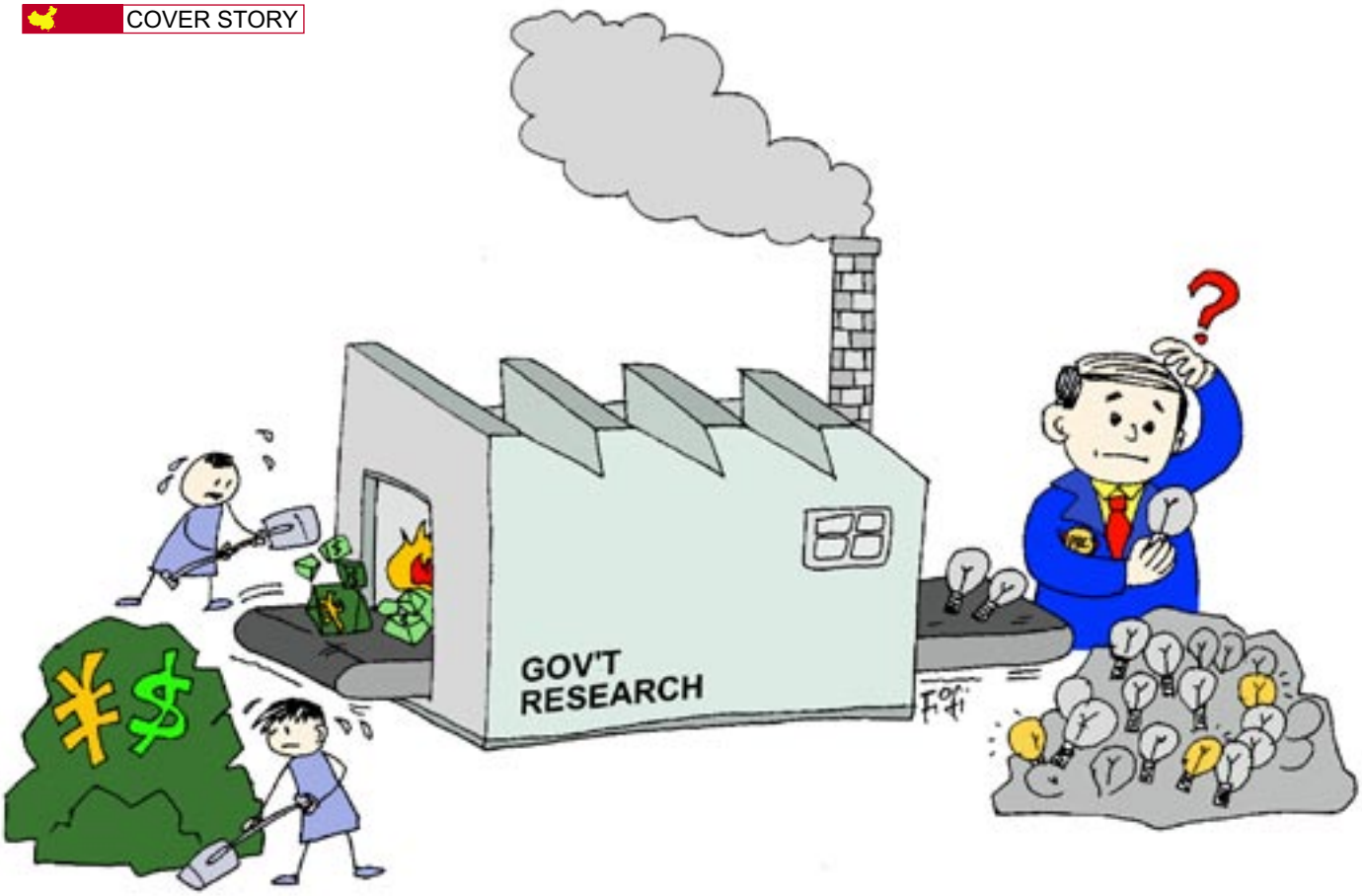


Mother of invention?

Innovation is high on the government's agenda. But can Beijing really plant the seeds and then let the garden grow on its own?

Running across the length and breadth of China, connecting 167 institutes and departments at 25 universities in 20 cities, is an Internet network that could be the blueprint for a new era in online activity.

