



DEMOS

China seminar

China: the next science superpower?

Atlas of Ideas Seminar

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China: the next science superpower?

James Wilsdon, Head of Science & Innovation, Demos (Chair)

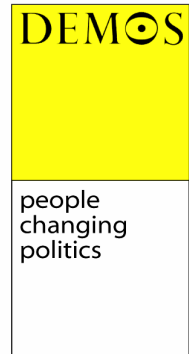
Welcome to the first in series of seminars that we're going to be running over the course of the Atlas of Ideas Project. I think a number of you were at the launch event that we ran in October. Today we wanted to look in more detail at China, and next year we'll be running a series of smaller events focussing on India and South Korea, and also on some of the cross-cutting questions that apply across all three countries. I won't say much more by way of introduction to the project: there's summary of what we're trying to do in your packs. We're delighted to have such an excellent panel of speakers today.

I read about a survey the other day that was carried out by 'Visit Britain', looking at the factors that influence Chinese tourists coming to Britain, and the fact that many Chinese still take their views of Britain from the novels of Charles Dickens. So it's perhaps appropriate that we're striking a Dickensian festive note in our first session, with representatives of Chinese science past, Chinese science present and Chinese science future. Christopher Cullen, the Director of the Needham Research Institute, will start by giving us a broad historical sweep on these questions, and reminding us that we often overemphasise the novelty of all this, and forget China's long and noble tradition of innovation. Secondly we're going to hear from Dr. Wang Qiming, who is the First Secretary for Science and Technology at the Chinese Embassy here in London. He'll be talking about the current policy framework for science and technology in China and the new strategy that's due to emerge in the New Year. And our third speaker is Jon Sigurdson, who in the past couple of weeks has published an excellent new book called *Technological Superpower China*, copies of which are available here today. So let's start by handing over to Christopher.

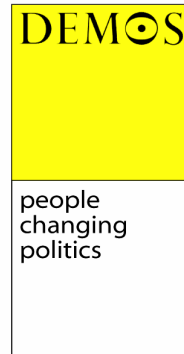
Dr Christopher Cullen, Director, Needham Research Institute, Cambridge

Well, I am the Director of the NRI in Cambridge, and the purpose of our institute is largely summed up in the characters on the logo, so I shan't tell you much more about that. The Institute was founded by Joseph Needham, who was probably the most influential historian of China and historian of science in twentieth century Britain. He's primarily known as the founder of the Science in Civilisation in China project whose results are published by Cambridge University Press in a series of massive volumes, which I'm now responsible for editing. A further five out of twenty eight are still to come. Buy these books for Christmas. They embody decades of research by Needham, and his many collaborators into the scientific, technical and medical heritage of pre-modern China seen in its fullest historical, social and intellectual context.

But all that's about the past. History is not about predicting the future, so why am I standing up here taking up valuable time in a seminar which is about China's future? I have two answers to that question; firstly, China's future is being created by Chinese



people, in particular by their political and economic leadership. Those people's sense of what China is and what it should become is vital to understanding the plans they make and the way they set up about realising those plans. And in China, that sense of national identity and purpose is deeply historical, as opposed to being say religious, or ethnic, as it might be in some other countries. The core of 'Chineseness', as seen in China, lies in participation in what is claimed to have been five thousand years of continuous national culture. So the rest of us had better understand what Chinese people believe that culture to have consisted of, and at present, very few of us do, in this country at least.



Secondly, I suggest there are some patterns in the Chinese past that may help us to understand China's possible futures, not in the sense of predicting them, but at least in the sense of helping us to direct our attention usefully, and helping us to talk about the flow of events in a way that is likely to produce useful dialogue, rather than mutual incomprehension. In all this, I'm following an old Chinese principle, that of using history as a mirror through which to think about the present and the future. It was in the light of that principle that Chinese scholars created the immense bulk of historical writing that makes the three thousand years of China's written history the best documented piece of past in the world.

So much then for methodology today. To enable you to allow for my personal bias, some confessions. I have to confess I approach the questions raised by China's rapid recovery of power and wealth as an optimist, not because I am a Panglossian, who believes that all is for the best in the best of all possible worlds, but because I believe that under present circumstances, an optimistic and positive approach to the Chinese phenomenon is the only safe approach on a world scale. Mutual mistrust, and mutual incomprehension will inevitably produce consequences that would be incalculable. So let's get down to business then.

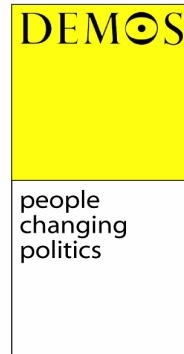
First let's be clear about one thing: Westerners thinking about China from the outside tend to believe that China's rapid growth and express modernisation means that China is Westernising. Many people in China would be astonished by this, because they see China as a country that made crucial contributions to building the modern world, and thus perceive China's growing economic and technological strength as a recovery of what rightfully belongs to it, rather than a benefit coming from abroad. But who says that China built the modern world? Surely all that depended on the scientific and industrial revolutions? And aren't those things that come from Europe? Let us listen to an unbiased source then. Francis Bacon, who any historian will acknowledge as a lead figure in what happened to science in Europe after the seventeenth century. He argued that the modern world that he saw in the process of creation was radically different from the world of Greco-Roman antiquity, because of three great technical discoveries: printing, the magnetic compass and gunpowder. These he claimed had changed the world more than any chance event or any intellectual movement. For Bacon the origin of these innovations was obscure and inglorious. But, of course we now know that all three were invented and fully exploited in China, long before they reached Europe. The story of all three of these inventions—printing the compass and gunpowder—is

something that every schoolchild in China knows about. Together with paper, another Chinese discovery, they make up the so-called four great inventions (*si da fa ming*) to which much national pride is attached.

These are not of course the only technological successes that China can legitimately claim. To choose a couple of others, more or less at random, we may note that China was mass producing iron tools by casting them in reusable moulds a thousand years before any European saw a single pig of cast iron, and that the stern post rudder replaced the inefficient steering oar in Chinese ships around the beginning of the Christian era, establishing a similar lead in nautical technology. It is no longer possible to believe, as some tried to believe once, that China produced these inventions but in some way failed to develop them properly. The technical fertility of Chinese society laid the basis of an economy that was for much of the last two thousand years very prosperous by world standards and which gave its people a relatively high standard of living.

It was of course the golden glow of the medieval Chinese economy reflected in the works of Marco Polo that led Christopher Columbus to plan his westward voyage, a voyage that he hoped would take him directly to China, East Asia in general, and cut out the Muslim middlemen, who took the real profits of the spice and silk trade. As we know, Columbus never reached China, because he hit America half way there. That was fortunate in two ways; firstly for Columbus, because otherwise his faulty estimate of the circumference of the earth (he underestimated it) would have meant that he would run out of supplies half way across the Pacific and would starve to death. And secondly, it was fortunate for the Europeans, since the possession of American silver mines gave them the economic power to actually pay for Chinese products when they got there.

Time is too short today to get involved in the ongoing debate of how long China's pre-modern economic lead actually lasted. We may simply note that some scholars claim that around 1700, China was still a considerably better place to be born as an ordinary country dweller than Europe was. This was certainly the perception of China transmitted back to Europe by the Jesuit missionaries who initiated the first Sino-European cultural contact of the modern age from 1600 onwards. Some of what they wrote was certainly propaganda, but much of it was sober reportage. It was not only that China seemed to them to be a prosperous and highly developed society in material terms, but also it seemed to be in some ways better ordered and better governed than much of Europe. For a start, its state officials were appointed to their posts on the basis of open competitive examination, rather than by the sale of posts or hereditary tenure. It is in fact acknowledged that the alternative political reality provided by China was a powerful tool in the intellectual subversion that laid the basis for the French Revolution. Sometimes the contrast I think between China and Europe can be expressed in rather striking personal terms, when we compare the use of court pageantry and ceremonial by Louis XVI seen there on the left (slide), dressed as the god Apollo to take part in a court masque in which he played a prominent part dancing on the stage, and the careful use of personal involvement and display in

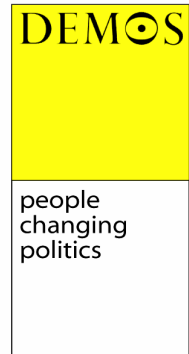


science and technology by his contemporary the Kangxi emperor. A recent pair of exhibitions in Versailles and Beijing contrasted the worlds of the two rulers and the message of the events was summed up in a Chinese newspaper: ‘The science of the Kangxi emperor and the dancing of Louis XVI.’

For our present purposes, the question is not so much how long China’s economic and technological lead lasted, but how long it was perceived to have lasted. On the Western side, the father of capitalist theory Adam Smith put things clearly enough in 1776 when he stated his conviction that ‘China is a much richer country than any part of Europe.’ On the Chinese side, the conviction of greater power persisted until at least the end of the eighteenth century when George III’s embassy seeking a trade treaty for Britain was rebuffed with apparent contempt. (Although there is really much more than meets the eye on both sides). But, by the middle of the 19th century it was clear that China was well behind the West and falling ever further behind, and what is more this was the way people in China began to see it as well as in Europe. For the politically aware classes of China, much of the last hundred years or so has been spent asking how their country could possibly make up all the lost ground, and even give itself a chance of getting back into the lead.

Joseph Needham spent 50 years, what he called his ‘second half life’ with the analogy of a radioactive isotope, uncovering more and more evidence of just how interesting China was for the historian of science and technology. It was clear that whatever China had been, it was certainly not what some Westerners had said it was, before Needham did his work; that is, an unchanging and deeply conservative society concerned with the natural world only from the point of view of mystical contemplation and artistic depiction. The sort of place, in short, that would invent gunpowder and then only use it for pretty fireworks. The sort of place that would get nowhere far until outsiders broke the mould, and liberated its people in effect, to stop being Chinese anymore.

Now, like most scientists of his generation (and we must recall that Needham was an eminent fellow of the Royal Society and biologist before he studied China seriously), Needham believed in progress as an almost ineluctable force driving all human societies onward. If progress appeared to stop, you had to ask what had stopped it, in the same sense that if an embryo ceases to develop, something has gone wrong. In the case of China, Needham asked why, after having in his view been created for so long, China failed to become the locus for the leaps into modernity that some scholars still refer to as the scientific and industrial revolutions. Now that’s the Needham problem, but the Needham problem is in itself problematic, and attempts to answer it have been many and various and there is no consensus among scholars as to which answer if any, is likely to prove fruitful. The blame has been put on everything from the legacy of so-called Confucianism, to the sheer success so it is claimed, of China in driving a pre-modern agricultural economy to such a high degree of productivity that it absorbed all the resources and left no space for alternatives. Others, such as Kenneth Pomeranz, have stressed a view that sees early modern Western Europe as a ‘fortunate freak’ that made windfall gains through the exploitation of land overseas, in the Americas particularly, and the proximity of large coal supplies to other resources such as metal



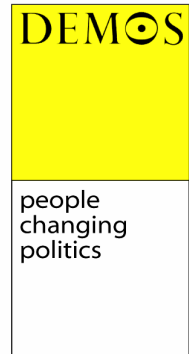
ores. Others doubt whether the Needham problem is a useful problem for historians to concern themselves with. Much ink remains to be spilt, and there are no signs that the controversy will go away. But I'm not going to try and solve the Needham problem today. However good any answer to such a huge question might be, it is likely to be so very general as to be almost useless in thinking about any particular aspect of China's present or future. Instead I should like to give you an example of a different approach, one which is in effect based on some comparative micro-history.

