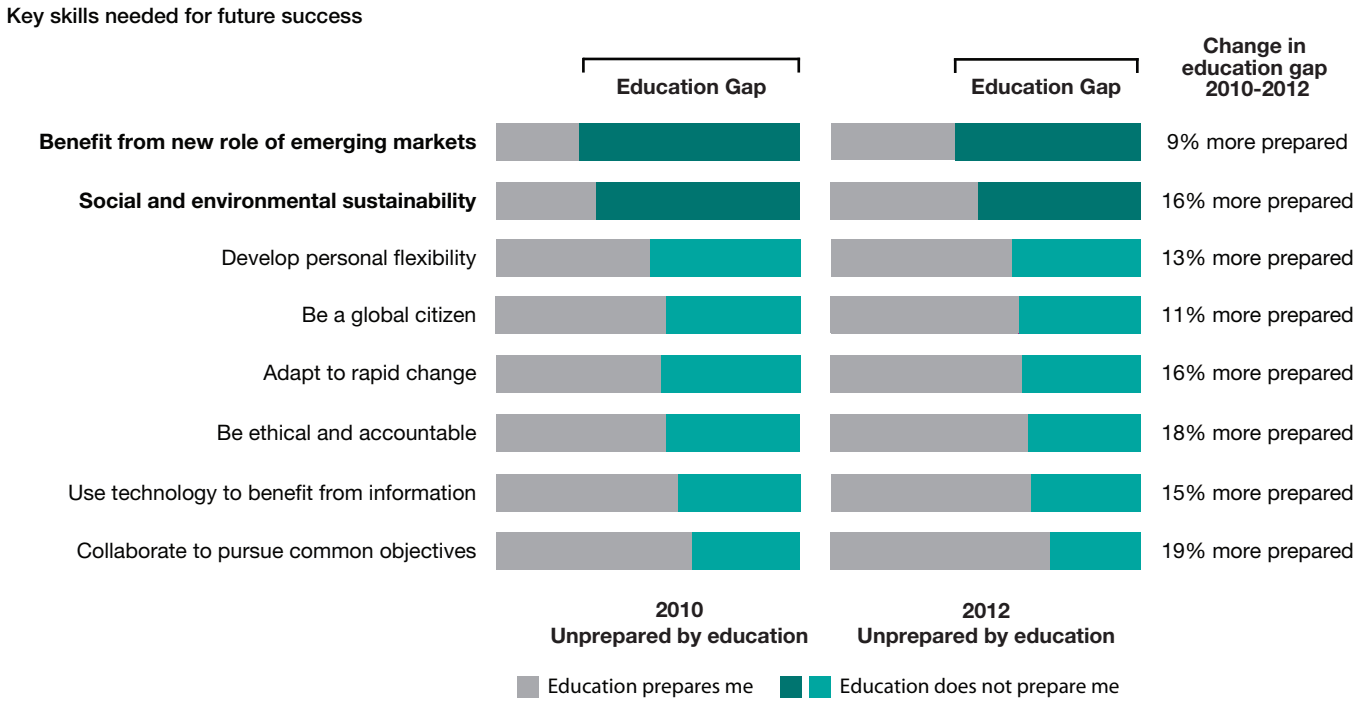

Figure 11: While a gap remains, education is getting better at preparing students for the future.

said they are already positioned to use technology to benefit from the massive amounts of information now available.

Global future

Since the 2010 Global Student Study, formal education has improved student preparedness across all the dimensions surveyed. Despite this improvement, formal education continues to lag behind student needs in some key areas.

Unfortunately, the capability for which students identified the highest gap in 2010 – benefitting from emerging markets – has shown the least amount of improvement (see Figure 11). The 2012 CEO Study revealed that CEOs, like students, place high priority on emerging or growth markets. More than half of the CEOs plan to increase operations and revenues across growth markets in Asia, South America, Eastern Europe and Middle East and Africa. Clearly, students need additional education in this area to feel more prepared for their careers.

Preparing tomorrow's leaders today

> "We need to step away from the traditional 'trait approach' leadership and manager characteristics and look to people who enable change." – United Kingdom student, age 21

The 2012 Global Student Study and the 2012 Global CEO Study show students and CEOs to be in general agreement on a broad range of topics. Collaboration, openness, personal empowerment, creativity, flexibility and innovation are all capabilities that both students and CEOs see as critically important.

There were, however, some disconnects:

- Students have strong insight into the customer needs and aspirations in the connected world but have not translated this knowledge toward understanding the need for CEOs to place customers at the very center of their strategic and mental ecosystems.
- CEOs understand the importance of social and environmental responsibility but place far less relative importance on it than students.
- CEOs are not prioritizing the importance of work-life balance, personal autonomy and empowerment for innovation that students expect in their working lives.

Rather than portending a major cultural clash, these areas of difference can be valuable "learning moments" for both students and CEOs alike. Differing perspectives from overlapping generational

perspectives provide valuable opportunities to create more robust and resilient organizations.

Five major conclusions emerge from the 2012 IBM Global Student Study:

1. Students see openness as a pervasive force; they are strongly oriented toward collaboration, creativity and innovation.
2. Students today place more value on social media for customers, themselves and others than CEOs; CEOs plan to catch up within three to five years.
3. To meet customer needs, students focus on changes that improve responsiveness, individualization, environmental responsibility and harmonized channels.
4. Students align with CEOs on key workforce capabilities for success but are more focused on work-life balance and innovation.
5. Education is getting incrementally better at preparing students for work, but gaps remain.

To address these challenges, we recommended that students, CEOs and educators consider the following.

Implications for students

Make the business case for change: Recognize that you can be a very powerful agent of change in organizations by bringing fresh thinking, ways of doing things and insights into the next generation of customers, employees and partners. However, for organizations to accept change, they typically need to understand the value of embracing the change. Identify and, whenever possible, quantify the value that change will create in organizations, make the business case and build consensus.

Be a social media ambassador: Many of the CEOs interviewed in the 2012 Global CEO Study said they are looking to the next generation of employees to help solve the social media riddle. Help future colleagues understand the profound impact that social media can have on business models and operations and how they can drive revenue from using social media in deeper and more meaningful ways. Also understand that social media can create other challenges in organizations, especially around confidentiality and security.

Embrace education as a lifelong journey: CEOs recognize that many of the functions that may be required of employees in as little as five years time may not even be known or understood today. Business is changing so fast that CEOs are less concerned about functional

Growing up social – and socially responsible

A junior at George Washington University majoring in business, Max Chen is an avid social media networker. As a millennial "born on the Web," he began using social media in childhood.

While attending Cornell University Summer College between high school and college, Max viewed and discussed the film,

An Inconvenient Truth. He then began to see the world through the lens of sustainability. He joined campus environmental groups and even created a video urging students, staff and faculty to think about better ways to manage water resources.

While at George Washington, Max took an "alternative" spring break as a volunteer in Greensburg, Kansas. Hit by a devastating tornado in 2007, the city decided to rebuild with the goal of becoming one of the most sustainable cities in the country.5 After interviewing the town's mayor, officials and citizens, Max combined their stories with footage of construction work in a video modeling a new way to rebuild after catastrophe. He then used social contacts to publicize his "green" story, including one who helped land a placement on a major television show. Max also did a tour with Long Way Home, a non-profit organization dedicated to sustainable development in Guatemala.6 Again he filmed sustainable development, but this time it was a very different approach.

Max explains that in this impoverished rural area, sourcing sustainable building materials means making "bricks" by stuffing trash into plastic jugs.

Having taken no formal courses in video production, Max turned to social media to learn a new way to express his passion for the environment. Education, he believes, does not just take place in the classroom or library. It is social. With or without formal academic credits, Max is applying millennial mastery of social media to accelerate his personal, educational and professional growth.

Recently, Max attended a White House event for winners in the Youth Sustainability Challenge. His submission: a three-minute video illustrating his personal growth in the area of sustainability. A veteran social media networker, Max handily secured more than enough online votes to place first in the "popular choice" category.[7]

capabilities and are increasingly focused on the ability of employees to be flexible, creative, collaborative and communicative. CEOs want employees to help identify and grow specific capabilities as and when they are needed. Recognize that because of ever-changing demands, education has become a lifelong journey. Successful employees will constantly need to revamp and develop new skills through-out their lifetimes and constantly adapt to ever-changing needs.

Implications for CEOs

Create the workplace of tomorrow – today: Students today are embracing organizational openness, with its associated opportunities for flexibility, collaboration and innovation. To be a desirable employment destination for students and attract and retain top future talent, CEOs need to embrace openness to build and sustain transparent and collaborative working environments and corporate cultures.

Invert the organizational pyramid: Students seek working environments that have all of the characteristics of their every day life – including immediacy, mobility and social interactivity. Having gown up social, students have a deep understanding of the power and limitations of social media and other digital technologies. By harnessing this raw knowledge and experience and directing it toward deepening relationships with customers, partners and other employees, future employees can make a profound contribution to innovating business models, improving operations and driving new – and as yet – largely untapped revenue sources.

Prepare to look back to the future: Students are making their views very clear: Having seen their parents work increasing hours for, in many cases, fewer rewards, they want a more equitable balance between work and personal life. The days of ever-increasing claims on employees is coming to an end. To attract and retain the best workers and thinkers of the next generation, reconsider working norms, structures and behaviors to address the dramatically different employee expectations that will become dominant as the current generation of students become the next generation of employees.

Implications for educators

Anticipate new business imperatives: It is clear that between 2010 and 2012, colleges and universities around the world have improved in terms of relevance.

Leadership begins in communities

Michael Bock grew up in a municipality with an advanced view of community planning. In 2005, Hampton, Virginia, received the Innovations in American Government Award from the Ash Center for Democratic Governance and Innovation at the John F. Kennedy School of Government, Harvard University. The award recognized the city's Youth Civic Engagement Initiative, which includes 15 years of assessment, outreach and consensus building – all aimed at making sure the city's youth become workforce and community leaders of the twenty-first century.[8]

Hampton's best practices for youth engagement included hiring students to support the recommendations of the local governing boards. Fortuitously, a spot became available when Michael was a high-school sophomore. The experience taught him that "leading from behind" requires thinking about long-term, visionary ideas while also getting other people involved. "You need to show people you have things under control without appearing aloof and also keep them engaged in the work," he says. Mindful, thoughtful leadership, Michael learned, requires a delicate balance.

As a freshman at University of Virginia, Michael secured a two-year term on yet another youth advisory board. State Farm, a leading U.S. insurance company, supports and funds local programs for "service-learning," a structured approach to education that integrates classroom teaching with community service. State Farm's Youth Advisory Board researches societal issues, as well as reviews grant applications and ultimately selects the winners.

As one of 30 students responsible for granting US$5 million for student-led projects, Michael once again had an opportunity to develop his personal leadership style.9 Working as part of a national group reviewing scores of proposals, he found it a bit disconcerting that he was unable to personally get involved with each applicant. However, relying on his high-school experience with the service-learning program in Hampton, he was able to extrapolate the local impact of each grant and contribute to a more streamlined review process.

Most of all, Michael savors the ability to make his own personal impact, whether that requires facilitating meetings or making presentations at a national conference. For him, the outcomes and personal interactions resulting from these activities provide feedback and new connections that fuel his commitment to "making a difference."

Continue building on this progress. Use the IBM C-suite Studies and other businessresearch to understand and anticipate rapidly evolving needsof organizations both in terms of core functional skills and changing roles, attitudes and philosophies that will be required around the key imperatives of collaboration and innovation.10 Invent the employee of tomorrow: Over recent history, organizations have had to respond at lightening speed to economic, financial and social disruption.

As a result, CEOs recognize the need for an intelligent, flexible and creative workforce that can identify changes and respond by developing new skills, capabilities and ways of interacting. Make skills development a core element of college and university education to provide today's students with the skills and confidence they will need to be tomorrow's successful employees.

Expand the educational ecosystem: As education becomes increasingly characterized by lifelong learning – "reskilling" and "upskilling" – leverage external partnerships to conceive new ways of supporting continuing education. Find ways of enabling and expanding alumni networks to demonstrate ongoing relevance – not just encouraging beneficence but establishing a lifelong partnership that supports development, helps expand skills and facilitates opportunity.

Next steps...

Today's students will become the business, government, political and social leaders of the future. Their attitudes and decisions will help guide the world of tomorrow. The 2012 IBM Global Student Study reveals that today's students are thoughtful, social and responsible.

While our study found students and CEOs to be in synch on a number of issues, we also found several areas where there are disconnects. We believe these differences present an opportunity for both CEOs and students to step outside their own spheres of influence and learn from one another. As CEOs welcome these leaders of tomorrow into the workforce, some amount of change will be experienced by both groups to accommodate the passing of the torch from one generation to another. And, within their increasingly interconnected lives, students have an opportunity to fulfill their desire to build an ever better world through the twenty-first century and beyond.

From high-fashion modeling to digital marketing
Amanda Salvato became a fashion model at 13 after winning a competition in her home town of Sao Paulo. Since then, she has appeared striding across runways in Japan, Milan, London, Paris and New York; gracing the pages of Vogue, Marie Claire, GQ and Sports Illustrated; and embodying the latest fashions for numerous top brands.

Insiders know that even glamorous careers are hard work – and time limited. Like pro sports players, many models are already working toward their second careers at an age traditional college students have barely embarked on their first. A few years ago, Amanda joined two friends to create a business, Top Swap, which allowed them to share their love of high-end fashion with women constrained by real-world budgets.

"People used to look down on a girl who wore hand-me-downs or used clothing," says Amanda. "Now it makes perfect sense. It is really consistent with the basics of fashion to create your own fresh look by swapping clothing you love. Fashion is always building on the tried and true to innovate."

Clients pay a small fee to get together in New York City or Sao Paulo to try on and swap clothes and accessories in a party setting. It's a real-world network for "fashion-forward" women. Clients can sell and buy their clothing online as well, and Amanda and her partners plan to launch mobile apps as well sometime in the future.

Amanda is also pursuing studies in marketing through a digital marketing certificate program. She attends class at NYU on Saturdays and Sundays and participates in an online class during the week. As a non-traditional student, Amanda finds school exciting because it is helping her achieve exactly what she wants in life – a career that combines her dual passions for fashion and technology. Whether she takes time for more classroom courses in the future or spends the time growing Top Swap, Amanda expects she will continue learning and applying new ideas to her business and her life.

To continue the conversation...

For more information about the 2012 IBM Global CEO Study and to get the full version of the report, see ibm.com/ceostudy2012

Access interactive content and listen to CEOs in their own words by downloading the IBM IBV app for Android or iPad.

For more information about the 2010 IBM Student study, see ibm.com/services/us/ceo/ceostudy2010/futureleaders.html

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Appendix

Regional Comparisons

North America Students

Less inclined toward organizational openness (NA 53 percent; global 58 percent)

Highly connected through social media (NA 83 percent; global 84 percent within three to five years), but little interest in online education (NA 72 percent rate online education as less valuable; global 50 percent)

Engaged by means of a collaborative work environment (NA 71 percent; global 68 percent)

Value inspirational leadership (NA 61 percent; global 56 percent) and a leader with a global mindset (NA 60 percent; global 52 percent)

Smaller education gap, ie: they are more likely to believe their education has prepared them for real-world issues (NA average 32 percent education gap; global 42 percent education gap)

South America Students

Highly impacted by macroeconomic factors (SA 84 percent; global 73 percent) and people skills (SA 48 percent; global 32 percent)

More inclined toward organizational openness (SA 72 percent; global 58 percent)

Highly connected through social media (SA 83 percent; global 84 percent within three to five years) and fewer negative feelings about online education (SA 27 percent perceive online education as less valuable; global 50 percent)

Highly engaged though a collaborative work environment (SA 84 percent; global 68 percent) and responsive to having an ability to innovate (SA 66 percent; global 54 percent)

Value leadership teaming (SA 62 percent; global 47 percent) and inspirational leadership (SA 61 percent; global 56 percent)

Europe Students

Less inclined to organizational openness (EU 50 percent; global 58 percent)

Highly connected through social media (EU 86 percent; global 84 percent within three to five years) but negatively inclined toward online education (EU 56 percent believe online education is less valuable; global 50 percent)

Engaged through a communicative work environment (EU 82 percent; global 79 percent) and having an ability to be flexible (EU 77 percent; global 67 percent)
Value competitive spirit (EU 55 percent; global 48 percent)

Japan Students

Highly impacted by globalization (JP 81 percent; global 62 percent) and much less by technology factors (JP 50 percent; global 66 percent)

Aligned toward social media/Web sites rather than face-to-face (JP F2F today 45 percent; global 58 percent) (JP social media/Web sites in 3-5 yrs 93 percent; global 84 percent); future engagement lies through channel partners (JP channel partners 72 percent; global 58 percent)

Value online education (JP 43 percent view online education as more valuable than classroom; global 26 percent) (JP 28 percent view online education as less valuable; global 50 percent)

Engaged by having an innovative work environment (JP 61 percent; global 54 percent)

Appreciate inspirational leadership (JP 59 percent; global 56 percent) that is diversity driven (JP 59 percent; global 26 percent)

High education gap (JP average 50 percent; global 42 percent)

China Students

Highly impacted by market factors (CH 95 percent; global 84 percent) and less concerned by technology factors (CH lowest score with 48 percent; global 66 percent)

Focus on call centers as a means of engagement (CH highest rank 65 percent; global 43 percent) with low focus on social media customer contact today for customer engagement (CH today 53 percent; global 70 percent); anticipate significant growth in social media over the next three to five years (CH social media 83 percent; global 84 percent)

Value online education (CH 42 percent view online education as more valuable; global 26 percent) (CH 27 percent view online education as less valuable; global 50 percent))

Engaged by a creative work environment (CH 78 percent; global 66 percent) and assertive attitude (CH 51 percent; global 28 percent)

Value bold leadership (CH 53 percent; global 33 percent), leadership teaming (CH 69 percent; global 47 percent) and global mindset (CH 65 percent; global 52 percent)

Experience a high education gap (CH average 57 percent; global 42 percent)

India Students

Inclined toward organizational openness (IN 68 percent; global 58 percent)

Prioritize social media (IN 64 percent; global 70) and call centers (IN 63 percent; global 43 percent); future F2F contact is expected to be low (IN 37 percent; global 51 percent)

High focus on analytical skills (IN 61 percent; global 49 percent)

Engaged by an innovative work environment (IN 74 percent; global 54 percent) and work flexibility (IN 53 percent; global 40 percent)

Prioritize inspirational leadership (IN position #1: 67 percent; global 56 percent)

Higher education gap (IN average 56 percent; global 42 percent)

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CHAPTER 10

FROM BIG DATA TO BIG INSIGHTS: MICROSOFT PERSPECTIVE

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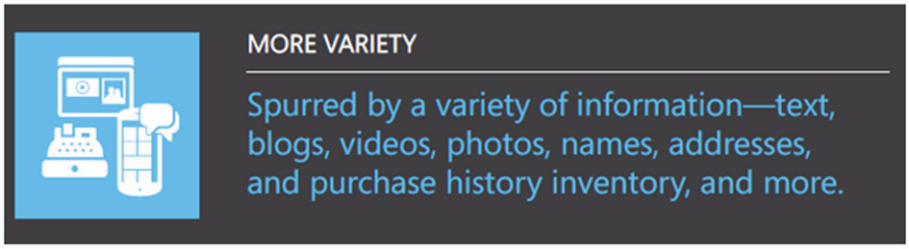
Microsoft®

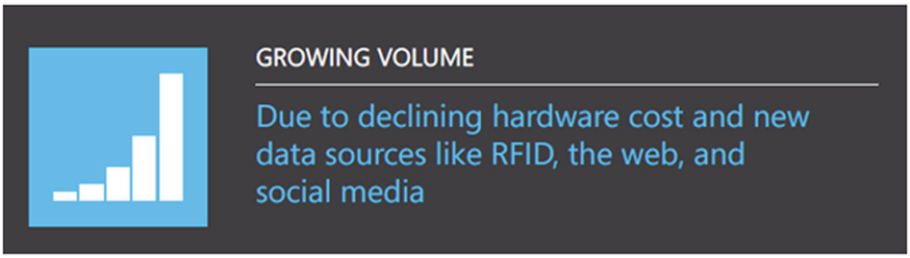
What is Big Data?