The China Next Generation Internet (CNGI), set up in 2003 and known as CERNET2, passed its core tests at the end of September. Running off Internet Protocol version 6 (IPv6) as opposed to the standard IPv4, it can transfer information at 2.5-10 gigabytes per second, 100 times faster than current Internet speeds.

CERNET2 is said to be the most advanced network of its kind in the world and it could put China in a strong position to direct the future of the Internet.

"IPv6 is the most important technology in the history of the world and China is the only one really doing something with it," said Alex Lightman CEO of Innofone, the only public company focused solely on IPv6. "China knows IPv6 is where millions of its people will be making phone calls, playing games and doing transactions."

Put simply, IPv4 supports 4.3 billion 32-bit addresses, the framework through which information is carried across the internet. This is insufficient to service a growing online population as well as the rapidly expanding number of internet-enabled devices. The 128-bit IPv6 provides addresses to spare (an undecillion – 36 zeros) as well as offering significant advances in terms of security and support for more sophisticated applications.

Strong core, no edge

But despite having the world's leading IPv6 backbone, China has little in the way of applications to run off it. Lightman believes this is suffocating the technology's commercial potential as there is nothing out there to generate consumer demand.

IPv6 is an innovation acid test for China – it has laid the foundations but must now nurture a creative community on top.

"Chinese companies will have the first chance to develop applications and hardware that is based on IPv6," said David Wolf, president of Beijing-based technology, media and telecom consultancy Wolf Group Asia. "It will be new ground for China to capitalize on these advantages and run the downstream effectively."

Innovation is vital to China. The way in which other Asian nations are eating away at the country's comparative cost advantages suggest it cannot rely on being the world's factory forever. Furthermore, its current growth model has pushed the environment to the brink. Water scarcity, land degradation and desertification and air pollution are becoming ever more serious.

A State Environmental Protection Agency official said earlier this year that pollution costs China 10% of its GDP.

"If you look at the major dilemma of the current economic model, it is that it is resource and energy intensive," said Dr Denis Simon, director of the New York-

based Levin Institute's Center for Science, Technology & Innovation in China (CSTIC). "Rather than focus on brawn, China wants to focus on brain."

To climb the product value chain, China must create its own intellectual property. But its track record here is patchy.

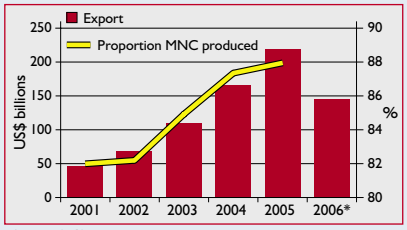
"I would say it's a pretty low innovative level," said Dr Adam Segal of the Council on Foreign Relations in Washington. "There is no example of cutting edge technology coming from China."

Figures that point to China as an emerging high-tech powerhouse are deceiving. The country's high-tech exports totaled US$145.1 billion for the first half of the year, according to the Ministry of Commerce (MOFCOM). This is well on course to surpass the 2005 full year figure of US$218.2 billion, which was itself four times the 2001 total. Over the same period, official statistics show a 133% increase in research and development (R&D) spending, which went from US$13.2 billion in 2001 to US$31 billion in 2005.

However, the majority of these high-tech exports were generated by the local branches of multinational corporations (MNCs). They were responsible for 82% of exports in 2001 and 87.9% in 2005.

On the shoulders of giants

China's high-tech exports



Source: MOFCOM
* Jan-July 2006

China remains merely an assembler of others' products rather than a creator of its own. Illustrating this point in a recent report on innovation, CLSA China macro strategist Andy Rothman looks at global output of notebook computers, 75% of which are produced by Taiwan firms that have shifted all but the design stage of the production process to the mainland.

Rothman also picks holes in patent activity as evidence of innovation in China. The State Intellectual Property Office registered 53,305 patents in 2005 compared to 16,291 in 2001. Although domestic patents grew fourfold over the period, foreigners still lead, registering nearly two thirds of all new patents in 2005. Japan was responsible for 36% of these, the US 24%.

"Most of these patents are for modifications to the use, or appearance, of existing goods or technologies. Only 30% of Chinese patents are for new inventions," Rothman noted, citing an official at the Chinese Academy of Sciences.

Commenting on the Chinese tendency to copy rather than create, Kiam Choo, founder of search website BBMao.com observed: "There is a lot of talent out there and not necessarily enough good ideas." (See: Same, same, same: Copycat culture)

Anti-innovative climate

The main problem is that China doesn't have a climate conducive to innovation.

