

CALENDAR OF EVENTS October 2005

4 October 2005

Web Services - Realising Economic Benefits and Enabling B2B Integration

Venue: Marina Mandarin Ballroom, Level 1
Time: 9.00am - 1.30pm

Web services have gained prominence and traction over the past year. The promise of new levels of connectivity, communications, fulfillment of products and services for businesses, partners and consumers remain. Enterprises that have enjoyed the tangible benefits of implementing Web Services are now keen to explore different avenues to deploy more Web Services applications. Web services have now moved beyond technology hype to show proven economic benefits for companies. Join big name companies such as SIA, PSA, OCBC and Nanyang Polytechnic, who will share their successes and challenges in their Web services journey.

URL:
<http://events.techmexevent.com/ida/weave05/>

13 - 14 October 2005

Regional Industrial Networking Conference

Venue: Singapore Polytechnic Convention Centre
Time: 9.00am - 5.00pm

Organised by Singapore Polytechnic's School of Electrical & Electronic Engineering, this annual conference focuses on Industrial Networks and previous years' events have covered topics ranging from Machine to Machine and Automation Network technologies as well as other wireless developments. RINC 2005 seeks to promote the use of 3G and future mobile technologies in various industry sectors as well as to increase public awareness in the use of 3G technology.

URL:
<http://www.sp.edu.sg/rinc>

16 - 21 October 2005

Gartner Symposium/ITxpo

Venue: Orlando, Florida, Walt Disney World Dolphin

The Gartner Symposium/ITxpo is Gartner's flagship event for senior IT and business professionals. Gartner analysts, IT solution providers and business professionals will converge at this conference and solutions showcase to discuss the latest IT trends and issues, such as security, compliance, sourcing, IT investments and many more. IDA, in partnership with leading service providers, will be participating in this event to showcase Singapore as the ideal location for companies to outsource their high-end business processes and operations.

URL:
<http://gartner.com/symposium/us>

ISSN NO. 02194457

iDA
SINGAPORE

Singapore's elite gamers slug it out for WCG crown: Pg 5

More than 600 gamers battled tirelessly over a three-day period at the Suntec Convention Centre for a chance to represent Singapore at the World Cyber Games Grand Finals.

Forging stronger ties: Pg 3

Bilateral relations between Singapore and Kuwait hit another high, with the two countries signing a second Memorandum of Understanding on e-Government cooperation.

Singapore unveils new moves to can spam: Pg 6

IDA and the Attorney-General's Chambers of Singapore call for a second round of public feedback on their proposed Spam Control Bill, which has been expanded to include mobile spamming.

iDA
SINGAPORE

The Infocomm Development Authority of Singapore (IDA) is committed to growing Singapore into a dynamic global infocomm hub. IDA uses an integrated approach to developing info-communications in Singapore. This involves nurturing a competitive telecoms market as well as a conducive business environment with programmes and schemes for both local and international companies.

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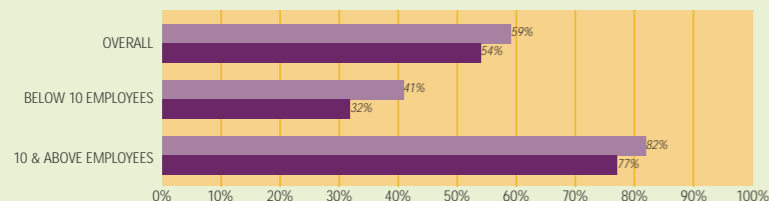


MORE LOCAL COMPANIES TAKING THE BROADBAND HIGHWAY

IN LINE WITH growing broadband penetration among the consumer segment, more local businesses are now hanging up on slower dialup connections in favour of high speed Net access.

According to IDA's Annual Survey on Infocomm Usage in Businesses for 2004, the adoption of broadband among Singaporean companies is steadily on the rise and has replaced narrowband as the prevalent form of Internet access.

Usage of Broadband (2003 to 2004)



The study, which garnered over 2,000 responses from companies on their usage of infocomm technologies, revealed broadband penetration among businesses has increased from 54 percent in 2003 to 59 percent last year. Conversely, the usage level of narrowband Internet access has dropped from 40 percent two years ago to 33 percent in 2004.