One of the lessons of the past couple of decades in the fields that I work in is that in looking at any pre-modern society, we should be extremely careful in using the perspective of any modern society as a point of comparison. Don't compare the past with the present. On the other hand, it seems to be quite fruitful to compare one pre-modern society with another pre-modern society. So instead for instance of comparing ancient Greek natural philosophy with modern science and trying to decide which bits are advanced and which bits are backwards, we compare it with ancient Chinese ways of thinking about the natural world, and how it may be properly understood.

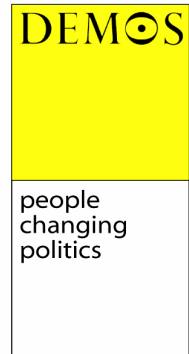
I want to offer you now an example taken from later in time, a period that might be called the cusp of modernity. Two men will be involved, Sun Ying Sing in China, and Georg Baeur, in Europe, often known as Agricola, his Latin name. Both these men were authors of technological encyclopaedias which provide fascinating insights into the arts and crafts of their day. Both of them believed in the importance of illustration in making their point, and in investigating the details of technical practice from a wide range of sources. Sun's book, the *Ting gong kai wu*—the exploitation of the works of nature—a general survey of all technical arts was published in 1637, and Bauer's book *De Re Metallica*—On Mining—came out after his death in 1556. Bauer's illustration there (on slide) shows a metallurgical furnace. What's happening in the left one for those of you who read Chinese is that he's extracting natural gas from a well somewhere in Sichuan and he's using this to evaporate brine.

Now, it seems to me a comparison of the lives and works of these two men feeds directly into a very modern problem, This problem is the origin of scientific and technical creativity, and of the circumstances that foster it and allow it to develop and be applied to the full. There is a wide consensus that China is currently being extremely successful in exploiting the combination of rapid globalisation and its position as an orderly society with large reserves of cheap and well educated workers, with a strong motivation for self advancement. But if it's going to become, in the words of Jon Sigurdson, a 'technological superpower', or to follow our seminar title, a 'scientific superpower', it will have to do better than that and become a world centre for innovation. What will be needed to achieve that, and what's that got to do with history?

As Richard Florida of George Mason University recently told a Cambridge-MIT Institute meeting in Manchester, on *Enterprising in Creative Places*, a key element of creativity and innovation is to set up circumstances in which internationally mobile creative people want to come together where you want them to work. Florida says, 'in



advanced economies such as the US and the UK, up to 40% people now work in the creative sectors of science technology culture, the arts and entertainment. A hundred years ago this figure was just five percent.’ Florida sees this exponential expansion of the creative class as indicative of the move from an industrialised society, where value is attached to natural products or the products of physical labour, to a post-industrial economy, where value emanates from the creativity of the human mind. In that new economy, the unit of competition is not so much the nation as the city. It’s not a case of the UK competing against China, or India against the US, in the eyes of the creative class, it’s a choice between Cambridge and Shanghai, between Bangalore and Boston.



Florida believes that this creative economy has concentrated wealth and creative energy in at least 50 places around the world. So, how can those regions outside the top 50 get their slice of the creative pie? To return to our exercise in comparative micro-history, I think it’s clear that Bauer’s life in the German states of Renaissance Europe gave him something that Florida would recognise as the elements for creative mobility. He was not only able to skip from state to state, across highly permeable borders to find religious and political circumstances that suited him, but he was also socially and career mobile. In a single lifetime he practiced as a professor of Greek, a doctor, and a mining entrepreneur and expert. He seems to have died well off and fulfilled as a burghermeister.

In contrast, Sun Ying Sing as a member of the Chinese scholar gentry had only one respectable career path that he could follow: the Chinese Civil Service. But as he took and failed the entrance examination, that career was closed to him. He ended up with a lowly post in the County Education Office and in the preface to his book he laments that he had no one to discuss his work with and that no one would bother to read a book with so little relevance to a civil service career. And since the Chinese Empire had unified every bit of the world he felt able to survive in, he simply had nowhere else to go. The last time China had borne any resemblance to the multi-state world of Georg Bauer had been in the Warring States period from the 5th to 3rd centuries BC, a state of affairs that was destroyed by the creation of the first empire. Now the China in which Sun Ying sing lived out his frustrations is long gone. A bright young Chinese or Dutch or Indian technologist lives in a world where almost all the borders of the countries that he or she might like to move to are relatively open. To that extent we are all Georg Bauers now. The point is whether the creative and mobile minds of the 21st century are going to choose to move en masse towards Shanghai rather than Boston or Cambridge. This is not certain yet.

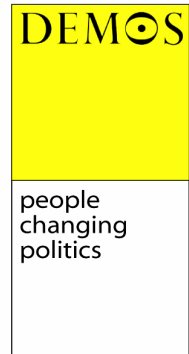
The problem seems to be historically that China’s great success in achieving growth has been based on economic liberalisation, linked to continued, relatively firm social and political control. This is the opposite recipe to that initially tried by the former Soviet Union, with more or less opposite results. The role played by the Chinese state in all this has been one that the majority of Chinese people undoubtedly have approved of over many centuries and will undoubtedly continue to approve of: that of the guarantor against disorder and the safeguard of national continuity and unity. There is a price to be paid for this, but for many people, at least those who live in large

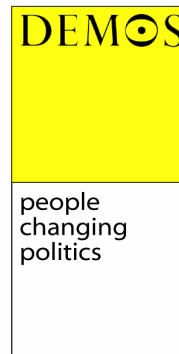
and prosperous cities it seems like a more than tolerable exchange. Considering how much better the lives of my Chinese friends and colleagues are than they were twenty years ago, I doubt that many of them would give it all up in order for instance to be allowed free access to the BBC News website, which is always blocked whenever I try to access it in China.

However, the circumstances which enable post-Deng Xiaoping China to achieve fast and sustained growth are not necessarily those which enable her to become a creative centre. Turning back to Richard Florida, he tells us that paying people a lot of money to work for you is not enough to nucleate these creative clusters. As he says, a key driver is the presence of one or more world class universities, but to help drive growth, these must be embedded in a broader cluster of creative industries, supportive institutions and a diverse and vibrant labour market. My research, he says, has found a high rates of correlation between on the one hand the openness of a city to immigrants, its absence of racial and ethnic segregation, its acceptance of gay and lesbian populations and its enthusiasm for artists and on the other, its ability to attract clusters of scientific and technical creativity and turn them into economic wealth. If Florida is right, it is by no means clear that it would be easy for China to make the transition from its present social and political conditions to one which might make China as attractive to the mobile creative classes as say San Francisco.

China is certainly committed to having several world class universities in its great cities, as programmes such as the 985 project showed, but is it willing to take the risk to create the cultural environment which historical study as well as Richard Florida suggest may be essential to enable such institutions to realise their full potential? Could there be, one wonders, special cultural zones, the intellectual equivalent of free ports, to match Deng Xiaoping's brilliant creation of Special Economic Zones such as Shenzhen at the start of the China's boom?

Well, as a historian I'm rather glad that that kind of question is not my problem but given the immense benefits for the rest of us of a prosperous stable China, making a contribution to human development in proportions to its size, it is certainly in everybody's interests that this problem should be solved. I'm not just talking of China's undoubted contribution to world economic growth: we all know one of the more positive aspects of globalisation is that growth is not a zero sum game. But, as Francis Bacon unwittingly showed us, history suggests that the modern world would not be what it is without crucial and highly novel past contributions from China. What more may the full development of China's creativity have offer in future? China's success in achieving its potential can, I suggest, ultimately benefit the rest of us too.





James Wilsdon (Chair)

Christopher, thank you for that great introduction, which is a real reminder of the value of a historical perspective when approaching these debates. And also for linking that to the questions raised by Richard Florida's work, which are something that the Demos team has been grappling with. Demos brought Richard Florida over to the UK for the first time a couple of years ago, so we've had quite a sustained engagement with his ideas. But it is difficult reconciling some of his arguments with the Chinese model, so this is perhaps something we could explore in discussion.

We're going to move now from the past to the present, and hear from Dr. Wang Qiming, from the Chinese Embassy, who is also going to give an overview of the current policy perspective and a hint of what's to come next year in the new 15 year science and technology strategy.

Dr Wang Qiming, First Secretary for Science and Technology, Chinese Embassy, London

Good Morning, My name is Wang Qiming, First Secretary for Science and Technology at the Chinese Embassy in London. My working area is in bilateral cooperation between governments, science parks and also sustainability issues in the UK and China as well.

Science and technology...why is it so important? In the year 2000, the Chinese government set another ambitious goal, that from the year 2000 to 2020 the total Chinese GDP would be quadrupled. This means that the annual growth rate would stay at 7.2%.

In the 25 years since China's opening up and reform, the economy has grown almost at 8% every year, so that goal will set up China for 40 years of continuous high speed growth. That is far above the world average, and far above the developed nations growth rate. So far no country in the world has ever achieved such a high growth rate for 40 years... even Brazil, Japan, Korea, others.

Can China succeed in meeting this ambitious goal of 40 years of high growth? Energy is the issue. 1993 was the turning point when China became a country importing more oil than exporting it. By this year, it is estimated that 120 billion tonnes oil will be imported. This is a very high amount, and is expected to grow.

China is a big country with a highly dense population. But in per capita income, China is still quite poor. And in terms of resources - water, arable land, forests, grassland, minerals - China in per capita below the world average.

So how to balance management of natural resources with the development model? What do we need to change? I believe there is an approach that might be possible, even if we don't follow the conventional development model. This possibility rests on science and technology. And policy for science and technology in China has two main

points. One is to create a more efficient model of development. The second is to coordinate economic and social development in a sustainable way. S&T support these two national goals.

Following up on 3000 years of the printing press and the compass and other things, we are now the 4th country in the world to have launch capability with rockets and satellites, the third country to grasp manned spaceflight, and also we have the collider, the cyclotron in Beijing, in Lanzhou and also in Hebei. And we created a standard— TDSCDMA — to use for third generation mobile phones.