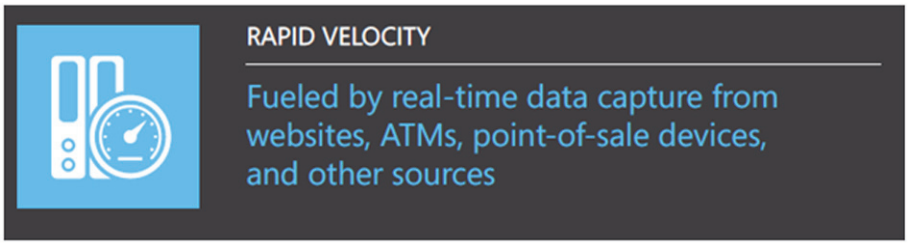
Big Data is an umbrella term that refers to the increasingly large and complex data that is now challenging traditional database systems.

YouTube videos, Facebook posts, credit card transactions, store inventory, your last grocery purchase - trillions of pieces of information are being collected, stored, and analyzed almost daily with increasing speed.

Big Data addresses one of the most critical issues facing business today: how to gain value from the growing reams of complex data.







Why Big Data Now?

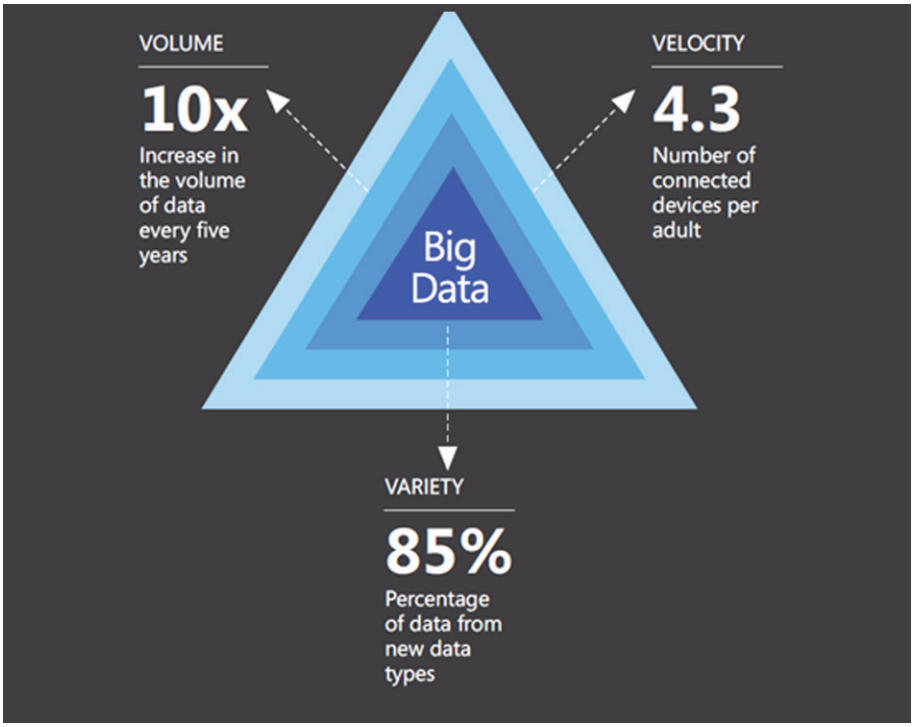
Data is changing rapidly.

Data volume is exploding: In the last few decades computing and storage capacity have grown exponentially, driving down cost to near zero. The rise of new technologies like Hadoop is significantly changing the economics of large scale data processing by enabling customers to analyze petabytes of data with industry standard hardware.

According to IDC the digital universe will grow to 35 zettabytes (i.e. 35 trillion terabytes) globally by 2020 (IDC Digital Universe Study, sponsored by EMC, June 2010). The variety of data is increasing. It's all getting stored and nearly 85 percent of new data is unstructured data. The real questions now are: How do you put all this captured and stored data to good use? How do you analyze it to make better decisions?

The velocity of data is speeding up the pace of business. Data capture has become nearly instantaneous thanks to new customer interaction points and technologies. Real-time analytics is more important than ever.

Today is a world of now, and your business needs to be able to quickly analyze new data and take action. Big Data gives you the tools to make sense of it all, and make effective business changes as a result.



What Kind of Data

How does Big Data help businesses?

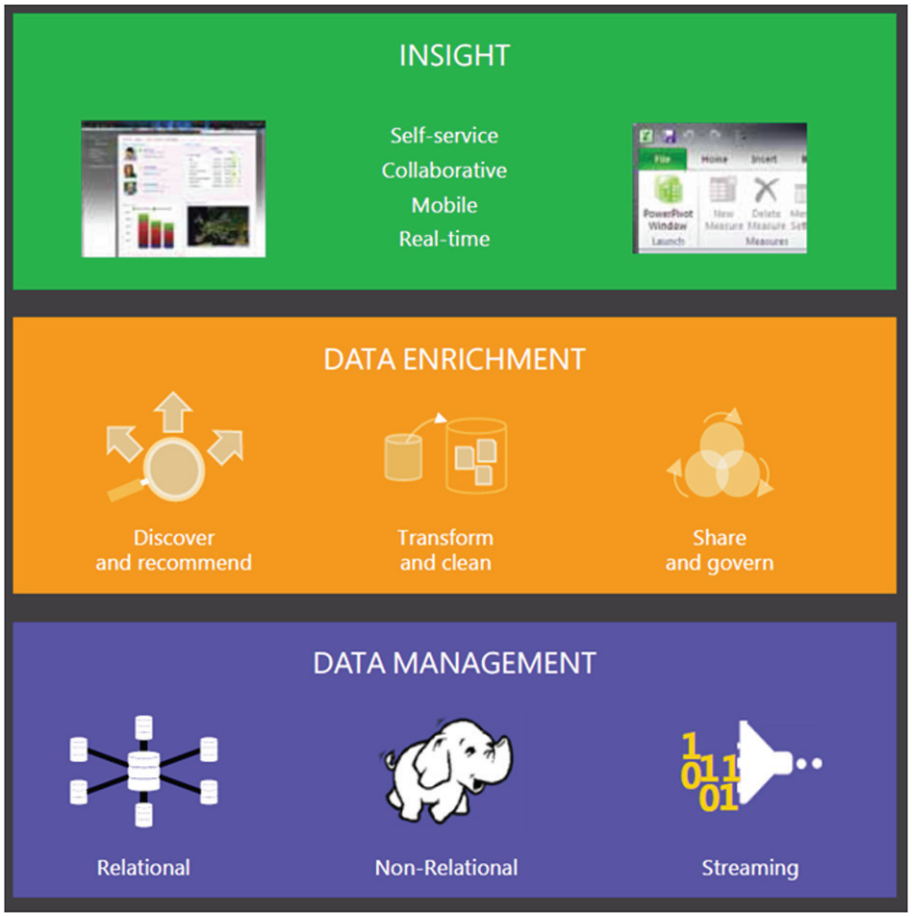
Big Data lets you ask a new set of questions of the businesses, for example:

- *Social and web analytics*
  What are people saying about my brand, products, or services?

- *Advanced analytics*
  How do I better predict future outcomes?

- *Live data feeds*
  How do I optimize my fleet based on weather and traffic patterns?

By asking and answering these questions you are preparing your business to reap the benefits of Big Data, whether that means revenue growth, cost savings, or entirely new business models.



> "By 2015, organizations integrating high-value, diverse, new information types and sources into a coherent information management infrastructure will outperform their industry peers financially by more than 20%." - Regina Casonato et al., Gartner ("Information Management in the 21st Century", Gartner - Regina Casonato, Anne Lapkin, Mark A. Beyer, Yvonne Genovese, Ted Friedman, September 2011)

Big Data requires an end-to-end approach

Traditional data management technologies are not equipped to handle the requirements of Big Data. This new world of data calls for a new approach that gives you the power to effectively manage, enrich, and gain insight from any data. For the first time, financial performance is directly tied to your investment in technologies that can handle the sheer volume, variety and velocity of Big Data.

The best platforms for harnessing the power of Big Data are open and flexible. They also blend the right technologies, tools, and features to take you from data compilation to data insight. A holistic Big Data solution includes the following:

- Flexible data management layer supporting virtually all data types.

- Enrichment layer for discovering, transforming, sharing, and governing data.

- Compelling suite of tools for gaining insight from analytics.

- A marketplace that combines your data with data from external sources.

Without the right tools, organizations will find themselves adrift in a sea of data. They need the ability to unleash the wave of new value made possible by Big Data: to manage virtually any data, regardless of size or location; add value to the data by enriching it with external input; and enable anyone in an organization to easily glean insight from your data so they can make smarter decisions.

Managing Big Data

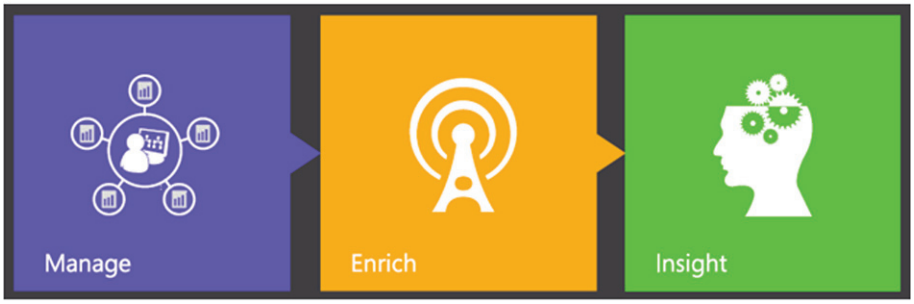
Good Big Data solutions should allow you to manage virtually any data, regardless of its type or data structure.

Regardless of data type, location (on-premises or in the cloud), or size, a good Big Data solution should give you the power of familiar tools coupled with high-performance technologies.

Not only that, a good Big Data solution should also enable you to enrich virtually any data – by discovering data from third-party sources; to combining that data, and finally refining that data for information management and advanced analytics.

There are essentially three broad categories of data:

Structured Data	Unstructured Data	Streaming Data
		



Today it's hard enough to find the right dataset within your organization, let alone outside it. And the time spent by your data analysts trying to surface the right data and source for your precise needs is costly. By connecting to external data sources you can begin to answer new types of questions and deliver new value in ways that previously were not possible.

Finally, a good Big Data solution should enable organizations to gain data from virtually any data. You cannot begin realize the value of Big Data until you can deliver new insights from all types of data—structured, unstructured, previously archived or discarded.

The benefits of Big Data are not limited only to business intelligence experts or data scientists. Nearly everyone in your organization can analyze and make more informed decisions with the right tools.

Transform your organization with Big Data

The world of data is changing in a big way, and customer expectations are changing right along with it. Big Data gives you the tools to make sense of all your collected data.

It challenges you to view your business in new ways. It gives you a basis to power innovation. And it gives you the power to take action.

It's time to get started.

Learn more about the Microsoft Big Data solution and how to get started at www.microsoft.com/bigdata.

CHAPTER 11

ADDRESSING TALENT NEEDS OF THE ECONOMIC TRANSFORMATION PROGRAMME (ETP)

TalentCorp
MALAYSIA

1.0 Malaysia— Addressing Talent Issues

Malaysia's success in transforming itself into an upper middle-income nation is the result of consistent and substantial investments in human capital development. However, in aspiring to further transform into a high-income, advanced nation by the end of the decade, our requirements for top talent are urgent and immediate. Malaysia needs to raise its benchmark for human capital management in order to secure the needed talent.

Malaysia has skilled talent that is world class and in high demand. Unfortunately, due to globalisation and the increased mobility of labour, we find ourselves having to compete for our own talent in the international market. Brain drain poses a challenge to our transformation ambitions.

Brain drain and other forms of talent loss, however, are not in themselves the problem, but are symptoms of underlying issues. To meet the talent demand of tomorrow, we need to enhance our ability to nurture, attract, and retain talent today. Our talent issues are far reaching and require the collective action of both the public and private sector. The Government is cognisant of the issues hampering the supply of talent and has embarked on a comprehensive range of structural reforms to address them.

1.1 We are caught in the middle of a global war for talent

Globalisation has resulted in a war for talent, a battle Malaysia must engage to secure the talent needed for economic transformation. As talent becomes an increasingly sought after commodity, globalisation continues to facilitate their increasing mobility and responsiveness to global demand and supply factors. Partly in response to this, significant talent gaps are forecasted for countries around the world by 2020 and even beyond (Figure 1.1)

In 2010, there were approximately one million Malaysian diaspora living and working in other countries (a third of these comprise skilled individuals aged 25 years and above with tertiary-level education).

It is worthwhile to note that brain drain is not necessarily negative. It is negative only when migration depletes the stock of skilled human

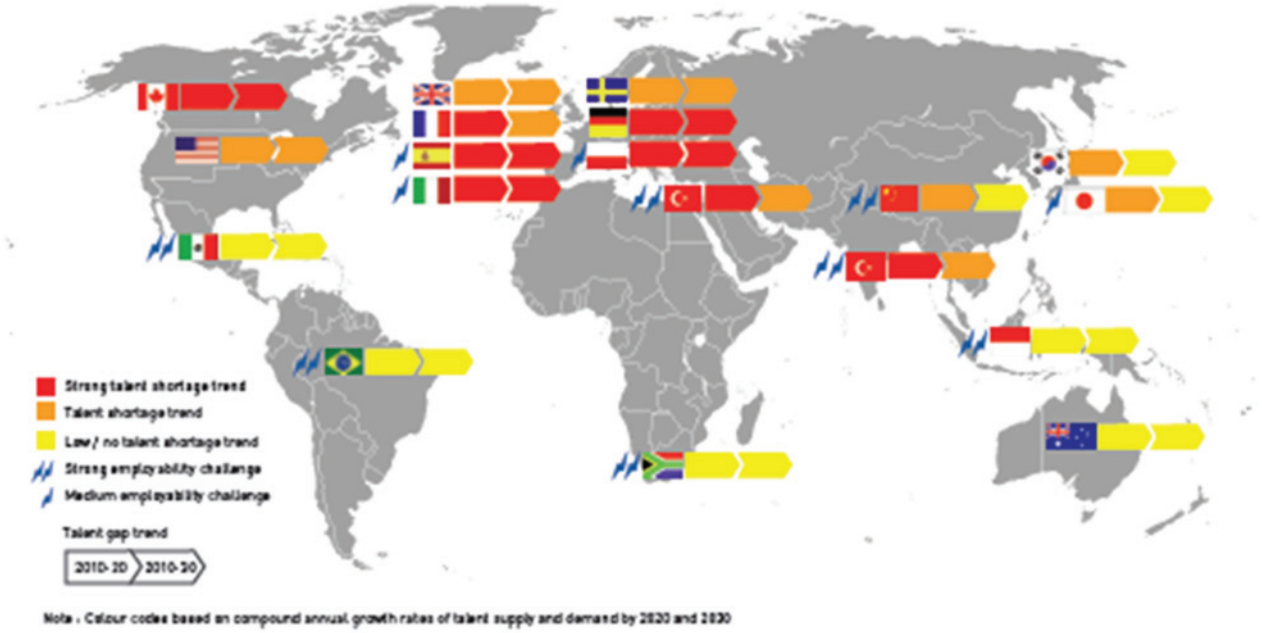


Figure 1.1 – Significant Talent gaps expected by 2020 and beyond
Source: World Economic Forum 'Global Talent Risk-7 Reponses', 2011

capital, potentially setting off a vicious cycle of insufficient talent. This in turn depresses economic growth and investment, thereby pushing more talent to migrate (Figure 1.2).

1.2 Supply and demand forces impact Malaysia's talent pool

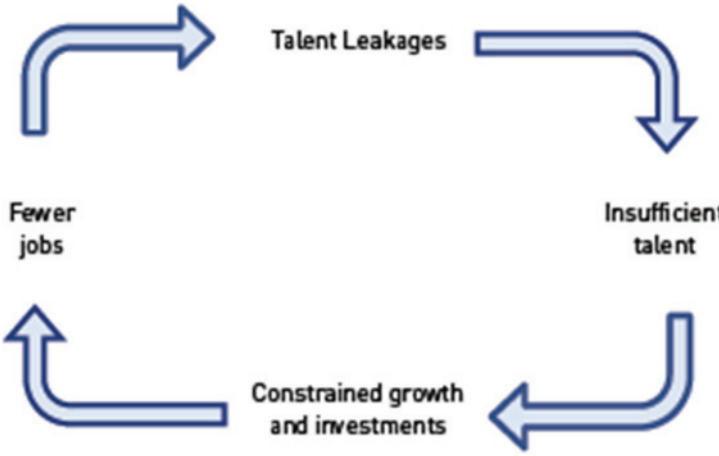
Malaysia's talent pool comprises skilled human capital predominantly supplied by the local education system. In addition, there are inflows of global talent, consisting of returning Malaysian diaspora and foreign talent. At the same time, priority sector demands on the talent pool continue to evolve as they transform and move up the value chain.

