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Interview with **Chairman Philip Yeo**

Mr Philip Yeo is Special Advisor for Economic Development in the Prime Minister's Office and also Chairman of SPRING Singapore, a government agency with the mission of enabling Singapore's small and medium enterprises to broaden and deepen Singapore's economy.

He was Chairman at the Economic Development Board (EDB) from Jan 1986 to Jan 2001 and then Co-Chairman EDB from Feb 2001 to March 2006 with the mission of building up the biomedical sciences industry. From Feb 2001 to March 2007, Mr Yeo was Chairman, Agency for Science, Technology and Research.

Mr Yeo is credited as the driving force behind Fusionopolis and Biopolis, both of which are co-located to enhance collaboration across diverse scientific domains and pave the way for multi-disciplinary research. For his formative role in Singapore's life sciences industry, Mr Yeo was awarded the BioSpectrum's Asia Pacific Life Time Achievement Award in March 2009.



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Many scientists think that an idea is a business, but they are wrong. In the good old days, money could be raised easily, until these scientists finally realised that an idea is not a business. An idea remains an idea, until it is transformed into a product or service.

THC: For Singapore to make biomedical sciences one of the successful pillars of the economy, what are the key ingredients needed?

PY: The key is to see the link up between biotechnology companies, the pharmaceutical industry and Research and Development (R&D). Now, we have GlaxoSmithKline (GSK), Novartis and Eli Lilly laboratories already established here. The pharmaceutical companies are currently creating small R&D centres, many of which are specifically disease-focused. What I planned in the early 2000s was that we should encourage this setting; we are the only other country in Asia, apart from Japan, where such a critical mass of major pharmaceutical companies is situated.

THC: Even in the context of Asia, can we excel against the Chinese, the Koreans and the Japanese in basic science and R&D?

PY: St Jude Children's Research Hospital in Tennessee has only 56 beds for paediatric cancer treatments and the Director is now on the A*STAR Biomedical Sciences International Advisory Panel. The crux is in developing specialised areas. Focusing on a specific disease is important but we should not allow research in one area to continue forever if it is not fruitful. Money is finite, so it should be reallocated. One must find some laboratories to close and others to support, but still look after the laboratory staff at the same time.

America's science has great competitive advantage. Scientists there are not rich, but are happy – their happiness is governed by a different reward system. Chinese, Korean and Japanese science is handicapped because of poor English.

THC: Geographical clusters may create a unique value proposition for economic growth and competitiveness. Can we create an economically vibrant cluster system like that between Hong Kong and Shenzhen?

PY: Hong Kong is part of China, so the relationship between both is like a house and windows. Singapore, on the other hand, has no hinterland. If Malaysia and Indonesia succeed, we will also succeed because we are part of this geographical location; we cannot row away! I am of the opinion that we should learn Bahasa in addition to Mandarin.

THC: Many pharmaceutical companies are moving their operations and R&D to China. Is that of concern to our own biomedical enterprise?

PY: China is focusing largely on producing for its huge market. Another issue is that of intellectual property, if R&D is to take place. The problem is not of compliance, but one of enforcement. It is tough because China is such a big country.

The big pharmaceuticals are here: GSK, Novartis, Genentech/Roche, Merck/Schering-Plough, Abbott, and Pfizer. I have been involved in this area since I was at EDB in 1986; I started

FEATURE



off with biotechnology investments in 1990, and have built up our know-how since then.

In mid 1990s, we decided to delve into chemicals, which involved oil and gas, petroleum and pharmaceuticals and started doing biomedical developments in 2000. Many drugs involve small molecules and links to GPCR receptors; this leads to side effects. More science is needed to accomplish targeted treatment.

THC: That is true; many of the new small molecules in cancer are not as effective as initially hoped.

PY: I agree that it is a tough job creating good drugs against cancer. Although we know much more about how cancers grow and spread today, we may not have real solutions yet. Many cancer drugs are merely providing extra months of lifespan.

THC: There is much hope and hype about the potential of stem cells and also the nature and role of cancer stem cells. Do the latter really exist?

PY: Dr John Dick of the University of Toronto, Dr Irv Weissman of Stanford and Dr Robert Weinberg of MIT believe in cancer stem cells. The problem is in identifying these stem cells and harnessing this new knowledge in treating cancer. At the end of the day, there are three important fields moving forward: cancer, immunology and stem cells. We have a number of scholars studying immunology, as immunotherapy is very important.