A large part of this can be put down to a flawed education system. A tendency to focus on learning by rote imposes obvious limitations on creativity, the effects of which are exacerbated by external factors. The halt to schooling during the Cultural Revolution has robbed today's 45-55 age group of much talent while a brain drain that began in the 1970s has cherry picked many of the best that have followed.

A CSTIC study established that China had 3.48 million people engaged in science and technology activities in 2004,

Same, same, same: Copycat culture

Competition is brutal in China. As soon as someone comes up with a new way to make money, their market niche is hollowed out as new firms offering similar, but often inferior, goods and services flood in.

White goods, mobile phone handsets and now Internet-related services – copycatting has coursed its way up China's high-tech chain.

"Every sector in China will go through this process," said Jesse Liu, CFO of wireless value added service (WVAS) provider Hurray. "You get a couple of first movers taking the leadership and, once they demonstrate initial success, the sector becomes fragmented through over competition."

Over the last 18 months or so, China's WVAS market has fallen victim to this practice. A raft of start-ups charged in after the likes of Hurray and, with nothing to lose, proceeded to abuse the market. Responding to complaints of spamming and billing malpractice, China Mobile implemented an industry-wide clean-up campaign.

Now copycatting is currently wreaking havoc with Web 2.0, Internet services that are driven by user-created content.

"There is a lot of competition in certain areas such as online video sites – and there is no creativity, these people are just copying," said Chen Xin, founder of Gbaopan.com, an online file community that allows users to store material on the Web.

Gbaopan.com started last year, funded by US$150,000 that Chen saved in his previous career working as a software engineer in the US. It now has 800,000 users. Unlike most community-based sites, Chen sees the file storage service as the foundation of his business.

"We offer something real – there is storage space, not just a virtual community."

Chen blames the endemic copycatting on cultural tradition. "We don't have the same creativity in our culture that they have in the West. The trend is to follow what is established , so people don't take risks."

Kiam Choo, the Singaporean founder of Chinese search site BBMao.com makes similar observations. He differentiates his product through the use of clustering technology which analyzes and categorizes search results. His competition "all look and feel the same as Google". But Choo is positive about the future.

"China is in a catch up phase. If its Internet industry can draw level with the US then there will be no models to copy. China will have to innovative."

Imagine China

ILL-EQUIPPED: A lax education system is blamed for the shortage of talented scientists

2.25 million of them trained scientists or engineers. It estimated that there were 2.38 million scientists and engineers in 2005, 260,000 short of the required amount. The deficit is only going to rise with 3.85 million scientists and engineers projected for 2010 against a demand of 3.48 million.

The study also highlights a decline in the quality of available talent.

Newly qualified science and technology professionals are often ill-equipped to perform their duties – Simon ties this to the higher education system doubling in size from 1999 only to see standards fall – and there is still no culture of creativity despite various policy initiatives.

"People talk about recent graduates as being smart in terms of book knowledge but not in the practical sense," he said. "They are not creative; they are not risk takers; they are not entrepreneurial."

The CSTIC study admits that the growing number of returnees – Chinese who return home from the West armed with an education, experience and a business plan – are something of an unknown factor.

Certainly this group is behind much of the nascent innovation taking place in China, but in many cases, projects get off the ground in spite – not because – of the system. Having an idea is useless if there are no funds available to develop it and China is infamous for under servicing the financial needs of its smaller companies.

Research by McKinsey Global Institute found that small- and medium-sized enterprises receive just 16% of bank credit, less than a quarter of the funds lent to state-owned or partially state-owned firms.

"The Chinese have very good technology and the only real impediment to their success is the financial structures in the country," said Mahesh Jayanarayan, CEO of London-based technology firm New Medium Enterprises, which has been working with domestic operators on China's answer to the DVD. "By being behind in this area they are being held back."

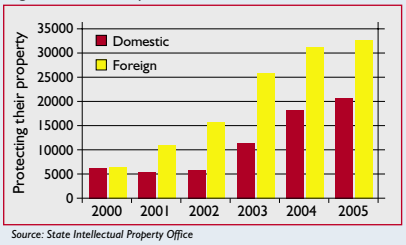
VC dependency

Foreign private equity and venture capital have been the lifeblood of tech startups in China (BBMao.com's Choo freely admits that he would never have got his search site off the ground without overseas backers that include MySpace founder Brad Greenspan). As Beijing moves to introduce efficiency to its financial sector, investors could do without being tripped up by red tape as they make their exit from an established venture via overseas capital markets or mergers and acquisitions.