Obstructions in the talent pool have resulted in poor optimisation of demand and supply, resulting in talent leakages. Brain drain is but one form of this. Other forms include women leaving the workforce and the mismatch of competencies between skills of local graduates and industry needs.

While these talent leakages represent a substantial drain on Malaysia's talent pool, the issue is whether our pool can maintain equilibrium to support our robust industry growth.

1.3 There are issues that affect talent in Malaysia

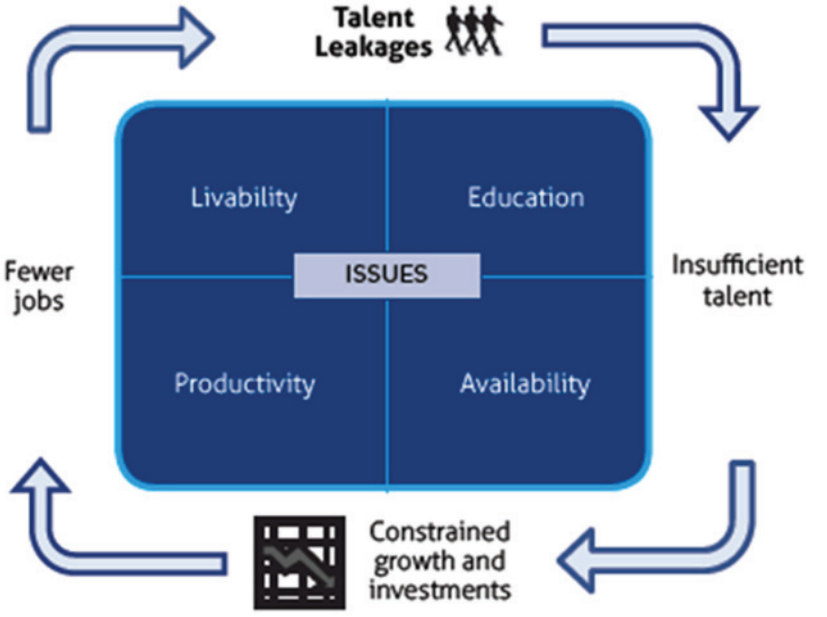
A sustainable talent pool should maintain equilibrium between talent inflows and outflows, thereby enabling a supply of appropriate talent to meet the demands of industry in a timely manner. The issues in Malaysia's talent pool, in the areas of Quality of Education, Availability of Talent, Workforce Productivity, and Quality of Life,



Source: TalentCorp Analysis, 2012

Description: Detrimental brain drain can potentially affect the abundance of talent in a country. As more talent leaves the country, the talent shortage significantly constrains the industry's ability to grow and scale up investments. This eventually leads to fewer jobs and high income opportunities, which further provokes more talent to leave, potentially triggering a vicious cycle of brain drain and economic softening.

Figure 1.2 Brain Drain can trigger a vicious cycle, affecting the abundance of talent in a country



Source: TalentCorp Analysis, 2012

Description: The potential vicious cycle of brain drain is a symptom of underlying issues that affect the talent environment in Malaysia. The education system has a pivotal role in producing a sustainable pool of talent to compensate for recurring leakages of talent. If unable to do so, the lack of talent availability in the country could ultimately slow down economic growth and investments, which would lower productivity. This would lead to fewer high income opportunities, which could affect the livability factor of the country, further aggravating talent leakages.

Figure 1.3 Issues within Malaysia's talent landscape aggravate talent leakages

Figure 1.4 Malaysia takes a relatively long time to fill professional vacancies

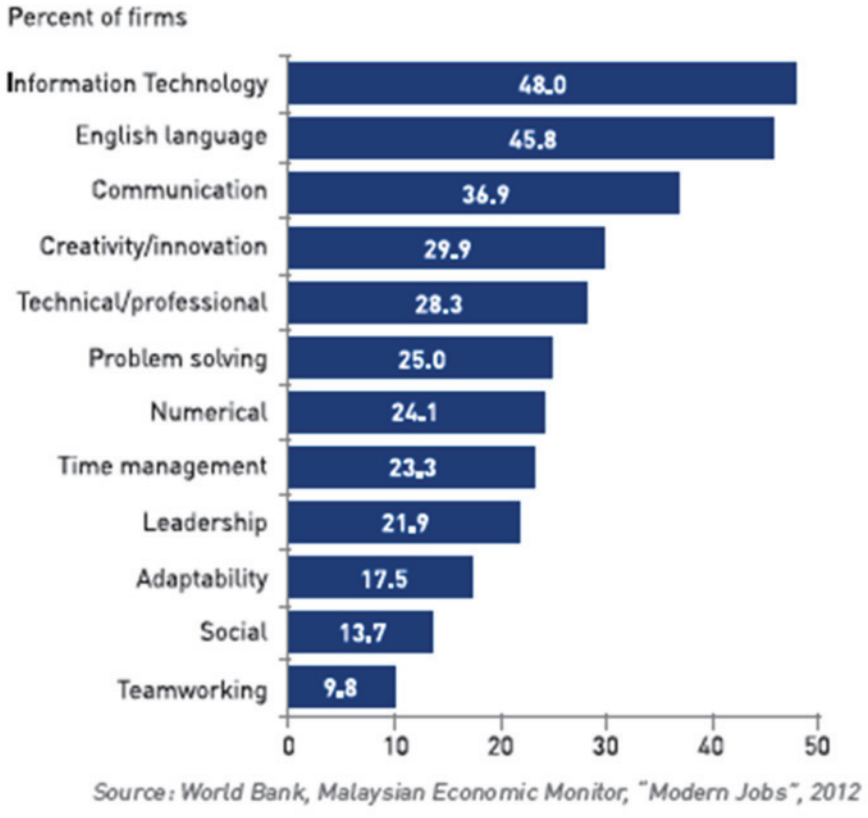


Figure 1.5 Firms generally identify non-routine and other soft skills as a restraint to hiring

compromise this equilibrium (Figure 1.3). This is further compounded by brain drain and the outflow of talent caused by both push and pull factors globally and domestically. These are critical issues constraining the ability of the pool to be a dependable and sustainable talent source.

1.4 Availability of Talent

1.4.1 Shortages of top talent and highly-skilled workers

As Malaysia progresses from a production-oriented to knowledge- and innovation-oriented economy, its key industries require a workforce with a different profile. The shift towards higher value-added activities has led to calls for a larger pool of top talent and a highly-skilled workforce.

The process of employing the right talent in Malaysia can be a costly and time-consuming process. For example, it takes six weeks to fill a professional position in Malaysia compared to three weeks in the Philippines and two weeks in Indonesia (Figure 1.4).

Nearly half of the Malaysian firms recently surveyed cited the lack of Information Technology skills and poor English proficiency as key restraints to hiring. Poor communication skills was the third top reason, while good academic qualification was not even featured in the top 10 reasons (Figure 1.5) .

1.4.2 Insufficiently leveraged pool of latent talent

Although Malaysia has done well in achieving gender parity in education, this has not translated into improving women's participation rates in the workforce. The national Labour Force Participation Rate among women in Malaysia has not surpassed the 50 percent mark since the 1980s. Labour force

participation, especially among women, is low by regional and international standards (Figure 1.6). Among the top reasons for poor women participation are inflexible working arrangements and the lack of appropriate infrastructure to allow women to return to the workforce after they have left, usually to tend to family commitments.

Figure 1.6 Women's labour force participation rate is low relative to other Asian and Organisation for Economic Cooperation and Development (OECD) economies

1.4.3 Shrinking Expatriate Base

One of the important pre-requisites of successful global cities is the presence of highly-skilled global talent. In contrast to cities that host many expatriates, Malaysia's highly-skilled expatriate base has been shrinking since 2004. The downtrend in the number of expatriates working in the country was noted in the New Economic Model (NEM) as a cause for concern (Figure 1.7).

1.4.4 Top global talent face restrictive entry regulations

Malaysia's immigration regulations are deemed cumbersome by both foreign talent and the employers wishing to hire them. Out of the 59 countries ranked in the IMD World Competitiveness Yearbook, Malaysia scored a middling 39th place in the category of prevention of employing foreign labour through immigration laws.

Laws governing professionals in the country have also been perceived to be less flexible in allowing global talent to practise professionally in Malaysia. Figure 1.8 shows the relationship between the country's competitiveness and its scale of liberalisation. In comparison with Australia, Singapore, and Hong Kong, Malaysia's scale of liberalisation is significantly lower, thereby impacting Malaysia's competitiveness internationally.

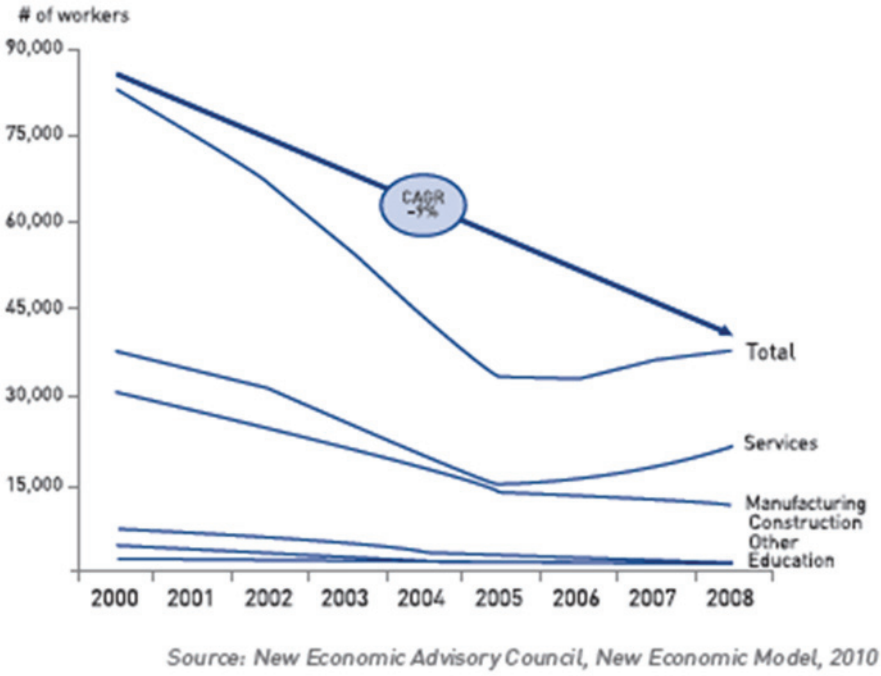


Figure 1.7 Malaysia's skilled expatriate base has been shrinking

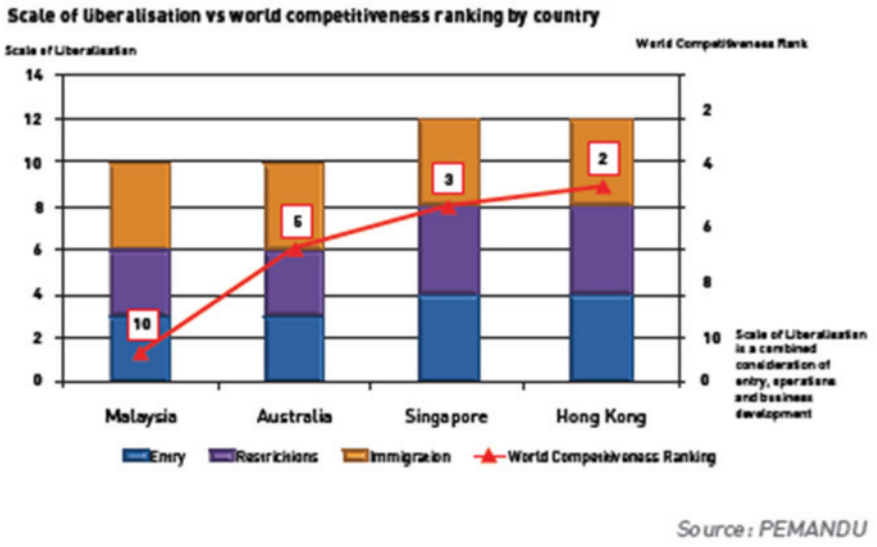


Figure 1.8 Countries that are able to attract world-class talent have clearly improved their competitiveness rating

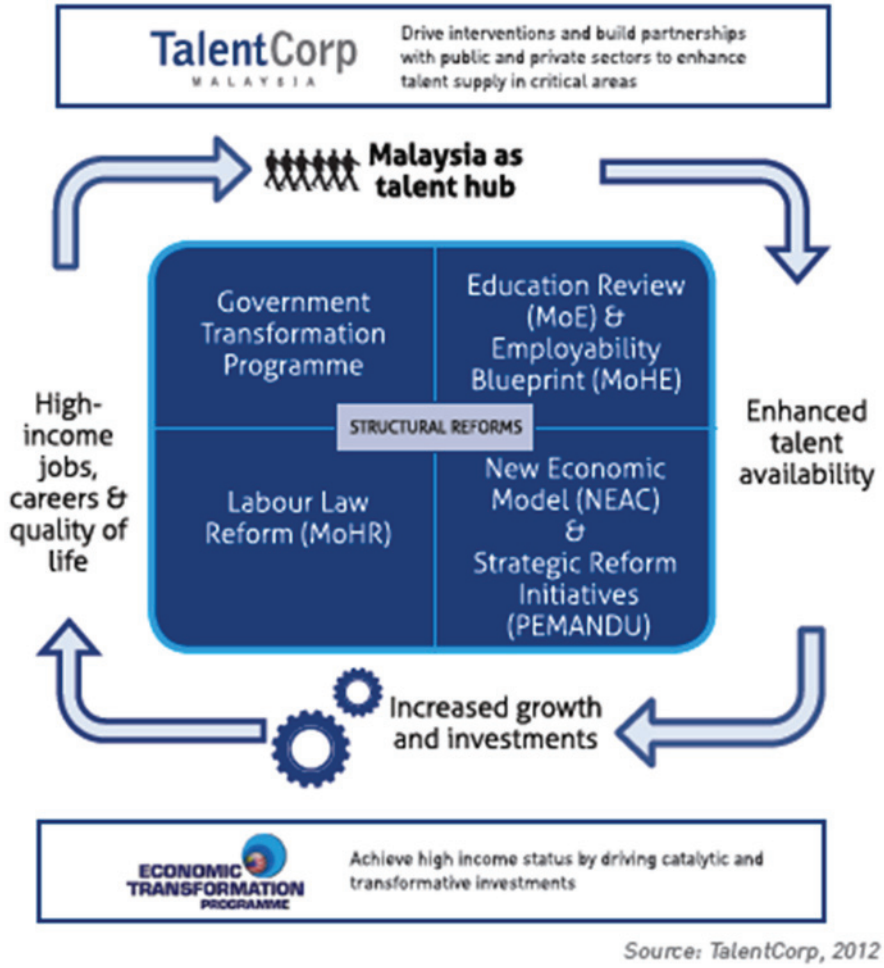


Figure 1.9 The Government has embarked on structural reforms to address talent issues

While it is undeniable that Malaysia has talent issues affecting the talent pool, the Government has made substantial and wide-ranging efforts to address them. Many of these initiatives to bring about structural reform have been placed to lead Malaysia towards Vision 2020 (Figure 1.9). Nevertheless, more demands and requirements will be placed on Malaysia's talent pool as the global war for highly-skilled, top talent escalates.

In cognisance of our critical talent issues, the Government has embarked on various structural reforms to address them. TalentCorp complements these structural reforms, to catalyse a virtuous cycle of talent in support of the Economic Transformation Programme (ETP). A review of the education system is needed to enhance talent availability in the country, which will increase economic growth and investment. The labour market conditions will then need to be improved to create a vibrant job market with abundant high-income jobs and career opportunities. The subsequent rise in the quality of life with the support of the GTP will then be able to attract and retain more talent in the country, thereby enabling Malaysia to be a global talent hub.

In 2010, the NEM highlighted that no single agency in Malaysia looks at talent at an aggregate level, much less the need for a critical mass in specific areas of expertise. This observation was echoed in the 10MP, which drew a parallel between the Malaysian Investment Development Authority's role in attracting capital investment and the need for a single agency to be tasked with delivering the human capital that Malaysia most critically needs from local and international sources. This need for a

single focal point acting as a bridge between talent, industry, and relevant government agencies brought about the establishment of TalentCorp (Figure 1.10).

In this context, TalentCorp will fill the gap in identifying the critical skills needed and finding solutions to talent issues affecting the nation's economic transformation. Armed with the mandate to nurture, attract, and retain talent, TalentCorp will work with the relevant stakeholders to develop a globally competitive, creative, and innovative first-world talent base to drive Malaysia's economic transformation agenda.

Figure 1.10 TalentCorp will act as a focal point for talent stakeholders

2.0 TalentCorp aims to address the talent shortages via three Strategic Thrusts:

Malaysia needs to ensure talent availability to support growth and economic transformation. A broad range of reforms are being undertaken to address talent needs in the long term. In conjunction with these efforts, more immediate talent-related interventions are needed to support the momentum of the ETP. Hence, TalentCorp was formed to act as a focal point to drive talent interventions (Figure 2.1).

