Samson Tam, Chairman of Group Sense Limited (GSL), remembered reading Sun Tzu's Art of War years ago when he was in school. Then, it seemed like just another of those ancient Chinese texts that teachers made their students read. But something about that 2000-year old treatise was coming back to him now as he thought about the future of his firm. He remembered:

> *Warfare is the Way of deception. Therefore, if able, appear unable, if active, appear not active, if near, appear far, if far, appear near.*
>
> *If they have advantage, entice them; if they are confused, take them, if they are substantial, prepare for them, if they are strong, avoid them, if they are angry, disturb them, if they are humble, make them haughty, if they are relaxed, toil them, if they are united, separate them.*
>
> *Attack where they are not prepared, go out to where they do not expect.*
>
> *Before doing battle, in the temple one calculates and will win, because many calculations were made; many calculations, victory, few calculations, no victory, then how much less so when no calculations?*

Maybe it was the part about the calculations since all of a sudden it seemed like running GSL was taking a lot of calculations and even more ideas. Maybe it was the fact that Samson had been thinking a lot about how similar business and war could be.

As he reflected further, Samson realized that he never would have thought of business as war prior to last year when GSL introduced their new smartphone, the G18, to the Hong Kong and regional markets. Before that time, GSL's main business had been to produce electronic dictionaries under their own branding and other small electronic devices through original design manufacturing (ODM). The electronic dictionary market had grown steadily since the company almost single-handedly established the e-dictionary market in Hong Kong with its Instant-Dict brand. By now, GSL was developing high-end electronic dictionaries with advanced features and dynamic learning interfaces. Business had gotten better and better over the years and GSL had enjoyed a long period of growth.

Then, after intensive research and development activities, GSL had also moved into the smartphone market. This was a logical extension to their production of personal data assistants (PDA), since a smartphone is actually and PDA and mobile phone combined to deliver multiple functions in one very useful device.

The launch of the G18 smartphone in September 2003 had gone very well. The handset even won a special award for its stylish design. With this foray into telecommunications, the future seemed very bright for GSL as it entered the smartphone market. Here was a new technology with huge market potential.

But now, in just a year's time, Samson felt worried about the directions the smartphone market was taking and he was looking for answers. Perhaps this was why Sun Tzu's old teachings had come back to him. Samson's primary worry was that GSL's smartphones were built upon Palm's operating system (OS) as their PDAs had been.

Now, competing operating systems had surfaced in the market and Samson and his older brother, Thomas, GSL's managing director, were both wondering if they should stay the course with the Palm OS or abandon ship and change operating systems. The implications were far-reaching for the company in terms of R & D investments. Even as a small player, GSL would have to take a side in what was quickly becoming a standards war if the company wanted to stay in the smartphone market with its on brand.

In fact, the smartphone market had, in that short year, already become dominated by the big guns in the mobile telephone market, including Nokia, Sony-Ericsson, Samsung, etc. Samson wondered what GSL's next move should be in terms of establishing its own brand outside of Hong Kong, where the company's electronic dictionaries had created solid brand awareness, and in trying to take the phone into the international market. On the other hand, should the company refrain from that tempting impulse and only produce smartphones for other players? Was it better to join in the battle or stay off the field? This ODM strategy was safer and also kept the company from directly engaging in the standards war. But would that mean giving up the huge opportunities that the smartphone could create for the company?

In addition, the company could not afford to ignore the next wireless wave, 3G. The 3G wave had washed to Hong Kong's shores in early 2004 when Hutchison 3 launched its 3G services network to huge market fanfare. Clearly, 3G was spreading in Asia and Europe and would make it to North America soon. Any company producing wireless devices had to have a 3G strategy. GSL needed to coalesce its 3G strategy with its smartphone and ODM plans. Where would 3G fit in the mix?

Now, as Samson waited for his brother to arrive so they could discuss these problems, he remembered again the words of Sun Tzu:

> *One who knows the enemy and knows himself will not be in danger in a hundred battles.*
>
> *One who does not know the enemy but knows himself will sometimes win, sometimes lose.*
>
> *One who does not know the enemy and does not know himself will be in danger in every battle.*

It seemed a good time for Samson to look deeply into where he and his company had been so that he could be sure that he did actually know himself before he tried to solve these pressing problems.

Company Background

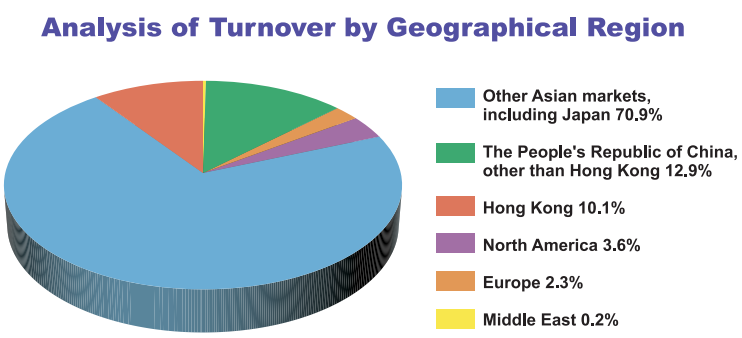
Group Sense (International) Limited (GSL) started off as a manufacturer of electronic dictionaries under the brand name Instant-Dict in 1988. Over the years, Samson Tam and Thomas Tam, the two founders of the company, had turned a HK$200,000 initial investment into a HK$ 1.3 billion business listed on the Hong Kong Stock Exchange.

Today, GSL has three Strategic Business Units (SBU): electronic dictionaries, original design manufacturing (ODM), and smartphones. It has extended its presence to overseas markets including mainland China, Taiwan, Korea, Thailand, Singapore, North America and the Middle East. The company has also established outlets and branch offices in China's three large cities Beijing, Shanghai, and Guangzhou as well as Singapore. Samson Tam is also politically active in Hong Kong. He was nominated as a candidate for the IT functional constituency in the Legislative Council election in September 2004.

When GSL first started its electronic dictionary business, there was virtually no other competitor in the market. The initial investment was quickly paid back and the company expanded. In recent years, the company has faced increasing competition in the electronic dictionary market, yet its first-mover advantage and dedication to continuous improvement of their products have allowed the company to maintain a leading position in the industry. To seek future growth opportunities, GSL has experimented with a number of other products including translators, page services, ODM, personal digital assistants (PDA), and recently smartphones.

In 2002, due to repeated losses from their pager operations, the company sold off this business. In recent years, the PDA market has also decreased considerably. Sony, a major player in the PDA marker, has announced that it is not going to release any new PDA models in the future. In response to the weakened market demand for PDAs, GSL has decided to shift the focus of their PDA business to smartphones, which are basically technological upgrades of PDAs, by incorporating additional mobile communication functionality. Senior management is looking into listing their operations on the NASDAQ, the Singapore exchange and Shenzhen's new second board once they have attained profitability. Currently, smartphone has the most momentum and will probably be listed first.

To diversify the sources of revenues, GSL continues to explore new markets. The diagram on the right shows the company's turnover by geographical market in the year ending March 31, 2004. In view of the intensified competition in mainland China, the company plans to shift some of their focus to the European market in the future.



Electronic Dictionary & Translator



The Electronic dictionary SBU remains the most profitable operation of GSL. The company is the largest electronic dictionary producer in the world and has a strong position in Mainland China, Hong Kong and overseas. It produces electronic dictionaries in over 20 different languages.

This operation is expected to continue to be a cash cow for the firm as the number of learners of foreign languages increases with the opening of the Mainland China market. However, growth potential is seen to be limited due to intense competition in the industry, which constantly lowers profit margins. The company will adopt a conservative strategy and focus on the high end of the electronic dictionary market.