Dr Christopher Savoie, CEO of biotech firm GNI, noted that his company's acquisition of Shanghai Genomics in 2005 went smoothly because the Chinese investors were keen to grab a rare exit route (See:

Putting a price on knowledge

Registered invention patents in China



Source: State Intellectual Property Office

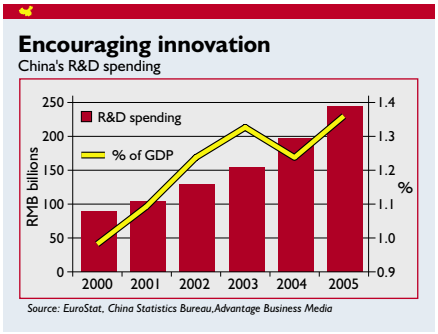
Science saves lives: The biotech boom).

Larger scale foreign involvement through MNCs can also play a valuable role in stimulating domestic innovation. According to MOFCOM, there are more than 750 MNC R&D facilities in the country and these can serve to raise the bar in terms of creative output.

Admittedly, not all the research centers are a positive addition – "more 'PR&D', doing low level work for publicity purposes," was how one tech watcher put it – but the majority can help enrich the creative environment. Employees will leave the MNCs able to develop their own ideas within their own companies and a new breed of tech start-ups will be born.

It is this dynamic – the emergence of innovation from the periphery not the core – that forms the crux of China's engagement with new ideas. In IPv6 as in every other field, the underlying structure must be made freely accessible to commercial operators. They take innovation to the next stage and actually make money from it.

"China is very good at saying we will develop a microprocessor but it will always be a generation or two behind Intel," said Wolf. "It is reactive rather than proactive. It needs to create a system in which people who innovate are rewarded."



History suggests this is best achieved in an open and competitive environment rather than the top down process China copied from the Soviet Union, in which R&D institutes were separate from manufacturers, effectively severing ties between the ideas men and the marketplace.

Time to let go

"Governments try to impose standards all the time but most useful things are done by trying to get around governments," said Lightman. "China is much better at stopping this than other countries but now it just has to let go in ways it hasn't before."

The question is: can Beijing do this?

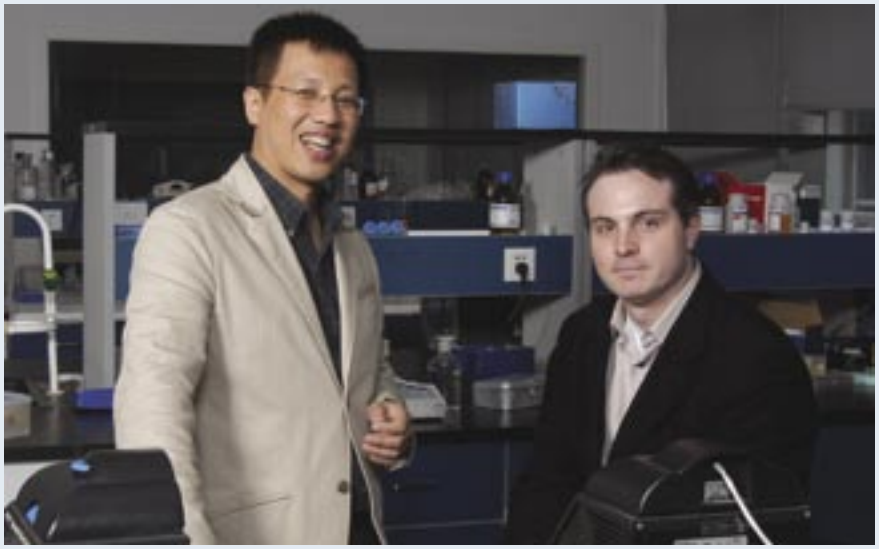
The government has launched numerous initiatives promoting innovation, including the Torch, 863 and 973 programs. Its most recent offering, the National Medium- and Long-term Science and Technology Development Plan for 2006-2020, unveiled at the start of the year, is seen by some as a step in the right direction.