THC: How can we convince Singaporeans to take risks, create new ideas and venture into new fields with the fear of failure being dominant in our DNA?

PY: Asian parents can influence their children, as they are often the ones



supporting them. We can increase our talent by attracting the brightest – and once this happens, more will join. This is the halo effect, although it is harder to manage smart people as compared to less smart ones. Smart people need room for different views – scholars will return from overseas with varying mindsets and will argue their points and also among themselves. The key is to have a system of tolerance for dissent and ideas; they cannot be expected to flourish if put into small pots.

THC: Why do we not have more innovative companies like Apple here?

PY: If a person is bright enough, innovation will follow. The issue here is that many of our young want to get a job, quickly get married and have children. Nothing wrong here, but many entrepreneurs have late marriages. How are these people able to marry when they are busy struggling away in their start-ups and businesses? It is a real sacrifice and unless one's partner shares similar values, it is hard.

THC: What do you think are the traits of Americans, which enable them to succeed in the innovation enterprise?

PY: I believe it is their ability to change. The Americans have the habit of criticising themselves, and this drives them. Their flaw is with regards to their massive expenditure. For example, can most Americans afford a house? They may be better off renting than buying, but they are lured by low interest rates. With the government's push for housing as well as the "American Dream", people who should not own property, do. In comparison to the Europeans who purchase property to live in, many Americans purchase them for flipping. This leads to the equitising of their house, and they use the money for other purposes.

I suppose all this is partly because the Americans are optimists; the Europeans do not do such things. That being said, I do admire Americans for their openness, flexibility, and abilities for self-criticism and change.

THC: The American free market system seems to be pretty robust; where certain companies die, they may also be revived, or have other stronger companies emerge.

PY: Yes, these companies learn from their mistakes and return. Also, there is



a lack of stigma. In Singapore, the bank will not see you if you are broke!

THC: Do you feel that universal health coverage is the answer to solving the healthcare problems of disparity and inequity in the US?

PY: Universal health coverage is the way to go. However, people should not be allowed to “eat free food” otherwise the taxpayers end up paying all the bills. The weakness of the current US system is that everyone uses Medicare, and charges every expense to it. It is almost a system of abuse, which results in ballooning healthcare costs. The current incentive system for doctors in the US can also be improved on; which will reduce the number of unnecessary tests and charges taking place.

Singapore’s healthcare is better in this aspect – people pay a portion of basic healthcare, coupled with government subsidies and a choice of insurance plans. However, on our part, we must keep up with inflation.

THC: Can Singapore learn from the Americans in building global companies and world-leading enterprises?

PY: No, that would not be advisable; we are a small country. Instead, we should look to the Danish, Swedes, Finns and Norwegians (for example, the Scandinavians) and the Swiss. I always admire the Swiss – they are much disciplined. Switzerland has a population of six million, and yet they have produced two giant pharmaceutical companies, Novartis and Roche. They have also produced great Swiss chocolate despite not having cocoa!

Perhaps the answer to the Swiss and Scandinavian model lies in their social compact and networks. In addition, the disparity between the top and bottom percentile is small.

THC: You once mentioned in the media that all else being equal, you would favour a poor scholar over one from an affluent background. Could you explain more?

PY: A middle to upper-income family can afford to give their child the best education and exposure from young. A child from the bottom twentieth percentile is handicapped from young. All things being equal, this child will lack exposure and experience when it comes to interviews. I favoured those staying in HDB housing, because there will be families who can afford to send their children overseas, and those who cannot. If a family is able to afford a scholarship, then they should not apply in the first place. Bond breakers are always those whose families can afford to break them. It is always the parents who pay for the cost of breaking the bond. Those who do not wish to be “tied down” should not have taken up the scholarship – it is a matter of choice.

THC: Tell us more about your A*STAR scholars.

PY: Our foreign scholars hold Singapore passports. They have grown up here.

I do not take people who have received their basic degree overseas – they must have received secondary school education here. However, this does not guarantee that they will not run away; we are taking a chance. The problem with Singapore is that with just over 4 million people, we have a limit to talent.

With four years of upper secondary and junior college schooling, together with nine years of BSc and PhD, it comes up to 13 years! It is a long and costly horizon, so A*STAR can only afford to fund about 100 BSc to PhD scholars a year.