GSL has decided to focus on the high end segment by incorporating multimedia applications in their electronic dictionaries and offering more value-added accessories. Downloading and MP3 functions have been built in to electronic dictionaries to allow users to combine their education and entertainment experiences.

The company has formed a strategic alliance with Macromedia. Flash applications will be added to future electronic dictionary models to enhance interactivity and provide users with a more flexible and dynamic learning interface.

After 10 years of research, the company has successfully developed the world's first Chinese-English full sentence translator. The product will be released in Fall 2004 and is expected to bring the company HK$ 130 million in sales.

To strengthen its leading position in the market, the firm also cooperates with reputable English-learning institutions to develop quality electronic dictionaries with enhanced learning functions.

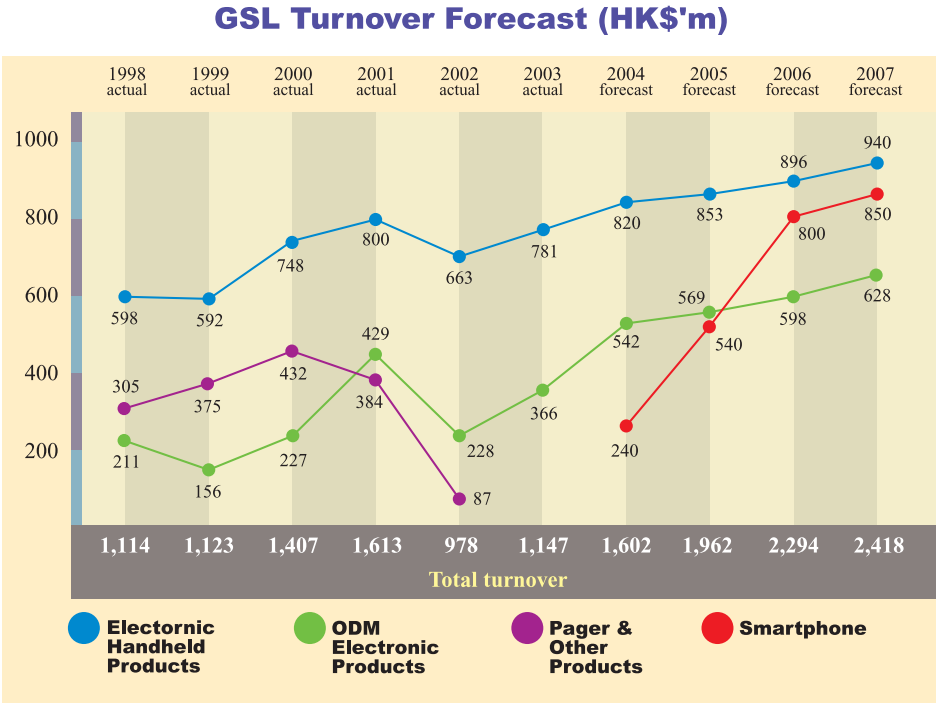
Original Design Manufacturing (ODM)

GSL's ODM business started in 1999. The ODM business, the company's second SBU, has been growing for the last few years and has become a major revenue source after electronic dictionaries. Profitability of the ODM operation increased by 60% in 2004. It now represents 43.5% of the company's total turnover. This SBU's outstanding performance is attributed to GSL's stringent quality and cost control. The SBU manufactures handheld products primarily for Japanese companies including two of the three largest electronic dictionary manufacturers in the country. They have been gaining market share in Japan and have increased outsourcing of product development and production to GSL to cut costs. The appreciation of the Yen over the last two years has resulted in more Japanese manufacturers outsourcing to other Asian countries. It looks to add two non-Japanese ODM customers in 2005. GSL has also

expanded its ODM business to Europe. It shipped an electronic album device for Nokia in 2003. Subsequently, Nokia awarded four new projects to GSL. One of these new projects is a Bluetooth keyboard for handsets.

Besides working closely with existing customers, the company will look into broadening its ODM customer base. However, GSL is selective in choosing its customers. Rejecting the electronic manufacturing service (EMS) model, which targets a wide range of customers, the firm's strategy is to tighten business partnerships with a limited number of selected customers who have established brands and sales.

In light of the global economic recovery and the current outsourcing trend, profitability is expected to continue to grow in 2005. The company will focus on the development of Bluetooth mobile electronic systems, which is expected to boost sales by 20% to 30%. The company will also join with key component suppliers to create unique products based on their technological expertise, with priority given to quality, delivery and cost reduction.



From PDA to Smartphone

The brand Instant-Dict has become a household name in Hong Kong and other Asian countries, giving GSL's electronic dictionary products a better margin than its ODM products. Having established a solid beachhead in the electronic dictionary market worldwide, GSL started to explore other products in the late 1990s. The objective was to diversify the product lines and develop future sources of revenue growth.

Riding on the surging demand for the PDAs created by Palm in the late 1990s, GSL established a SBU to develop a new line of PDA products. The decision to move into the PDA market was a sensible one as the experience and technologies in developing electronic dictionaries could readily be applied in the design and manufacture of PDAs. Also, established distribution channels could be used to distribute products from this new line of business.

Until the turn of the millennium, PDAs were offline devices. While they supported data communications and internet surfing, these devices required wired connections. The original PDA was conceived as a personal information management (PIM) device and not a means for voice communications.

During the same period, wireless telephony experienced phenomenal growth both in terms of technology advancement and market demand. The mobile handset changed from a simple voice communications device to a personal assistant that provided personalized services for work and leisure use. PDAs and mobile phones started to provide increasingly overlapping functions and there became a point at which a person did not need to carry both. In other words, PDAs and mobile handsets came to a cross-over point with a new off-spring - the smartphone.

A smartphone has all the features of a PDA, which include PIM services, such as a calendar, address book, and task lists, as well as a suite of document authoring and viewing tools. In addition, smartphones provide the same wide range of voice communication functions if not more expected from a regular phone if not more.

Although the company decided to shift the focus of its PDA operation to smartphones, its experience with PDAs was very valuable in the move towards the new direction. In the fiscal year ending March 31, 2004, turnover of this SBU came mainly from the sales of smartphones. The revenue from smartphones was much higher than that from PDAs in the previous year, indicating the company's success in evolving the SBU from PDA to smartphones.



The company's first self-developed smartphone, the G18, was launched in September 2003. The phone has been well received by the local market and was awarded the "Hong Kong Awards for Industry: Consumer Product design" by the Federation of Hong Kong Industries in 2003. The G18 is currently sold in Hong Kong, Taiwan, Singapore, Malaysia and Thailand. It has also been shipped to Europe through distributors in Italy, Spain and Germany. GSL sold around 100K smartphones in 2004. The second model, Xplore G88, was launched in early 2004. However, the interest in the G88 has been smaller than expected in Europe and China due to some licensing issues and the longer-than-expected negotiation time with Chinese handset vendors. Although the European market has not been doing as well as expected, the company still plans to extend its presence in Europe.



GSL Smartphone G88

Smartphones command a net margin of 10 to 12%. Losses from handsets narrowed from HK$25m in the first quarter of 2004 to HK$5m in the second quarter (excluding the provision for old PDA models). The smartphone SBU is expected to break even in 2005 as volume increases.

In Hong Kong, with the exception of the two large appliance and electronics stores, Fortress and Broadway, all local sales go through MC Founder, which has been appointed as GSL's exclusive distributor in Hong Kong. MC Founder is also a distributor of Nokia phones. In a retail-focused market like Hong Kong's, sophisticated customers require customized and value-added features. They need distinctive handsets that reflect their personalities.

In mainland China, the ODM business model is used as a means of selling products to local manufacturers. Some of the products are also sold directly to network operators. The company aims to achieve 0.3% to 0.5% market share in the mainland mobile phone market.