2.1 TalentCorp was established to be a focal point

The establishment of TalentCorp was announced in the 10th Malaysia Plan (10MP) as the focal point "agency responsible for sourcing top global talent to fill skills gaps and to deliver human capital that Malaysia most critically needs, from both overseas and locally." TalentCorp commenced operations on 1 January 2011 and was established as a

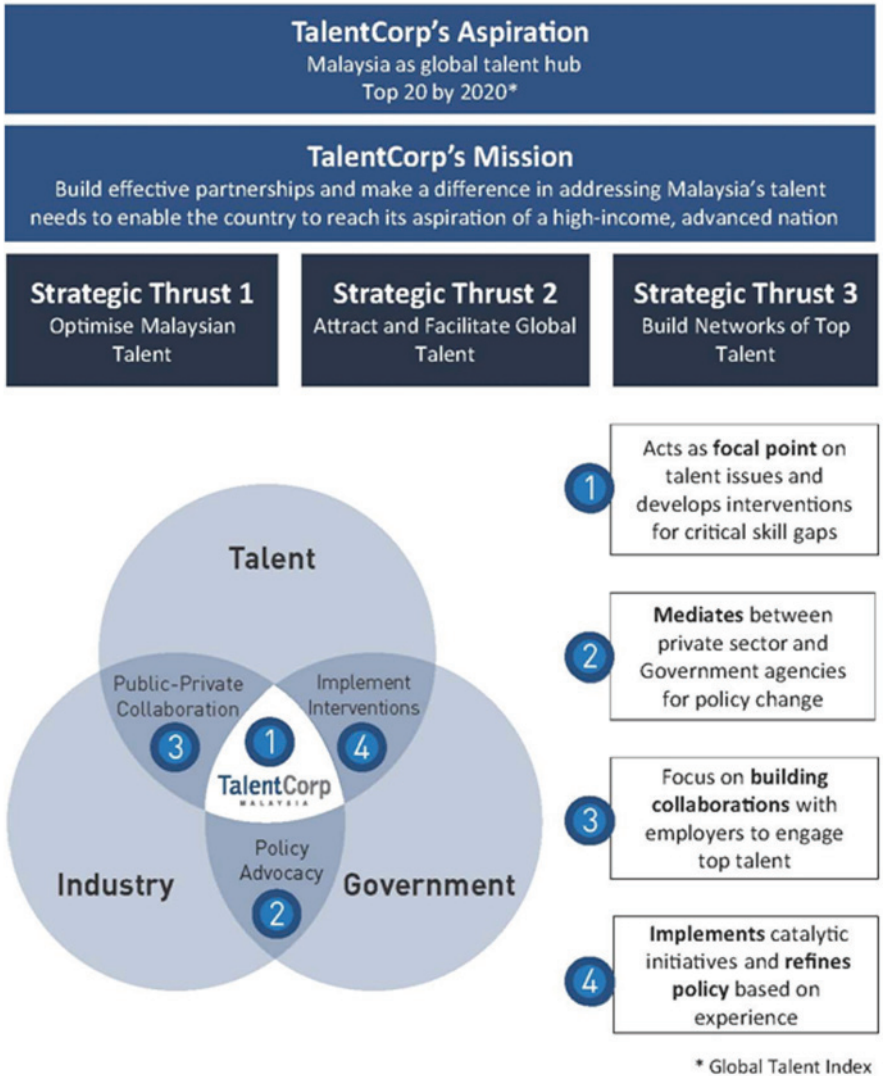


Figure 2.1 TalentCorp is a focal point between key stakeholders in the talent pool

company limited by guarantee under the Prime Minister's Department.

The context and premise for TalentCorp arose as follows:

i. **Talent** – Key to Vision 2020: to realise our ambitions to transform to a high-income economy with knowledge intensive and innovation led activities, requires top talent across our priority sectors. Our success in transforming from low-income to an upper middle-income economy was enabled by significant and consistent investment in human capital development. However, better talent outcomes are needed to achieve Vision 2020.

ii. **Risk of vicious cycle:** if not addressed, outflow of talent (whether through brain drain, skills mismatch) will constrain the ability of industry to invest and grow, which in turn motivates greater outflow of talent and thus, undermines economic development.

iii. **Underlying issues to be addressed:** Currently, Malaysia's talent environment does not benchmark favourably against developed countries, in terms of our ability to produce talent (education system and availability of skills) and to retain top talent, in relation to high-income career prospects and livability.

iv. **Collective action needed:** to address Malaysia's ability to nurture, attract and retain talent requires the public and private sector to align and intensify their efforts on talent. There are clearly areas within the domain of the private sector such as ensuring commensurate pay levels in line with productivity, and providing rewarding career paths. There are also areas which require public-private sector collaboration to catalyse change.

v. Go**vernment structural reforms initiated:** on its part, the Government has initiated structural reforms to comprehensively address the underlying issues for talent. These reforms include Employability Blueprint, Labour Law reforms, New Economic Model and efforts to improve livability under the Government Transformation Programme.

vi. **Urgent talent needs:** while these structural reforms are being implemented, there are currently immediate talent requirements and critical skills gaps faced by priority sectors and leading companies, particularly those moving up the value chain and transforming internationally.

vii. **ETP and TalentCorp to catalyse virtuous cycle:** to complement structural reforms and address immediate talent needs, interventions are required. TalentCorp was established to drive interventions to address talent needs and enhance talent availability which supports the needs of new ETP investments. This in turn will create more high-income jobs, setting into motion a virtuous cycle of talent and investment.

2.3 Strategic Thrust 1: Optimise Malaysian Talent

Malaysian talent is clearly the most important source of talent to meet the needs of the nation. Within the domestic talent pool, more than 35 percent are below the age of 25 years[1], making this group the natural focus of these programmes.

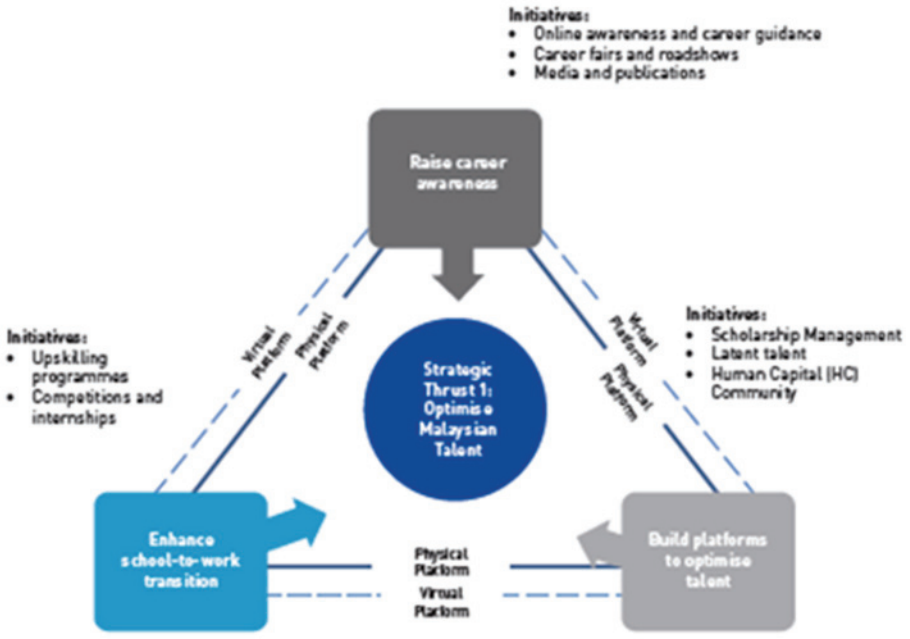


Figure 2.2 – Three key programmes have been identified to optimise Malaysian talent

Programmes	Initiatives	Phase 1 (2011 – 2015)	Phase 2 (2016 – 2020)
1. Raise career awareness	• Online awareness and career guidance • Career fairs and roadshows • Media and publications	• Raise awareness of ETP career opportunities for tertiary students through physical and virtual channels • Involve selected company partners and key sectors	• Integrate career awareness into education (career guidance) with industry-driven content • Encourage more industry-led career awareness programmes to be implemented
2. Enhance school-to-work transition	• Upskilling programmes	• Upskill to address critical skills gaps in key sectors	• Upskill top graduates for key industries and for supporting investment promotions • Industry content embedded into curriculum
	• Competitions and internships	• Establish early involvement of industry in university life • Encourage collaboration of companies, industry bodies and learning institutions to develop structured internships	• More sector-focused structured internships driven by sector regulators, industry bodies and leading institutions • Longer internships with earlier industry involvement into education
3. Build platforms to optimise talent	• Scholarship management • Latent talent • HC community	• Manage assignment of scholars • Advocate policy change • Build HR community and advocate best practices	• Operationalise management of scholars Promote best practices • Coordinate HC conferences, forums and events

Figure 2.3 The programmes are designed to optimise Malaysian talent over two phases

Three key programmes (Figure 2.2) have been identified to optimise Malaysian talent, with the intended outcome being a sustainable pool of top local talent to meet industry needs.

The three programmes are designed to ensure Malaysia optimises local talent pursuing careers in line with interests and strengths to support the growth of priority sectors. The details of the programme over two phases are illustrated below.

2.3.1 Raise career awareness

TalentCorp aims to bridge and supplement up-to-date, industry driven information on career opportunities within key sectors. With greater awareness of career options at hand, students and graduates will be better positioned to make informed decisions regarding their career choices.

i. Online awareness and career guidance

In a fast-growing world where knowledge continuously evolves, technology and social media are solutions to capture and exchange information. Targeted at undergraduates and young professionals, TalentCorp collaborates with the public and private sector to design and enhance a series of industry-driven self-directed learning resources. Online awareness will be tiered – at one level, communication information; at another, interactive content such as self-assessment in terms of psychometrics and suitability to career paths. In addition, engagement with industry is also undertaken to source online content and self-learning modules to improve employability.

ii. Career fairs and roadshows

TalentCorp conducts career fairs in collaboration with leading companies and universities, including Sector-Focused Career Fairs (SFCF) that expose undergraduates to career opportunities in chosen key sectors. Physical interfacing between students and employers provides an important channel of raising awareness, particularly in terms of understanding job requirements. Efforts to consolidate career fairs as opposed to fairs conducted by individual universities, enhances the engagement. The involvement of various Institutes of Higher Learning (IHL) facilitates access to a larger student catchment, which in turn attracts more companies to participate, and raises the scope of career awareness.

Sometimes, the career fairs are preceded by virtual career fairs, which are designed to complement a physical career fair, providing recruiters the opportunity to pre-screen resumes and engage targeted candidates during subsequent physical career fairs.

2.3.2 Enhance school-to-work transition

Aimed at providing students exposure to the working environment through earlier involvement of the industry, TalentCorp is focused on reaching out to students undertaking their undergraduate and graduate degrees in Phase 1. In Phase 2, efforts to bridge the university environment with work will be institutionalised and included in the curriculum.

i. **Upskilling programmes**
In Phase 1, TalentCorp is focused on addressing critical skills gaps in key sectors. Typically, there is a gap between academia, which focuses on theoretical academic rigour, and the company, which focuses principally on industry relevance. Upskilling programmes are stop-gap measures to address this issue, recognising that in the long run, university curriculum will need to be regularly reviewed to be more industry-relevant.

One of the programmes initiated to address this issue is the FasTrack programme. The FasTrack programme focuses on accelerating the engineer's path into Research and Development (R&D).

ii. **Ready4Work Portal**
Ready4Work is the go-to portal for Malaysian undergraduates and graduates prepping to enter the job market. It aims to enhance the marketability and employability of young talents in Malaysia by creating awareness on the employment needs of the industry.

iii. **Competitions and internships Industry-sponsored campus competitions**
TalentCorp is working together with leading IHLs and companies to introduce undergraduates to the working environment. In partnership with existing competition organisers including Students In Free Enterprise (SIFE), Innovate Malaysia and the Multimedia Super Corridor (MSC) Malaysia - IHL Business Plan Competition challenge students to develop solutions for leading companies facing real-world issues and challenges. Competitions, particularly those anchored on practical workplace projects, offer employers a better insight into the competencies of a student. Competitions are often also designed to include team-based problem solving, thus easing transitioning to the workplace.

iv. **Structured Internship Programme (SIP)**
The structured internship programme is a collaboration between TalentCorp and the Ministry of Higher Education (MoHE), offering tax benefits which enable qualifying companies to offer practical experience and emphasise the development of specific knowledge or skills for students of IHLs.

v. **Graduate Employability**
Management Scheme (GEMS)
The main thrust of GEMS is to enhance graduate employability with the aim to reduce talent shortages in the national key economic areas by 2020, in line with the ETP.

GEMS is a sector focused and demand driven initiative. The sectors covered by GEMS are Oil & Gas, Shared Services, Biotechnology, Telecommunication, Small & Medium Enterprises (SME), Information & Communication Technology (ICT), Electrical & Electronics, Hospitality & Tourism and Fast Moving Consumer Goods (FMCG).

2.3.3 Build platforms to optimise talent

TalentCorp aims to develop initiatives to address talent availability at all levels, from fresh graduates to experienced talent.

i. **Scholarship Management**
This initiative aligns the scholarship model to better serve the needs of the country by essentially facilitating the placement of Government scholars in both the public and private sector. TalentCorp assists with the monitoring of scholars in serving their scholarship bond in the private sector under the Scholarship Talent Attraction & Retention (STAR) programme and leverage on its partnership with STAR companies to provide value-adding initiatives for scholars.

ii. **Latent talent**
Talented women in Malaysia are arguably not fully optimised given the scenario where they make up more than 60 percent of enrolment in local universities, but show a labour force participation rate of only

46 percent. TalentCorp will undertake policy advocacy with the private sector over best practices. The situation will need to be reviewed for potential solutions and interventions to address the issue, whether in terms of policy disclosure, incentives or re-training allocations, targeting women returning to the workforce after a career break.

FlexWorkLife.my

The flexWorkLife.my portal aims to build a network of employers and talent to optimise work-life integration, while maximising work efficiency and enhancing employee engagement. This portal has a repository of the best ideas and practices in flexible working arrangements as well as family-friendly facilities. Jobseekers can now explore career opportunities that offer flexible working arrangements and family-friendly facilities. It also allows employers to apply for tax incentives when they train women returning to the workforce.

2.4 Strategic Thrust 2: Attract and Facilitate Global Talent

Global talent encompasses Malaysian diaspora and foreign talent. Malaysian diaspora with the requisite experience and expertise, especially in Malaysia's priority sectors, represent opportunities for brain gain. In a survey conducted by the World Bank in 2011, almost half of the Malaysian diaspora demonstrated a strong sense of attachment to Malaysia, while 30 percent of those surveyed showed interest in returning home for good at some point. Meanwhile, 44 percent of respondents were unsure, suggesting an open and positive avenue to engage with

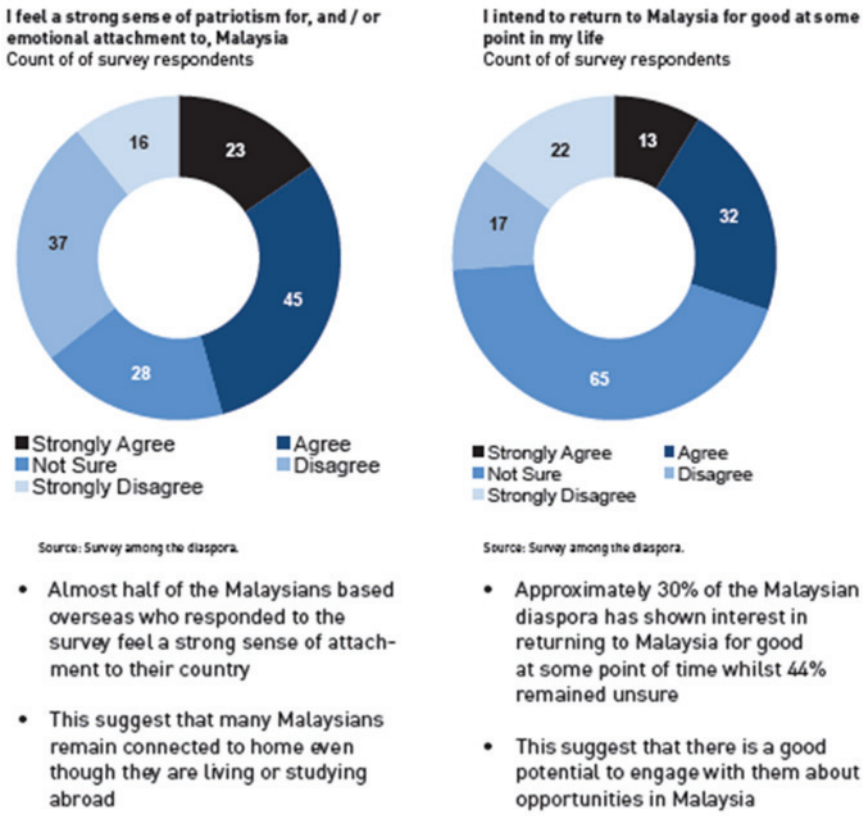


Figure 2.4 Positive attitudes towards return migration
Source: World Bank, "MEM Brain Drain", April 2011

them and explore opportunities in Malaysia.

2.4.1 Outreach to Malaysians abroad

Targeted at Malaysian diaspora, TalentCorp's outreach programme intends to achieve two objectives: firstly, to raise greater awareness of job opportunities in Malaysia; and secondly, to promote opportunities for collaborations and contributions while remaining abroad.

i. **Professional outreach**
This initiative focuses on engaging Malaysian diaspora through networking sessions with Malaysian companies and agencies. These professional networking events are mostly sector-focused to give the Malaysian diaspora a better understanding of the many opportunities available back in Malaysia. The sessions serve the following purposes:

- **To raise awareness:** Communicating the message of the country's transformation and opportunities in Malaysia;
- **To create meaningful engagement:** By identifying areas in which Malaysian diaspora can contribute back to Malaysia, either via conferences, virtual platforms, or other means;
- **To build and improve on networks:** By opening up communication channels with various nodes and networks abroad, TalentCorp provides a platform for diaspora to connect with each other and to discuss collaboration opportunities.