We look for future research leaders, not bookworms. When scholars are picked, they are seen as the future of

our country. I have a good track record in my selection; these scholars enter top schools even as undergraduates. Whether all end up doing science, or divert, it is alright as they have had sufficient foundation.

If managed well, these scholars will contribute to Singapore and create an impact in 10 – 15 years. They are the intangible wealth of our nation, and for me, it is a 15-year effort. Most importantly, these scholars must come home. At the end of the day, the topic of money has never been raised, as they believe in a different value system. If we succeed with our scholars, we will have an advantage over all our neighbours.

THC: There have been remarks that you might be setting unrealistically high benchmarks for your scholars – some eminent scientists have commented that despite not doing well as an undergraduate, one might still shine phenomenally later on so there should be second chances.

PY: The scholars that we look for must be able to do well and survive. It is no big deal to do well at the BSc level – to get a GPA of 3.8, all a student needs is 50% of As and 50% of A minuses. 3.8 is the cut-off mark, and these students must meet our requirements for PhD funding.

I don’t believe that our criteria may cause us to miss an Albert Einstein or Lee Hartwell. Both were not selected at ‘A’ Levels! If our scholar is not able to survive at the BSc level, he/she will probably not be able to get into the best graduate schools for their PhD. For those with such quirks, I would rather let someone else take care of them. Our time and resources are finite, so there is no compromise. Our students are not run of the mill; they are the best and brightest, and most of our scholars are well-rounded. It is an issue of proper time management – if they cannot do



well, they will not be able to enter top PhD schools. One has to compete with global talent just to enter, and one is on his/her own after entry.

We need to have high standards: it is easy to go low, but we should set a benchmark. Our job is not to manage outliers, but to manage our total talent.

THC: Urban legend has it that you know each and every one of your scholars inside out. What are your hopes and visions for them?

PY: Well, I interviewed every single one up till our seventh batch. Many of these scholars will come back in 2010/2011, about 100 each year. These scholars have been away for nine years, doing their BSc up till PhD.

All our scholars are very bright, but there has to be a value system at the end of the day. Our young PhD scholars realise that America is an R&D haven. It is very competitive in America, to the point of being Darwinian. It is such a big country and also a magnet for talent. I brought the “whales” to Singapore, so that our youngsters can grow up under their guidance. My mindset is that if our youngsters are “guppies”, they will become “whales” someday. At the end of the day, my bet is on our young people who put in nine to ten years; 15 if we consider their working experience – before we can see a well-rounded scientist. It is important to have a long-term view.

These students are lucky. We have 1000 scholars; a battalion’s worth! Not all of them will make it, but then again, how many will have the tenacity to do research? When these students return, it is imperative that we have an environment that allows them to blossom. If we talk down or attempt to control them, they will be stifled; they should be allowed free rein, as long as they deliver results. Our system has to be tolerant, not dictatorial.

THC: How do you prevent your scholars from being headhunted by the private sector?

PY: At the end of the day, people will stay if they feel that there is a sense of value and ethos. Everybody thinks that it is all about the money but people move because they are pissed off. Money is just an excuse; if someone is happy with his/her work, it is not about the money! Most of the time, it is the environment that drives people away, with money being the most convenient excuse.

Singapore has to plug into the global connection. Rather than forcing all to root themselves to Singapore, perhaps it is better to allow them to spread. One has to find an environment where they feel they can contribute, and will be rewarded. If not, there is no reason for them to come back. This is our challenge.

THC: It takes years to build a global pharmaceutical company like Novartis. Which companies do you admire most?

PY: The key to admirable companies is their people. Chairman and CEO of Novartis, Dr Daniel Vasella, is excellent. The problem today is that an increasing number of pharmaceutical leaders are finance-oriented.

THC: Are you looking for the priests of science like Francis Collins/Sydney Brenner, or biopreneurs like Craig Venter/Bill Haseltine?

PY: I would say there has to be a spectrum. Apart from academic results, I also look at the personality of the scholar, whether they are Type A or Type B. I am looking for research leaders – this is evident in our scholars. Whether these scholars are local or foreign-born, they are capable, outspoken and independent. What is leadership? It is the capability in managing people and if we want talents in the biotechnology

industry, we will need people who are not only scientists, but also possess the abilities to organise and lead.

THC: I agree that scholars should have the freedom to grow, form independent opinions and think different. However, even in the United States, there are limits. The Nobel Prize winner for the discovery of PCR, Kary Mullis, is certainly *different*. So what is your opinion on the recent incident of the A*STAR scholar who walked around Holland Village nude?