"I think there are some good things in the plan," said Segal. "There is a focus on shifting R&D from government research institutions to commercial enterprises."

To others, the fact that it originates from the government undermines much of what the plan might achieve. "The government is most effective in driving innovation when it creates the infrastructure and gets out of the way," said Wolf. "China's government is not comfortable with that."

Nevertheless, he is positive about the country's future prospects for innovation. The legal and financial frameworks underpinning enterprise are slowly slipping into place and there are signs that official attitudes will undergo similar changes.

"I think they are asking the right questions," said Wolf. "We have not heard the final word yet from the government on what it will do to encourage innovation and from that aspect I am quite optimistic."



NEXT GENERATION GENOMICS: Luo Ying and Christopher Savoie offer a Sino-Japanese solution

Science saves lives: The biotech boom

Backed by a government that is keen to develop good health care as well as indigenous technology, biotechnology is experiencing rapid growth in China.

Policy changes, low costs, increased funding and the return of overseas-trained scientists kick started the industry at the end of the 1990s and there are now over 300 biotech companies. They carry out research, provide services to Western biotech firms and are obtaining licenses for their own products, which range from traditional Chinese medicine to gene therapies.

"When I came back from the US [in 2000] there were several companies starting second generation gene technology, which focuses on interfering with growth hormones and protein-based drugs," said Dr Luo Ying, president of Shanghai Genomics, which was set up in 2001 and is now part of pharma firm GNI. "With the growth of China's economy, the bio-tech industry is attracting investment from China and abroad. There is a huge healthcare market."

China's biological product market was worth more than US$4.48 billion in 2005, according to the National Development and Reform Commission, and the authorities have granted approval to more than 20 biopharmaceuticals. The most high profile success has been Shenzhen SiBiono GeneTech, whose gene therapy drug genedicine has received government approval, the first treatment of its type in the world to do so. Developed by Dr Peng Zhaohui, who set up SiBiono in 1998 on his return from the US, Genedicine fights cancer through a virus that carries a tumor-suppressing gene into the body. However, researchers in the West, concerned at the potential lack of transparency in China's drug regulation system, have said they need more information about the drug's clinical trials if they are to overcome their skepticism.

While Chinese companies are busy creating their own intellectual property, foreign biotech players have been put off the China market by fears of IP theft. It was concerns about IP that drove GNI's acquisition of Shanghai Genomics last year.

GNI, set up by Japanese national Dr Christopher Savoie in 2001, has been dubbed a "mini-multinational" as its 100-strong workforce is spread across several locations. Exploiting geographical comparative advantages – access to human cell samples at a maternity hospital in the UK and access to supercomputers in Japan – it reverse engineers cells and establishes how the genes interact, using the results as the basis for new treatments.

Impressed by the high-quality and comparatively low-cost of research Shanghai Genomics carried out for GNI, Savoie told his investors that he wanted to spend two thirds of his budget on R&D in China. "Some of the investors laughed at this," he said. "They said that our IP would get stolen. I said 'What if I get equity and a board position?' and they said great."

With China now established as GNI's main base for clinical trials – according to Savoie, the company benefits from "one-stop-shop access to large patient populations" – the country will be the first to get the drugs once they are approved. GNI is tailoring its products accordingly.

"Our strategy is based on where we are located," said Savoie. "Asians are under-serviced in areas such as stomach cancer, liver conditions and cirrhosis as the big pharma companies target conditions like colon cancer, which are more of a priority in the West. Chinese and Japanese patients will benefit first."

Time to lead?

China wants the power and money that come from setting technology standards. The jury is out on how effectively it can achieve this

The shift from assembly point to creative hub that China is trying to engineer within its economy has been accompanied by a growing interest in the technological standards upon which high-tech trade is built.

The principal reason is obvious: money. China makes 90% of the world's DVD players but, for every one sold, around US$20 goes to the foreign firm that holds the patent on the technology. Only US$1-2 of the profit remains in China. The story is similar for notebook computers with manufacturers receiving only US$15 out of a US$700 export price.

If China could export goods based on its own technology standards, the money would stay at home. Digital television, mobile communications, wireless networking, video discs, radio frequency identification, audio/video compression – China is focusing on domestic standards right across the board, regardless of what established systems stand in its way.