For companies with 10 or more employees, broadband penetration stood at 82 percent last year, twice that of their smaller counterparts with less than 10 staff.

Reliability and stability, ease of use and affordability were cited as the key factors for the switch to broadband technologies. In turn, greater productivity, faster turnaround time to

market, and lower overheads were listed as the key benefits of making the move, the study revealed.

With the increasing reliance on the Web as a business platform, local companies are increasingly becoming aware of the importance of deploying Internet security tools. As testament to this trend, 63 percent of businesses have adopted content screening and antivirus software last year, up from 56 percent in 2003.

Similarly, the usage of firewalls/gateways among Singaporean companies rose by 3 percent to reach 50 percent in 2004.

Other key findings include:

- 8 in 10 companies (83 percent) used infocomm appliances such as PCs, workstations and handhelds in 2004. Of these, nearly all companies with 10 or more employees (98 percent) have used infocomm appliances, while 7 in 10 companies with less than 10 employees (71 percent) did so.
- The usage of Wireless LAN increased from 26 percent in 2003 to 27 percent in 2004, while the percentage of local companies using GPRS (General Packet Radio Service) increased from 14 percent to 16 percent.

Singapore
wave

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SINGAPORE AND KUWAIT COOPERATE TO ACCELERATE E-GOVERNMENT PLANNING

BILATERAL RELATIONS BETWEEN Singapore and Kuwait hit another positive note as the two countries signed a second Memorandum of Understanding on e-Government cooperation. The second MOU was signed by His Excellency Sheikh Ahmed Al-Abdullah Al-Ahmed Al-Sabah, Minister of Communications and Health of the State of Kuwait and Dr Lee Boon Yang, Minister for Information, Communications and the Arts of the Republic of Singapore last month.



Forging stronger ties: His Excellency Sheikh Ahmed Al-Abdullah Al-Ahmed Al-Sabah, Minister of Communications and Health of the State of Kuwait and Dr Lee Boon Yang, Minister for Information, Communications and the Arts of Singapore, signing the MOU

Under the second MOU, the renewed relationship will look towards two new areas of co-operation. Singapore will serve as an Advisor to Kuwait on Information Technology and e-Government matters, while Kuwait and Singapore will also work together to select suitable private sector suppliers to implement projects identified under the e-Government Blueprint. In particular, Singapore will assist Kuwait in the drafting of the RFP (Request

for Proposals) specifications at the pre-tendering stage; and will assist in the evaluation of RFP submissions and recommend suitable e-Government solution providers at the tendering stage.

The increased co-operation on e-Government between both countries will forge closer relations, allowing e-Government specialists in the public and private sectors of both countries to find new opportunities for collaboration. This will in turn contribute to respective socio-economic development and help to enhance the competitive edge of both countries.

The inking of the second MOU between Singapore and Kuwait on e-Government co-operation came nearly a year after the first MOU was signed. The first MOU focused on promoting dialogue on e-Government issues to identify ways to accelerate development for Kuwait and forming working groups from the public and private sectors of both countries to collaborate together.

The close collaboration between the two countries was partly the result of a Singapore visit by His Highness Sheikh Sabah Al-Ahmad Al-Jaber Al-Sabah, Prime Minister of Kuwait, in July 2004. He expressed interest for both countries to strengthen bilateral trade and economic links with each other to then-Prime Minister of Singapore, Mr Goh Chok Tong. The result of their discussion then led to the signing of the first MOU on September 15, 2004 as both parties agreed to cooperate in e-Government planning.

The MOU represented a significant milestone in terms of strengthening both countries' bilateral relations. "The agreement was more than just a transfer of technology and best practices – it was also an exchange of ideas, culture and fostering of friendships between the people of our two countries," according to Dr Lee Boon Yang, Singapore's Minister for Information, Communications and the Arts.

Besides Kuwait, Singapore also inked a year-long technical services agreement with Jordan in October 2003. As part of this pact, the two countries have exchanged know-how on the planning and delivery of e-Government systems. IDA also led a delegation of Singapore's leading technology companies to Jordan as a follow-up to our sharing of expertise with the Jordanian government the following year.