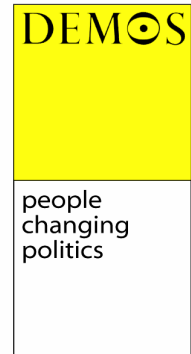
Looking at the facts of R&D input in China, from 1991 up to 2001, we can see the growth rate is quite substantial (refers to slide). Divided into central government and local input, we can see that central government is double all the local inputs to S&T.

The government view of S&T has changed from how it was in the past. S&T will play a leading role for society going forward. There is also greater awareness of the role of technology transfer, and they ways that knowledge and creativity will be used for the benefit of people's lives. So in terms of science, the government will emphasise creativity, and will be more focussed on what we call the self-innovation strategy.

In January 2006, China will open its Science and Technology Congress. Every 15-20 years, this Congress plays a key role in the development of S&T strategies. The first one took place in 1956, the second in 1983. And the third will be in January 2006. This will set out a medium to long-term science and technology plan, running from 2006 to 2020. The plan will show how China can move from a big nation with a large number of scientists and engineers, to a strong nation in which scientific results and engineering products meet the highest global standards. And China will enter the category of those countries with real power in S&T: nations like Russia, Canada, Korea, Italy and perhaps one day the UK. S&T will support China's development by solving constraints of oil, energy, agriculture and so on.

Looking at the data (slide), we can see that China has a small amount of pure or basic research – about 5% - but a huge amount is applied. This means that over the past 25 years, a substantive amount of R&D has been on the applied side. And in terms of policies, in the past the key player was only the government – either central or local. But now all sectors are involved. The question is how to balance the role of the government and the market.

In the past five years, enterprises have started to play a key role alongside university and research organisations. Enterprises have linked the universities and research organisations with civil society. And China has changed its policy from a 'follow-up' strategy to an innovation strategy. People then argue whether China has the capability of doing this innovation by itself. Not entirely of course. R&D in China is only 4-5% of the total R&D in the world, and China is still a developing country. The strategy is that China will focus policy on key areas that will promote its economic development. These include nanotechnology, energy, biotechnology and information technology. In



China, the first thing to look at is market occupancy: how much we can take from the domestic market and export overseas. And secondly, employment is a very important issue as well. So enterprises will play a greater role, saying what they want to do from the market.

Another change is a greater focus on talents rather than on projects, and the creation of platforms on which enterprises, universities and research organisations can collaborate. And a fourth area is the environment for knowledge transfer. Of course the system and structure reforming still needs to be strengthened.

On UK-China collaborations, we can see that the two sides are quite consistent in their efforts to work with each other. We can see that the UK provides incubator spaces – one in Cambridge, one in Manchester University – for Chinese high tech companies that wish to invest in the UK. These contribute to the UK's economy and growth and identify partners that can draw on the UK's strength in R&D and China's strength and capability in manufacturing.

Other areas of collaboration worth mentioning are new and renewable energies like biofuels, carbon abatement, hydrogen, tidal and ocean currents. And in January 2005, Lord Sainsbury and China's Minister of Space Technology signed an agreement on space technology. Surrey University helped China to launch two satellites for earth observation. In biotechnology, we are still exploring the possibility that the two sides can work together, particularly in the area of stem cells.

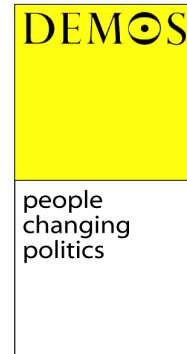
And a final area that is just beginning is venture capital. The UK has particularly strength in financial management. By the year 2008, China will open her domestic currency to the international market, and this will open a window for foreign companies to enter China's financial market.

So that's a very brief review of the policies in China, the future, the changes and the key role that S&T will play. And a summary of how China and the UK are working together. Thank you very much.

James Wilsdon

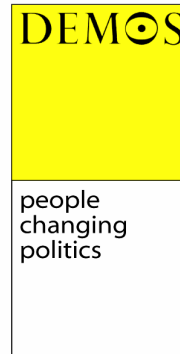
Dr Wang, thank you for that very helpful overview. For the Atlas project, the imminent publication of China's new 15 year framework highlights the timeliness of the questions that we're asking. We look forward to reflecting with you and others on the implications of that framework when it emerges.

We're going to hear now from Jon Sigurdson. We're really delighted Professor Sigurdson could be here. He's just flown in from Singapore, where he is currently a visiting professor. I met Jon in Stockholm earlier in the year and was interested to learn about the work that he's been doing. Today marks the UK launch of his book, *Technological Superpower China*, and he's going to give us a flavour of some of the rich material that the book contains.



Professor Jon Sigurdson, Stockholm School of Economics and author of *Technological Superpower China*

Ladies and gentlemen, thank you for bringing me from Singapore to give you what will be a slightly different perspective. Let me start with a few words about my background. My first exposure to China was in 1963. I entered Kowloon station in Hong Kong and started the overland journey by train from Hong Kong to Stockholm. The train made a stop at the Lo Wu bridge, which was the border between China and Hong Kong at the time, and I took another train and continued via Canton and eventually to Beijing. I was invited by the then Swedish ambassador in Beijing, and in this connection a little later he invited me to become Science Attaché. That was the starting point of a long-term interest in China and also gave me an interesting exposure to the Cultural Revolution at that time. Now that's the background.



This is a very exciting topic that you've started here, the Atlas of Ideas. In the first presentation, there was a suggestion that we should think about the relocation of talent. China will be a very important actor in this type of talent creation and relocation. I assume most of you have seen the financial newspapers, the Herald Tribune or other sources from yesterday, referring to an OECD report, which says that China, in terms of the export of IT products, is now overtaking the US. What is actually happening is to a very considerable extent based on advanced technology components being imported. Let me show the next slide, which gives you an indication of the role of China becoming the world's largest ICT market. It's already very large today, and the demand is merely made by imports.

At the same time, China is able to attract very substantial investments in ICT factories in China. If we look a little ahead, China is going to surpass the US and Japan as the world's largest ICT market by approximately 2008. But I would like to give you another perspective on the information published by OECD. Here I gave you the indication that China is very heavily dependent on importing semiconductors. And here you see the balance from 2000-2008. You see a very small share of Chinese domestic supply in 2000, and even in 2008, the share has not increased that much. That doesn't mean that in the longer term, China is not going to be a very important producer of semiconductors. In the areas of application, specific integrator circuits and design plays a very important role, and here we have a large number of Chinese programmers being involved in the programming and design of specific circuits.

This is an indication that China has an ambition to move far ahead. But where is China today? Well, maybe midway on the technology stairs. And there's no doubt that China has the ambition to scale the top of these stairs. In doing this, as we have been told before, talent will be very important. Here at the top we have science, R&D, design and engineering. I'll give you some figures about the education system in China that give us an idea of what is taking place. These figures (slide) give per 100,000 inhabitants in China, how many people are in higher education. The national average is 1,420. Shanghai has a much higher number, Beijing has a much higher number and also Tianjin. But if we take it across a belt, the North East China, we can see that this area of China has more people in higher education than the rest of China. I wanted to

give you this as a precursor for the next picture. This one is speculation. Using available statistics up to the present time, and based on interviews with government officials in education, what proportion of the population of university age do they expect to see in higher education? In Shanghai it's already around 40-50%, and in many of the other advanced cities, it's a similar figure. So this may mean that by the year 2015, China might have 90 million people who have diplomas or degrees from universities in China. This is an extremely large talent pool.

Now, what is China today? There's no doubt China potentially constitutes the largest market in the world, and today it is the largest manufacturing base in the world. I would suggest that China will also become the largest concentration of R&D. What will this require and what are the consequences?

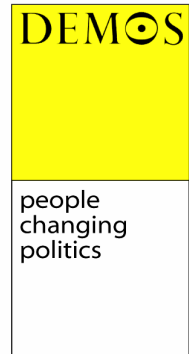
Well, absorbing science and technology knowledge and results inside China and diffusing it. Today, I would say a large number of scientists and researchers in China are still in ivory towers, there's a need for continued reform. China will also have to develop funding resources – as the previous speaker indicated – that are not singular but diversified. And as we heard, China will develop a new culture and new institutions in its plan for 2020.

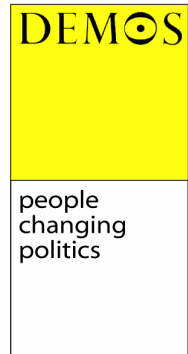
Now 'Technological Superpower China' is the title of my book. How do we recognise technological power? Usually, we look at the level of patenting. China in the traditional way of counting is very low in terms of innovation patents. But it is high in terms of design and utility.

Design capability in China is rapidly expanding and that's important. China as we all know is flexible and the time to market (TTM) is very short. In a number of industrial sectors, we have rapidly changing products, and this mean that TTM and flexibility are very important. This explains why China has been so successful in providing us with industrial products in any sector that we can think of. But China is successful in a number of other ways.

Let me give you the example of the new generation of mobile standards. The International Telecommunications Union held a conference in the US in 1998 and was going to make decisions on a number of different approaches for radio access technology. Two years later, they decided on standards, and the Chinese made TDSCDMA a standard. As far as I can see in newspaper articles at the time, many did not believe in the Chinese standard, it was basically dismissed. What is the situation today? Every major vendor - Nokia, Nortel, Bluesync - has joined the TDSCDMA forum. This is an extremely good example of how China will become a big market. and its ability to work on standards will be important in a number of technological sectors.

So what is needed for successful innovation? An institutional framework, public policy, industrial research development and funding. Education is very important, both in terms of quantity and quality. Telecom and internet infrastructure play a very important role.





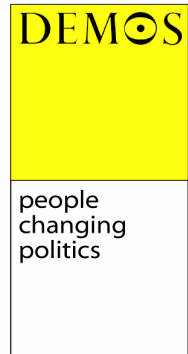
What does the system actually look like in China? I think this is important to understand. There is, as in any country, a national innovation system, with a large staff. There is a Chinese corporate sector, with an even larger staff, and today we have a number of foreign companies setting up R&D labs in China. Officially the number of these companies is around 700 and I've calculated roughly 60,000 people are working in foreign controlled multinational R&D. So what China has created or accepted is a global innovation system which consists of three parts: its own national system, its own corporate system, and the foreign companies also setting up very substantial units in China.

So what are the benefits and advantages of having a growing amount of foreign talent in science and technology? Well, learning from international R&D, benefiting from competition in R&D and using state of the art equipment. At the same time, these R&D units are attracting Chinese talent from government and corporate R&D, and occasionally weakening Chinese R&D units. And I think they are not so keen on transferring technology, they would rather restrict access to the latest technology and innovation.

Now, why do they move to China? Being close to customers is important. The availability of personnel is important, the talent pool, the returning highly trained specialist scientists, and also the salary cost. This is not often mentioned but if you look at traditional industry production in Finland and Germany compared to China, the cost differential is quite substantial. But for R&D generally if you look at high technology products, the difference is 40%. So there are very substantial cost differentials that foreigners can benefit from when moving R&D to China.