In Europe and the United States, mobile phones are sold to customers mainly through network operators. Network operators bundle value-added features through the phone manufacturers. American users focus on the cost-effectiveness of their phones, while European users pay attention to the unique features of the phone. The demands from the different markets are different.

Despite having huge growth potential, the smartphone industry is highly competitive. Major players include mobile giants such as Nokia, Sony Ericsson, Siemens and Motorola. GSL's Xplore G18 and G88 appeal mostly to existing Palm users. In 2005, GSL plans to invest HK$70 million in R&D, most of which will be spent on smartphones.

Comparison Table

	Nokia 7610	O2 XDA II	SonyEricsson P900	Xplore G88	PalmOne Treo 600	Motorola MPX	Siemens SX1 200
Price (HK$)	$4,398	$6,688	$5,680	$3,690	$5,980	$3,180	$3,880
Band/Mode	GSM 900/1800/1900	GSM 900/1800/1900	GSM 900/1800/1900	GSM 900/1800	GSM 850/900/1800/1900	GSM 900/1800/1900	GSM 900/1800/1900
Display unit	65,000 color TFT	65,000 color TFT	65,000 color TFT	260,000 color TFT	3375 color STN	65,000 color TFT	65,000 color TFT
Screen size	43mmx35mm	74mmx56mm	65mmx43mm	47mmx32mm	47mmx45mm	46mmx33mm	45mmx35mm
Camera	1.0 mil pixels	300k pixels VGA	300k pixels	100k pixels CMOS	300k pixels	External (optional)	300k pixels
Operating System	Symbian OS 7.0S	Windows Mobile 2003 for Pocket PC Phone Edition(Chi. Version)	Symbian OS 7.0	Palm OS 4.1.2	Palm OS 5.2.1H	Windows Mobile 2002	Symbian OS 6.0
CPU	n/a	Intel Xscale PXA263400MHz	ARM 9	Motorola Dragon Ball VZ33MHz	144 MHz ARM	Texas Instruments OMAP710	130MHz Texas Instrument OMAP310
Installed memory	8MB	128MB RAM/ 64 MB Rom	16MB	24MB Flash	32MB (24MB usable)	32 MB RAM	4MB
Built-in expansion slot	RSMMC	SD/MMC	32MB Memory Stick Duo	n/a	SD/MMC I/O	SD/MMC	MMC
Wired connection interface	USB	USB	USB	USB	USB Hotsync	USB	USB
Wireless connection interface	Bluetooth	IR/Bluetooth	IR/Bluetooth	IR	IR	IR	IR/Bluetooth
Dimensions	93.5x53x18.7mm	130x69.9x19mm	115x57x24mm	100x49x21mm	112x60x22mm	89x48x27mm	109x56x19mm
Weight	118g	190g	150g	116g	168g	118g	116g
Talk time	3hr	3.5hr	13hr	2hr	6hr	4hr, 4.5hr	4hr
Standby time	240hr	150hr	400hr	100hr	240hr	95-112hr	200hr
Radiation	0.54 Watt/Kg	n/a	n/a	0.49 Watt/Kg	0.85 Watt/Kg	0.11 Watt/Kg	0.52 Watt/Kg

The Smartphone Industry

The industry has classified mobile handsets into three categories: vanilla voice phones, feature phones and smartphones. Vanilla phones cover the low end of the product segment. They are low-priced devices providing basic telephony services including voice communications and simple messaging support. Since their margins are low, vanilla phones are manufactured in large volume by ODMs and marketed mainly in developing countries. Feature phones provide additional features over vanilla phones such as a large color screen, a camera for pictures, video recording, and support for MMS, Bluetooth and basic PIM services. Smartphones add, on top of these features, a large collection of applications, extensibility, and seamless integration with enterprise software for corporate applications. The following table highlights the difference between the three categories of mobile devices:

Segment	Description
Vanilla voice	Conventional black and green screens, limited to voice and text-messaging capabilities
Feature phones	Handset with a color screen, and a range of additional functionality such as radio, mp3, mms, picture messaging, or an attachable / integrated camera
Smart phones	Can be distinguished from feature phones in three main ways: (a) a larger color screen and more sophisticated user interface, (b) a more "open" operating system, that is licensed by multiple hardware vendors, and (c) that has a community of third party developers creating additional software applications (that can be added to the handset when shipped or sold/downloaded later)

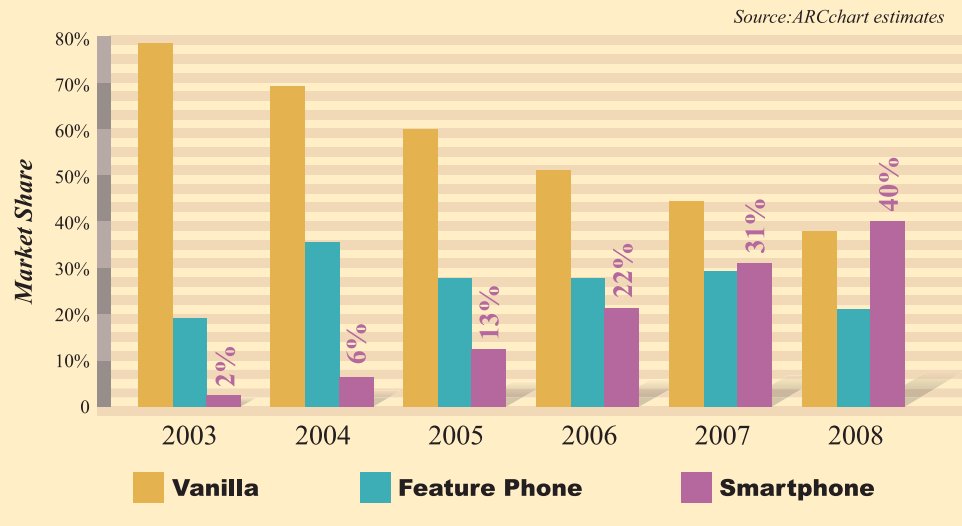
Source: Deutsche Bank (7 May 2004)

There are two notable trends in mobile computing that can be readily quantified. One is the declining PDA market. The other is the meteoric rise in sales of smartphones. The market for smartphones is still small. But it is growing fast, as new features are added to handsets, making them even smarter. Of the several hundred million mobile phones that will be sold this year, around 16 million will have built-in cameras. Nokia, the world's largest handset maker, expects to sell 50-100 million color-screen handsets next year. A new report from Analysys, an industry consultancy, predicts that, by 2007, nearly 300 million Europeans will be carrying handsets with color screens, cameras, music players, support for downloadable games, and other features that are now available only in the most advanced models. Such features are already common in Japan and South Korea, and they are starting to appear in Europe and America.

According to Ovum, the smartphone market has grown from just two million units sold in 2002 to some 10 million sold in 2003, with 25 million expected to be sold in 2004 and 130 million in 2007. Projections from other market research firms are consistent, with IDC forecasting 30 million devices in 2004 and 86% compound annual growth through 2007.

ABI predicts similar growth and expects 150 million units sold by 2008. These global sales figures include both consumer and enterprise markets. According to ARCchart, the industry will see a continuous decline in vanilla phone demand in the future. The current growth of feature phones will peak in 2005-6 and the momentum of growth will be driven largely by the demand for smartphones.