McNEALY CALLS FOR 'COMMUNITY SPIRIT'

PARTICIPATE OR BE LEFT BEHIND. That was the message from Mr Scott McNealy, the CEO of Sun Microsystems, during his recent visit to Singapore.

His call for participation stems from his belief that with the proliferation of tools and services like blogs, the Internet has become a far more interactive medium where schools of people can now actively share information at ease.

"If you are not participating, you're missing out. You've got to get active, you've got to get involved and you've got to start contributing to the Net," said Mr McNealy. He was speaking at the IDA Distinguished Infocomm Speaker public address held at the Suntec Convention Centre last month.

Likewise, companies can also think about how they can go about building larger communities which could then be translated into future business opportunities, he added.

Mr McNealy cited eBay's recent acquisition of Internet telephony services provider Skype as one such example. Skype had garnered a large user pool globally for its complimentary software which allows consumers to make low-cost, international phone calls over the Internet. Likewise, eBay had a large consumer following for its online auction sites.

"What they both did was to create massive committees and monetised on it," he said, adding that Sun is taking a similar approach with its Java strategy.

According to Mr McNealy, there are close to 2.5 billion Java-enabled devices in the market and the number is still set to grow. As a commercial entity, Sun can take advantage of the proliferation of the programming language and ready developer pool.

For example, Sun has adopted a unique licensing model for its Java Enterprise System, a suite of server software - as it charges users on a per employee, per year basis. Unlike most competing offerings, the price is not pegged at the number of servers the software package is installed on.

As testament of its popularity, the number of subscribers for Sun's software tools is going to surpass 1 million this quarter, Mr McNealy said.

"Recurring revenues and very good gross margins - that's how you monetise a large community," he explained.

Besides highlighting the benefits of building strong user communities, Mr McNealy also cautioned businesses against a common mistake when making IT purchasing decisions.

"There are many people buying computers out there that are missing the boat on one component that's very important. We're all very good at understanding the total cost of acquisition, but the barrier to entry is really

the purchase price," he said. "The second thing is the ongoing cost of operation. The third is the most important cost, and that's the cost of exit."

With rapid technological advancements, the pace of technology obsolescence has also increased. In view of this, Mr McNealy said companies need to be mindful of the ease of getting out or replacing their IT systems.

"All technologies have the shelf life of a banana. Within 18 months, anything anybody sells you is obsolete. The most important thing is how to get out of what I'm going to buy. The total cost to exit is totally ignored in the purchase process of technology," he stressed.

Espousing Sun's approach, he said the open-source model thus works well to mitigate technology obsolescence.

"We have no barrier to exit. Think about the barrier to exit before you jump on," he advised.



Scott McNealy,
CEO of Sun Microsystems

SINGAPORE'S ELITE GAMERS SLUG IT OUT FOR ULTIMATE PRIZE

MORE THAN 600 LOCAL GAMERS battled tirelessly over a three-day period at the Suntec Convention Centre earlier this month. The stake: a chance to represent Singapore at the finals of the World Cyber Games (WCG) which will take centrestage here next month.

The 600 finalists in the Singapore leg of the competition were chosen from a field of more than 2,500 participants in various gaming challenges held over the past year. At the end of the fiercely-contested event, 15 representatives were rewarded with cash prizes worth around \$33,000.

More importantly, these "elite" local gamers will get to pit their skills against 800 international counterparts in the WCG Grand Finals in November.

One such victorious team is the Titans, and its members are relishing the challenge. According to Stanley Aw, an ardent gamer who made headlines recently for deferring his National Service to take part in the Singapore finals, said: "I'm really happy that I've finally got this off my back. The trouble and hard work I went through was definitely worth it. Now I can play for Singapore without any worries."

This is the first time the WCG Grand Finals, which is into its fifth year, is being held in Singapore. Contestants will be slugging it out for the crown across eight different computer games, including popular titles like Counterstrike and Warcraft.

The growing support from both corporations and consumers around the world in the WCG marks a changing mindset towards computer gaming. Far from being a casual pastime, gaming has even evolved to become a huge industry worth billions globally, with multinational companies like Samsung now sponsoring major tournaments. Correspondingly, the activity has evolved to become a serious profession in countries like the United States and Korea.