Well I'll soon come to the end of my presentation and I just want to mention what was briefly indicated by Dr Wang. This is a semi-official statement from China saying that it aims to be one of the front-runners among developing countries by 2010, and some ten years later to be among the leaders in science and technology and close to the top in 2049. This is why you have to put a question mark after 'scientific' superpower; I'm dealing with a 'technological' superpower.

What is important of course is the education system and I'll finish with that. A week ago I listened to Dr Charles West, former vice-director of MIT. And he said that if you're going to have good universities, these are the criteria that must be fulfilled: diversity of institutions, new faculties, competition for students and faculties. What is the situation in China? Today there are 100 priority universities, 30 are singled out to be internationally recognised, they have responsibility for key disciplines, they have key laboratories, they have open admissions, and they are engaged in the brain game. One example of that is the school of Microelectronics in Fudan University. This has a focus on sophisticated semiconductor technology. It has 600 graduate students and good contacts with the factories. They invited Professor You from University of Texas and he's now the leader of this place, and he's brought 4 or 5 colleagues of his from the US and Europe, and together they are creating a new type of organisation.



Another example is Shanghai. The final chapter in my book explores “*Shanghai: from development city to knowledge city.*” Shanghai has formulated a number of programmes to attract talents to Shanghai through special incentives, *Star* is one of them, *Leader* is one of them and *Return* is another. All of them seek to bring talented people from abroad to key positions in the Shanghai system.

So what will be the talent position in China sometime in the future? You saw the graph where I indicated the rapid rise in the number of university graduates. By 2015, the number of graduates could reach 90 million. And at this time China could achieve critical mass, and start posing a strong challenge to its neighbours, Japan and South Korea. Let’s assume 20 million Chinese graduates in 2014 have an engineering training, and assume 1% of them are engaged in research into hi-tech marketable products. China would then have around 200,000 brains pushing hi-technology development. And this may well lead to a relocation of talent from other parts of the world.

This photo was taken in 1992 (slide). Margaret Thatcher is sitting with a picture in the background of Hong Kong. Deng Xiaoping is sitting with a picture in the background of Tiananmen. That was the start of a very rapid change over the border in Shenzhen. 23 years later, in this photo (slide), President Hu Jintao I smiling alongside President George W. Bush are both smiling. I think that maybe there are a number of reasons why President Bush isn’t smiling so clearly, and one of them of course is that China is now exporting more hi tech products than the US. China is already on its way to becoming a technological superpower. The time frame for it becoming a scientific superpower lies a little further in the future.

James Wilsdon

Jon, thank you very much. That has given us a useful flavour of what’s in your book and the richness of some of your research into these questions. We’ve now got around twenty minutes for questions. Please say who you are when you make your comments and then we’ll come back to the panel for a response. Louis, let’s start with you.

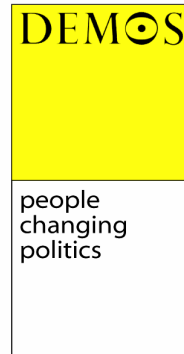
Louis Turner, Asia Pacific Technology Network

A question for Jon. I’m interested that you put most of your emphasis on the number of graduates. The Koreans would basically say they already have the world’s highest proportion of PhDs per capita in the world, What do we know about the future of postgraduate PhD facilities that are coming up in China?

Anne McLaren, University of Cambridge

A question for Dr Wang Qiming. I’m Dr. Anne McLaren, a biologist at the University of Cambridge working on stem cells. Dr Wang Qiming had an interesting graph showing basic science, applied science and technology experimentation. I think it is a mistake to think that innovation is greater in basic science than in those other areas. Dr Wang commented that China had a rather low proportion of basic science - less than 5% compared with other countries. Every country I know voices the opinion that

it should put more money into basic science. It's not clear what proportion of funds should go to basic science for optimal creative advance and I'd like to ask whether the Chinese S&T leadership has any target for what proportion of funding should go to basic science.



Mattias Ramirez, Brunel University

It's about the relationship between academia and new technology firms. On a recent trip to Beijing, we talked about a number of spin-offs from a number of universities, particularly Tsinghua University. We got the impression that there had been a change in the relationship between universities and small firms. Initially some of the universities had set up small companies, and then there had been a separation between the two institutions. It seemed an interesting development but we didn't understand more about it. Perhaps you could comment on that?

Ming Dong, Brighton University

What's the policymaking process in allocating research funding and what's the role of so-called experts in this process because I've heard from many school heads in Chinese universities that it's very difficult to get included in the community of experts. If you can't go into that community, is it very hard to get funding from the government?

Ali Hessami, Atkins

Given that the current development in China comes from a fundamentally different mindset, do you see cultural differences with the West emerging? Are we going to see a clash or a fusion of cultures?

Dr Wang Qiming

First I'd like to say something about the basic relation with innovation. Of course there will be more innovation in the classic sense, in experimental R&D, but China eventually realises that the university doing innovation should have more of a linkage directly with enterprises. The reality is that most of the innovation in China has been not by Chinese universities themselves but by foreign companies in China. So that's one fact. How we reflect the basic situation in China? Most people believe that China should increase its basic research. But by how much? We don't know. It's definitely going to be more than 5%. I understand that 10% is the new target in the future.

Secondly, about relationship changes. Tsinghua is a leading university in China, and those companies coming out of Tsinghua would like to use Tsinghua as a brand to promote their products. But then the situation changes and Tsinghua University's spin-offs can become companies that generate more income than the university itself. So the government makes it clear that sustainable companies should be separate from the university, and be self-supporting. For start ups, support is fine, but self-sustaining companies should go their own way.

Finally, on the peer review system in China. Because expertise is not very large in certain areas, if experts get into formulating the guidelines for programs, those experts

will easily get funding. That's what's happening in reality, but now the situation is changing, the system is being reformed to be more transparent and open.

Jon Sigurdson

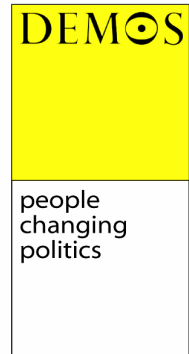
Immediately after China started opening up in 1978, there was no postgraduate training ability, so they were sent to the US for training, and much to the concern of the leadership until recently, two thirds of them were staying in the US. Now there is a potential brain gain in bringing them back. In the meantime, there has been an extraordinary expansion of Masters and PhD student training in fairly substantial numbers in universities all over China. The same expansion has taken place in engineering and science. If you want to provide good teaching for all those who want to do Masters and PhDs, you have to draw some of the people who would have gone into basic research to teach, which delays to some extent the ambition to expand basic research. You have a trade off between training good masters and PhD students and being involved in research. Of course they should be combined but at present there is a trade off.

Christopher Cullen

I've been asked to address the question about the clash of cultures, which has a slightly apocalyptic tone to it. I think insofar as there are different cultural mindsets and different historical legacies that are important in the questions that we are addressing today, one which I think is extremely important is this: historically in Western Europe there was the state, the secular power and the Church. To some extent, these were countervailing powers. It was the existence of the church as a separate entity that gave universities eventually their basis for independence from the government.

No Chinese state for a very long time has ever been willing to tolerate that there should be any independent intellectual basis within the country other than essentially what the government wanted. You can look back as far as when the Tang dynasty crushed the institutions of the Buddhist Church, I think before you could say that there was something in China where learning could take place without the government being in control of it. That situation still persists. It is largely inconceivable that intellectual life could exist for a purpose other than essentially serving the government. That's how I think Chinese people largely see it today.

So it seems normal that the government should decide what Tsinghua should do with its spin offs. This is radically different from the situation that evolved historically in the West, radically different from the situation in the richest countries in the West where we know that MIT and Harvard don't turn to the US government to ask how they're going to develop their policy. And in a country like England, Oxford and Cambridge have every day bitter cause to regret the day that they fell into the funding embrace of the government. So I would say that is a great cultural difference and working out the implications of that difference would be very interesting and I'd like to live another fifty years to see what happens, but I won't. There will be sparks as this problem is resolved.



On the wider scale, I'm a naïve and Panglossian optimist about the world. China has been historically remarkably good at dealing with influences from other countries. It certainly hasn't been a closed culture, it's often been a cosmopolitan one. Just look at the fact that in the first millennium it adopted a completely alien and foreign religion, Buddhism, from India and transformed itself socially and philosophically in many very deep ways. Look at how it adapted in the last century Marxism, again another completely foreign philosophy, and then, when it found that it wasn't producing quite the results required switched to a socialist free market so rapidly.

I've no problem in dealing with the flexibility of China in dealing with the rest of the world. My only worry sometimes is this: people in the outside world don't know enough about China, they often tend to see its rise as a threat, which I don't think it needs to be. This is counterbalanced sadly by the fact that because for political reasons, most people in China have been given a rather simplified view of Chinese history in its relationship with the rest of the world, there are Chinese rednecks, just as there are American rednecks. And I just hope that the two lots of rednecks don't get in power for long enough to go head to head. But I don't think that's going to happen.

Rohit Talwar, Fast Futures

If you look at the relationship that Microsoft has formed in setting up its offices in Beijing, there's been a strong emphasis on joint publication of papers, joint production of patents, and absorbing a lot of students into the organisation. That seems to be a very successful model from China's point of view in terms of tracking IP and getting it back into the economy. Do you think that's the kind of model that will go forward? And if so, what are the challenges that companies face in trying to set that up?

David Learmond, China Gateways

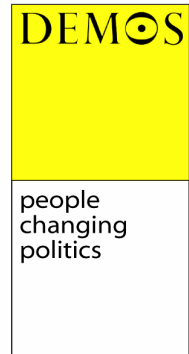
Having lived in China for the past 5 years, and having been recruiting a lot of Chinese graduates from leading universities, I see quite a difference to the West. There's still a great preponderance of learning by rote in Chinese universities and I wonder if this will hinder Chinese development? I wouldn't say that there are fantastic graduates from those institutions. Just to give you an example, last year we recruited 40 management trainees from China. We had 17,000 applications and so sorting them we didn't find many more than we wanted to offer jobs to at the end of the day.

Nicoletta Marigo, Imperial College

Dr Wang, you mentioned before that enterprises and firms would play an important role in the future of Chinese economic development and innovation, so I was wondering what support if any the government is giving to firms? Is innovation and technological development only in the hands of entrepreneurs and companies, or is the government doing something to support innovation at the firm level?

Lloyd Anderson, British Council

Christopher, when you talked about Georg Bauer, I think you were linking mobility and creativity together. I just wonder about the European Union, and the linkages between greater Europe and China, and to what extent the problems we're having



around the EU budget and self interest amongst European states, what that might mean for China-European relationships?