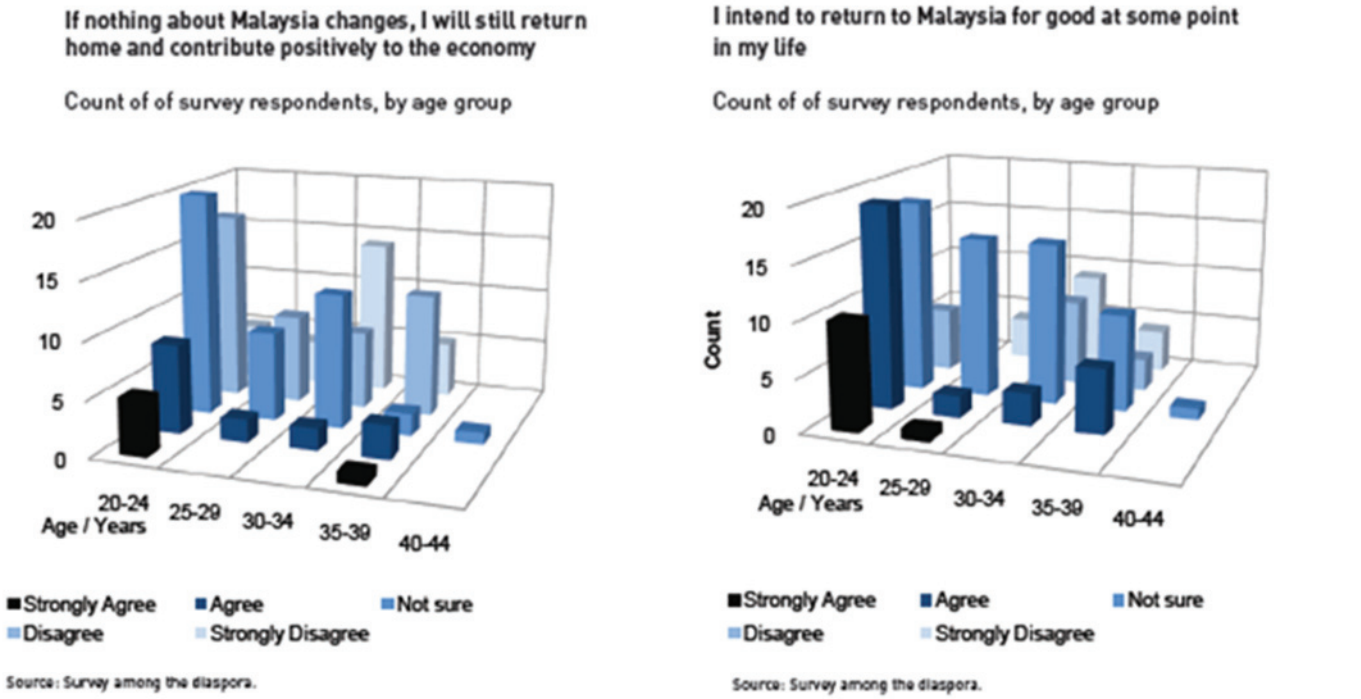


Figure 2.5 Our diaspora – we need to act now
Source: World Bank, "MEM Brain Drain", April 2011

TalentCorp's engagement with Malaysian professionals overseas up to July 2013 has so far physically reached out to more than 7,500 Malaysian professionals worldwide Moving forward, the aim is to increase the physical outreach to more Malaysian professionals and promote opportunities in Malaysia to a wider spectrum of the diaspora.

TalentCorp also reaches out to Malaysian diaspora via the MyWorkLife portal. This portal provides the necessary information required to facilitate the relocation of Malaysians returning home with information on starting afresh in Malaysia, guidance on career opportunities and everyday matters such as preferred property locations, good schools, banks and other necessities.

ii. Student outreach

The student outreach initiative focuses on connecting and engaging with young Malaysian students abroad. To tap into the top talent pool, TalentCorp collaborates with Education Malaysia, JPA, Majlis Amanah Rakyat (MARA) and student associations to obtain information regarding high-performing Malaysian students abroad.

Based on Education Malaysia data, scholars currently make up only 30 percent of total overseas students. Therefore, it is becoming more crucial for TalentCorp to focus efforts in ensuring Malaysian students abroad (scholars and non-scholars) are well-informed of employment opportunities in Malaysia. Career fairs are intended to provide these students with information on career opportunities in Malaysia, as well as provide a platform for Malaysian companies to tap this talent pool to meet growing talent needs.

TalentCorp administers the Career Fair Incentives (CFI), which allows for double tax deduction for Malaysian companies participating in endorsed career fairs abroad. These career fairs provide a platform for reputable Malaysian employers to source for top Malaysian student and professional talent.

2.4.2 Facilitate returning talent

In parallel with the outreach programmes, TalentCorp also facilitates the return of Malaysian professionals from abroad through two key initiatives.

i. Returning Expert Programme (REP)

The REP is a long-term initiative to facilitate the return of Malaysian professionals who have been working and contributing their knowledge and skills overseas. It is open to individual applications or applications made by companies as part of their compensation package in engaging Malaysians abroad.

ii. Recognition of professional qualifications

TalentCorp supports efforts to liberalise professional services by actively advocating for fewer restrictions for professional Malaysian talent returning home. TalentCorp works closely with relevant bodies such as PEMANDU, Ministry of International Trade and Industry (MITI), as well as other Ministries and regulators to escalate issues and provide input for appropriate measures to reduce restrictions hampering the return of professionals to Malaysia.

TalentCorp plans to leverage on existing initiatives to liberalise the professional services, which would see a less restrictive environment for professionals such as engineers and doctors. This includes leveraging on the reviews of laws, for example the Engineers Act 1967 to recognise non-citizens and allow them to be registered as professional engineers.

2.4.3 Enhance expatriate facilitation

Malaysia hosts a number of foreign talents working and living here, both for the short and long term. Expatriates from various countries provide a talent pool to complement the locals in contributing towards the economic transformation.

Recognising that foreigners are beneficial in spurring the competitiveness and innovative capabilities of the local workforce, there is room to better facilitate top foreign talent to work and settle in Malaysia. Some of the employment issues faced by individual talent and companies seeking to attract talent include identifying understudies and advertising for these positions, restrictions on headcount and job type, and uncertainties in terms of tenure and approval. These limitations were outdated and subsequently removed.

The country needs to liberalise top foreign talent entry while managing reliance on foreign labour, as well as mitigating security risks. In cognisance of this, TalentCorp, upon syndication with key industry players in identifying issues, jointly reviews and develops corresponding policy measures with the Ministry of Home Affairs (MoHA).

Furthermore, the establishment of an oversight committee to coordinate all expatriate-related policies and programmes will drive further immigration innovations.

i. Residence Pass - Talent (RP-T)

The RP-T is an immigration instrument introduced to attract and retain top expatriates to stay and contribute in the longer term to the ETP. It is a 10-year renewable pass for highly qualified foreign talents to continue to reside and work in Malaysia.

ii. Premier service centre for leading companies

As part of the expansion plan to further enhance service delivery and customer experience, a premier service centre to meet expatriate requirements of leading companies is critical.

Some of the recent immigration innovations include:

- Exemptions to bring in foreign domestic help;
- Permission for foreign spouses to work while holding a Dependent Pass
- Employment Pass liberalisation initiatives which include the removal of requirements to advertise positions, identify an understudy, and limits on work durations;
- Introduction of the i-Pass
- Re-branding of the Expatriate Services Division

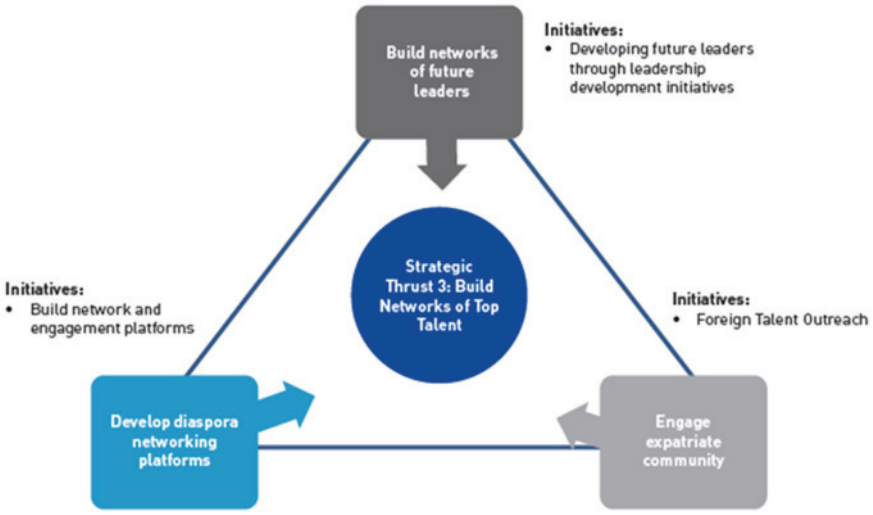


Figure 2.7 Three key programmes have been identified to build networks of top talent

Programmes	Initiatives	Phase 1 (2011 – 2015)	Phase 2 (2016 – 2020)
1. Build networks of future leaders	Develop future leaders through leadership development initiatives	• Develop networks for leadership pipelining • Private-Public Sector and Intra-Private Sector Talent Cross Assignments	• Cross-Level Mentoring • Integrated talent management (channel top talents to priority sectors and companies)
2. Develop diaspora networking platforms	• Build networks and engagement platforms	• Develop networks of professional diaspora and eminent Malaysians to assess opportunities in Malaysia or contribute from abroad • Leverage on international sector-focused conferences	• Establish self-sustaining networks in key sectors and priority geographies to facilitate engagement and contribution from abroad • Organise sector-focused conferences
3. Engage expatriate community	• Foreign talent outreach	• Engage expatriate community to develop networks	• Strengthen and broaden networks of top talent

Figure 2.8 The programmes are designed to build networks of top talent over two phases

2.5 Strategic Thrust 3: Build Networks of Top Talent

The talent networks form the basis for TalentCorp to build up a source pool of talent. As job opportunities arise, the networks allow TalentCorp to engage individual top talent that are best-suited for the job. Figure 2.9 illustrates the three key programmes to build networks of top talent.

The programmes focus on building networks and platforms to facilitate ease of engagement to foster collaborations, and contributions from talent abroad. The details of the programmes over two phases are illustrated in Figure 2.8

2.5.1 Build networks of future leaders

The network of Malaysian top talent will comprise future leaders identified from TalentCorp's leadership development initiatives. The objectives of the networks are to:

- Connect future leaders to prominent captains of the industry for mentor-mentee relationships; and
- Develop a pool of business leaders for key sectors.

Phase 1 focuses on developing a networks of top talent for leadership pipelining, while in Phase 2, TalentCorp will enhance the mentoring programme, optimising the top talent pool to ensure leaders are channelled to priority sectors and companies.

i. Developing future leaders through leadership development initiatives

Cross-assignment programme

Targeted at professionals with at least five years' working experience, the cross-assignment programme is designed to upskill managers and above via exposure across different companies and industries. Under this initiative, managers are cross-assigned between government-linked companies (GLCs) / multinational corporations (MNCs) and Government ministries / agencies over a one to two year period.

Mentoring will be included as part of the cross-assignment framework to nurture future leaders. Participants of the cross-assignment programme will be mentored by a prominent local CEO as part of their development towards becoming future leaders and future mentors themselves.

Scholarship alumni

The alumni of scholars will be encouraged to connect among themselves. As part of their development, scholars will be invited to participate in mentoring programmes. The monitoring of the professional progress of the scholars will also be useful in assessing enhancements to the management of the scholars. At the same time, given the past track record of scholars in becoming corporate leaders, the alumni is a talent pool to be sustained for future opportunities.

2.5.2 Develop diaspora networking platforms

TalentCorp is leveraging on Malaysian diaspora to act as Malaysian Talent Ambassadors in propagating valuable opportunities in Malaysia or by contributing from abroad. Contribution from abroad can be facilitated through various options such as participation in conferences and seminars, setting-up of global offices, or via online platforms such as virtual forums and social networking media. To

support this, TalentCorp is currently building directories of top talent based on information collated from networking events and existing data from relevant Government agencies.

Phase 1 will include working with key industries and companies to engage networks of diaspora and eminent Malaysians to communicate opportunities in Malaysia, including leveraging on international sector-focused conferences. In Phase 2, TalentCorp will focus on establishing self-sustaining networks in key sectors and priority geographies to facilitate engagement and contribution from abroad.

i. Build networks and engagement platforms

Build networks and engage eminent Malaysians
TalentCorp realises that Malaysians are still able to contribute while abroad. The concept of Global Malaysian Network (GMN) was introduced to facilitate a conducive and supportive environment for diaspora contribution. One key focus for diaspora to contribute is through knowledge exchange. TalentCorp has forged partnerships with relevant partners in order to provide a range of platforms for the exchange of knowledge, ideas and also the exploration of collaborative opportunities between the Malaysian diaspora, the public, and also the private sectors.

Establish platforms for key sectors and priority geographies
The Malaysian diaspora is distributed in clusters in certain fields and geographies. For example, there is a concentration of O&G professionals in the Middle East, whereas in Ireland there are doctors and accountants. TalentCorp will facilitate engagements between these specific clusters of professionals with relevant employers in Malaysia, in the same field.

REP Club
The REP Club is intended to provide a support network for returning experts and will serve as a community to welcome and facilitate their return. The REP Club will promote a sense of inclusiveness and belonging among those returning, as well as provide an avenue for discussion and information sharing. Under the REP Club initiative, the Travelling Leaders Series has been launched to provide an avenue for Malaysians abroad to engage with leaders who are travelling abroad as part of their work.

2.5.3 Engage expatriate community

i. Foreign talent outreach
TalentCorp initiates networking and dialogue sessions to promote awareness on expatriate-related programmes and development, and at the same to obtain more insight and feedback from the expatriate community. TalentCorp focuses on developing the foreign talent network in Phase 1, and aims to build on the networks in Phase 2.

The outreach programme is to raise awareness regarding programmes to enhance livability and facilitate entry and stay for expatriates in Malaysia. Some examples include the Budget 2012 announcement of foreigners being allowed to make withdrawals from the Employees Provident Fund (EPF) to purchase individual properties, and Employment Pass liberalisation initiatives.

TalentCorp leverages on existing expatriate platforms to interact with the community. Forums organised by foreign chambers of commerce, expatriate associations as well as informal channels such as international schools, provide valuable sources to engage the leading MNCs' top expatriates, who can contribute to Malaysia by assuming advisory roles in promoting investments. In addition to this, Talent Ambassadors are being identified to represent Malaysia in their respective countries, to raise awareness about the various opportunities to invest, live and work in Malaysia.

3.0 Conclusion

By 2020, Malaysia aspires to emerge as a high-income, advanced nation as well as a global talent destination. These ambitions are significant and intertwined, as the achievement of one is dependent on the realisation of the other. The success of the economic transformation relies on the ability to act collectively and cohesively to nurture, attract, and retain talent. This in turn is a crucial component in supporting the flow of investments and spurring growth critical to the economic renaissance of Malaysia.

The Government has articulated a holistic Transformation Agenda, which will culminate in the National Transformation Policy. This transformation includes the NEM and ETP, which are focused on transforming Malaysia from an upper middle-income to a high-income, advanced nation. The Government has also initiated a comprehensive set of structural reforms to enhance the nation's talent landscape. This will be made through the GTP, which includes enhancing livability

as well as through initiatives, such as the Education Review, Graduate Employability Blueprint, and Labour Law Reform.

A critical success factor to the transformation of the Malaysian economic and talent environment is Collective Action. Transforming the economy and addressing talent issues require all stakeholders, both in the public and private sector, as well as the talent themselves to make a difference. Through its reforms, the Government is committed to provide a facilitative business and talent-friendly environment. However, it is the private sector that ultimately makes investment decisions to drive transformation, moving business activities up the value chain. In addition, it is the companies that provide attractive and rewarding career paths for talent, that commensurate with productivity. To catalyse change, the Government will promote transformative investments through the ETP, and in tandem, TalentCorp will drive talent interventions towards sparking a virtuous cycle of greater investments, as well as talent attraction and retention.

As set out in the Talent Roadmap 2020, TalentCorp will act as a focal point for talent needs arising from the economic transformation. TalentCorp will play its role in developing and driving interventions to address critical skills gaps. Such interventions will involve a combination of addressing policies, building public-private collaborations, and implementing solutions directly. TalentCorp's priorities include developing a pool of graduate talent, as well as addressing the urgent requirement for experienced professionals. Interventions will be anchored on three strategic thrusts, namely to (1) Optimise Malaysian Talent; (2) Attract and Facilitate Global Talent; and (3) Build Networks of Top Talent. During the first phase of the Roadmap (2011-2015), TalentCorp will focus on scaling up the impact of its initiatives on talent availability, prioritising policy and talent engagement programmes. The second phase (2016-2020) will focus on operationalising integrated national talent management as policy refinements become institutionalised.

Malaysia aspires to achieve a ranking of top-20 in the Global Talent Index by 2020. The combination of the holistic Transformation Agenda, Collective Action, and the Talent Roadmap 2020 is the formula to propel Malaysia to emerge as a global talent hub, and in so doing, enable the realisation of Vision 2020.

CHAPTER 12

BROADBAND DIFFUSION, INNOVATIVE CAPACITY AND SUSTAINABLE ECONOMIC DEVELOPMENT: LESSONS FOR MALAYSIA

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Abstract:

While scientific endeavour is the 'life-blood' of an innovation-driven society, it is the advanced information communication technology (ICT) that acts as a catalyst for the diffusion of scientific knowledge across all segments of society. This study will show that countries with high diffusion levels and speedy ICT connections are successful in being part of scientific networks that power the next generation of innovations. Advanced ICT facilitates these countries to enhance their innovative capacity and achieve high standards of living. In this study, diffusion of broadband in Malaysia and its impact on quality of scientific institutions, innovative capacity and economic development were benchmarked with other countries. The study show that Malaysia has done well in the league of developing countries, but lags behind more developed countries in terms of diffusion of high speed broadband, quality of scientific institutions, innovative capacity and economic development. Key strategies to facilitate Malaysia to move up the innovation value chain are discussed in the paper.

Keywords: Broadband, sustainable development, innovation capacity and network externalities

1. Introduction

In the past three decades, the global community has witnessed unprecedented transformations in the way information and communication technology (ICT) has changed the social fabric of human living conditions. Every facet of human existence is dependent on some form of ICT use. Due to increasing demands of high speed information flow, countries across the globe have been investing in broadband infrastructure. Increasing investments in broadband infrastructure have opened new economic sectors, enhanced employment opportunities and increased economic wealth across the globe. Nair (2011) show that high speed ICT is a foundation condition for an innovation-driven and knowledge-intensive society.

Broadband technology leads to network externalities, which enable people to de-couple the space time continuum. It has opened platforms for the various economic agents to interact and collaborate to create economic and social capital. Increase collaboration and cooperation contribute to six types of spill-over benefits to society. First, broadband diffusion has opened new channels for the public and private universities, government, industry and consumers to work in real-time on new innovations that will benefit all stakeholders. Thus, strengthening the 'quadruple-helix' and enabling organizations to pursue open-innovation models that reduce uncertainties and improve productivity.

Sound ICT provide firms an opportunity to globalise their business operations, including expanding their research networks and democratising access to new research to smaller firms (OECD, 2008). A survey of firms in 2006 showed that 74% of firms outsource and off-shore their innovations due to shortage of skills in their domestic economies (Couto et al., 2008). In 2007, top 80 companies in the United States spent 55% of their R&D budget of USD146 billion outside the continent, while top 43 Japanese companies spent 56% of their USD71.6 billion in other countries (Jaruzleski and Dehoff, 2008). Increasingly, innovations in fast communication networks enable firms to tap into the 'global network-brain' to address challenges that impact society. For example, Proctor and Gamble (P&G) engages close to 80,000 researchers worldwide from 173 countries with a budget of USD1.7 billion to power the next generation product innovations (Hof, 2005).