"A recent PWC report forecasts the growth of the global video game industry at 16.5 percent annually over the next four years. Significantly, the Asia-Pacific is expected to lead the growth in the Online and Wireless Games category, at 45 percent and 48 percent respectively, by 2009," said Mr Chan Yeng Kit, CEO, IDA, in his opening address at the Singapore WCG finals. "Gaming just might actually be a career choice worth considering," he added.

However, Mr Chan was quick to add that there is a need to have a balanced lifestyle and to practice moderation in all that one does.

"Gaming can be part of a healthy lifestyle. Studies have shown that gaming can be good for stress relief, relaxation and promoting teamwork. But game in moderation. Too much of a good thing can still be harmful," he quipped.

GETTING INTO THE GAME

In a bid to create a local vibrant gaming scene, the Singapore government has embarked on a series of initiatives in the past few years.

For example, Mr Chan highlighted the Digital Exchange strategy which seeks to create a new source of growth for the games industry and extend Singapore's hub status in the digital entertainment realm. As part of this strategy, IDA launched the Games Bazaar last June. This is a scalable hosting platform that will allow games companies, publishers and distributors to test and deploy their offerings around region with greater speed and less upfront costs.

In addition, IDA kicked off the Games Exchange Alliance in October 2004. This initiative blends the strengths of multiple companies in areas like games distribution, hosting, localisation and marketing into one accessible platform.

Mr Chan also pointed out that the Government is doubling its expenditure into the research and development in interactive digital media space and hopes to invite more world-class companies like Lucas Arts into Singapore.



Intense concentration as gamers battle for the spot in the Singapore leg of the WCG finals

SINGAPORE'S PROPOSED ANTI-SPAM LEGISLATION TO COVER MOBILE SPAM

IDA, IN COLLABORATION with the Attorney-General's Chambers of Singapore, is now calling for a second round of public feedback on its proposed Spam Control Bill for Singapore.

The first public consultation exercise was conducted in May last year when both parties unveiled the initial spam control legislative framework. However, the proposed bill has since been revised, a major change being that it has now been expanded to include mobile spam beyond unsolicited commercial e-mail messages.



Given Singapore's high mobile penetration rate and the prevalent usage of text messaging services, IDA had consulted both the operators as well as marketers on this issue, and examined the economics involved in mobile spamming.

While the costs involved in sending mobile spam may itself act as a deterrent, IDA is also aware of the difficulties and inconvenience for users should they decide to change their phone numbers to avoid receiving unsolicited commercial messages. The personal attachment consumers have to their handsets also amplifies the negative impact of mobile spamming.

Besides extending the Spam Control Bill to the mobile realm, another revision is that any affected party will be allowed to take civil action should they suffer damages or losses as a result of spamming. The initial legislation only allowed Internet Service Providers to take legal recourse.

The use of dictionary attacks and address-harvesting software to automatically generate e-mail/phone numbers permutations and retrieve e-mail addresses/phone numbers from the Web will be prohibited. Errant spammers found guilty of using such techniques or violating other aspects of the Bill can be ordered by the Court to stop their actions or pay damages to the affected parties. Compensation can be up to \$25 (US\$14.90) per spam message, with a maximum penalty of \$1 million.

As with the initial proposal, the "opt-out" approach towards curbing spam in Singapore remains unchanged. Companies that are sending unsolicited commercial messages to consumers would be required to tag them with an "ADV" label for easy identification. Businesses are also barred from putting misleading or false subject headers in their commercial e-mail or mobile messages. Genuine electronic or postal addresses, as well as an option for consumers to unsubscribe must also be provided.

The public can download the consultation paper at the "Policy & Regulation" section of the IDA Website (www.ida.gov.sg). All views from the public and the industry on the draft Spam Control Bill must be submitted in writing before 12 noon on October 14.

TRUE NUMBER PORTABILITY MOVES CLOSER TO REALITY

SINGAPORE MOBILE PHONE USERS welcomed the news on hearing IDA's announcement last month that it will be reviewing existing number portability solutions for both fixed-line and mobile phone services.