Market Shares of the Three Handset Types, 2003 to 2008



In terms of features, smartphones sold in the future are expected to provide the following functions:

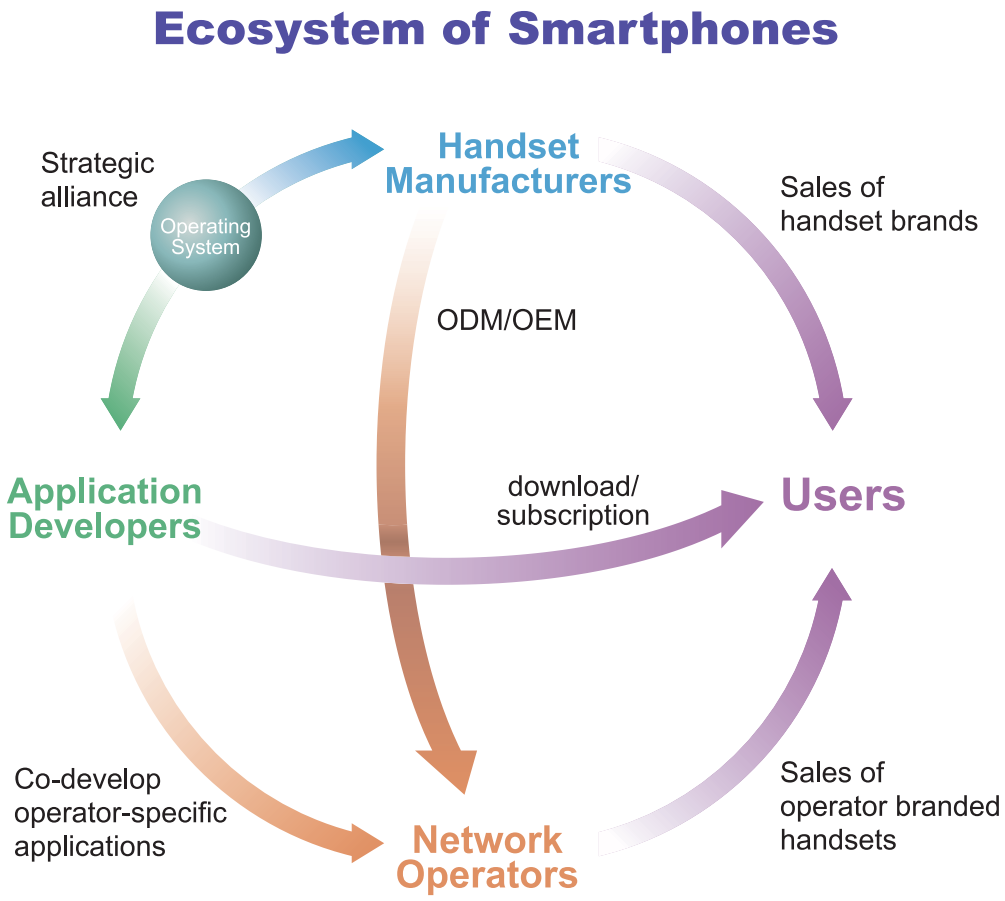
Features	Details
Price Range	US$150 - US$450
Main Function	Phone, PIM, VPN client, Thin client, Voice, Email, IM, Web browsing, Fax
Other Functions	Music player, Video conferencing, Digital camera, Scanner
User Interface	Pen, Browser & speech recognition
Operating System	Symbian, Microsoft, Palm OS, Linux
Microprocessor	RISC or X86, 2000-3000 MHz
Connectivity	Cellular 3G: Up to 384 Kbps IEEE 802.11g: Up to 54 Mbps Bluetooth: Multi megabits/sec
Display	QVGA or full VGA
Program Memory	512-2048 Mbytes RAM
Flash Memory	256-1024 Mbytes
Expansion Slot	Compact Flash, SD, MMC
Mass Storage	2048-4096 Mbytes memory cards 10-20 Giga Bytes hard disk

Key Features of Future Smartphones

Source: http://www.smartphonetoday.com/articles/2004/6/2004-6-3-Overview-Symbian-Smartphone.html

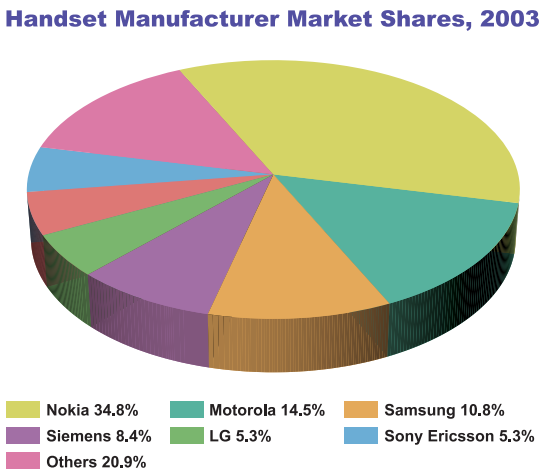
The Ecosystem of Smartphones

The ecosystem of the handset market consists of four major components: handset manufacturers, network operators, application developers, and end users. At the center is the operating system of the smartphone.



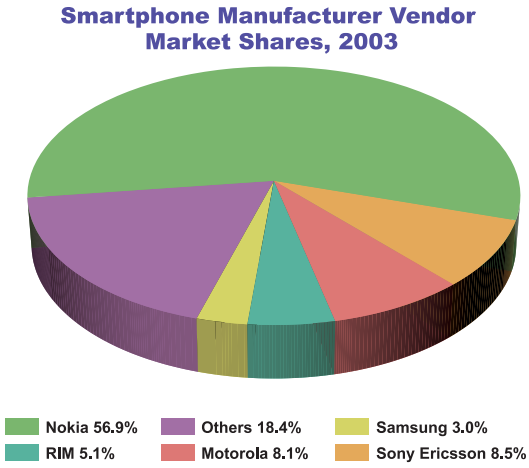
Handset Manufacturers

The handset manufactures include major players such as Nokia, Motorola, Siemens, Samsung, Sony Ericsson and an increasing number of new brands from Taiwan, S. Korea and Hong Kong/China, such as BenQ, Legend, Kyocera and GSL. Nokia is the market leader with 34.8% of the entire handset market in 2003. The market has become more fragmented and competitive as newcomers are capturing a major share of the market (20.9%) and the percentage continues to grow as major



brands concentrate on more sophisticated models and outsource the vanilla and feature phones to ODMs and OEMs.

Nokia's dominance of the smartphone market is clear, as reflected by its more than 50% market share. Nokia is followed by Motorola and Samsung. Interestingly, the "Others" category constitutes 18.4% of the market share, which is not significantly different from the overall market share of all handsets. With the availability of reference designs and standard chipsets, small and less-known brands are able to acquire the necessary technology components to compete with major brands.



At the same time, traditional handset manufacturers are facing increasing competition from major PC manufacturers such as Dell and HP and consumer appliance manufacturers. As the technology components become commoditized, the latter can leverage on their manufacturing base, outsourcing experience, and distribution channels to compete head-to-head with established handset brands.

Network Operators

The network operators provide the network infrastructure to connect users to each other. Maximizing traffic volume is still the primary objective of operators as their major source of revenue is still derived primarily from traffic volume. However, transaction revenues (e.g., download and information services) have been on the rise in recent years. It is expected that data services and transactions will become a major source of revenue for operators in the future.

To stimulate service usage, the network operators have to provide applications that users find interesting and attractive. These applications need to be highly interactive, reliable, personalized, entertaining, and ubiquitously available. To support these applications, the mobile devices must handle multiple applications concurrently (e.g., retrieving a calendar while talking over the phone), support broadband access (e.g., multimedia content transmission), have hi-fidelity information capture (e.g., a high-resolution camera), and have access to a host of services and applications developed by a community of third-party information vendors.

Distribution of phones through network operators is advantageous to phone manufacturers. The extensive sales network of network operators leads to secure orders from the operators and to competitive pricing. Moreover, the collaborative effect of such a distribution arrangement strengthens the manufacturer's brand name.