"They are saying, 'We have a market that is large enough to support our own domestic standards'," said David Wolf, president of Beijing-based technology, media and telecom consultancy Wolf Group Asia. "The royalties that are paid to use other people's standards are huge and they see it as money that they don't have to spend."

If the swift investments made by the likes of Siemens and Nokia into China's domestic third-generation (3G) mobile telecom standard is anything to go by, access to the country's growing markets is tempting enough to make foreign firms adapt.

Standards equal status

But, as far as China is concerned, it is about more than cash: these standards represent a seat at the technology table alongside the US and Japan. What remains to be seen is how far China is willing to go to get there – will its strategy be positive and inclusive or overly mercantilist and obstructive?

Either way, the country looks set to have a much greater say in the development of global technology.

"The reality is that this was coming all along," said Dr Denis Simon, director of the Levin Institute's Center for Science, Technology & Innovation in China in New

York. “Why should we have expected the Chinese to sit idly by?”

China’s commitment is certainly borne out by its involvement with the bodies responsible for endorsing global standards. The Standards Administration of China (SAC) currently provides the secretariats of five technical committees and five subcommittees as well as the conveners of 19 working groups for the Geneva-based International Organization for Standardization (ISO).

From the ISO’s point of view – and that of its fellow standards organization, the Institute of Electrical and Electronics Engineers (IEEE) – China’s participation is vital as it represents such a large slice of the world market, in technology experts and consumers.

“China has expressed ambitions to go beyond manufacturing to become an innovator of technology,” said Alan Bryden, secretary-general of ISO. “As ISO standards are vehicles for disseminating innovation, then we can expect increased Chinese participation in developing standards for new technologies.”

But when it comes to developing its own standards for key sectors, China’s track record is not strong. The country undermines its efforts by failing to win global support for standards due to an unwillingness to share details on how technologies are developed, or by just sitting in the blocks, allowing other countries to move ahead and take both the glory and the profits.

Of the major, commercially lucrative standards under development, only China’s high definition DVD technology has actually completed the transition from blueprints to product on the shop shelves (See: EVD: China’s answer to the DVD).

The waiting game

The country’s 3G mobile telecom standard, TD-SCDMA, is a classic example of the all talk, no action approach. 3G has been around for several years and networks using established international standards WCDMA and CDMA2000, developed by Japan’s NTT DoCoMo and US-based Qualcomm respectively, are ready to roll. But China has yet to distribute 3G licenses and it is thought that delays in perfecting TD-SCDMA are behind this.

“We are already five years into 3G as a commercially operable service and now countries are looking beyond the three basic channels,” said Dave Carini, co-founder of Beijing-based telecom, media and technology consultancy Maverick China Research.

“It’s going to be a while before they have even a single TD-SCDMA network ready to run and show the world that it does work. China is not so much late in coming to the table; they were early but waited too long. Maybe they were just not able to do it as fast as they’d hoped.”

Crossed purposes?

China’s key technology standards initiatives

Technology	International	China
Mobile Communications (Multimedia mobile phones)	WCDMA CDMA200	TD-SCDMA
Wireless Networking (Radio-based computer contact)	IEEE 802.11	WAPI
High Definition Video Discs (Increased capacity DVDs)	HD-DVD Blu-Ray	EVD
Audio/video compression (Encoding material for broadcast)	MPEG-4 H.264	AVS
Radion Frequency ID (Electronic tagging systems)	EPC UHF G2	Undecided
Digital Television (Higher quality, multi-channel TV)	DVB ATSC	DMB-T

Unlike TD-SCDMA, China's wireless networking (WLAN) standard, WAPI, was not slow in pushing itself forward. Introduced in 2003, Beijing said the standard would be compulsory for all WLAN products sold in China, forcing the likes of Intel to team up – and share technology and royalties – with local players. After intense lobbying, and the possibility of WTO action, China agreed to back off.

When WAPI was proposed for global standard status to the ISO, alongside the IEEE's 802.11i standard, the Chinese believed they had the superior technology.

"802.11i is an immature standard … It contains many security loopholes and structural weaknesses," the Broadband Wireless IP Standards Working Group (BWIPS), the body tasked by the Ministry of Information Industry to coordinate WAPI development, told China Economic Review. "WAPI's technological innovation and structural strength makes it a far superior security solution."