Christopher Cullen

Yes I will say that like everybody else who's ever had to deal with an E organisation I have some painful feeling about how Byzantine it can sometimes become. We mustn't forget that the Byzantine empire was an extremely successful and long lived empire. I feel that we have benefited in Europe from our multipolar cultural, political and economic identity, and I want to sing a hymn to multipolarity. I said a little bit about the Warring States Period in China when China was essentially rather like pre-modern Europe: a number of competing states with a more or less common culture, in the same sense that the European states all identified themselves as belonging to Christendom in some way, they were all part of *Hua Xia*.

That age was the really creative era of Chinese thought in which many of the great themes to were to be played out in succeeding millennia were worked out. It was an extremely lively period, brought to a sudden, juddering halt and I think there has always been a sense of cultural loss, and a need in China to justify why that obliteration of diversity had to occur, and if anyone has seen the film Hero, *Yingshuo*, then you'll remember how painfully that film sets out to ram it home, saying, "it's selfish to want to keep your own little culture, you must sacrifice it for the greater good." Everyone in China knows that. I feel therefore in Europe where we still have that multipolarity and diversity, we have a great deal to gain, and I feel that one reason too why Beijing is particularly interested in building up relations with Europe is because China wants to see a multipolar world, and what could be more multipolar than Europe.

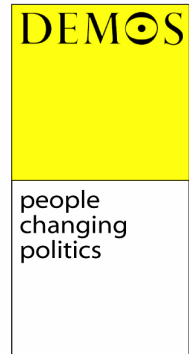
Jon Sigurdson

There was a question about Microsoft working in an academic way, producing joint papers. Now if you look at the foreign multinationals setting up their activities in China, there are a number of categories. Some set up to support manufacturing, some are also in software, some have mature products and shift out of them completely, some shift the development of modules, maybe within the mobile phone. Microsoft is only one example of that, but I think we will see more of that

I would also like to make a comment on finding the right talent in China. This man, Dr. Chu, went to Fudan to become Director of the School of Microelectronics and to recruit a few of his colleagues. He said that: most of the time everyday I am involved in cultural clashes between how I would like to see this school of microelectronics run and the old times. So I assume that within a number of companies and research laboratories, there is a learning period, which partly has to do with the culture clash.

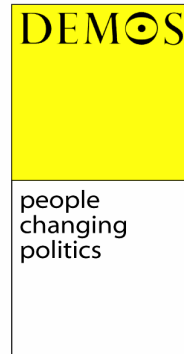
Dr. Wang Qiming

I will just pick up on the one about the enterprises. I found this a very interesting question. Government support to industry is not just recent, it goes back to the 53 state hi-tech industrial zones in China, which is very impressive in terms of the



number of foreign investors going there. But what I'm talking about is more on the R&D side.

Looking at the enterprises there's a small amount that invest in R&D. The question is how to encourage domestic Chinese companies to do more R&D work. The policies are under review, such as the R&D tax credit. Another change is for high innovating companies to receive extra funding from provincial levels as well. Policies are still under evaluation, the whole set has not been released yet, but I believe the main issue is how to build up a partnership of industries and universities and research organisations. What kind of incentives and R&D tax credits do you need? And what kind of opportunities are there for those in enterprises to join national S&T programs?



Coffee break

James Wilsdon

Welcome back to the second half of our discussion. We're now going to hear two further perspectives on the future of Chinese science, and then I hope we'll have plenty of time to continue with the discussion that we started before the break. Our first speaker is Mike Walker, who is the Group R&D Director for Vodafone. Vodafone is one of the partners in the Atlas of Ideas project, and they represent a fascinating case study, in that they are in the process of considering how and whether to proceed with an R&D lab in Beijing. So I thought it would be good to get Mike to come and talk about the kind of decision making process a large multinational goes through when making that sort of investment, and some of the choices, dilemmas and opportunities that fuel those decision processes.

Secondly we're going to hear from Jeanne-Marie Gescher, the founder of CGA, another partner in the project. CGA is a partner that we're working with in Beijing to provide a different way into these discussions. Jeanne-Marie is incredibly well networked at different layers and levels of Chinese society, has lived there for a very long time, and can I think provide us with a contemporary cultural perspective on some of these debates, to complement the historical perspective that Christopher gave us earlier. So first of all, Mike...

Michael Walker, Group Research and Development Director, Vodafone

Good morning. As James said, my name is Michael Walker and I'm the Research and Development Director for the Vodafone Group. I haven't got any slides this morning, which I think people may be pleased with. What I want to do is to reflect on what we've been doing for the last six or seven months, in considering whether we should open an R&D centre in China. That centre would sit alongside and complement the seven or so other centres we have around the world.

What I'd like to do just for about 10 minutes is to share some of the insights into what we consider to be research and development, and what we have discovered to be research and development in China. There is some difference between what we think of research and development and the way research and development is conducted in

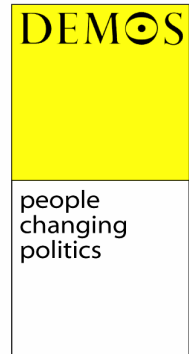
China. So specifically I want to talk about the nature of research and development in China, its standing within universities and companies, and its focus. The latter is very important to us, and as I say I'll cover both companies and universities and draw a few conclusions from our perspective.

Now to put these things into context, I'll just start by saying few things about Vodafone and its current business interests in China. Then I'll talk a little bit about what R&D means to Vodafone as a company because R&D is very company-specific, it varies from sector to sector. What goes on in the finance industry in R&D is very different from what goes on in the telecoms industry or what goes on in a manufacturing environment. Then I'll say something about why we're attracted, and at this stage it's just attracted to doing R&D in China, and there you'll see that our motivations are slightly different from other industries that you heard about this morning.

So OK, first of all about Vodafone. We're the world's largest mobile telephone operator. That's all we do. We operate mobile telephones and when I say largest, it's largest in terms of profit, turnover and capitalisation. Not though in terms of the number of customers. In terms of the number of customers, we have about 175 million customers. If we own 60% of an operation we only count a customer as 0.6 of a whole person so that's where the proportion comes in. We've got operations in 27 different countries, and we've also got franchises and brand engagements in about 14 other countries, so we are truly international.

Turnover last year was about 35 billion, profitability 10 billion and if you discount the proportionality, about 1 in 4 people on the planet that have a mobile phone are connected to a Vodafone network. It's a significant business. We do have a presence in China. We have a 3.27% equity holding in China mobile. That sounds very small, but China Mobile is a very important partner to us, not least because China Mobile alone has 250 million customers. So in one country, there's more customers than we have worldwide. That's why I said we weren't the largest in terms of customers. This means that if we work with China Mobile, there's a huge amount of leverage across the whole industry, with the two companies working together. That's what drew us to China Mobile. We don't have though any operational presence in China, the operation is all China Mobile. We don't have a brand presence, so it's merely an equity investment and then joint activities. We don't have any local sales, we have nothing of that nature, so that's an interesting perspective when looking at why we want an R&D presence.

If you look at vendors, vendors tend to go to China because they set up manufacturing there, and they have sales there, both internally and they use it as a platform to sell externally. Along the manufacturing chain follows the design and eventually afterwards follows the R&D. But we're not in that position. That means we're fairly unique, I know of only two other examples of companies that are considering an R&D facility in China where they don't actually have a trading presence. The other two incidentally in our sector are France Telecom and Docomo. Now that's not to say we don't already do a lot of work with China Mobile. The sort of things we do range from



joint purchasing through to evaluation of 3G technologies and joint specifications on how we will deploy those technologies. But all of that is not R&D, it's a long way from R&D. It's really day to day business, business as usual.

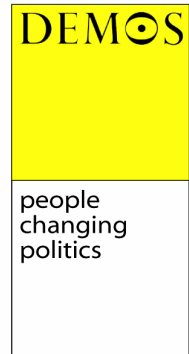
So what's R&D in terms of Vodafone? Broadly speaking, the role of R&D in Vodafone is to spot new opportunities. Usually, they're technology based. So new technologies can provide us with commercial opportunities. Having spotted them, we evaluate them and shape them. We get engaged with those who are actually developing them in order to develop them to best suit our purposes. Then we bring them to the attention of the company in the form of demonstrations and commercial pilots. So that's the R&D activity. We don't manufacture technology ourselves, we don't build anything.

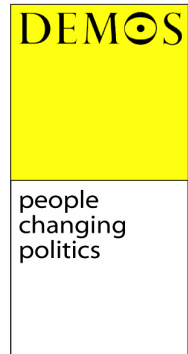
We're an operator, so in order to bring these things to the attention of the company we have to work with vendors. We have to work with traditional suppliers, we work with the ICT industry at large, we work with start-ups, to bring technology to the company. And because our focus is on applied research we don't do any of the basic stuff either. So we need to work with universities to understand what's on the horizon to get a grasp of the basic stuff which is going to influence our technology downstream. So that positions us. Most of our work we have to do in collaboration, either with universities at one end, or with vendors at the other.

So why do we want to even consider having R&D facilities in China? First, and I'm sure everyone says the same: China is expected to fuel worldwide industrial growth, and in the wake of that, we expect innovation and technology to follow. Now I say that very carefully, 'in the wake of it, we expect it to follow.' I'll come back to that but we don't believe it's there at the moment. But it will come, and we like to be where innovation is.

The second reason is that Asia as a whole represents the largest customer growth potential for Vodafone and for many telecoms operators, in fact for many businesses, it's a big growth area. It always makes sense to have an R&D presence where growth is. Why? It's not to do with the growth per se, it's because in a growth environment you get lots of enthusiasm. If you're in a growth business, people want to join you, so smart graduates want to come along and be a part of that growth. So you can attract innovation and innovative people because you're in a growth environment. Frankly that's difficult for us in Europe now, where there isn't growth in mobile communications. If you go to graduates in university and ask them if they want to work in mobile communications, they say, 'mmm, maybe, maybe not.' Ten years ago, it was entirely different, they all wanted to come. So we look to where the growth is, for that reason.

Finally, we have to work as I said earlier with our vendors, and our vendors are moving more and more to China, for the reasons I explained; for sales, manufacturing. But if they're there, that's where they're starting to invent, and if they're there inventing, we'd better be there with them to invent alongside them. So these are the three real reasons.





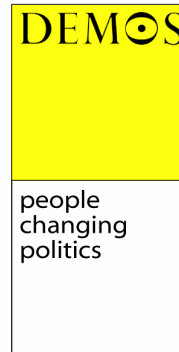
Now, what have we learnt then about the vendors in China and the universities in China and the R&D they do and how we might work with them? Let me start with companies. There's a big difference between Chinese companies and European companies that happen to be in China. If I could summarise what we've discovered over the last half year, and this is our view, on Chinese companies in the Telecoms sector, they are in terms of R&D big in D and almost nowhere in R.