Number portability refers to the ability for users to retain their current phone numbers when they switch operators. Industry experts believe the implementation of this feature would spur operators to offer more value-added services and competitive pricing packages in a bid to retain their customer base.

Under the current number portability system, customers who switch service providers will still have to get new numbers. Calls made to their old numbers are then forwarded to the new lines, with the telcos imposing a one-off charge of between \$10.50 and \$21 for this forwarding feature.

As number portability solutions are now more mature, and can be implemented at lower costs, IDA is now proposing that operators adopt a centralised database approach which promises to alleviate consumers from the inconvenience of call forwarding.

The database will be accessible to all operators, service and content providers. It will contain the relevant phone number information so that subscribers can easily transfer the line when they decide to switch from one service provider to the other. This approach will ensure that phone calls, text messages, multimedia messages, and other value-added services can follow the consumer, regardless of the telco he has chosen.

Such databases have already been implemented in Europe, the United States and some countries in Asia. While 2003 estimates put the cost of developing such a database at more than \$100 million, IDA believes that with improvements in technology and recent market developments, the system can be deployed at about a tenth of the initial cost estimate.

"Number portability benefits consumers by allowing them to take advantage of the latest service plans from any operator, without the hassle and inconvenience of changing phone numbers. A robust and efficient solution for number portability will enhance benefits for consumers and businesses," said Mr Leong Keng Thai, Deputy Chief Executive and Director-General (Telecoms), IDA.



"With technology advancements, it is timely for IDA to review the number portability solution to ensure that it continues to effectively serve the infocomm market, and hence promote further competition," he added.

IDA has concluded its month-long consultation to seek feedback from telcos and consumers on the feasibility of implementing this solution for both fixed lines and mobile calls on October 5. A decision on the approach is expected to be made by the first half of 2006.

ONE NUMBER TO REACH THEM ALL?



WITH THE PROLIFERATION OF communications tools from handphones to fax machines to electronic-mail, modern consumers often have to grapple with remembering multiple numbers to contact others and remain contactable themselves.

However, if a trial by IDA proves successful, Singaporeans may enjoy the convenience of having to remember only a single number which merges

most of the communications channels we are currently familiar with. With the convergence of Internet and telecommunications technologies, IDA is now inviting companies to participate in an Electronic Numbering (ENUM) pilot to see how numbers can be used for multiple services beyond traditional telephony.

With ENUM, consumers will be able to make voice calls, send and receive e-mails via a single, Web-based phone number. For example, instead of having to remember a contact's e-mail address, a user can simply send the message to his contact's "e-Number".

The 6-month trial will be conducted by the Singapore Network Information Centre (SGNIC), a subsidiary of IDA. Interested participants will be required to provide ENUM registration, server hosting, and offer services which leverages on the new Internet-based number. The approach mirrors how domain name services are currently offered to consumers. For example, beyond registering Web addresses for its clients, a registrar may host the domain name on its server and choose to offer value-added services such as setting up e-mail accounts that match the new domain.

At the end of the trial period, SGNIC will assess if the pilot needs to be extended or if ENUM services will be launched commercially in Singapore.

In a related announcement, IDA also announced the results of the auctions it held last month for numbers it had made available for fixed-line, IP telephony and cellular services. In all, 40,000 numbers beginning with the prefix "3", which were designated for IP Telephony services, have been auctioned off to four companies. 50,000 level 6 numbers, which can be used for both IP telephony and fixed line calls, were allocated while 120,000 mobile phone numbers beginning with the prefix "8" had been snapped up.

INFO BYTES

IDA and IE Singapore Lead Delegation to GITEX

In a bid to tap business opportunities in the Middle East, IDA and IE Singapore led a delegation of 10 Singapore technology companies to participate in the Gulf Information Technology Exhibition (GITEX) in Dubai. The Singapore Infocomm Pavilion at GITEX served as a platform for showcasing the strengths and capabilities of our home-grown ICT firms and helped companies to forge stronger ties with potential partners in the Middle East.