But the disadvantage to such an arrangement is that the manufacturer loses production flexibility. Lower prices decrease the profit margins.

Currently, the purchase of a handset is decoupled from the subscription with an operator in many countries. That is, a person can choose a phone in one store and subscribe to a network operator in another. The purchase considerations are separated. This does not cause much conflict between the handset manufacturers and the operators for vanilla phones because the main use of the phone is voice telephony.

With feature phones, the situation is slightly different. With an increasing number of applications loaded on the handset, closer coordination between the handset manufacturer and the operator becomes necessary. Applications enabled by new features (e.g., image and video capture) are constantly added to the service menu with considerable implications for network operations, billing and customer support. Conflicts arise as operators become increasingly dependent on the handset manufacturers and the operator loses control of pricing and the launch time of new services. Network operators would like to extend their control over users' handsets for the following reasons: (1) to have more control of the design and implementation of services and applications to improve the utilization of network resources; (2) to provide more personalized services by synchronizing the handset and backend servers with the objective of increasing loyalty and switching costs; and (3) to "decommoditize" network services by developing a unified brand and a total experience for customers.

As the conflict between operators and handset manufacturers grows, operators may decrease their reliance on major handset brands by working with OEM/ODM to develop their own handsets. This will create ample opportunities for small and medium manufacturers and EMS The shift towards sourcing from low-cost OEM/ODM may also trigger major brands to outsource their design and production activities to compete with the operators. The relationship between operators and handset manufacturers is very dynamic and it depends to a large extent on how likely and how fast mobile handsets are commoditized.

Application Developers

The applications (including voice) accessible by a smartphone provide the revenue sources for both the manufacturer and the network operator. Advanced features such as online video-conferencing and high-resolution image capturing enable the handset maker to charge a premium for the handset. At the same time, services supported by these features provide additional revenues for the operator, increasing the average revenue per user (ARPU), leading to increases in overall revenue.

To cope with the advances of new technologies and changing demands from users, a community of application developers has emerged to provide a wide array of services

and applications for smartphone users. They work closely with the operators and engage in a wide spectrum of revenue sharing and equity structuring arrangements.

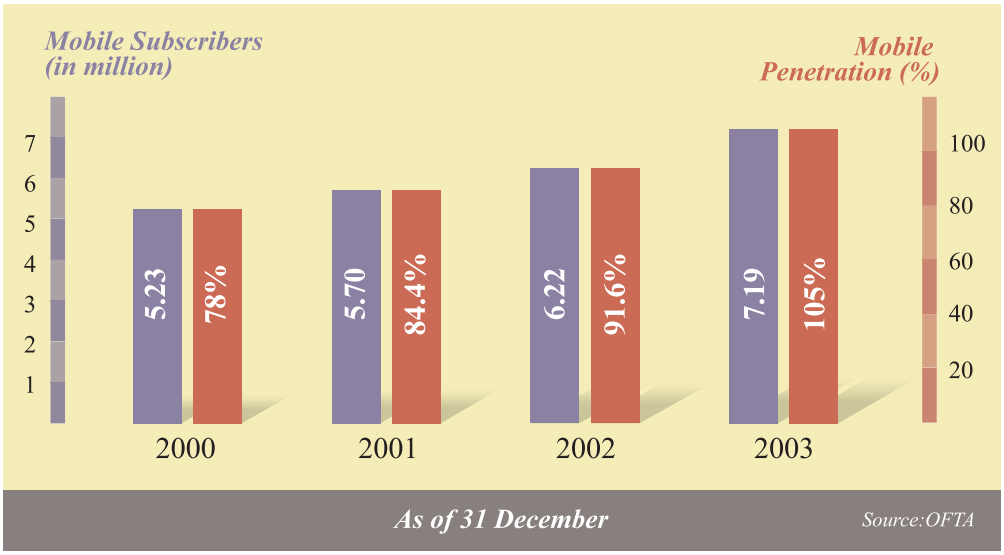
Users

The number of mobile phone users has experienced exponential growth over the last decade. In Hong Kong, there were 7.19 million mobile phone subscribers at the end of 2003. The number of registered mobile phone numbers has exceeded the total population, indicating a very high penetration of the technology. While the majority of users still use vanilla phones for voice communications, it is expected that the number of vanilla phones will decline over time as market acceptance of smartphones increases.

While the projections indicate the great promise of the smartphone, the actual growth of the smartphone market (and the corresponding decline of the vanilla and feature phone markets) will be the result of two interrelated factors.

The first is the entrenchment of users with their vanilla and feature phones. In other words, what are the new technology features that will motivate users to migrate to the smartphone?

Number of Mobile Users in Hong Kong

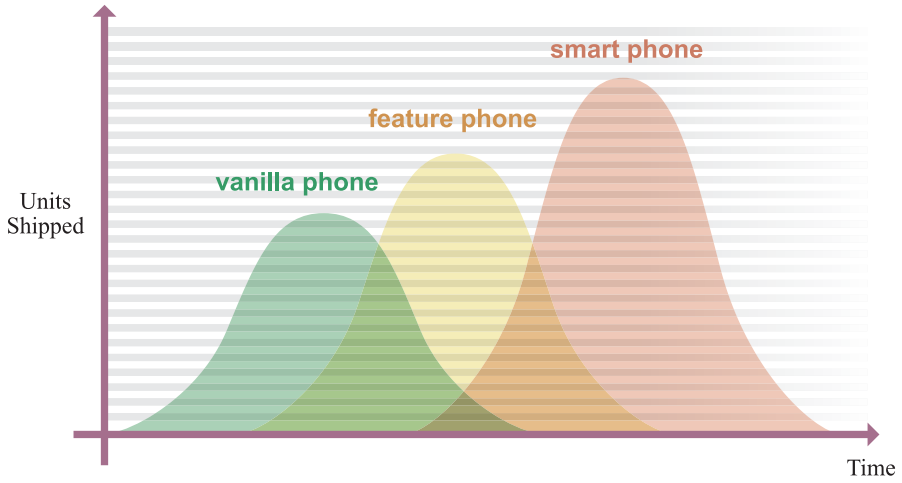


Second, what are the strategy options for both the operators and handset manufacturers to induce users to give up their existing phones and buy a smartphone in a controlled way?

Providing a controlled migration plan is important for operators because they have to strike a delicate balance between maintaining steady revenue sources from their

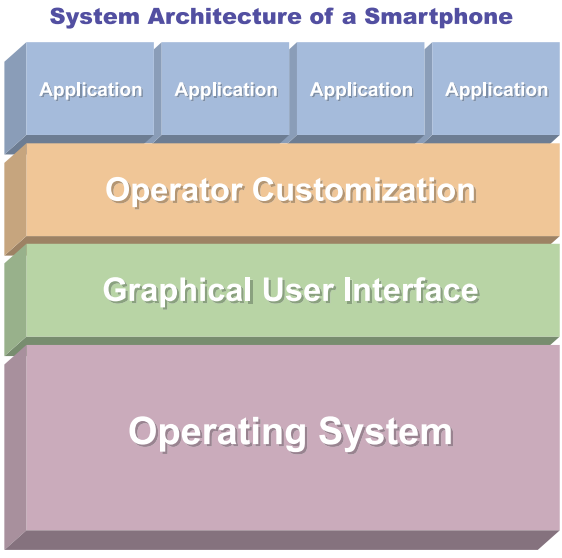
existing services and inducing existing customers to migrate to a new service, which may not significantly contribute to the bottom line in the first few years.

The interweaving of relationships can be illustrated by the cannibalization effect of overlapping generations of mobile services.