There's a lot of development based on research done elsewhere, but there's not much within those companies in terms of research itself. The development is very impressive and what's more, the time to market after the development cycle is incredibly rapid. We have seen in our own business, companies like Hua Wei take the next generation or the next phase of 3G rollout from the standards and they've got it into product well ahead of any of the European manufacturers that have been doing this for years. So it's very impressive how they turn the development into a product.

They also do a lot now in terms of contributing to international standards. Two or three years ago, they were at all the international standards meetings, but they didn't make much in the way of a contribution, they were listening. Now they are contributing, because what they're very keen on doing is getting their technology outside of China. So they're looking for the export opportunities, and they will only get that if they comply with international standards, and they recognise that. As big as they are, they can't set their own standards and sell abroad. They're looking to work with international communities. Now, they're very good at presenting R&D, but sometimes it's a showcase piece, and if you look behind, there's not so much supporting it as it appears on the surface. Very good at presenting, and I think with all respect to one of our speakers today, the TDSCDMA case is a very good example of that, it's very well presented, but behind it, there's not as much substance as has been promoted.

Also, Chinese companies are very focussed on building strong links with national and local governments, and saying you have an R&D presence makes a lot of sense there. It brings them a lot of merit, and it is something they feel they need to do to get on well with their local government. A consequence of all of this is that within the Chinese companies themselves, although the development is spectacular and the return on the development is very rapid, there's not as much inventiveness and innovation as one might expect. The potential is there but it hasn't emerged yet. In contrast, if I look towards Western companies that do research and development in China, they genuinely do the research and development piece together. They're not just populated by Europeans, there are many Chinese that work for them. Their programs are nearly always part of a global program of research and development, and genuine innovation gets exported from China to the rest of the world. If I look at a company like Siemens it developed its entire clamshell phone product in China and now sells it across the world. So there's a big difference there. There's much more genuine innovation in China within Western companies who set up resources there.

So what about the universities? If I try and characterise what I've observed from going around Chinese universities (and my team, many more), like all universities, they rely a lot on government funding. I agree there may be other parallel streams of funding developing at the moment, but they get a lot from the government, especially when the research they're doing is very visible and contributes to some international program. Like for instance, next generation mobile communications. They don't have problems within the universities getting funding for that. They get funding when their research is image building, when it's directed to solving a very real problem faced by Chinese society, but the result of this is that academic thinking and the quest for invention and knowledge is not the main driving force in Chinese universities. That's not a criticism, it's just an observation.



The net effect is that the emphasis, even in universities, is on the D instead of the R. If you look at the undergraduate level, and this is our observation in China, they're on a par with the rest. The graduates are extremely good, very well qualified engineers, and they're well ahead Europe and certainly the UK in terms of the number of science and technology graduates they're producing. All very good. But if you look at the postgraduate level, if you look at those who are seeking some academic career, who are really genuinely interested in a subject from an academic point of view, they tend to want to go overseas to do their PhDs. The ones that stay are those that are more attracted to D. So it's all back to D. The D bit in Chinese universities means that they're very interested in collaborating with industry, which is actually quite refreshing because frankly in the UK you find it quite difficult to get universities to genuinely want to collaborate with industry. So that's nice for industry. But there's not much collaboration between Chinese universities and Western universities. That's partly down to language but also I think it's partly down to the fact that they're D-focussed and European universities tend to have a better balance and certainly have more basic research and therefore more R. It's strange that you find very few foreign academics in Chinese universities, whilst you find lots of foreign academics in European and American universities, so that's another thing that emphasises the gulf between them.

Now it's important for a company like Vodafone that a university can work on both sides, because we want the D but we also want the R. I've seen companies successfully do that in China by having a Chinese university and a European university and you create a nice triangle where the Chinese university does a lot of the development and the European university does a lot of the basic research, and the company is the bringer to market of all that talent. So I think there's something that can work there, but the Chinese universities per se are not the place to go to look for basic research to fuel the next generation of whatever technology you're in.

In summary, across both companies and universities there's a strong emphasis on technology development, but at the moment we don't see that balanced with real inventiveness and innovation. Given the dynamics of China though, I suspect that it will emerge and it could emerge quite quickly. But it's not quite there yet. That's our observation. Thank you.

James Wilsdon

Mike, thanks for that more nuanced and critical take on these developments, which is very helpful. I'm sure we'll return to several of the points you've raised in questions. Now Jeanne-Marie is going to give us a broader cultural take on all this.

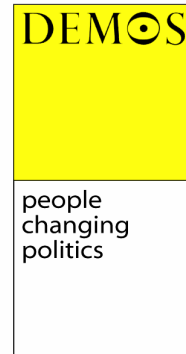
Jeanne-Marie Gescher, Claydon Gescher Associates, Beijing

I'm going to take two minutes to talk about what we do, because what we do defines how we think. I'm a lawyer, I'm a barrister, I've lived in China since 1989, I used to teach Chinese law and Indian law at SOAS. Before that I was at the Bar doing competition law. On the way I worked for a small UN agency called EFAD.

What my company in China does is to think. We think in three different spaces. We first of all think about the digital world, and that's how I first met James in fact. I would say for the first 8 years of our corporate life in China which was from 1992, almost all of our work was focussed on bringing multinational corporations into some of the toughest sectors in China, things that were most highly restricted. The first thing that we did was to bring in the world's first privately held global satellite service provider and after three years of very hard work we got CCTV (China Central Television) on that digital platform. In fact CCTV had the world's first digital satellite platform.

From a pretty early stage you couldn't really do the almost impossible if you didn't create a win-win. And the win-win was obviously a win for our client, but also a win for our client's partner, but it went beyond that and it was something meaningful for China. A lot of the work we did in the 1990s around digital media was about creating distribution platforms not just focussed on the very attractive urban demographic (people who can afford to pay for what they want to watch) but also for people in rural areas. And we did quite a lot of the thinking behind some village-to-village schemes for example. That's always been a very important bit of what we do, there are very good practical as well as human reasons for thinking like that. But that over time led to a broader policy focus, outside the digital world. And then we have a very specific sustainability focus, which has emerged over the last six to seven years, as a result of our increasing concern about a range of sustainability issues, which we feel are very important not just in China. We think that China's take on those issues is what I describe as a proxy and a crucible. We think that China is a proxy for some of the world's biggest issues; we think it's a crucible for some of the world's biggest issues.

I was talking to Charlie earlier in the break, obvious questions for today's session, what is science and technology, but also what is creativity, what is culture, for me a very big question is what is democracy? I've lived with that question in and around China now for nearly 20 years, and I think it's interesting to see how that question has metamorphosed, particularly in recent years. But I think a very big thing that China brings to the table is a sharper spotlight on what it means to participate in a democracy. Oddly enough that is something rather relevant to this question of science and technology and the Atlas of Ideas. So with that kind of spectrum I'm going to make some observations which I've scribbled down.

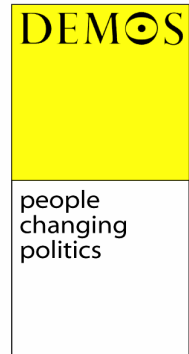


I thought when I was listening to the presentations this morning that there are three things to me that drive science in China. For the sake of argument, when I say science I mean science and technology, I'm not scientific enough to draw a clever enough distinction although I think there are some interesting questions around it. I think one needs to look at fundamentals, and the relevant fundamentals in China it seems to me are *need*, *curiosity* and *imagination*.

Need...I actually think that if Tony Blair has a hard time sleeping at night I can't imagine what it's like to be Hu Jintao or Wen Jibao, I don't know how they get a moment's sleep. Nor can I imagine how the myriad people that we work with in government policy, people who are involved in looking at issues of social and environmental need, people who are frankly involved in bringing about this huge economic and entrepreneurial revolution in China, how any of them sleep at night. When we think about need, I would say that need is more important than growth, and then I thought well maybe that's a bit frivolous, because if you've got need without growth then you've got Africa and maybe no one's paid that much attention to Africa over the last 20 years, give or take the last 18 months.

Actually what you've got in China is this incredible combination of need and growth. You've got this incredible engine of growth going. Now, the thing that keeps me awake at night is the increasing size of this coefficient. China is now one of the least equal societies in the world. We've just come to the close of a project that we've spent six months on, called China Rural. We've pulled apart rural society in China, the rural economy, and human issues and environmental issues and we've mixed them all up in a big pot and once we'd recovered from our shock we began to think what all that meant. Some observations I would make on need—and I'm going to make this observations largely in the context of rural China, that's not to say there isn't need in urban China but I think that it's of a different dimension and actually most of that need is the migrant population of that rural group that has gone to try and find a (rather temporary future) in urban areas. It's a large country, it's not the largest country in the world, and sadly it has got an even larger population. And although that population isn't growing anything like as much as India's population, the reality is that there's just not enough space. There are not enough resources. The resources of 4 planets don't get you there, it is not possible to pursue the same kind of economic and consumer model in China as it is in the rest of the world. And it astonishes me that people haven't quite understood that. I'm very bad with numbers, but one number that sticks in my head is that China's population of 1.3 billion people lives on something like 27% of the total landmass. And actually that landmass is shrinking, largely as a result of environmental degradation. So need is number one, attached to an engine of growth which makes China a very exciting and important place to be, and I think those two are rather inseparable.

The second perspective on need is the government's perspective. And I think this government is 110% focussed on need in that first sense of rural need. It has made a huge shift in terms of where it set its policy priorities, the reality is that it's very difficult to shift an engine that big, very fast. So we're seeing a lot of policy attention,



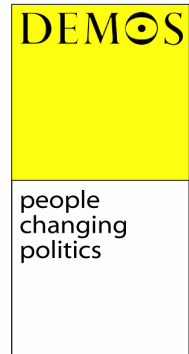
and a real lag in terms of delivering change in rural areas and you're seeing the consequences of that in terms of rising social unrest. I would say that in our experience people are more concerned about social unrest in China with a sense of 'how are we going to deal with this?' Our unusual organisations like the public security bureau devote a lot of time to working out where the risks are and what social change is needed to bring about change. This is a very different kind of country to the one that people have historically based their perceptions on.

If I was thinking about the government's sense of need I would also think about science and technology in a much bigger sense. I'd think about 21st century science, and in our opinion I would say that this government is focussed on what it believes to be the defining role of science and technology in terms of global positioning. No-one has mentioned it so far this morning but you must all be aware that this is the single most scientific and technologically qualified government on earth ever, and that isn't just in the top leadership, you'll find relatively few social scientists in key policy making positions, but you'll find a lot of engineers, technology people, scientists.

That brings a very particular focus to the question of shaping and resolving problems. I would agree with my colleague who said that TSDCSMA is technically not that great, but that's not the point. The point is that the government has decided—and I probably think they're that wrong—that investing in science and technology is not enough and they will invest increasingly more, and they will focus on standards, on owning platforms, across the board. And that's a very deliberate focus. I find my clients are generally unprepared for that focus. It is a focus which is not simply coming down from the government and attaching to policy, it's one that is shared as much by entrepreneurs and university students and academics as it is by the government itself.