NETS, Asia Payment Seal Deal for Online Transaction Processing

Singapore-based electronic payment provider NETS has concluded an agreement with Asia Payment Systems for online transaction processing for credit cards and debit cards in Singapore and China. Together with Asia Pay, NETS aims to extend its products and services throughout the Asia-Pacific region. The company's online payment platform, called eNETS, is already recognised as a trusted payment gateway as it has been awarded the TrustSG deal in July this year. The initiative, which is supported by the National Trust Council and IDA, aims to beef up the security of online transactions.

HOMELAND SECURITY FOCUS SPELLS BUSINESS BOON FOR STRATECH



Dr David Chew, Chairman, Stratech Systems

HEIGHTENED SECURITY CONCERNS stemming from terrorist threats have set governments around the world thinking about how they can better safeguard their borders. Recognising the sizeable business opportunity, homegrown Stratech Systems is hoping to spread its wings globally by exporting its expertise in developing homeland security systems.

Over the past few years, the company has seen a surge in demand for its "Intelligent Vision" systems and its clients now include major corporations and government bodies in Singapore and abroad. They include the Civil Aviation Authority of Singapore, Citibank Singapore and the Airport Authority of Hong Kong.

Stratech's Intelligent Vision systems are based on the notion of "putting a brain behind machines that see," according to company founder and Chairman Dr David Chew.

For example, the firm's offerings include a vehicle surveillance and access control system for law enforcement professionals. Called iVACS, it is capable of capturing and zooming in on high-quality pictures of vehicle undercarriages. The system can automatically compare historical images with new ones to detect discrepancies. It also integrates with other security procedures such as number plate recognition, explosive detection and driver verification into a single system.

Besides iVACS, Stratech's comprehensive product portfolio also includes "smart", real-time video security and surveillance applications as well as vessel tracking systems for ports.

While the company is looking to international expansion, Dr Chew admits gaining a foothold in other markets is no easy task. He admitted to having a tough time in trying to convince overseas firms and governments that a Singaporean firm has what it takes to compete globally.

"When we first approached companies overseas, they were hesitant and cautious about our capabilities. Singapore is such a small country

when compared to many others and some of the people we first approached had no idea where it was! To them, we were part of China," Dr Chew quipped.

His key learning from these hurdles is that the first impression could make or break the company.

"When we were in front of a new customer, especially one from overseas, we learnt we had to tell them what differentiated us from our competitors and how our solutions could help them," he stressed.

Dr Chew added that the reason some companies fail when they try to expand globally is that they often underestimate the challenges.

"While the determination to succeed must be there, to really succeed, you need to play smart as well as have the pure grit and desire to make it," he explained.

It took some time to overcome the initial scepticism, but a demonstration of the capabilities of the Intelligent Vision offerings soon won customers over. Having established a good track record in Singapore and Hong Kong, Stratech is looking at the United States, Japan, Australia and Europe as markets for growth. Although these are developed economies, Stratech believes that they offer the best opportunities to showcase its strengths. Moreover, according to Dr Chew, this top-down approach allows Stratech to establish credibility by having their solutions deployed in key markets.

"It hasn't always been easy," Dr Chew says, "but we are at a point where we can see all our hard work and effort paying off. Now that we are poised to go global, there is just no holding us back."



Stratech's vehicle surveillance and access control system in action

EYE TO EYE: PROFESSOR RAVI ARON



Dr Ravi Aron is an Assistant Professor of Operations and Information Management (OPIM) at the University of Pennsylvania, Wharton School. He is currently a member of the Information Systems, Strategy and Economics Group (ISSE). His recent research focuses on the pricing of information-rich services and inter-organisational information-sharing in outsourcing relationships.

Dr Aron has served as an advisor to government and policy-making bodies in Singapore, Mauritius and India and consults with firms in several other countries in the domain of strategic outsourcing services. He is currently doing a longitudinal, multi-year study of the impact of strategic outsourcing on firms and on labour markets.

CONTRARY TO POPULAR OPINION, Singapore is not facing stiff competition from resource-rich countries like China and India, says Dr Ravi Aron, a specialist in Business Process Outsourcing (BPO).

"There are complementary services that Singapore will offer whose value and volume will grow if there is growth in China and India," said Dr Aron, an Associated Professor with the University of Pennsylvania.