Smartphone Operating System Standard

A major difference between smartphones and vanilla/feature phones is the layered architecture of the smartphone which includes an operating system (OS) [EL2]that serves as the foundation of the technology platform. The core of the architecture is the OS, which interfaces with the network infrastructure and the applications accessible by users.



Unlike vanilla and feature phones for which handset manufacturers provide total integration of the layers based on proprietary technologies, the OS of a smartphone is based on an industry standard. Currently, there are four major OSs for smartphones, including Symbian, Microsoft Mobile Windows (WMS), Palm, and Linux. They are licensed to handset manufacturers who install the OS on their phones prior to shipment.

Symbian

Symbian was created by the three largest handset vendors, Psion, Nokia and Ericsson in June 1998. Motorola joined this group a few months later. However, the ownership structure has changed considerably with Motorola withdrawing its investment in September 2003 and Nokia acquiring Psion's stake in February 2004. With the acquisition of Psion's stake, Nokia became the largest stakeholder in Symbian.

Initially foreseeing the need to establish a manufacturer-independent operating system, Symbian's mission was to develop the EPOC operating system inherited from Psion Software Plc into a handset operating system for advanced mobile devices that would act as a platform for application development but would allow continued handset differentiation.

The result was the development of Symbian, a manufacturer-independent smartphone operating system specifically designed to enable a licensee to customize aspects of the code to fit its device. Therefore, it is flexible regarding the type of phone and provides an effective application platform for third-party developers. It also incorporates revenue-generating applications for network operators. Symbian is constructed to provide a balance between delivering a common platform for application developers and an OS that can be customized to specific mobile devices.

The Symbian core is common to all flavors of the operating system, i.e., Series 60, Series 80, Series 90 and UIQ. The kernel, file server, memory management and standard device drivers are contained within the core. The Symbian OS is written in C++, making it suitable for broad application development on the platform, but such development is widely known to be a complex procedure. It is, in fact, more suitable to code in Java for applications that do not need to integrate with the core functions. Version 7.0s incorporates MIDP 2.0 of the J2ME platform, enabling Symbian devices to support a wide range of Java applications.

Microsoft WMS

Microsoft, co-hosted by the European network operator, Orange, started its development of its smartphone OS in November 2002. Although it is not generally favored by other network operators, WMS has been improving over the last 12 months. Its main ODM partner, HTC, has had success with its smartphone device. Samsung, initially unsupportive, is now shipping its SCH-i600 model based on WMS. More and more operators are showing interest and planning to join the group. In September 2003, Motorola withdrew its investment in Symbian and publicly announced that it would be shipping handsets with Microsoft's WMS platform, which brought instant credibility to WMS. However, WMS is still facing resistance from the majority of handset OEMs.

WMS is a closed platform based on Windows CE, which is a 32-bit, multitasking, multithreaded OS. Although user interface customization features are available for

mobile operators, hardware vendors are unable to customize the source code. Handset manufacturers have to follow the design parameters dictated by Microsoft. The parameters include an alphanumeric keypad, a specified arrangement of hotkeys, a color screen with a 16-bit 176 x 200 resolution and support for the SD removable storage format.

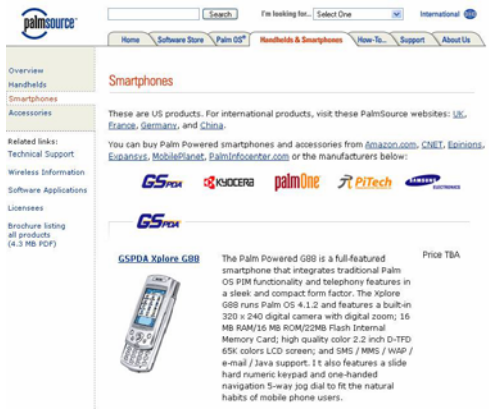
The current WMS is a derivation of the Windows CE 3.0 OS, which has Win32 features and functions, including Win32 APIs and Winsock. An embedded Visual C++ 3.0 toolkit and MS Visual Studio NET are used in application development.

In order to gain network operators' support, Microsoft has initiated a number of strategies, including driving application developers to increase the range of applications available on the platform, encouraging handset ODMs and OEMs to produce WMS hardware, and convincing semiconductor developers to produce complete, detailed reference design solutions for the manufacturing community.

Palm OS

The Palm operating system was developed and is licensed to handheld and smartphone device manufacturers by PalmSource. PalmSource was originally a subsidiary of Palm, Inc., but became an independent operating business in November 2003. Palm OS was the first operating system designed for handheld devices.

The Palm operating system is positively differentiated by some key features. With scalability built into the core of the system, it creates an homogenous application development environment together with a certain degree of device hardware variety. In this way, a balance between device differentiation and ease of application development is achieved, but there it a lack of advanced custom user interface development features.



Palm OS 5, the current version in the market, has a key disadvantage because its PDA-specific genealogy results in its limited ability to multitask. To resolve this problem, PalmSource introduced a true multi-tasking OS, Palm OS 6, and announced a two-tier product strategy in February 2004. Palm OS 5 was renamed Palm Garnet with key enhancements while Palm OS 6 became Palm Cobalt. Garnet incorporates some new features over Palm OS 5, including native Bluetooth support, a dynamic user input area and a broader range of screen resolutions. Palm Cobalt is PalmSource's premium flagship product. It is a full rebuild of the Palm operating system and is based on the Be OS acquired in 2001 by Palm. It incorporates a fully scalable communication architecture, robust security features, a new multimedia framework, a scalable graphics

engine, and interchangeable I/O features that will enable different methods of data input and native support for landscape or portrait screen orientations.

In order to stay competitive in the smartphone market, PalmSource must continue to upgrade its platform and manage its new two-tier pricing strategy well. It must hold onto its current smartphone vendor licensees, convert its existing unconnected PDA licensees into smartphone vendors, and sign up new partners.

Linux

Linux was created by the Finnish programmer, Linus Torvalds. It is an opensource clone of the UNIX OS family. Linux is free to users under the GNU Public License (GPL). Users are free to modify it as they wish but any modifications must be made available to all other users. This results in relatively shorter development times compared with other systems. Operating system vendors gather Linux modifications that offer different types of components and features, so that they can be assembled to make a small and efficient OS by removing unnecessary modules. Motorola declared its support for Linux before withdrawing from Symbian in 2003. It announced the impending release of its smartphone A760, a touch-screen Linux smartphone using a Linux kernel supplied by MontaVista and the Trolltech Qtopia Phone Edition suite. However, no global deployment is seen.

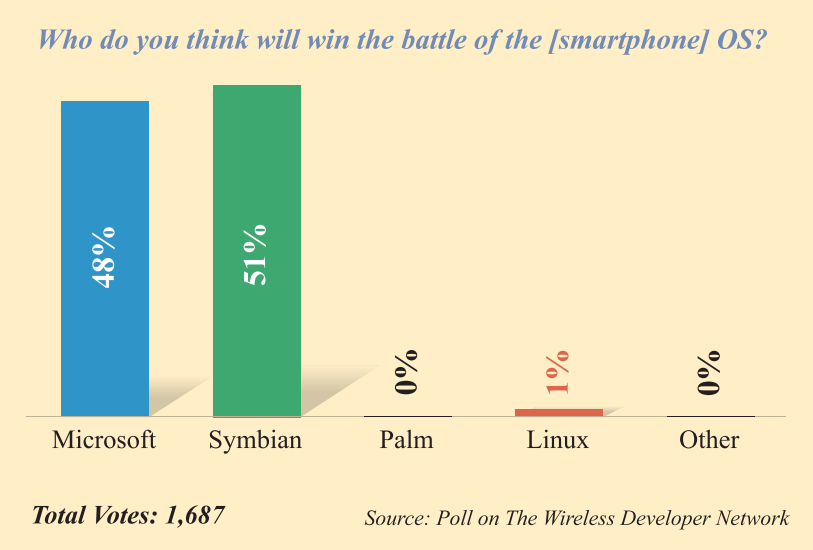
Since Linux was originally designed for x86 computers, it does not naturally suit smartphone devices. Companies, for example MontaVista, have fine-tuned the code for handheld devices by shrinking the code down to the kernel level and adding power management features. One of the major concerns is that Linux is not an end-to-end operating system. That is, a core OS layer is needed on top of the kernel. The OS layer incorporates the relevant communications modules, device drivers and application libraries. A graphical user interface, PIM tools and web browsing capabilities are also required. Creating a complete Linux system automatically introduces a proprietary element into any Linux implementation, meaning that developers may need application engines as the coding platform.