Burned in the ballot

However, in March of this year the ISO ruled against WAPI. Voters said they were unhappy at the Chinese candidate's refusal to disclose the full technical specifics of WAPI, which has to a large extent been developed behind closed doors.

The Chinese claim that 802.11i prevailed because the IEEE didn't play fair.

"There were numerous ethical and procedural problems which created an unfair situation for WAPI in the whole ballot and after ballot process," BWIPS said. "We have provided a detailed list of those violations. So far, we have not seen any detailed counter arguments against our complaints."

3G IN ACTION: But are they using TD-SCDMA?

Steve Mills, chair of the IEEE Standards Association Board, insists that the accusations are unfounded.

"Everything we did came under proper review and was done in open session," he said. "We believe there is a lot of good stuff in WAPI. Making WAPI a standard in its own right was not the question for us. The question is always: how do we make the most of the technology we see?"

BWIPS claims that it is "very unlikely" that 802.11i will be accepted as a Chinese national standard. It believes the domestic standard will be pushed forward by the government, citing the establishment of the WAPI Industry Alliance as evidence of this. The 22-member group, intended to represent "a complete industrial chain" includes China's four major telecom operators as well as Lenovo and Huawei.

Tech industry watchers say that China is neglecting to learn from its failure.

Not only must Beijing master the politics of the ISO, it also needs to respond to the principal concern raised by ISO voters about WAPI: that it was built behind a veil of secrecy. Unproven standards, developed outside of the competitive sphere, will inevitably struggle to win global approval.

"Where is China's track record for standards," said Alex Lightman, founder of next generation Internet company Innofone. "China hasn't grasped that competition is necessary for standards to emerge."

Wolf added: "China has not mastered the game of getting an ecosystem in which standards can be developed apart from by compelling it by law. Unless you build an ecosystem from the start you are not going to build the best standards."

Both TD-SCDMA and WAPI have their merits but, as Wolf observes, this is no guarantee of survival.

"We have seen endless cases where a technologically superior product has failed on the market. I just need to say the word Betamax [the Sony-backed videocassette format that was overwhelmed by VHS]."

He thinks it is unlikely China will turn itself into a technological island through the pursuit of domestic standards but, by ignoring the IEEE and going it alone, it

ZTE: INTERVIEW WITH AN INNOVATOR

Shenzhen-based telecoms manufacturer ZTE is often cited, alongside rival Huawei, as an example of top innovation in China. Jiang Hua, ZTE technology director, spoke to China Economic Review.

Q: Why is ZTE seen as one of China's most innovative companies?

A: ZTE has a culture that encourages innovation, in management and marketing as well as in products… ZTE engineers commit 50% of their working time to communicating with the market.

Q: How much emphasis does ZTE place on R&D?

A: ZTE commits around 10% of annual turnover to R&D. The company has set up 14 R&D institutes at home and abroad, has over 10,000 engineers and experts engaged in R&D and more than 50 engineers and executives involved in intellectual property licensing.

Q: What particular areas does ZTE focus on?

A: Mobile infrastructure, mobile devices, telecom software, optical infrastructure, and fixed-line switching and access. Wireless brought in more than half of the company's product sales for the first half of 2006 – infrastructure represented 33.5%, and handsets 20.3%.

Q: What proportion of ZTE products are exported and where to?

A: For the first half of 2006, 36% of ZTE revenue came from overseas. In terms of exports, ZTE has been more successful in Asian and African countries but ZTE has also broken into the Canada, US and UK.

Q: How often does ZTE collaborate with foreign companies?

A: Intel and Fujitsu are ZTE's WiMAX silicon partners, while Ericsson will provide a channel for the company's TD-SCDMA products. Partnerships with Cisco and France Telecom will focus on 3G, networking and data technologies, and, at the same time, ZTE will work with Comverse on value-added services for the Chinese market.

Q: What does ZTE hope to achieve through standards development?

A: Innovation capability is a matter of life or death and that's why ZTE attaches great importance to standards development. For example, GoTa – the world's first digital trunking system – was independently developed by ZTE. To date, GoTa products have been deployed in over 20 countries.

will lose the opportunity to sell its domestic standards to the rest of the world.

The ones who would be hit hardest by this shift away from global compliance are the original equipment manufacturers. Politically obliged to pursue standards that have little or no following beyond Chinese borders, they couldn't focus so much on more lucrative export markets for products based on rival standards. Torn between standards and at cross purposes with the government, business would likely suffer.