PY: The girl in question had a Karolinska Institutet (KI) scholarship in Sweden and there, nobody cares if you want to walk around naked or skinny dip in the summer. I think that she and the young man, who accompanied her, did it for fun.

THC: What drove you to make the remark that those with basic science degrees would only qualify as “test-tube washers”?

PY: I was using the power of ridicule to motivate people. Children in Singapore do not want to do their PhDs, but want to be successful scientists! There is no future in science with only a basic degree alone, especially with the increase in the NUS and NTU intakes.

THC: When Dr Goh Keng Swee was creating the universities in Singapore, he tended to place more emphasis on hard sciences, and less on social sciences. Your thoughts?

PY: Dr Goh’s reasoning was that it is easier for students of hard sciences to study soft sciences, unless the person cannot read and write! For example, 50% of the science students whom we send to the University of Chicago do humanities. It is much tougher for a social science student to pursue physical science, and the best way around this is to ensure that physical



science students can study humanities as well. I was an engineering student in Canada, and 25% of my curriculum was devoted to humanities like literature and economics!

For Dr Goh Keng Swee, Singapore's focus at that point in time was industry-based. However, he never neglected the fact that one needs to be able to read and write well. Dr Goh himself was very well-read, with a big library and books everywhere.

THC: There is a famous story about you being headhunted by Li Kar Shing to work for him in a top position in Hong Kong. What stopped you from going over?

PY: I retired from the Singapore Administrative Service as a Permanent Secretary in March 1999. Richard Li flew to meet me in Boston in late August 1999 with an offer that was to commence in 2000. I could not join him as I had just started planning for Singapore's biomedical industry. If I had left, there would have been no biomedical sciences industry, Biopolis and Fusionopolis today.

THC: Are you nervous about the fiscal "burn rate" at the Biopolis?

PY: The amount of money has not changed; the budget of \$4 billion has remained the same during my time, from 2001-2006. Biopolis and Fusionopolis belong to JTC and I help by getting companies to come here, so as to cross-subsidise. Some of our scholars eventually moved to these companies. It is a long-term investment, awaiting the return of our scholars.

A lay person will not realise that the 5-year budget I inherited from my predecessor was \$5 billion, and I returned \$1 billion to MOF and reshuffled the use of the S\$4 billion amount. The BSc to PhD scholarship

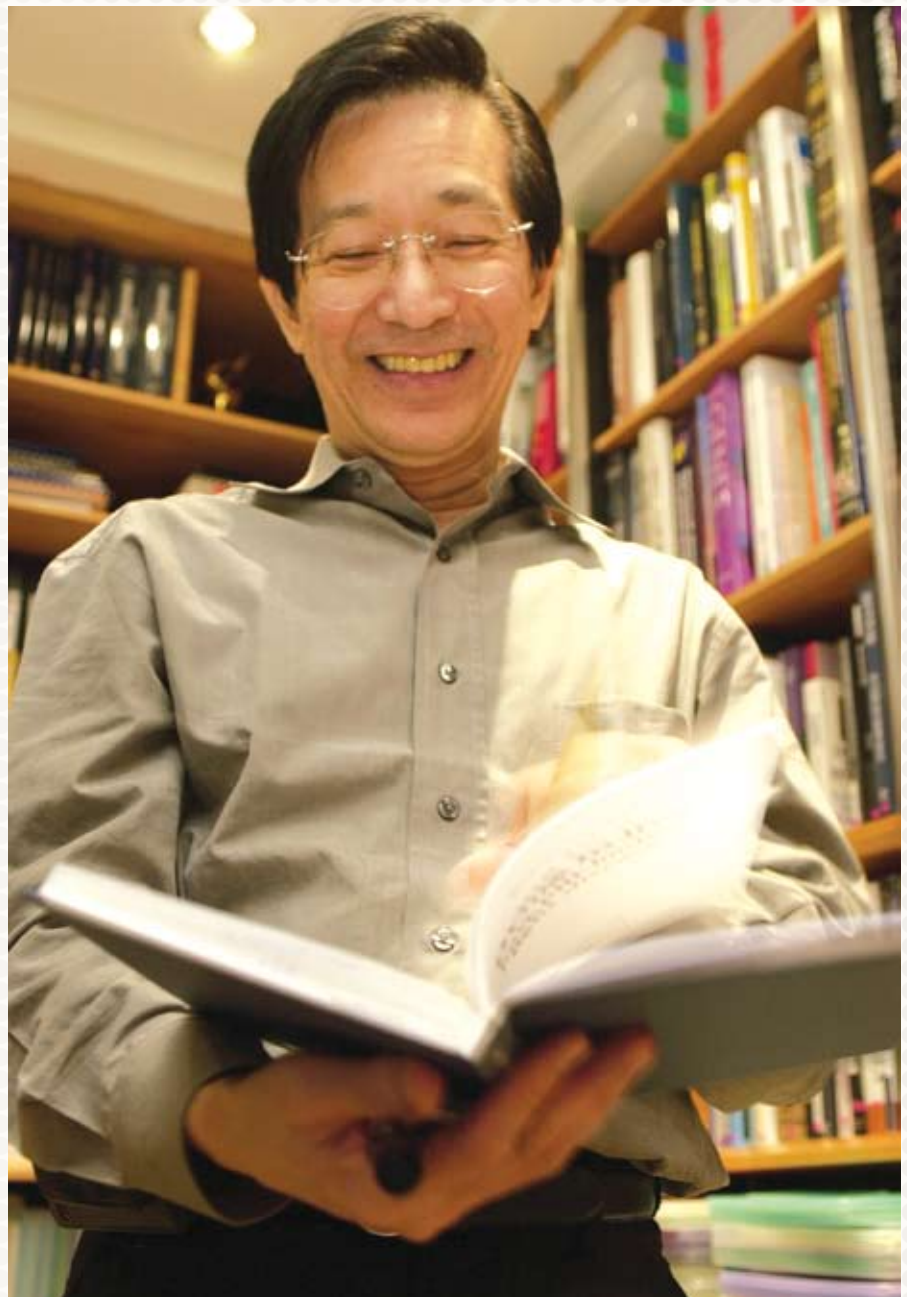
was created without extra money! From 2007-2010, there has not been any increase in the budget as well.