I would say that any country that's gone through the rapid and relentless change that China has gone through over the last 25 years is going to be a pretty extraordinary place to be, and certainly one that is going to think a huge amount about need. I've touched on the environmental consequences of this huge transformation; they are beyond almost anything we could imagine, actually. They are problems to keep anyone awake at night. But also the implications this has had on shaping human lives, and creating huge gulfs between the economic but also other experiential factors, such as the health worlds of individual people. I think this raises interesting questions in China about the role of the individual. I think China will be a crucible for the question of our time, which is 'what is the role of the individual?' We've lived through a twentieth century where the individual has been defined very much in terms of what can I get, how individual can I be, how far can I push this envelope.

We've heard about Richard Florida, I'm a great fan of Richard Florida but I don't think that's where we're going now. I think we're looking at a world which is increasingly saying, what is my responsibility as an individual and oddly enough I think China is an extraordinarily well qualified society to ask that question. What is the relationship between the individual and the collective, between the individual and society? If we come back to this focus on science and technology I would say that there are two really

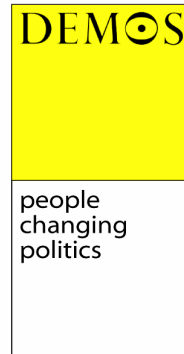


big questions. One is what's the role of the individual as an innovator, and what's the role of the individual as an ethical consumer?

On the innovation side, some of the most interesting conversations I've ever had in my life have been with extraordinary scientists who head Chinese universities. I accept clearly as my predecessor pointed out there are very big differences between what goes on in R&D in different sectors but in some areas in China there is a lot of R going on, and there are a lot of big questions attached to the R. A conversation that I had once and will remember forever was with Song Jian, the architect of Special Economic Zones. We had a conversation about the separation of science and religion in Europe and what that meant for society. These are big questions for China, because one of the casualties of this dramatic change that China's gone through, has been about what responsibility does the individual have as an innovator. I think you will find that question being asked by a lot of interesting scientists and one of the sad things is language, some wonderful people with fabulous ideas in the UK find it very hard to have wonderful discussions with scientists who think about these questions because the scientist's language is often in English pretty well equipped for a scientific discussion, but not so well equipped for the broader human discussion. But one shouldn't assume that it isn't there, it really is.

I think in this question about the individual we should think less about Richard Florida and more about Amartya Sen. In his book, *Development as Freedom*, Sen talks about the voice of individual being really important in terms of economic impact. Well the fact that the Chinese government is absolutely focussed on economic growth is really important, because without it nothing else happens, without it the hundred of millions of jobs that need to be created aren't created. The question of course, as Wang Qiming pointed out, is what kind of growth, what quality of growth. I think that's a pretty brave question for somebody to ask when they're going full throttle ahead and can't really afford to go below 7-8% growth per annum.

I'll say one last thing about the question of the individual. We did some work last year around sustainability and one of the questions we tried to get a grip on was 'what do people believe in China?' It was purely anecdotal, we didn't interview 1.3 billion people. But we got this sense that what people believed in wasn't quite what they thought they believed in. We had this sense that Confucianism didn't quite get you there, and money didn't quite get you there, so what was it? At the end of the day, we found that China has more formal religions than any other country in the world, the President is the titular head of all of them, including the Church of England, so that gives him a nice conversation piece with our Queen. But apart from that, on a more serious note what we found was this really deep conversation among artists, among people on the street, among intellectuals and among people on the web in chat rooms, which was about materialism. And this question about what is materialism and actually how do we define 'good materialism' and 'bad materialism.' Again, I think this raises some interesting perspectives for China around science and technology.

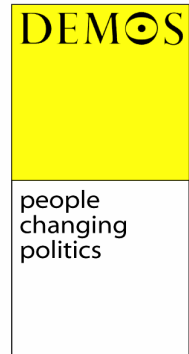


So curiosity. I think one has to separate education in China into at least two streams, you've got an incredible elite going through some extraordinary universities, and although my predecessors are absolutely right that there are very few foreign scientific academics in China, there are around 150 foreign academics attached to Tsinghua, thinking about economic policy and beginning to think about social issues. So I think that might change a lot more quickly than we might expect. But nonetheless in these elite education institutions we've got huge talent and huge ambition, and as many of my predecessors pointed out this morning, this great link with the West is absolutely true, people go abroad to study.

The interesting thing is that people choose not to go abroad for their first degree if they can possibly avoid it, if you can get into the top three if not the top ten Chinese universities, then that's where you go. That's where your real home is. And then you go abroad and learn some stuff and then you come back. This question of returnees from the Chinese government's point of view is hugely important; it's something the government is encouraging. Not every returnee comes home. Lots stay abroad. But the ones that do come home have created a rather interesting society all of their own. It's funky among those people not to speak English, it's funky to speak Chinese. It's really cool to be Chinese. What they think is, Silicon Valley was really great we learnt a lot, but the real opportunity is back home.

And when I talk about curiosity, what I see is an awful lot of people focussing on the online environment. Obviously mobile is part of that. 400 million mobile users, 100 million online users, which will probably change by about 2 or 3 million in the next two weeks give or take. There's a huge attachment to technology as a means of communication. I don't know whether any of you read Robin Li's interview in the Guardian last week. Robin Lee who founded Baidu, the Chinese search engine. We've been trying to get some of our clients in the media space to understand how important search is in China. Search is not just another Google business in China. Search is fundamental to this idea that you've got a very young population where people feel that technology is opening totally new horizons for them. There are a huge number of Chinese netizens on the web, a huge amount of communication, and a huge passion for accessing knowledge. So in some ways technology isn't moving fast enough.

We would say that one of the reasons why there's a lot of investment in technology in China and why foreign businesses are investing in China is that this consumer market is much more demanding, particularly among the urban elite, than it is anywhere else in the world. I would mention a company called Tung Fang, which we know quite well. Somebody had a question on the relationship between enterprise and academia, and I'm going to touch on that in a second when I talk about imagination, but I would just say that Tung Fang is really worth taking a look at, it's an amazing platform of knowledge and it's all in the Chinese language. I work with a lot of companies who ultimately believe that the world is English. They think it's just a question of time before the Chinese learn enough English so that we can keep on rolling out our content services in China. But it's not going to happen.



Into imagination...I think I said it before, any country that has gone through the kind of dramatic and sustained changes that China has gone through is going to have a big imagination. Everything that you knew and assumed has been broken down, every barrier that you took for granted has gone, and that has changed the way people work. You don't have to be government, or business, or academia, or some private person. You can be all of those, all at once. One of the first projects I did in China was for the Asian Development Bank trying to understand enterprise structures. Even then (and that was 16 years ago), there were a huge number. Today the question is almost meaningless, what really matters is what you're doing, and the example I would give is I guess what we would call the Linux Republic. There's a fairly widespread resentment against the idea that Microsoft could assume China was a Microsoft market. It wasn't just within government it was in academia, and it was among a lot of the academic elite who had graduated from Tsinghua and had gone back and set up their businesses.

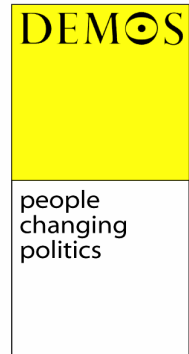
Tsinghua is home to about 160 businesses which are part owned by academics, some of those academics have gone on to become wildly successful VC investors as well and hardly have the time to spend any time in Tsinghua. It's an incredible hot pot of capital, energy, ideas, and extreme access to offshore knowledge centres. Now Linux Republic to us is a group of people who simply said: 'Well we just want to do it differently. We don't want Microsoft standards, we want our own standards and actually there's Linux who will give us a hand up.' And then a little company called Red Flag came along and said to the government, 'We'll move this along, and actually would you mind giving us a standard to help us embed our position'. And lo and behold China had some standards that didn't quite fit Microsoft. I would say that thespace changes very quickly. And when I talk about imagination I would say that the ability to imagine that the world can be different, the ability to imagine that one person can compete with a legacy business is what will define change in China and continue to define it. That's why I think it's probably one of the most exciting places in the world to be.

James Wilsdon

Jeanne-Marie, thank you, that was fantastic. We've got 20 minutes or so now for discussion. It might be useful to start by returning to Mike's point, the balance between the R and the D in all of this. Can we tease out other perspectives in the room about how that balance is changing? How far and how fast are we moving up the value chain? Who'd like to come in on that?

Rohit Talwar, Fast Futures

You mentioned earlier that Chinese companies doing the D side of it are incredibly fast at moving from the D side to the market, and then you talked about foreign companies doing R&D there. Are they getting the same kind of speed to market, when they're doing their development out there, or are they finding things much slower because they happen to be part of global programmes?



Mike Walker

I think if they bring the products of R&D back out of China and put it through their normal processes then they are slower. If they have a manufacturing base in China and they do it through that then they are much faster.

Rohit Talwar

And do you think they're learning from what they're doing in China? Is that impacting back on the whole corporate...

Mike Walker

I can only guess that it is, I would expect companies to learn from other areas...

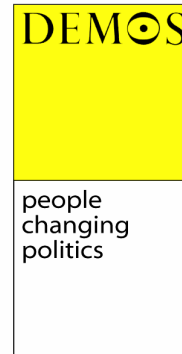
Jeanne-Marie

We did some very early work in the '90s for some of the larger foreign investors who were starting to look at China. Their approach was basically to say, 'you must be off your rocker, why would anyone want to do R&D in China?' We said, well hang on; look at what's going on here. Our argument was that it was about learning, going up a learning curve. If you want to invest in China it's a very difficult thing to do because it changes so quickly. And so what you do is you try and have a very open surface architecture, and actually it's the telecoms and ICT firms who have done that best. They have now come to see China as a place where you take a look at something and if it works then you roll it out relatively quickly. Motorola are doing some very creative work in China, it's their hugest market, but what they're doing is investing their knowledge in China and then putting that back under the control of the markets afterwards.

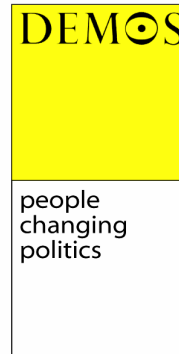
Charles Leadbeater

One of the thoughts going through my mind is that there's a big danger of us measuring the wrong things the whole time. What's important about innovation and creativity is often what can't be measured, but also underlying our discussion is an assumption that for China to become an R&D superpower it needs to do R&D and science in the way that we do it, so R is very important. Two questions really: one is maybe science will just be a very big development power; maybe the R won't count as much, because maybe what China needs is massive, rapid development. And I was struck by the OECD report on China, which said something like; the weakness of Chinese R&D is that a lot of scientists are in production. Well it might be a great strength, actually. If what you want to do is to develop new forms of production. What Mike said about universities is very true. A huge amount of policy now is devoted to trying to transfer from universities into business. So if you set up universities where those barriers aren't as big, that might be a huge advantage. So rather than thinking, where's the R going to come from, maybe we should just think, China is going to develop a new kind of development-led innovation system, that's what's most appropriate for it right now.