Although Linux OS allows for there to be large numbers of developers not bound by huge licensing restrictions, a Linux-based smartphone OS is not easily accommodated by the established hardware makers. Linux-based OS providers must try to encourage any level of developer support for the system and it is costly to support a developer community in the long term. An option is to use J2ME. The shortcoming for using J2ME is that it is unable to offer the rich functionality of programs coded natively.

The Dynamics of Industry Competition

The complexity of the ecosystem of the smartphone industry creates a high level of uncertainty for all stakeholders. ARCchart has suggested three potential scenarios for the smartphone industry. These are: (1) entry of the PC and PDA vendors into the smartphone market, pushing high-end branded devices at competitive price points; (2) Nokia pushing its Series 60/Symbian platform further down its handset portfolio into its feature phone range, increasing the shipment of Symbian devices into the market; and (3) mobile network operators challenging the Microsoft and Nokia dominance of the OS market, shifting their support to platforms over which they can exert greater control. The entry of the PC and PDA makers into the smartphone market will play directly into Microsoft's hand.

At this point, a number of alliance groups have formed around the OS standards. Some are committed to a single standard while others are developing multiple technologies based on the various standards. Membership in the alliance groups is continuously changing, reflecting the dynamics of the industry and the changing expectations of the alliance members. It will be crucially important for all players to assess and predict the outcome of this "standard war." As the OS stands at the core of the ecosystem of smartphones, the dynamics are propagated and magnified along the food chain of the ecosystem. A possible scenario is the "winner takes all" outcome. Those who invest resources in losing standards may suffer and become marginalized. On the other hand, those who commit to the winning standard will reap healthy payoffs from their investments.



While it is difficult to predict the outcome of this dynamic process, attempts have been made to forecast the end state. Findings of a poll from the Wireless Developer Network indicate that 99% of the 1687 respondents agreed that the market will be dominated and split between Symbian and Microsoft.

Strategic Alliancs between Manufacturers and OS Standards

Vendor	Symbian	Microsoft WMS	PalmSource	Others
Fujitsu	Yes	No	No	No
GSL	**No**	**No**	**Yes**	**No**
Kyocera	No	No	Yes	No
Legend	No	Yes (Pocket PC)	No	Yes (Hopen)
Motoroia	Yes	Yes	No	Yes (Linus)
Nokia	Yes	No	No	No
PalmOne	No	No	Yes	No
Samsung	Yes	Yes	Yes	Yes (Linus)
(Sendo)	Yes	No	No	No
Slemens	Yes	No	No	No
Sony Ericsson	Yes	No	No	No

GSL's Smartphone Business – Current Status

GSL's first smartphone, the G18, was launched in 2003, followed by a second model, the G88, in the first quarter of 2004. The two models were regarded as signature products powered by Palm OS. The two models were among the first smartphones using the Palm OS and are featured on Palm's website. While the volume is still low compared to that of the company's main business, electronic dictionaries, the two models have established GSL as a key vendor of smartphones, demonstrating the company's experience and knowhow in designing and manufacturing complex personal electronic devices at reasonable prices. GSL has become well known in the manufacturer community.

In terms of market development, GSL plans to introduce smartphones under its own brand in Hong Kong, Singapore and Malaysia to leverage on its established brand awareness and distribution channels. In other Asian countries, the company will develop the market in its ODM capacity because GSL is new to these markets and, in some countries, the entry barriers are high. For instance, in mainland China, a license is required for foreign companies to sell their handsets. At the moment, only four licenses have been granted to overseas vendors, namely Samsung, Motorola, Sony Ericsson and Nokia. Other players have to form joint ventures (JV) with local companies to enter the market.

Major Competitors

The worldwide handset market is dominated by a few major brands. GSL is a new player in the market and may not position itself to compete with big brands such as Nokia and Motorola. Currently, GSL's major competitors are mainly in Taiwan and Korea.

Korean brands are self sufficient on critical components because Korea has a highly developed semiconductor and component industry. However, their production costs are high compared with the costs at GSL's manufacturing base in mainland China. Competition among Korean firms is extremely keen and the industry is undergoing restructuring, which has resulted in a few manufacturers going under. To maintain their competitive edge, Korean firms are actively setting up JVs and operations in China, posing a threat to GSL on the cost dimension.

Taiwanese manufacturers excel in component manufacturing and integration. Although the level of basic technology is not as advanced as in Korean brands such as LG and Samsung, Taiwan has a very well-developed semiconductor manufacturing industry. Many handset manufacturers have considerable experience with PDA, PC, and laptop production. Many have already setup JVs and manufacturing bases in China.

Product Development

The smartphone market is very dynamic. The mobile phone is no longer a utilitarian communications device. It is perceived to be a personal accessory that is subject to the trends of fashion, advertising influences, and peer pressure. As such, the product life cycle is getting shorter and shorter. The typical life span of a smartphone model is 5-6 months. The product life cycle is characterized by the continuous roll out of models with minor improvements to some features and design-of-form factors. To maintain its competitive edge, GSL will continue to add new features and improve current ones (e.g., increase the resolution of the camera). Improvement is incremental rather than revolutionary as the technology becomes standardized and commoditized.

GSL is going to roll out a new handset model (operated on new version 5.3 Palm Garnet OS), which boasts better photo quality, higher resolution, multimedia functions (movie/mp4/mp3), an expansion slot (SD RAM card) and a 45-minute video-filming function in the last quarter of 2004. This new model will be launched in Hong Kong. Management has high hopes that this new phone will help the company secure big orders from operators in Europe.

In terms of product development, the company plans to develop and release three to four new models in 2005. Turnover is expected to increase by three times up to HK$ 400-500 million. The new models will have customized features to satisfy the needs of different users who may have preferences for PDAs, mobile internet, cameras and

entertainment functions. There will also be emphasis on cooperation with technology partners to upgrade the operating system and the mobile communications and multimedia functions.

Development of 3G Handsets

The writing on the wall about the wireless revolution is clear to GSL. The management of GSL foresees the migration of the Internet to the mobile Internet in the coming year with society becoming fully digitally connected. One important development is third-generation communication standards (3G). In Oct 2000, SK Telecom launched the world's first commercial 3G network based on the CDMA2000 1x standard. As of August 2004, there are 104 3G network operators in 46 regions in the world. Each is associated with a 3G standard. So far, there are three dominant standards: WCDMA (35), CDMA2000 1x (67) and CDMA2000 1xEV-DO (8). (The number in the parantheses is the number of operators supporting that standard.)

In Hong Kong, Hutchison 3 launched its 3G services in the first quarter of 2004. Its 3G standard is based on WCDMA and the operator has engaged in partnerships with a number of handset brands including NEC and LG. Hutchison is one of the largest network operators in the world with 3G licenses in a number of countries. While there were some technical problems in the early stage of the launch in Hong Kong, such as connection losses and short battery life, the number of subscribers has increased steadily.