THC: One of Singapore's key enterprises is our internationally competitive healthcare sector. How can this further be developed moving forward?

PY: I agree. Our healthcare should not merely be about treatment delivery alone; it should also be backed by research. We can emulate the American

academic specialty centres like Mayo Clinic and Cleveland Clinic.

The key is to do clinical science. There should be laboratories in the hospitals, where doctors and scientists can go to and work together. There needs to be separate funding as well; clinical, hospital and research. What I have done is to shift the focus from pure science to science-based medicine. I believe that this is where the real effect is; science is unable to accomplish this unless there is clinical translation.





I brought the “whales” to Singapore, so that our youngsters can grow up under their guidance. My mindset is that if our youngsters are “guppies”, they will become “whales” someday. At the end of the day, my bet is on our young people who put in nine to ten years; 15 if we consider their working experience – before we can see a well-rounded scientist. It is important to have a long-term view.



THC: Do you think there should be a group of doctors who are well-versed in science? Doctors contemplating this career track fear that this entails a pay cut!

PY: Yes, and they should also be rewarded differently. It is also harder as funding has to be sought, and this group must have the freedom to do outside work. To do research, a laboratory complete with equipment and assistants is necessary for graduate students. This needs to be embedded, and perhaps inter-agency funded by A*STAR and the Ministry of Health (MOH).

Funding for MBBS-PhD comes up to about a million and a half; the cost of medical education is expensive, and also has to include the salary. When scholars return and complain about their starting salary, they have forgotten that their education was fully paid for, and they did not have to do “real work” for the past nine years! These scholars

must realise that a million dollars have been invested in them, and it is almost like winning the lottery.

THC: As a child, were you inquisitive?

PY: I am the middle child, and was allowed the freedom to do my own things. I was never hot-housed, and was lucky enough not to have anyone bugging me.

THC: Are your children scientists?

PY: My daughter is a happy English teacher in Japan. She loves the culture there.

My son is an Assistant Professor at UC San Diego Medical School heading a laboratory of 10 persons. Recently he won a stem cell research grant of US\$1.37 m for his lab.

THC: Could your son have become a businessman?

PY: His interest is not so much about

making money, but being creative in science.

When he was doing his post-doctoral work at the Salk Institute in San Diego, he wanted to understand the basics of business management. He then enrolled in UC San Diego’s business school for part-time MBA studies that spanned two years. While conducting his research, he would have to go for his studies every alternate Friday and Saturday! He is now trying to raise money for a company dealing with bioinformatics. Today, biology is now bioinformatics. It is tough if one is not a numerically-inclined person.