Singapore's well-developed physical, business, financial and legal infrastructure makes it an ideal location for global and regional organisations to position their Asia-Pacific headquarters. Dr Aron cites a few reasons for this, including Singapore's very efficient financial institutions, transparent capital markets, its Free Trade Agreement with the United States and an acceptable Western standard of living and way of life.

"As China and India grows, there will be huge spokes for which the hub will be Singapore. Singapore stands to gain every time a massive factory or processing centre is set up in China or India," said Dr Aron.

For example, while operational day-to-day management activities are handled between the company and its outfit in China or India, there are numerous other tasks that would be more efficiently handled in Singapore, he explained.

Dr Aron called these tasks "medium to long-term strategic controls" and they include responsibilities like legal and accounting compliance, privacy and protection of intellectual property, data security, and business continuity practices, managerial and financial audits and so on. Singapore's proximity to China and India puts it in good stead to fulfill these functions, he added.

He terms this synergistic trend the "made elsewhere, managed here" business model, adding that global entities are increasingly adopting this approach for optimal business efficiency. Some industries that can look at adopting this model are healthcare, financial services, telecommunication, bio-technology and retail consumer industries which involve commercial services such as hospitality, Dr Aron told Singapore Wave.

In addition, he noted that Singapore is more competitive than most other Asian countries for high-end outsourcing despite higher wage levels compared to its emerging neighbours.

Singapore's robust telecommunications and IT infrastructure, transparent financial markets, clean legal regime, and the availability of a strong pool of middle and senior management personnel are all favourable factors, Dr Aron stressed.

"Singapore also has tremendous risk mitigation management and containing expertise, all of which can substantially offset Singapore's higher wage levels", he said.

According to Dr Aron, some examples of high-end outsourcing services that Singapore can provide include bio-informatics, financial risk management, fixed income research, sell-side equity research, bond pricing research and asset pricing research.

A NEW GLOBAL COMMUNITY?

THE CONVERGENCE OF PEER-TO-PEER (P2P) and Grid technologies may, according to some technology trend-spotters, accelerate the creation of a new global community for knowledge sharing.

P2P applications are a class of specific applications that takes advantage of resources — storage, CPU cycles, content and human presence — available at the edges of the Internet. Grids support a variety of applications, and focus on providing infrastructure with service-level guarantees to moderately-sized and partially-trusted communities.

While both P2P and Grid technologies share the objective of pooling and coordinating the use of large numbers of distributed resources, there are differences between the two.

A P2P network typically has many more users than a Grid, but offers limited and specialised services, with little or no support for accountability or trust. Grids provide the necessary infrastructure to integrate resources that are more powerful and diverse, but fall short of being able to dynamically manage users on a scale as large as P2P networks. It has been said that "Grid Computing addresses infrastructure but not yet failure, whereas P2P addresses failure but not yet infrastructure".

However, P2P and Grid technologies are now coming together. From the Grid perspective, the problem of providing autonomic management — empowering computers with self-configuration and self-healing properties — is being addressed as the scale and reach of Grids increases. Researchers are currently looking at the decentralised, reliable and scalable management of Grid resources.

The Global Grid Forum, a Grid standards body, is studying this convergence and how existing Grid standards can be enhanced to support the P2P paradigm. P2P communities are also building critical infrastructure to support sophisticated applications such as "social" file-sharing networks consisting of a closed set of users.

"P2P Grids" will bring Grid Computing closer to consumers. One promising application domain is education. Casual users would be able to participate easily and tap on practically limitless information and computing power. An example of this is the Virtual Observatory being built by the international

astronomy community. Governments can pilot new P2P Grids to make such educational projects available to everyone, young and old.

But there is possibly a negative side to the convergence. Imagine a not-too-distant-future when a layman can offer (or even sell) his own PC's processing power to a global grid that may help malicious users break encryption algorithms. The P2P/Grid convergence might enable him to do this quietly from the comfort of his home.

In Singapore, a P2P Data Grid is currently being designed to facilitate collaboration within the manufacturing industry through the sharing of design models as part of IDA's Collaborative Engineering Programme. More information on the programme can be found at www.ida.gov.sg under "Technology Development".