There are many potential 3G users, including:

1. Business executives: Business executives would use 3G smartphones to browse the Internet browsing, check emails and maintain a daily calendar.
2. Technophiles: Technophiles are people who love technology and need 3G smartphones to lead their "e-lives".
3. Students: Students require an "all-in-one phone" device with value-added features like MP3, mobile Internet, and a video camera.
4. Corporate users: 3G smartphones will be highly demanded by the American and European corporations as tools to increase corporate productivity and to keep track of the location of employees through the built-in geographical information system (GIS).
5. Real-time information users: Real-time information, like stock prices, forex values, odds (football or horse racing), traffic congestion, and breaking news is essential to these users. Instant and real-time information allows these users to keep abreast of up-to-date information and to make quick decisions.
6. Household Private Networks: Household users will use 3G for home surveillance purposes, such as monitoring small children or ensuring home security.
7. Entertainment users: Powerful entertainment features available through 3G like Web TV, online games, and instant messaging are in demand by the entertainment users The Asian market is dominated by entertainment users.

8. Early Adopters: Early adopters like to try new products and show their status through new technologies.

3G is an inevitable trend in the world. GSL plans to launch its first 3G smartphone by the end of 2005. By that time, 3G technology will more mature and the market more developed. The end 2005 should be the right time for a second-tier manufacturer like GSL to enter the market. By then, there should be about 20 global players on the 3G field.

Experience in Handheld Device Design and Manufacturing

GSL started manufacturing handheld devices in 1988 and has gained considerable experience in hardware integration and system software development.

On the hardware side, GSL excels in developing effective power management schemes for handheld devices. Lower power consumption is very important for mobile devices. In smartphones, the OS, application software and color high-resolution LCD are high power-consuming units. These units must be properly managed to increase the phone's battery life to increase the meantime to recharge.

Also, as more and more components are packed into a phone, interference must be monitored and reduced. Unlike vanilla phones, which are basically RF devices, a smartphone is both a computer and a communications device packed onto a small footprint. The ability to reduce and control interference between the CPU and the RF circuitry is critical. GSL has been able to design and develop two smartphones in a relatively short period of time, indicating its high level of competence in system integration.

On the software side, the company has been designing system software and graphical user interfaces (GUI) for electronic dictionaries for many years. The GUI is an important element for a handheld device. It makes a big difference in the user's experience and perception of the overall quality of the device. GSL has built up considerable experience and expertise in developing user-friendly GUIs. Also, the technologies developed for multi-language input/output and real-time translation for the electronic dictionaries can be readily deployed to smartphone development. These are the core assets of GSL, making it the only smartphone manufacturer in Hong Kong at the current moment.

Production Capacity and IT Support

GSL has increased production and management control in four different areas in recent years.

(1) GSL has invested in a HK$30 million factory in Dongguan, China to boost its production capacity by 30%.
(2) The electronic dictionary SBU implemented a new MIS system to simplify operation procedures to improve cost control.
(3) In November 2003, a "Dealer Terminal Management System (DTMS)" for monitoring the sales performance of distribution networks and sales trends in Mainland China was set up to increase operating efficiency.
(4) A customer relationship management (CRM) system was also implemented in Hong Kong in May 2004. According to senior management, production capacity is expandable and will not impose limitations on the company.

Relationships with Suppliers and ODM Clients

GSL has developed, over the years, good relationships with their component suppliers. Core technology components such as LCD panels, batteries, and GSM chip sets are readily available in the market. In fact, with the development of the component industry in the southern part of China, GSL is able to source most of its components in close proximity to its manufacturing base in Dongguan. In 2004, GSL's five largest suppliers represented 40% of the company's overall sourcing. GSL has also co-developed some core components with suppliers so that it can develop products that are unique and that serve the needs of the market.

The smartphone market, as it currently stands, consists of distinct alliance groups associated with different supply chains. The competition is not so much between companies but between the different alliance groups who embrace different OS standards. So far, the supply chains are quite unique with some, but not substantial, overlap between the different alliance groups. As such, GSL has not experienced a frequent change of suppliers over the years.

While the ODM SBU covers a wide range of devices, ODM of mobile handsets represents a potential market to be explored. In China, GSL sells models to Capitel, a domestic handset manufacturer, on an ODM basis. In Europe, the company received an order for 10,000 units from an Italian distributor. While there are certainly advantages to create its own brand as reflected in the success of Instant-dict, it is unclear at this stage the profit margin of ODM is not much lower than that of branded products. This is because the costs to maintain the brand image and the required distribution channels could be substantial as competition intensifies.

Relationships with Network Operators

The company is making in-roads in developing long-term relationships with network operators. It has good relationships with operators in Hong Kong and GSL has also signed an agreement with Orange to sell its phones in Thailand on a trial basis.

Unlike the major brands, which focus on large volume purchases, GSL is well positioned to work with operators, meeting small batch orders of less than 100,000 units. Senior management believes that this is the edge of the medium-size manufacturer, at least in the early stages of market development. It is a win-win situation as operators can introduce new models in smaller numbers under a tighter timeframe.

The company hopes to produce 300,000 to 400,000 units annually in the future so to lower the cost of production and to make the price of its smartphone more competitive in the market.

In the ODM business, senior management has targeted network operators as the main market to be developed in the short and medium term. GSL will first explore the European and Chinese operators markets. Given the potential technology problem (tri-band) in the US, N. America will not be a primary market in the next few years.

The China Market and the Impact of WTO and the CEPA agreement

Senior management has the view that the impact of China's entry into the WTO and the CEPA agreement with Hong Kong will be limited in the short and medium term. Telecommunications is a heavily protected industry in China and equity and operation restrictions still exist even though China has entered the WTO. For instance, only a handful of manufacturers have been granted licenses to manufacture (under their own brands) and distribute handsets in China. Other non-licensed manufacturers can only serve as the OEM for licensed local manufacturers or network operators. The emphasis of the CEPA agreement is on the services industry at this stage. As such, it will have small impact on GSL's business until it extends to manufacturing.



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With these facts in mind, Samson was contemplating the issues facing GSL: On which side would GSL end up in this OS standard war? This was a very touchy subject for the whole company. They had their loyalty to Palm to consider. What would be the consequences of disloyalty should GSL move to one of the other OS? What would be the consequences of taking the safe bet and letting the other players fight the war?

And what about the branding problem? In order to play on the larger field, a recognizable brand was essential. In the shadow of the big companies like Nokia and Samsung, how could GSL ever hope to become a household name the world over? Was this pursuit worth it? Was the ODM path, while safer, obviously the one to take?

And how would GSL fit 3G into the mix? Clearly, the next wireless war would be about 3G and GSL could not afford to stand on the sidelines and watch. The company would need to develop some killer 3G models and applications for this new market. What should GSL's 3G strategy be? What are the important 3G product features required by customers? How should the company promote 3G products to its target customers? Should the company focus on a niche market or the mass market? Should the company concentrate its efforts on developing a 3G Asian market or developing American or even European 3G markets? There were many questions to answer.

What would Sun Tzu advise? His words were haunting Samson Tam:

> *Do not attack an enemy that has the high ground; do not attack an enemy that has his back to a hill; do not pursue feigned retreats; do not attack elite troops; do not swallow the enemy's bait; do not thwart an enemy retreating home.*
>
> *If you surround the enemy, leave an outlet; do not press an enemy that is cornered.*
>
> *These are the principles of warfare.*

Appendices

1. GSL Annual Report (Year 2004)
2. Worldwide Mobile Survey Conducted by RCEC
3. Financial Statements (1998-2004)
4. GSL Market Research