THC: In the wake of the 2008 financial crash where many biotechnology companies have gone bust, do you feel that the biomedical enterprise is too risky?

PY: There are too many biotechnology start-ups. Many scientists think that an idea is a business, but they are wrong.



In the good old days, money could be raised easily, until these scientists finally realised that an idea is not a business. An idea remains an idea, until it is transformed into a product or service.

In the medical arena, the greatest challenge is clinical trials. I had a Japanese journalist asking me recently, what the relationship between biotechnology and pharmaceuticals was. I replied that the relationship could be likened to that between a flea and a dog. Biotechnology needs pharmaceutical companies, and the latter's strength lies in its ability to fund clinical trials. These companies can upscale ideas to a production scale, manufacture and then distribute. Not many biotechnology companies can accomplish this; the only two are Amgen and Genentech, but they both have gone into production.

THC: Do you feel that we have not enough private VCs (venture capitalists) here?

PY: "VC" is a misnomer. The VC will not respond to you unless there is a ready product, so the fact that every scientist thinks that their idea can become commercial is simply not viable.

If one deals with IT, that is easy, because it has to do with applications. What we see in the biomedical field is new knowledge. Today, the amount of new knowledge far outweighs that in the 1990s, when we first started doing biotechnology. Perhaps the issue has to do with the full journey of clinical trials taking such a long time.

THC: What are you currently reading?

PY: I am reading *The Invisible Hook: The Hidden Economics of Piracy* by Peter Leeson. Piracy is basically about venture capital. If I had a pirate ship, I would go around looking for other people; it is property sharing. No prey, no pay!

I usually read a whole bag full of papers, which have been pdf-ed and printed out. I read about 30 articles a day. The problem is that they proliferate so I end up with boxes of paper which I cannot bear to throw away as collecting them took much effort. My house is like a storeroom; I should go down to PSA to rent some storage space! I can't give them away either, as it is a personal collection. Sydney Brenner too has tons of papers, which he donated to the A*STAR library and his collection includes monographs and original copies.

THC: You have been both daringly controversial, and yet a pivotal player in the decades of Singapore's development. How does the political leadership view you?

PY: To me, a job is a job. If others do not like what I do, it is not my problem. If I had hindsight, I would have gone ahead to make a lot of money. I believe strongly that the system needs to allow one's freedom to do things.

There was no model for the Biopolis. What I did was look around and wonder why institutes and research were separate entities. Why couldn't industries be located together with public and private research?

THC: There is disappointment surrounding the outcome of Germany's biomedical enterprise, and the success rate of Biopolis is projected at only 50% by one international journal. How is success defined, and what would ensure the success of such a venture?

PY: Germany's biomedical field was like throwing money at them. The people involved want instant results and biotechnology companies. Most of the results are science, not products or services.

Biopolis is a foundation, which will take a long time for its success – it is a 15 to 20 year effort. There was

no blueprint or scenario planning for Biopolis or Jurong Island. It was like experimenting with clay. China can do this too; there are more bright people there but the key is that their system must allow this.

I went to Guangdong in early 2000, and the Party Secretary (PS) invited me for dinner. I had to travel to Hong Kong and he asked me to go by way of Zhuhai. The PS of Zhuhai waited for me by the highway, to "kidnap" me to show me their airport! The man was impressive; he built an airport without permission! He bypassed Beijing and built an airport so as to put Zhuhai on the map. That's not scenario planning; he broke the rules! I must say that the airport and its runway were beautiful.

THC: Economist Professor Amartya Sen said that post-2008 financial crash, the Europeans have not collapsed in terms of their quality of life because of their social safety nets including universal healthcare. The Americans are facing more significant pressure points in this respect. Your thoughts?

PY: I was in Europe last month, and did not see any homeless people. This is in contrast to the homeless people in the US, even in Cambridge/Harvard Square. Many Americans have been laid off in this economic downturn, and there is no net to catch them.

Europeans are no less innovative. I was with the Party Secretary of Jiangsu two years ago as I am one of his advisors. This man was in his early 50s, and said that following the American model might have been a mistake. There are lessons to be learnt from the European model, unlike the extremes of the American system. The bottom line is that a society must be able to look after its lowest tier.

THC: It's been a great interview. Thank you, Chairman. SMA