"If a group of individuals chooses not to participate on a standard, it has an impact," said IEEE 802 Committee Chair Paul Nikolich. "From a manufacturer's perspective, you don't have as large scale."

Stuck in the middle

This appears to be the case for China Mobile, which is keen to adopt WCDMA as its 3G standard and could probably start rolling out handsets within hours of being granted a license. But Wolf believes it will – at the very least – have to set up municipal TD-SCDMA networks in major cities.

As further evidence of dueling standards, Maverick China's Carini points to how Huawei Technologies and ZTE Corporation, the country's premier innovators, have targeted the international market almost at the expense of unproven TD-SCDMA. Despite this insurance strategy, both companies are still paying the price of Beijing's tardiness on 3G.

"The lack of 3G has prevented them from getting major contracts," said Carini. "Hebei province is bigger than most European markets. If you can win a contract like that then maybe it's easier to break into the European and North American markets."

South Korea has no such problems. A decade ago Seoul decided to throw its backing behind CDMA2000 and invest heavily in providing the foundations on which 3G could be built. As a result, the likes of Samsung have prospered and are now looking beyond 3G.

"South Korea is now far ahead of the US for mobile phones," said Carini. "It shows that if you take someone else's standard and roll with it, things do work out."

Operating in a world of competing domestic and international standards, Chinese manufacturers will have to maintain a careful balance between their commercial needs and Beijing's requirements.

But Dr Leonard Liu, founder of Chinese software outsourcing firm Augmentum and a veteran of IBM and Acer, is not worried. "The Chinese will not be constrained by standards. Anything they can make money on, they will do."

EVD: A Chinese answer to the DVD

China Foto Press

LOW COST: EVD will target emerging markets

While China's standards for 3G and wireless networking appear to be stuck in the blocks, its high definition DVD technology is already on the shelves.

Enhanced Versatile Disc (EVD) players, developed by Beijing E-World Technology in collaboration with London-based New Medium Enterprises (NME), were set to go on sale in November. Priced at around US$125, they substantially undercut the better known HD-DVD and Blu-ray standards, backed by Toshiba and Sony respectively, which start in the region of US$500.

NME CEO Mahesh Jayanarayan – which created the Versatile Multilayer Disc (VMD) technology incorporated in the EVD player – is full of praise for the technological input of the Chinese side. "They created a standard for HD way before anyone else but were too early in the market place. Now we have worked together and created something that will stand up to any international standard."

EVD's principal selling points are flexibility and affordability, which come thanks to NME's optical disc. A standard DVD-9 stores information on two layers of the disc, allowing a maximum capacity of 8.5GB. The VMD has the ability to carry data on at least 4 layers – and perhaps as many as 20 – providing sufficient space for high definition movies that start at 20GB and all manner of on-the-disc extras as well.

HD-DVD and Blu-ray generate the extra capacity by using blue lasers, which allow more information to be stored on each layer, but VMD uses the red lasers found in standard DVD players. As a result, existing manufacturing equipment requires minimal modification and this translates into lower costs.

"HD-DVD is not user friendly," said Jayanarayan. "The replicators have to invest a lot of money in new equipment."

He also points to the challenges of creating multiple layer discs under the blue laser format, with HD-DVD currently using a dual layer 30GB disc and Blu-ray a single layer 25GB offering. "The studios will not be held back – they create content, not formats," Jayanarayan said. "We have met with the likes of Warner several times. One studio representative said to me: 'If you get us the player we have to give you the content'."


Imaginechina

LAYER ISSUE: Multi-layers means more content

NMD will take the bulk of the royalties as it provided the lion's share of the technology used in the first batch of players. But China is playing a larger role in the development of second and third generation players and can therefore expect a larger cut of the takings.

However, time may not be on the EVD's side. The jury is out as to whether EVD can obtain the critical mass it needs to survive before HD-DVD and Blu-ray solve their problems and start selling in large numbers and at lower prices. Furthermore, sales of the low-cost EVD/VMD player are focused on the emerging markets of China and India and it will be a battle to persuade consumers to shell out for both the player and the HDTV required to get the full effect.

"They have not created a compelling reason for original equipment manufacturers, users and content manufacturers to cross over," said David Wolf, president of Beijing-based technology, media and telecom consultancy Wolf Group Asia.