Second, high speed broadband improves firm level productivity as the economy moves online by enabling them to foster closer collaboration with their suppliers. Thus, reducing the delivery time of inputs; ensuring products and services gets to the market on time; and reducing inventory and other transaction costs. It also enables firms to extend their reach for new and diverse markets, enabling them to pursue economies of scale and scope and at the same time diversifying their risks. Sadun and Farooqui (2007) showed that broadband use among UK firms expanded their business linkages and improved labour productivity. Forman et al. (2005) showed that firms that recorded highest productivity growth are the ones that have adopted broadband. Entner (2008) showed that the adoption of mobile broadband in US healthcare industry has led to increase of productivity of USD6.9 billion.

Third, broadband provides consumers innovative ways to access affordable services such as telemedicine, online-education, online banking services which include mobile-banking and online-microcredit financing and other input for business development, which otherwise

would not be available for many, especially in the developing and under-developed world. Access to these services would contribute to improving the socioeconomic wealth of many in developing and under-developed countries. The increasing flows of information powered by broadband also provide consumers greater choices in the purchase of products and services at relatively lower cost. Consumers can use 'shopbots' (also known as 'shop robots') to search for information on wide range of products and services. Empirical studies such as Brown and Goolsbee (2002), Baye et al. (2004) and Tang et al. (2007) show that the use of shopbots empower consumers to access wider choice of products and services, instilling greater competition in the market, thus reducing prices and price dispersions.

Fourth, as consumers become more ICT savvy, the demand for on-line services will increase the growth of service sectors, thus creating new employment opportunities (Katz, 2012). These new value added sectors tend to generate higher income as opposed to the traditional agricultural and manufacturing based industries. Increasing demand for e-commerce will also open new markets and wealth creation opportunities, which otherwise would not be available for small and medium enterprises (SMEs). The new digital medium will provide the SMEs new opportunities to create specialized niche services for larger players and the broader business community.

Fifth, e-governance systems powered by broadband can also instil greater transparency and accountability of the public sector, a vital enabler for a competitive economy. Wider access to online public services can reduce market failures such as moral hazard and corruption. It also can reduce barriers among public sector departments that at times tend to work in silos, leading to inefficient and inferior services. A key driver for an innovation-driven economy is a "transparent smart e-governance with seamless access, secure and authentic flow of information crossing the inter-departmental barrier and providing a fair and unbiased service to the citizens" (Kalam, 2003, pp1275). Greater interactions between government departments in the delivery of public services will increase total factor productivity across all sectors of the economy.

Sixth, broadband is also seen as an important development tool to overcome poverty (Quibria et al., 2002). It provides the poor access to information, education, financing, technology and other key resources for business development. It also provides the poor access to technology that enables them to bypass various intermediaries and middle-men to access resources and markets. Broadband technology also empowers the poor to take ownership and chart a path of self-sustenance to improve their productivity. Bhatnager (2000) show that ICT have been used to provide poor communities in India access to education and medical facilities, which otherwise would be unavailable to these communities.

The study also show that high speed communication facilities in India provide milk farmers opportunities to establish strong networks that allow them to market their products in more efficient and productive ways. Nair and Vaithilingam (2012) showed that ICT users among urban-poor communities in Malaysia have higher probability of being employed and have income levels higher than non-users of ICT. The study also show that ICT users among the urban-poor communities tend to use the digital medium to access services such as education, medical, entertainment and banking services, thus improving their productivity and socioeconomic wellbeing.

Several studies have shown that broadband have contributed to economic growth in developed countries. For example, Czernich et al.(2009) showed that a 10% increase in broadband penetration increased per-capita GDP growth in 25 OECD countries from 0.9 percentage points in 1996 to 1.5 percentage points in 2007. A similar study was conducted for 22 OECD countries from 2002 to 2007 by Koutroumpis (2009) showed that an increase in broadband by 10% increased GDP growth by 0.25%.

The study also showed that countries with high broadband penetration rates (Denmark, Norway, Sweden, Netherland and Switzerland) have a GDP growth of 0.023% for a 1% increase in broadband diffusion; while the medium broadband penetration countries (Germany, France, Japan, Belgium, UK, US, Canada and Luxemburg) had a growth rate of 0.014%. On the other hand, countries with low broadband penetration rates (Greece, Portugal, Italy, New Zealand, Austria, Hungary, Spain and Ireland) had a GDP growth rate of 0.008%. Another study by Qiang et al. (2009) showed that a 10% increase in broadband penetration increase GDP by growth by 1.21 percentage points for 66 high income countries and 1.38 percentage points for 120 low and middle income countries.

Similar results were also reported by Katz (2012) for countries in the Middle East that higher broadband penetration rates, tended to get higher rate of return on GDP growth rates. For example, Bahrain with a growth rate of 695% in broadband penetration experienced a GDP per capita growth rate of 6% from 2004 to 2010. On the other hand, over the same period, Libya with a broadband penetration rate of 14% only experienced a GDP per capita growth rate of 0.58% (Katz, 2012).

The positive impact of the broadband on socioeconomic wellbeing of people has resulted in countries across the globe intensifying investment in broadband. For example, the US broadband penetration rate in 2009 was 48 per cent of the household and over a four year period the government invested close to USD6.39 billion to increase the penetration rate to 62% creating 378,000 new jobs as a result of new business services and new economic activity (Katz, 2012). Germany launched their National Broadband Plan, which is envisaged to provide 75% of its citizen access to broadband service of at least 50Mbps by 2014 and 50% of the households have broadband of at least 100Mbps by 2020, with another 30% having access to 50Mbps (Katz, 2012). It is envisaged that these initiatives will create 304,000 new jobs by 2014 and another 237,000 by 2020 (Katz, 2012).

There have been a number of studies that have shown that diffusion of broadband have created new employment and spurred economic growth in developing countries. For example Katz (2012) shows that a 10% diffusion of broadband in Brazil has reduced unemployment by 3.89% between 2009 and 2010. The study forecasted that an increase of 20% in broadband penetration rate will reduce the Brazilian unemployment by 4.03%. The study also showed that an increase of 1% in broadband penetration will increase the Brazilian GDP growth by 0.008% point.

In the Asia-Pacific region, Katz (2012) showed that a 1% increase in broadband penetration rate in India resulted in an increase of 0.028% point in employment rate between the period 2007- 2008 and contributed to 9 million new jobs in 2009. In Indonesia, a 1% increase in broadband reduced unemployment by 8.6% and this is due to the creation of new jobs and saving of existing jobs, which otherwise would have disappeared and would have contributed to a higher unemployment rate (Katz, 2012).

The above studies show that the diffusion of broadband has resulted in network externalities that have positive impact on economic performance of developed and developing countries. Malaysia like all other countries has introduced a national broadband plan to provide a systematic framework for the deployment of broadband across the country. While these policies and strategies have increased broadband penetration from 2% in 2005 to 32% in 2009 (Economic Planning Unit (EPU), 2010), it is unclear how effective were these policies in enhancing Malaysia's innovative capacity. Thus, the objective of this study is three-fold. First this study will benchmark the broadband diffusion (penetration rates and speed), quality of scientific institutions, innovative capacity and economic wealth in Malaysia and other countries. The benchmarking analysis will measure the digital and innovation divide between Malaysia and other developed countries. Second, the study will examine the factors that hinder the diffusion of broadband and its role in enhancing innovative capacity. Third, the study will identify a way forward to raise the level of broadband penetration and its impact on Malaysia's innovative capacity.

The rest of the paper is organized as follows. Section 2 provides a discussion on broadband diffusion strategies undertaken in Malaysia. In Section 3, the conceptual framework and empirical method to benchmark Malaysia's performance with other countries are provided. In Section 4, discussion of the empirical results and measures to improve Malaysia's broadband diffusion and innovative capacity are provided. In Section 5, concluding remarks are provided.

2. Broadband Development in Malaysia

The Malaysian government recognized the importance of broadband in enhancing the reach and richness of the public sector, enterprises and the broader community. Since the launching of the National Information Technology Agenda (NITA) and the Multimedia Super Corridor (MSC) in the middle of 1990s, a number of major policy strategies in the provision of high-quality broadband services were launched. The stages of development of broadband are summarised in Figure 1.

The Malaysian government recognised the importance of broadband in increasing the productivity of Malaysian enterprises, thus positioning Malaysia as global ICT hub and enabling marginalised communities to migrate to a high income

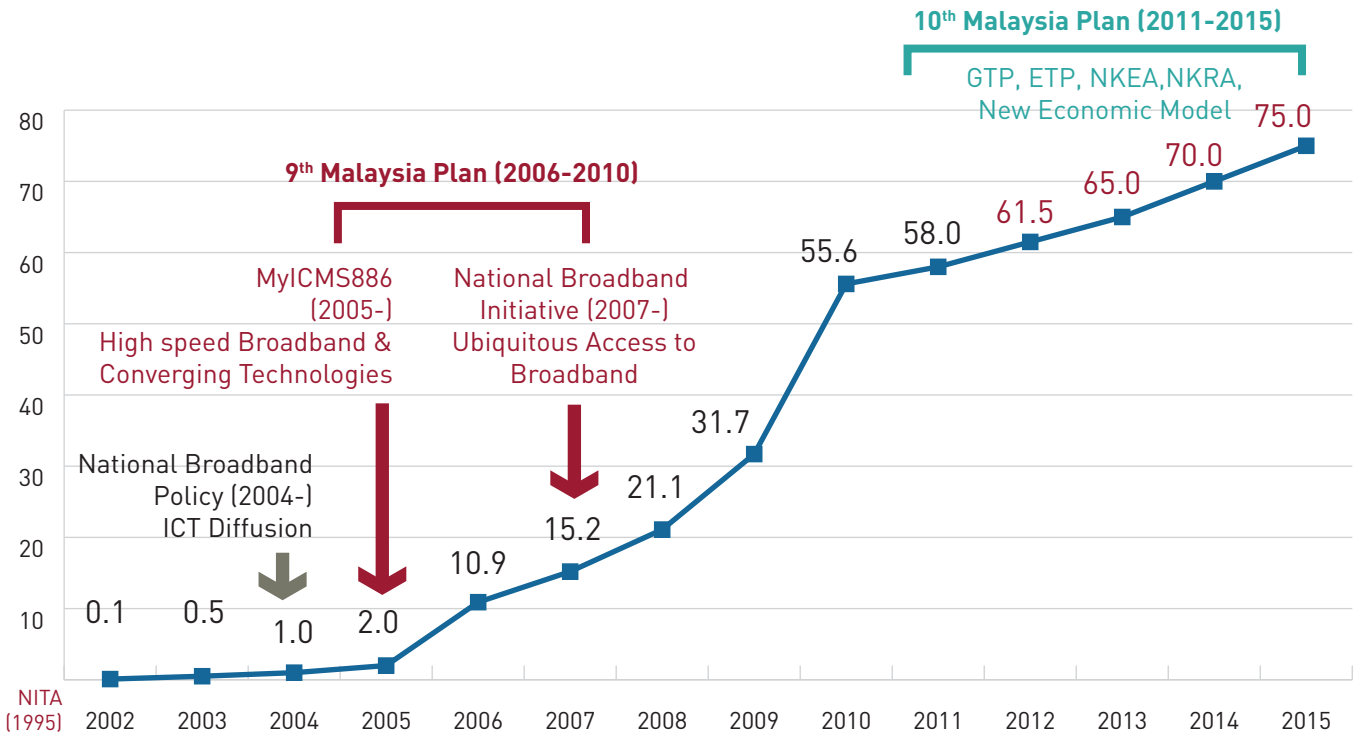

Figure 1: Broadband Penetration in Malaysia (2002-2015)
Source: data from MOSTI and PIKOM.

economy. In 2004, the National Broadband Plan (NBP) was introduced for the systematic diffusion of broadband across the country. The implementation of NBP was accelerated under the 9th Malaysia Plan (2006-2010) with target of increasing broadband adoption from 1.9% in 2006 to 13% at the end of 2010 (EPU, 2006).

In 2005, the Malaysian government launched the MyICMS886 program that provided a strategic framework for the development of advanced ICT infrastructure that caters for the technologies that increasingly converge between the internet, mobile phones and broadcasting. As part of the plan, eight services were identified and they are: high-speed broadband; 3G & Beyond, Mobile TV; digital multimedia broadcasting; digital home; short range communications, including RFID technology; VoIP/ internet telephony; and Universal Service Provision (http://www.nitc.mosti.gov.my).

The plan also focuses on infrastructure that supports multiservice convergence networks, which include 3G cellular networks, satellite networks, and next-generation internet protocol (IPv6), home internet adoption, information & network security, competence development, product design and manufacturing (http://nitc.mosti.gov.my).. The plan identified six growth areas that can be an important source of growth for Malaysia and they are: content development (e.g. education and entertainment, games sectors); ICT education hub; digital multimedia receivers; communication devices such as VoIP phones; embedded components, devices such as. RFID; and foreign ventures (http://nitc.mosti.gov.my).

Under the 9th Malaysia Plan, the MyICMS886 program was intensified and to support the plan, the National Broadband Initiative (NBI) was formulated in 2007 to provide broadband services to all segments of the population. To provide universal access to broadband, the NBI complemented the supply side initiatives with demand side push by creating awareness on online contents. Under the supply-side initiatives, Broadband for General Population (BBGP) and High Speed Broadband (HSBB) program were introduced. The BBGP consists of 3G/HSDPA & WIMAX Services, where network speed was up to 2 Mbps.

This broadband speed only facilitates basic applications (e-mail, browsing, basic e-commerce and online services). The BBGP became the digital backbone for providing last-mile connectivity to rural and remote communities in the country. As part of the NBI, High Speed Broadband (HSBB), a broadband service with a speed of 10 Mbps was introduced for firms operating in key economic and industrial locations (MCMC, 2010).

To ensure broadband is affordable to a wide segment of the population, the demand side initiatives were also introduced, which include promoting greater awareness and incentives for wider use of online services. Wider coverage of broadband services increased demand for online services, e-commerce and e-government applications (EPU, 2010). Both the supply-side and demand push initiatives enable the nation to reach its target by 2010. During this period, high speed broadband was also extended to 750,000 homes and WiFi coverage increased to 5,000 hotspots across the country (EPU, 2010). It is envisaged that a 50% broadband adoption by 2010 contributed to 0.9% of GDP and contributed to greater employment opportunities in Malaysia (MCMC, 2010).

A report by the National Economic Action Council (NEAC) in 2009 highlighted that Malaysia was caught in the middle income country trap and to become a high income economy, Malaysia should leverage on new technological developments, especially in ICT (NEAC, 2009). Measures to develop a New Economic Model was outlined in the 2009 and 2010 NEAC reports, which would set the foundation for Malaysia to leapfrog to a high income economy (refer to NEAC 2009 and NEAC 2010 reports). Key plans to transform Malaysia into a developed economy were outlined under three major initiatives, which include the 10th Malaysia Plan, Government Transformation Programme (GTP) and Economic Transformation Programme (ETP).

Under the 10th Malaysia Plan and as part of the GTP and ETP, it was recognised that advanced ICT ecosystem is an important enabler for Malaysia to be globally competitive and for the bottom 40% of the population to move-up the innovation value chain (PEMANDU, 2010a and 2010b). One of the entry point project (EPP 7) is to ensure broadband access to all Malaysians.

To achieve this objective, The Ministry of Housing and Local Government would be required to amend the Uniform Building By Laws to ensure all new buildings include broadband as essential services by end of 2010 (PEMANDU, 2010b). PEMANDU forecasts that a total of RM2.4 billion is required to fund this initiative, of which RM1.34 billion will fund capital expenditure for fixed broadband and constructions of 1,500 wireless sites; and the remaining as working capital (PEMANDU, 2010b). PEMANDU envisages that this initiative will lead to RM1.7 billion contribution to the gross national income (GNI) and create 5,468 new jobs (PEMANDU, 2010b).

Measures were put in place under the 10th Malaysia Plan and Rural Transformation Programme (RTP) for marginalised communities to have access to high speed broadband. This included the extension of the 1Malaysia Telecenters for rural communities. These telecenters play a key role as knowledge centers that foster a culture of creativity and innovation among rural communities. It is envisaged that these telecenters will be self-sustaining and will become e-commerce nodes for these marginalized communities (EPU, 2010).

The communication infrastructure and content development that are beneficial to the local communities (e-education, telemedicine, m-banking and e-government services) were classified as one of the National Key Economic Area (NKEA). It is envisaged that broadband and advanced communication services will enable marginalized communities adapt to a more knowledge-based economy (Performance Management and Delivery Unit, (PEMANDU), 2010a).

Advanced ICT services are also important for achieving the targets set under the National Key Result Areas (NKRA), which include reducing crime, fighting corruption, improving student outcomes, raising the standard of low-income households, improving the rural basic infrastructure and improving public transport (PEMANDU, 2010a). PEMANDU forecasts that the communication and content ecosystem that improves connectivity to the global economy will contribute around RM35.7 billion to the GNI and will create 43,163 new jobs (Performance Management and Delivery Unit, (PEMANDU), 2010b).

In summary, the Malaysian government has been pro-active in engaging with private sector in initiating and implementing several programs to increase ICT diffusion across the country. While these initiatives have increased the awareness and importance of advanced communication technology and broadband among all stakeholders, the use of these technologies to improve the quality of scientific and innovative endeavours are less clear. The primary objective of this study is to determine if the key ICT initiatives have enable Malaysia to catch-up with more developed countries in terms of broadband use, quality of scientific institutions, innovative capacity and economic development.

3. Dynamics between broadband diffusion, network externalities and economic development

Over the last decade, improvements in communication technology have enabled the spawning of new national, regional and global research networks. Countries that have developed a sound communication platform are at the frontier of powering the next generation R&D activities and scientific discoveries. A recent report by The Royal Society of United Kingdom highlighted that during the period 2002 to 2007 an increase in R & D expenditure from USD790.3 billion to USD1.15 trillion is attributed to an expansion of global research networks (The Royal Society, 2011). During the same period, number of publications increased from 1.09 million to 1.58 million and number of researchers from 5.7 million to 7.1 million (The Royal Society, 2011).

The Royal Society Report also shows that the global knowledge networks are led by OECD countries. However, the study also show the formation of knowledge networks in other developing countries and greater interactions among the various regional knowledge networks from developed and developing countries. Increased cooperation among the knowledge networks is a result of increased diffusion of advanced ICT.