The second question goes back to Christopher Cullen's presentation, which was based on the premise, if Richard Florida is right, what kind of components of that model can



we see emerging? And I think the question is really, *is* Richard Florida right? Because actually what we've heard is a number of new possibilities of new creative or innovative zones emerging in China which may well not fit Florida's thesis, they might be online, they might be around diasporas, like Jon's guy at Fudan University. And I suspect they won't resemble Richard Florida's creative community at all, but they will look quite different. So my underlying feeling about this discussion is that there is a tremendous danger in looking for things that we recognise, and missing things which are genuinely different, and that the really significant thing about what's happening in China might be that something genuinely different in terms of R&D and innovation and start-up is emerging, but we may well not recognise it because we're looking for what we find familiar.



Mike Walker

I don't disagree with you at all. I did say that these were 'observations,' rather than criticisms. We don't find the R, and we don't find the innovation at the moment and it may well be the case that the innovation will come out of a different cycle, it may come out of development, it will come out of the way in which they are able to turn things round so quickly, and that itself will lead to innovative ideas. I think you're right, we have to look for other things, and different ways of doing things that may emerge.

Jeanne-Marie Gescher

I would see Richard Florida, not as a prescription, but as a description. So I'd be looking at different things. It seems to me that people come to China, not because it's a comfortable place to be, not because it's going to have as many Starbucks as other places have. James has been to where we work, it's a munitions factory, but it's about the most exciting place I've ever worked, so I think people are choosing excitement and challenge.

Christopher Cullen

First of all I've no wish to get into a fight between Amartya Sen and Richard Florida! I did say that I couldn't predict the future, and nor can anybody else in this room either, even if they're not in the story. I think we're going to have to wait and see where the Chinese Nobel Prizes flood out from, and then we shall know whether Chinese innovation is going to be different from what it has been elsewhere and in what ways it is going to be different. I'll just say let's wait and see.

I'd like to direct something towards Jeanne-Marie, because I was fascinated by some of the things she said about the individual and democracy. I wonder if she'd familiar with some of the writings of Geoffrey Lloyd on ideas of democracy in a comparative sense. But, what I'd like to ask more directly is this: you were talking about a shift away from the self-directed individual to a more socially and ethically directed individual did I get that right? I too have had my talks with Song Jiang, a very impressive man. All I'd like to ask is: you use language which is very common in talking about the present, like where we are going and so on, which is very vague language. Are you speaking as an observer of this trend in China or as an advocate of it. And since ethics is rather dull if not actually applied and participated, I'd like to know how much has your experience

of being immersed in what I know is a very impressioning environment, where the talk is about public ends and the public good, while what goes on behind the scenes is often very different indeed. How much has immersion in that different kind of ethical aquarium changed the way you do your business and run your own personal goals as an individual?

Jeanne-Marie Gescher

First of all, Nobel Prizes; one of the things that most preoccupies the Chinese government. I might take Charlie's point on by asking whether a Nobel Prize is the single most important point in defining what innovation is. But I'm not a scientist.

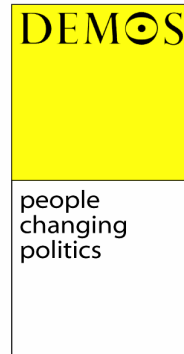
In terms of observation and advocacy, I've lived in China a long time. I wouldn't live there that long if I didn't really like it. So I am what you see. I find actually though what I try to convey to people is that China is a 360 degree place. I get lots of people who come who make mobile phones, or they run TV networks or they own a bank. And they all come with their very narrow stream, and what I try to say is that China is as wide a spectrum of social, human, scientific and ethical ideas as any other country in the world, and I think very few foreigners see that.

So forgive my kind of infectious enthusiasm but I often think this is quite important to get across. In terms of ethics, I don't know whether it's a chicken or an egg. I think the business that we have is an odd one. Most people say that to me and I've learnt to take it on the nose. I used to think it was a gross insult and now I've come to think that it's a point of pride. It's odd because we do a lot of advisory work, we help to build investments, we also do pro bono work. We will step in if we think a small organisation needs help, then we try to put people together. So the people that know us in the room know that we put together a lot of dialogues and whereas sometimes we do them for clients for a fee, we will often do dialogue programs for thought leaders who come to China, for anybody who we think has got an interesting idea.

It isn't necessarily that 'oh I've become a great person being in China.' What my experience has been is that I don't believe it's possible to understand what's going on in China without persistently going out to talk to more people everyday, to ask questions and put more people in dialogue with each other. And it's hard, it's emotionally challenging to keep putting yourself in front of new questions. Oddly enough I think that's been an exigency of the Chinese environment, and I find it hard to imagine whether we could have done that here in the UK. I think it would have taken a lot more emotional and professional courage to take a question out of one space and ask it to someone in another. So I don't know if I would have had that courage here. So, I don't know, long answer, short question.

Dr Wang Qiming

I still have two doubts about the R&D thing. I still don't know how much evidence you have of foreign companies in China doing R more than D. To my understanding it's still much more D than R. How to develop their products, how to customise them in the Chinese market, changing to the Chinese language, fitting into the Chinese model



and so on. My second doubt is on the universities R&D. So far the criticism from the economic side is that the Chinese research ends up in publications, rather than solving the real problems that the Chinese face. That's why the government is trying to guide university research to be more useful in terms of future development.

Jeanne-Marie Gescher

Thirty years ago, there was an incredibly sophisticated system of agricultural research within rural communities and that has disappeared, creating a huge challenge in terms of individuals who actually need those appropriate technologies. I think the Chinese government will have to work very hard to deal with that, and I think they've recognised as most people have that the answer is not going to lie in government programs, it's going to lie in reshaping the relationship of society to government, and that raises some really big questions about what society is, depending on what part of China you come from. I think that's probably going to be one of the biggest challenges. And that's also why I think that science and technology are not going to be issues that are separable from much broader questions of social and human policy.

Peter Dickenson, Brunel University Business School

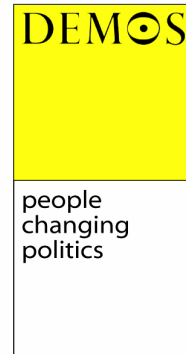
We're researching the Chinese innovation and IT industry at the moment. Recently we've been talking to a lot of spin off companies, particularly from Tsinghua. They're all complaining that they're being pushed out by joint ventures and foreign businesses. They're losing staff, they can't compete on salaries with the joint ventures, they can't really find a competitive edge as far as the Western companies are concerned. And that rather raises the question, what is the development perspective of the Chinese government? Does it see supporting indigenous firms and their innovations as being the way forward? For instance, foreign companies have a favourable tax regime compared to indigenous companies, they're all complaining about that, and the indigenous companies are complaining, they can't raise finance, they have to finance their projects from their own resources, whereas the joint ventures clearly have multiple sources of finance. And so there's a big question mark over the sustainability of indigenous Chinese IT companies. I think that this is something that will perhaps come to a head quite quickly.

Mike Walker

I can see the problems with the start-ups. Although I must admit from what we've seen the start-ups in China do offer huge potential. Outside the US it is the most dynamic if embryonic start up environment that we've come across. But the big companies in the IT sector in China such as Hua Wei are very competitive internationally and growing at a huge rate, and as far as I can see don't have a problem getting very good staff producing products that the rest of the world wants to buy.

Jeanne-Marie Gescher

Can I just say one more thing? It's only to say that I don't disagree, but we also work with large companies who find it difficult to understand why they lose all their great talent to young Chinese start ups, and I think a bit of it has to do with more



entrepreneurial structures, so there are obviously different experiences in different areas. But I don't think that it's all downhill for Chinese entrepreneurs.

Louis Turner

There are just two quick things I'd like to recommend for the final report. One is this question about the Nobel Prizes. The evidence is that economic growth comes first and Nobel Prizes come second. But as far as I'm aware, Chinese Americans have won Nobel Prizes. What would be good in the study is if you had at least a bit on the contribution of overseas Chinese scientists to the international scientific community. Secondly, Mike you mentioned graduates. You said that the standard was good, but then we've had comments from the floor about rote learning, I've had a British investor out in Tianjin basically saying that the engineering graduates he sees are equivalent to 16 year old students here. So certainly we've got brilliant universities at the top, some are at the bottom. What would be good is if the final study could differentiate a bit about the Chinese university system, about the standards at the top, the middle and the bottom, just to give an idea of what's there.

Carol Rennie, Royal Society

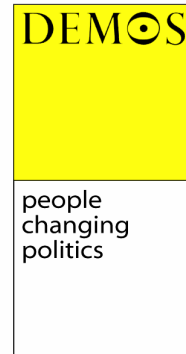
Is there a tension from the requirements to publish in international journals to get research money and to count as a top research institute? One person I spoke to at Tsinghua said 'we're no longer going to do that, we don't care, we're going to go against the system.' I don't know if anyone knows about that tension? Does it perhaps reflect the difference between doing basic science, being internationally recognised and perhaps a different Chinese model?

Dr Wang Qiming

The quick answer is that China has never put a Nobel Prize as one of its targets by the year 2020. That will just come along, you never dream it.

Jeanne-Marie Gescher

On research publishing, I think it's part of the bigger question of who owns it. I talked about platforms and standards and who owns them, and the kind of routes that Chinese scientists have into those platforms. I think that what you'll see over the next few years is more Chinese platforms coming up, possibly in collaboration with global partners. My sense is not so much that people object to the idea of publishing, it's that they object to the parameters that are set by the traditional publishing model. I wouldn't call it open access. We talk about open knowledge, but we think there will be a lot of platforms that will be created to open up access to more Chinese research, and actually I think that that is what the Chinese government wants. There is a question if you're trying to look up your ranking in the world, the number of patents you've got, the number of citations you got, in peer journals, but I think there's another point about how do you get more knowledge about what kind of thinking is going on in China, circulating through Chinese society. I think there's room for both.



Mike Walker

All I can say is that I'm sure we looked at the best universities, we didn't go out across China, and we are convinced that they are every bit as good anywhere else in the world.

James Wilsdon

Thank you all very much. I'm not sure how definitively we answered the question on the wall behind us but we've certainly raised a lot of issues that we'll be exploring in greater detail as we go on with the Atlas of Ideas research.

We'd certainly encourage everyone here to stay in touch with us over the course of the project. There's a page up on the Demos website which we'll be regularly updating with information about future seminars and also about the larger conference we'll be organising at the end of the project when we publish our report. Do stay and continue the conversation over lunch, but for now, thanks to our speakers Mike Walker and Jeanne-Marie Gescher.

END