In this section, we argue that broadband is a key driver for enhancing the quality of scientific and research institutions, which contribute to innovative capacity of countries. First a conceptual framework for capturing the relationship between broadband diffusion, quality of scientific institutions, innovative capacity and economic developed are discussed. Then, an empirical analysis showing the dynamics between the four factors are provided. Based on the empirical results the gap between Malaysia and other developed countries are identified. The study will also show the gaps in the broadband penetration and economic development within Malaysia.

Broadband contribute to innovative capacity via three channels. First, broadband facilitate speedy and cost-effective knowledge transfer between all stakeholders via formal and informal channels, thus strengthening the 'quadruple helix'. Advanced communication technology provides an opportunity for researchers, government, industry and the greater community to acquire new skills, knowledge and resources (such as capital, research infrastructure and other support systems) which would otherwise be lacking. This will allow economic agents to accumulate new knowledge and develop creative processes and systems to enhance their innovative capacity and economic wellbeing.

An example of advanced communication technology contributing to strengthening the quadruple-helix are the 'Living-Labs' that are user-driven open innovation ecosystem. Co-creation systems are used to ensure that users are included in the early stages of product/service design. This provides all the stakeholders' information on early use behaviour patterns, which are then used to refine product/service designs so as to ensure it meets the needs of the community. One of the seven living labs under the Collaboration@Rural (C@R) project is the Cudillero Living Lab project, which developed intelligent fishing management systems that enable fishermen to improve the flow of information with other stakeholders in the sea and on shore. Their direct access to real-time information on demand conditions and daily pricing of fish, guide their decision on the optimal catch for the day (http://www.openlivinglabs.eu/livinglab/cudillero-living-lab). The intelligent fishing system enables the fishermen to get better value on their catch, reduces wastage and prevents over-fishing. Examples of other Living Labs can be found in the following website: (http://www.c-rural.eu/Southafrica-LivingLab/images/stories/Files/wts@sap.pdf).

Second, broadband provides the research community in the developed and developing countries access to knowledge networks that can be mutually beneficial. Researchers from different continents can share information from their localities, creating wider database based on diverse geographical setting. The transnational research networks fostered by broadband can also provide researchers access to technology, skills and other support systems, which may not be available in their countries. The contact with more established research platforms in developed countries also helps them enhance the quality of their research and expand their global research footprint (publications, citations and impact).

In the Asia-Pacific region, the Trans-Eurasia Information Network (TEIN3) provides researchers a platform to establish research linkages with close to 8000 research and academic centres across the globe (http://www.tein3.net). It provides researchers in the region opportunities to work on transnational research projects

that address common and global challenges. For example, TEIN3 allowed researchers in the region to exchange large data with leading research centers across the globe to rapidly screen viruses and parasites that cause killer diseases such as the bird flu and malaria (http://www.tein3.net/server/show/nav.2224). Information from these screenings and transnational clinical trials with different drugs, allow researchers to quickly narrow down the treatment that is effective and this reduces the cost of new drugs.

Third, broadband provides the international research community the ability to address global challenges such as health pandemics or natural disasters in a relatively short period of time. For example, in November 2007, a joint effort by Germany and Indonesia resulted in the establishment of the Tsunami-early warning system in the Indian Ocean (http://www.tein3.net/server/show/nav.2225). Using the advanced communication technology, researchers across the globe are able to study large oceanography data and develop models to forecast tsunamis in the region. The data are also used for studying current patterns in the Indian Ocean and its possible impact on vessels travelling in the region. Advanced ICT also have been used to address other natural disasters such as typhoon warning, wildfire management, post-earthquake relief (http://www.tein3.net/server/show/nav.2225) and global disease surveillance (http://www.who.int/csr/disease/influenza/influenzanetwork/flunet//en/).

The discussion above show that the diffusion of broadband which results in network externalities can enhance global research collaboration among the research community thus improving quality of research institutions, leading to increased publications, citations, patents, IP generation and commercialisation of creative ideas. New discoveries that are commercialised not only increase economic wealth, but also improve quality of life for the global community. It also provides the international community the ability to use the 'network brain' to minimize the risks associated with natural disasters and health pandemic.

In summary, countries that are investing in advance communication technologies such as the broadband are in better positions to be part of the global innovation intelligence that powers the next generation of scientific breakthroughs and innovations that benefit mankind. Through these incremental and radical innovations they are able to create new employment, improve productivity, open up new avenues for generating income and improve quality of life. Many of the developed countries reinvest their wealth to develop or adopt frontier communication technology that reinforces the upward trajectory for scientific discoveries and building their innovative capacity and competitiveness. The broadband penetration, network externalities and its impact on society are summarized in Figure 3.

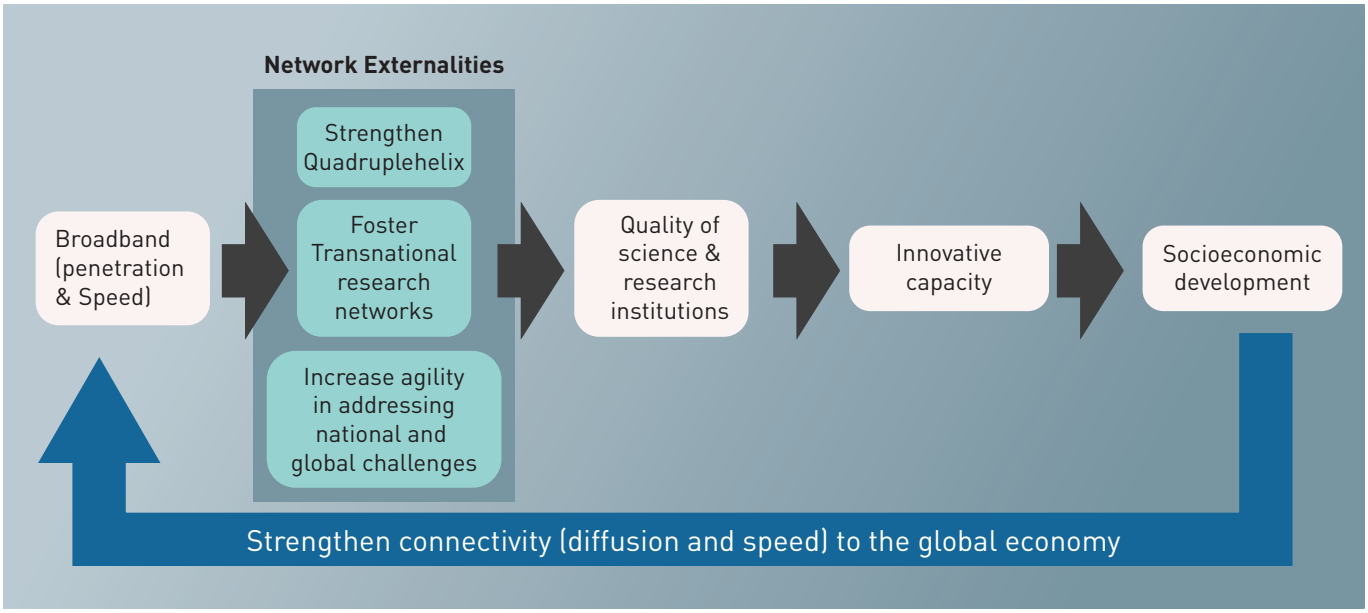

Figure 3: Relationship between broadband diffusion, network externalities, innovative capacity and socioeconomic development

Indicator	Year	Description	Source
Broadband Penetration	2010	Number of subscribers per 1000 inhabitants	IMD (2012)
Broadband of Speed	2010	Per internet user (kbps)	IMD (2012)
University-Industry Collaboration	2010	To what extent do businesses and universities collaborate on research and development (R&D) in your country? (1 = do not collaborate at all; and 7 = collaborate extensively)	Schwab, K. L. (2011)
Quality of Scientific Institutions	2010	Scientific research institutions (public and private) is high by international standards (0 = low and 10 = high)	IMD (2012)
Innovative Capacity	2010	Innovative capacity of firms (to generate new product, processes and/or services) is high in your economy (0 = low and 10 = high).	IMD (2012)
Economic Wealth	2010	Per capita GDP in USD (based on PPP)	IMD (2012)

Table 1: Indicators used for measuring network externalities in 57 countries

The relationship between broad penetration, quality of scientific institutions and innovative capacity of 57 countries across the globe for the year 2010 are examined. The data descriptions and sources are given in Table 1. A 3-dimesional quadratic functional form characterising the relationship between broadband penetration, broadband speed, university-industry collaboration, quality of scientific institution and innovative capacity were estimated (refer to Appendix 1 for technical notes on the estimation method). Countries were classfied into 5 groupings based on the score in the innovative capacity measure and the classifications are as follows: pace-setter, developed, hotspots, starter and laggard. Malaysia's performance vis-a-vis other pace-setter and developed countries were assessed below.

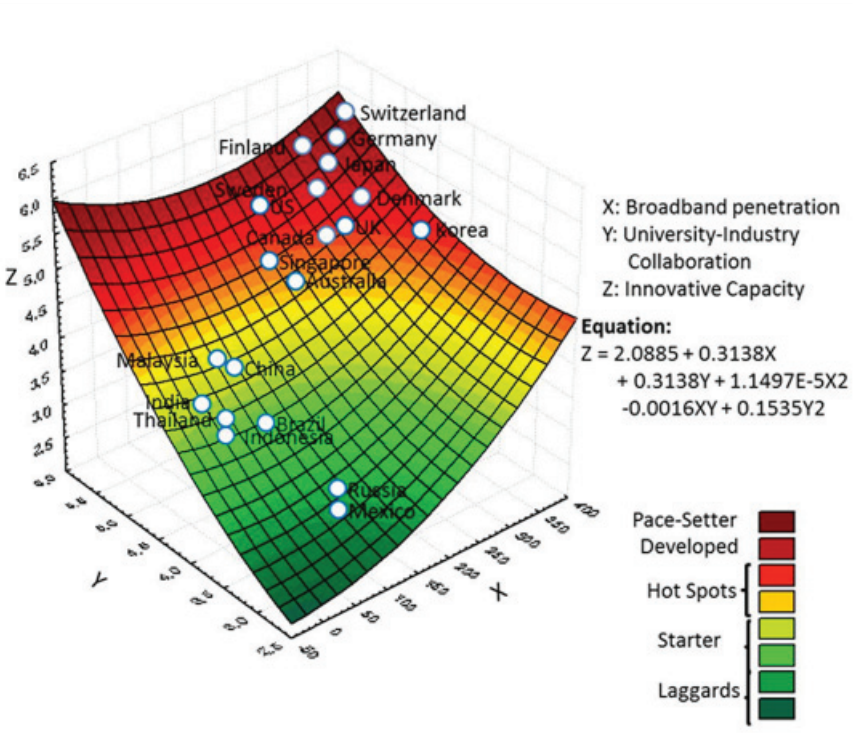

Figure 4: Relationship between broadband penetration, university-industry collaboration and innovative capacity of nations

Figure 4 show the relationship between broadband penetration, university-industry collaboration and innovative capacity of nations of selected pace-setter and developing and non-developing countries. The figure show that as broadband penetration increases, both the university-industry collaboration and innovative capacity increases at an increasing rate. This implies that as countries increase their broadband diffusion rate, it will increase university-industry collaboration and move up the innovation value chain at a faster pace. The figure show that the pace-setter countries such as Switzerland, Germany, Japan, Finland, Sweden and US have high broadband penetration rates, university-industry collaboration and innovative capacity. T

he broadband and innovation gaps between Malaysia and the pace-setter are high. To catch-up with these pace-setter countries, Malaysia should increase the diffusion of high speed broadband across the country.

Figure 5 show the relationship between broadband penetration, quality of scientific institutions and innovative capacity of countries. The figure shows that in countries with high diffusion of broadband, the quality of scientific institutions and innovative capacity are also high.

This implies that higher broadband diffusion increases both the quality of research institutions and innovative capacity. The figure show that leading research institutions are in pace-setter countries such as Switzerland, Germany, Sweden, Japan, Finland, Denmark, UK and US. Malaysia is in the hotspot region. However, the gap between Malaysian research institutions and those in pace-setter economies are large. Higher diffusion of broadband will be an important catalyst for Malaysian scientific institutions to catch-up with other institutions from pace-setter countries.

The relationship between speed of broadband, university-industry collaborations, quality of scientific institutions and innovative capacity are shown in Figures 6 and 7. One of the key features of the functional forms in Figure 6 is that as speed of broadband increase, the increase in university-industry collaborations and innovative capacity increases at a decreasing rate. In the case of Figure 7, an increase in speed on broadband, increase the quality of scientific institution at a constant rate, but innovative capacity increases at a decreasing rate.

The decline in marginal returns of broadband speed is attributed to the fact that the number of applications has not kept up with the increase in the speed of broadband. The broadband speed of most pace-setter and developed countries are in the range 100 kbps to 200 kbps per user in 2010. With more applications at speeds beyond 100-200kps per user, the shape of the functional form might change from diminishing returns to increasing returns.

The figures also show that broadband speed in Malaysia is significantly lower than that in developed and pace-setter countries. Hence, Malaysia is unable to benefit from the network externalities witnessed in these countries. The university-industry collaboration, quality of research institutions and innovative capacity for Malaysia was found to be significantly lower than that of pace-setter & developed countries.

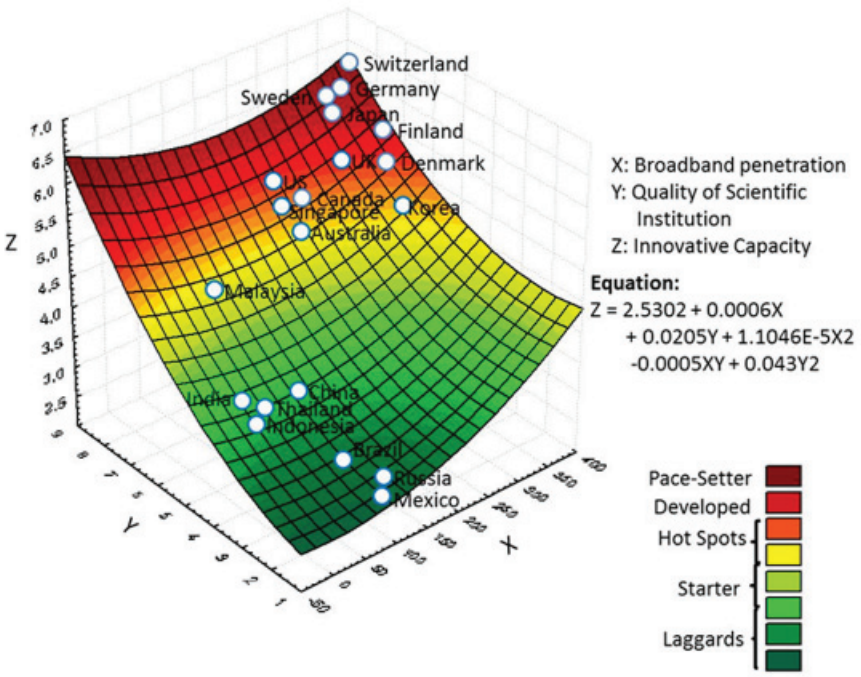

Figure 5: Relationship between broadband penetration, quality of scientific institutions and innovative capacity of nations.

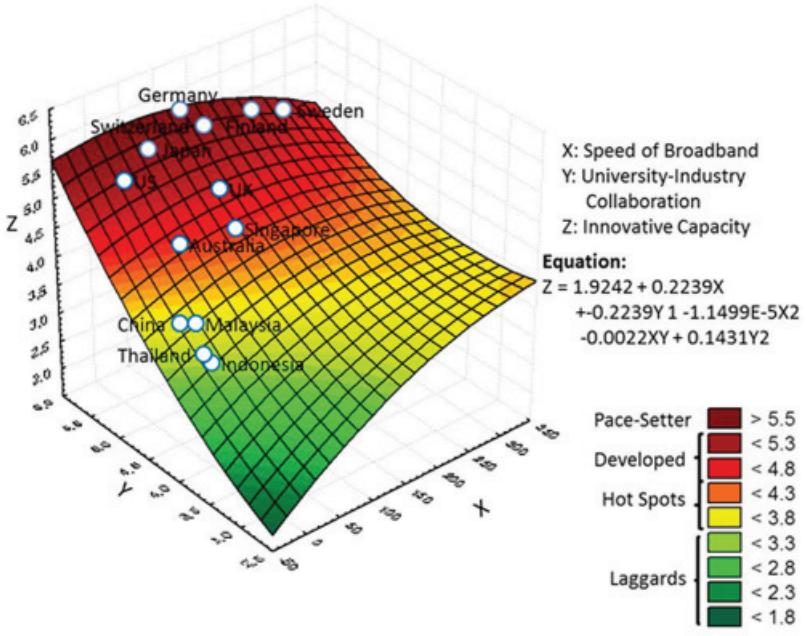

Figure 6: Relationship between broadband speed, university-industry collaboration and innovative capacity of nations

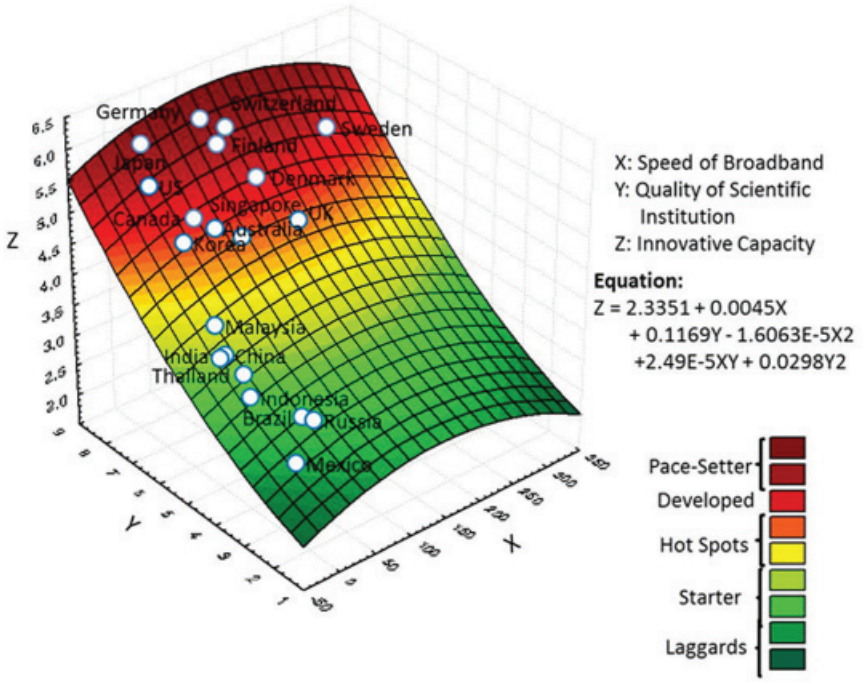

Figure 7: Relationship between broadband speed, quality of scientific institutions and innovative capacity of nations

Income levels and country classifications based on stages of development in broadband, innovative capacity and economic development for the 57 countries are given in Table 2. The table show a strong association between broadband penetration and per capita income. Countries with high connectivity to the global economy have high income levels.

The empirical evidence suggests that for Malaysia to leapfrog to a high income economy there must be clear strategy in place to improve the innovative capacity of research institutions and firms. This would require significant improvement in the quality of scientific institutions in the country, ensuring they are a part of the global innovation networks that are contributing to

Pace-setter		Developed		Hot-spot		Starter		Laggard	
Country	GDP (PPP) per capita	Country	GDP (PPP) per capita	Country	GDP (PPP) per capita	Country	GDP (PPP) per capita	Country	GDP (PPP) per capita
Germany	37,438	Denmark	40,257	China	7,584	Ukraine	6,721	Colombia	9,616
Japan	33,573	Netherlands	42,167	Slovenia	26,954	Hungary	20,517	Romania	14,529
Sweden	39,024	Austria	40,017	Australia	37,906	Qatar	87,956	Slovak Rep.	23,280
Switzerland	46,149	Belgium	37,826	Czech Rep.	24,524	South Africa	10,565	Bulgaria	13,942
Finland	36,477	Norway	56,867	**Malaysia**	**14,628**	Spain	31,579	Kazakhstan	12,081
Israel	28,299	Taiwan	35,596	Italy	32,187	Lithuania	18,611	Philippines	4,009
USA	47,095	UK	35,755	New Zealand	29,363	Poland	19,876	Mexico	15,099
France	35,262	Luxembourg	86,982	Brazil	11,458	Chile	15,797	Jordan	5,690
		Korea	28,786	Indonesia	4,432	Thailand	8,769	Peru	9,413
		Singapore	57,934	Ireland	40,501	Turkey	15,633	Greece	28,436
		Canada	39,075	Estonia	20,663	Argentina	15,970	Venezuela	12,233
		Iceland	35,642	India	3,523	Croatia	19,548		
				Portugal	25,421				
				Russia	19,814				

Table 2: Country classification and income level in USD in 2010

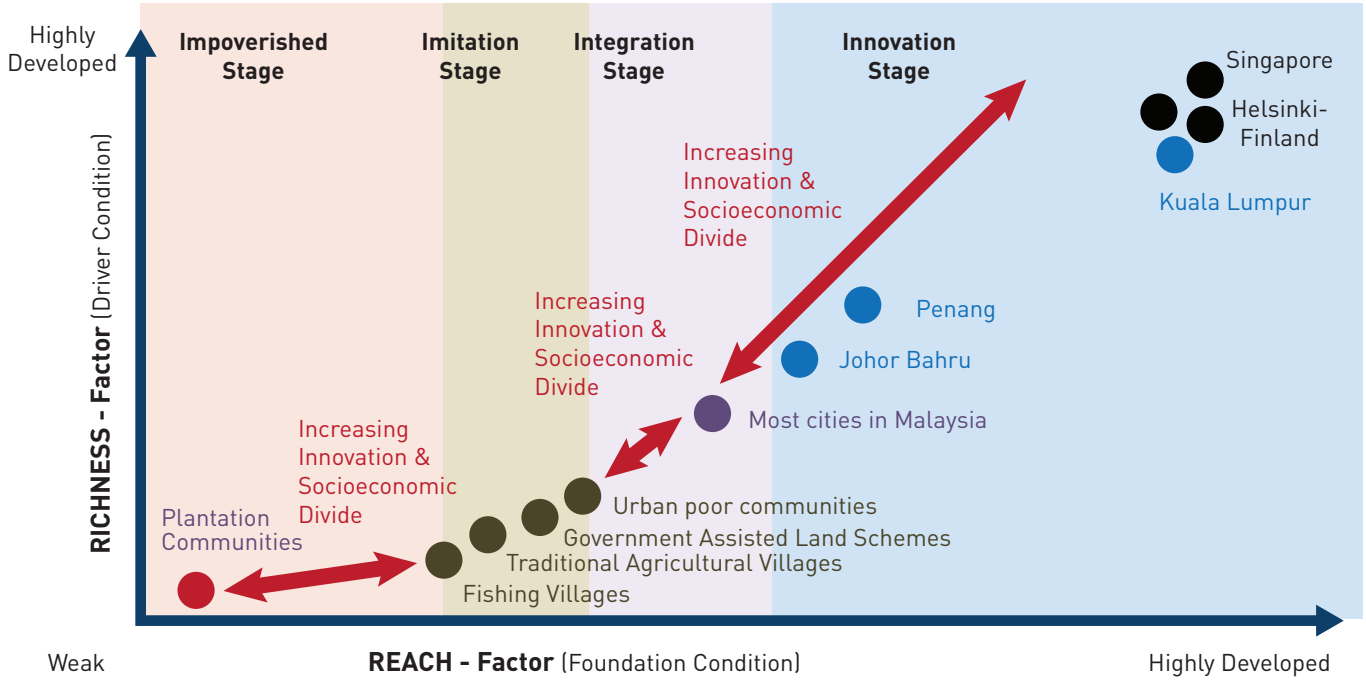

Figure 9: Digital-divide and socieconomic gaps in Malaysia (Nair, 2012)

Notes: reach factor is the ICT infrastructure (broadband and advanced ICT services) that facilitates connectivity to the global economy. Richness are factors such as intellectual capital, interaction between stakeholders in the economy, fiscal and non-fiscal incentives for innovative capacity, institutions that enable a efficient functioning of a knowledge-intensive society, and good governance systems and mechanisms that foster greater transparency and accountability.

the next generation of innovations and frontier of knowledge. The scientific institutions must have strong collaborations with industry and the broader community so that the research undertaken is relevant in meeting the needs of the industry and community. In summary, high speed broadband is crucial for strengthening the 'quadruple-helix' that will ensure sustained development of all economic agents in an information-driven society.

At the micro level, affordable broadband and advanced ICT services can help the poor communities manage their resources more effectively and use it in creative ways to improve their socioeconomic wellbeing. The Malaysian economy is rapidly transforming into an information- and knowledge-driven sector. Figure 9 show that rural and urban poor communities seem to be left behind in the global innovation marathon race. Nair (2011) also show a concerning trend that the digital- divide between marginalised communities (rural and urban-poor) and more wealthy communities are leading to increasing income inequality. National Economic Advisory Council (NEAC) (2009) reported that Malaysia has the second highest income inequality after China.

Increased income inequality and relative poverty among various segments of the population can be a potential recipe for increasing social problems. Factors hindering low use of ICT services among marginalised communities are attributed to affordability, low ICT literacy and lack of adequate ICT applications for these segments of the population (Nair, et al., 2009).

4. Discussion

The discussion in Section 3 show that Malaysia is lagging behind many of the developed and selected developing country in the deployment of high speed broadband. This has had an adverse impact on the quality of scientific institutions, innovative capacity and economic development. At the micro level, digital-divide between rural and urban communities has resulted in increasing innovation and income gaps in the country. Key factors hindering the diffusion of high speed broadband are discussed below.

Malaysia has been slow in deploying broadband. Further, the high cost of broadband is also an important factor for low diffusion of broadband in the country. The high cost of broadband services is partly due to the highly concentrated market, dominated by a few suppliers. The broadband services

provided in Malaysia support low end applications such as the BBGP (4Mbps), HSBB (1Gbps), fixed broadband (4.4 Mbps), mobile broadband (1.77Mbps) and mobile internet (2.8Mbps). These low speed broadband will not support the more advanced ICT applications and services that is important for an innovation-driven economy. Low quality transmission hinder transnational research collaboration between Malaysia and other leading research centres from across the globe.

Nair (2010) show in Figure 10 that cost of broadband (household rates, $USD, corrected for purchasing power parity) in Malaysia is higher than most of the pace-setter and developed countries, resulting in Malaysia having lower broadband penetration rates and lower readiness for an innovation-driven economy compared to these economies. Lack of high speed and cost effective broadband services can hinder extensive use of this medium of communication for fostering scientific collaborations with leading research scholars and research centers across the globe. Without sustained engagement with leading international scientists, the exposure to high quality research standards may be limited. This will hinder the quality of scientific institutions and erode national innovative capacity and competitiveness.

One of the ways to ensure access to quality and affordable broadband services is to increase competition in the provision of broadband services. Greater competition will reduce the cost of broadband services and increase the use of broadband more extensively. Increased competition will also encourage service providers to be more innovative in designing technologies and packages that are affordable to people from all segments of the population. Salminen (2003) showed that the Government of Finland opened the 3G market to all local operators, which resulted in the rapid fall in prices and significant improvement in services. This resulted in rapid diffusion of 3G across all sectors of the economy, thus increasing innovative capacity and competitiveness of Finnish firms.

In Malaysia, research collaboration between university and industry are rather patchy. Many of the researchers work in silos and have little interaction with industry and society unlike the research community in pace-setter and

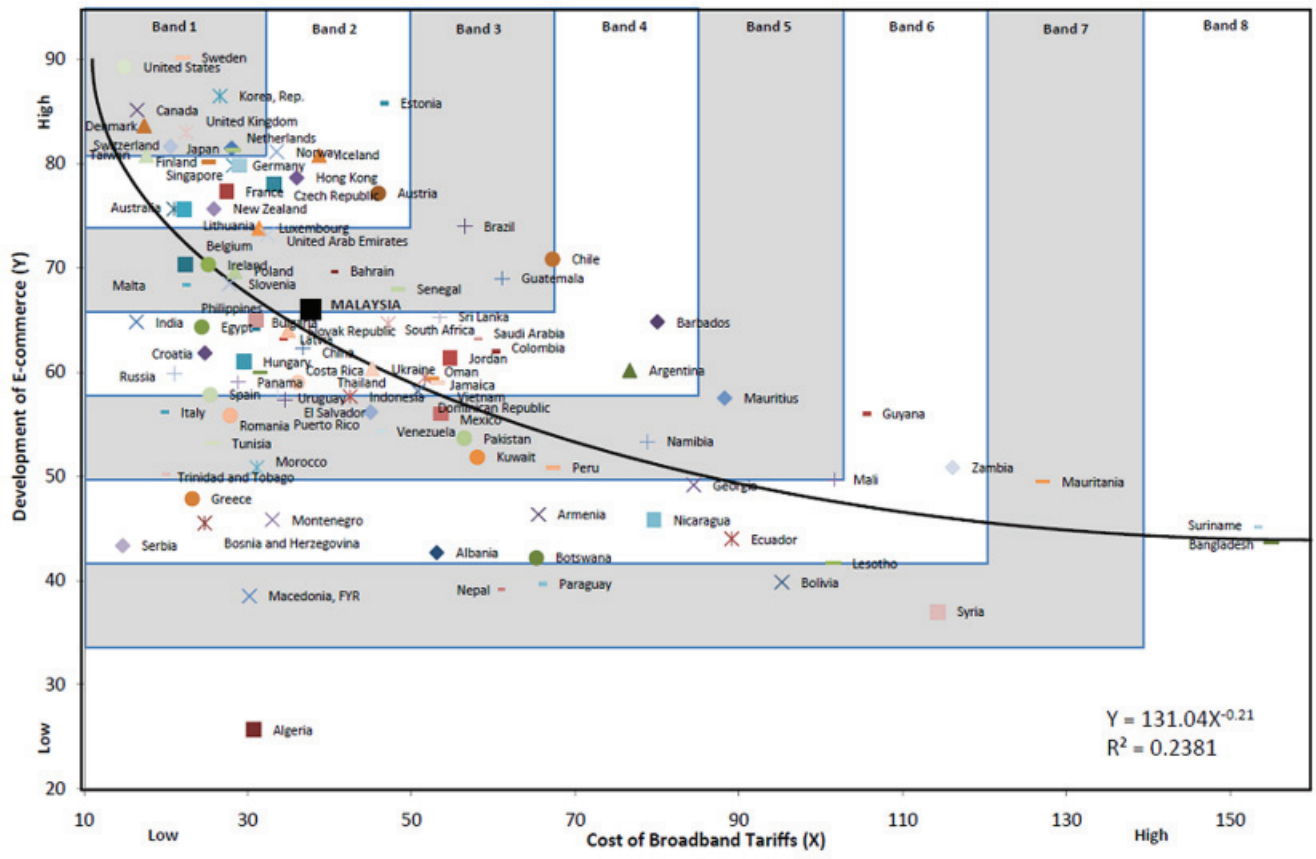

Figure 10: Cost of broadband and e-commerce development (Nair, 2010)

developed countries where industry associations and government agencies play advocacy roles in strengthening the 'quadruple-helix'. Several programs have been introduced to foster stronger scientific cooperations among universities, industries and government research institutes in these countries. Examples of successful programs include the Manufacturing Extension Program (http://www.nist.gov/mep/) and the Small Business Technology Transfer (STTR) Program (http://www.sba.gov/content/small-business-technology-transfer-program-sttr-0) in the United States.

In these programs, government established regional based manufacturing centres and training facilities to provide SMEs assistance in selection of appropriate technologies for business development, entrepreneurship development, and technical consulting. The interactions between the various stakeholders are conducted face-to-face and virtually using advanced communication technologies. Progress of each SMEs under these programs are monitored closely using the latest communication technologies. These two programs have been very successful in facilitating technology transfer from universities and government research institute to SMEs. Both these programs play key roles in fostering innovation that will enable industries in the US to be globally competitive.

Advanced communication technology has enabled global companies to outsource their innovation to increase their innovative capacity and competitiveness in a relatively short period of time. The open innovation partnership provides large multinational companies an avenue to overcome skills shortage, reduce cost of R&D, source new ideas externally and diversify risk (Economic Intelligent Unit, 2008). In a survey conducted by Economic Intellingent Unit (EIU) in 2008 of 305 executives, 37% of the respondents reported about one quarter of the companies' innovation came from external sources (EIU, 2008). The survey also showed that 26% stated that the channels of communication via ICT contributed to increase innovations from external partnershios (EIU, 2008). Among the ICTs, 68% stated that collaborative project systems made it easier for the firms to capitalise external sources of innovation (EIU, 2008). The survey clearly highlights that advanced communication technology informs firms about research undertaken globally and assist them identify external partners that enhance their global competivenes.

One of the concerning trend that has emerged from the empirical analysis is that broadband and ICT diffusion in the rural areas and among urban-poor communities were low. Increasing digital-divide between these marginalized and more developed communities may lead to increasing social problems. The Malaysian government recognized the importance of providing the bottom 40% of the population with the necessary ICT infrastructure to help them access important resources such as education, healthcare and other public services.

Under the Rural Transformation Programme, resources have been allocated to provide rural and other marginalized communities advanced communication services. Rapid deployment of broadband in rural areas, coupled with development of content that meet the needs of the rural community and ICT literacy training can help increase the use of ICT in the daily lives of rural communities in Malaysia. In this context, the 1Malaysia Telecenter can play an important role as the anchor player to develop the 'Living-Labs' open innovation ecosystem within the rural areas, as discussed in the earlier section. These telecenters should include the rural community in the design of community based development programs so as to ensure the programs are relevant in meeting the needs of the community and are sustainable in the long run.

5. Conclusion

In this study, we highlight that diffusion of high speed broadband is crucial for countries to move up the innovation value chain. The network externalities due to broadband technology will enhance the quality of scientific institutions and power the next generation of innovations and knowledge. Countries that are able to provide its citizens access to the technology that enables them to connect to the 'network brain' will be at the frontier of innovative capacity and socioeconomic development.

Malaysia's performance in the global marathon race was benchmarked with other developed and developing countries in this study. The study showed that Malaysia lags behind developed and pace-setter countries in the innovation race due to slow deployment of broadband. Key factors that hinder rapid diffusion of high speed broadband and 'catch-up' strategies to connect all segments of the Malaysian population to the global network society were discussed in this paper.

In summary, the social fabric of society is being transformed by rapid innovation in ICT. Countries that are leading the information revolution are setting a new world order for global competition. Countries that do not adapt to the new rules of engagement will be at the mercy of forces that power the rapid transformation of the global architecture. Countries like Malaysia that are caught in the middle income trap, should emulate lessons from pace-setter countries in charting a new path to sustainable socioeconomic development using more advanced communication networks.

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Appendix

Technical notes

The 3-dimensional functional form was estimated using ordinary least square method. The functional form estimated can be characterized as follows:
$z=f(X,Y)=a+b_1X+b_2X^2+g_1Y+g_2Y^2+I\,XY$, where X, Y and Z are broadband diffusion/speed, quality of scientific institution/university-industry collaboration, and innovative capacity respectively. A quadratic functional form was used to capture marginal rates of returns of broadband diffusion/speed and quality of scientific institutions/government-industry linkages on innovative capacity.

If $\beta_1>0$ and $\beta_2 > 0$, then broadband is said to has a positive and increasing returns on innovative capacity and if $\beta_1 >0$ and $\beta_2 < 0$, then broadband is said to has a positive and decreasing returns on innovative capacity.

If $\gamma_1>0$ and $\gamma_2> 0$, then quality of scientific institutions/university-industry collaboration is said to has a positive and increasing returns on innovative capacity and if $\gamma_1>0$ and $\gamma_2< 0$ then broadband is said to has a positive and decreasing returns on innovative capacity.

If $\lambda > 0$, it implies that university-industry collaborations/quality of scientific institution increases innovative capacity at a faster rate, as broadband diffusion/speed increases. If $\lambda < 0$, it implies that university-industry collaborations/quality of scientific institution increases innovative capacity at a decreasing rate, as broadband diffusion/speed increases.

Once the models have been estimated, countries are classified based on the estimated value of innovative capacity (Z). If Z > 5.1, the region is classified a pace-setter region: 5.1 - 4.6 as a developed region; 3.0 – 4.6 as a hotspot region; 3.6-3.0 as a starter region; and < 3.0 as a laggard region.

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