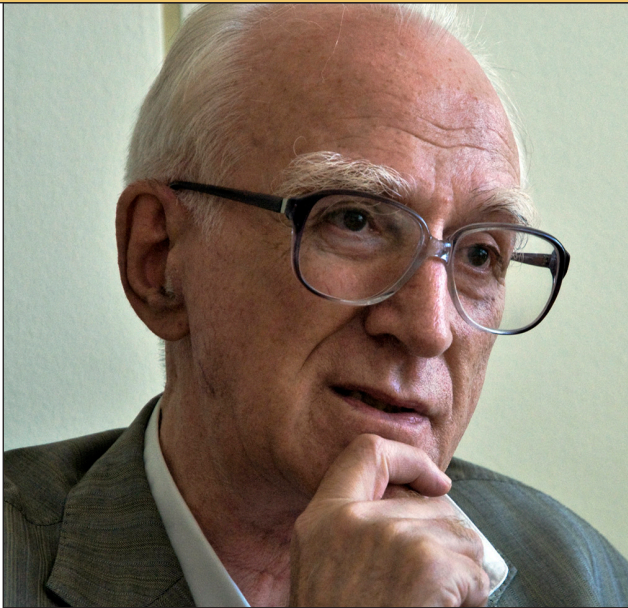


There Are Hundreds of Companies that are Capable of Making a Leap – p.13
There is no Such a Thing as a Single Unique National Innovation System for the Whole World – p.15
«President Medvedev Understands the Importance of Rules» – p.61

MAIN SUBJECT

THE BEST OF 2010-2011

Innovation Approach Needed to Create Unconventional Institutions



Viktor Polterovich — RAS Academician, Member of Executive Committee of the International Economic Association, Chief Editor of the Journal of New Economic Association

What do you think are the most and least successful examples of innovation-oriented policies in the world?

The term “innovation” has many meanings; it needs to be clarified. The Federal State Statistics Service differentiates between advanced production technologies that are new for Russia and those that are totally new. Totally new means ones that have been developed for the first time and have no substitutes anywhere in the world. And new technologies for Russia mean ones that have been essentially borrowed from other nations. In 2007, Russia borrowed for the first time 653 advanced technologies, and developed a mere 75 totally new ones.

If your objective is not to amaze the world but to improve performance and therefore living standards, you can opt for borrowing rather than developing new technologies. Moreover, if a country lags behind in technology, it usually finds it much cheaper to borrow. Advanced nations, on the other hand, are limited in their choices of borrowing; they are forced to develop totally new solutions.

The most successful among such nations is naturally the USA. The Americans have developed an effective

mechanism for generating and implementing innovations from fundamental research to commercialization and to retailing. It drains brains from all over the world, enticing researchers with high compensation packages and comfortable working and living conditions. Using venture funds and a well-oiled stock market, it skims the best projects. They know how to commercialize the products and solutions developed. The USA supplies innovations to the world at large, and the world pays for their development by putting its savings in dollars. This is an example of the best innovation-oriented policy.

Economic-miracle countries, such as Japan, South Korea, Taiwan, as well as Finland and a number of other economies, use sophisticated innovative strategies. To begin with, they imported foreign-made machine tools and equipment, then they bought patents, set up their manufacturing facilities, and forced out imports. After that they committed to exporting, gradually upgrading their products and switching over to high technologies. And only then they did opt for innovative growth. These nations provide examples of successful innovation policies. But there are many more nations that have failed.

Why?

They failed to follow the correct sequence of switching. A case in point is Brazil, which is not the most backward nation in Latin America, not by a long shot. Brazil is growing at a fairly good rate. But there has been no leap forward in Brazil, as there was in Japan, as there was in Taiwan and South Korea, because it has failed to come up with the correct strategy.

It must be emphasized here that a successful strategy at each stage of development has both distinctive macro-political features and specific methods of government intervention. For example, small businesses play an important role at the stage of innovation-driven growth, typical of advanced nations. And major corporations are much better at arranging borrowing.

Sometimes we hear even from, one would think, the authoritative lips of spokespersons for the World Bank that all Russia's troubles come from the insufficient number of small and medium-sized businesses in Russia. But history and theory provide evidence to the contrary. To be sure, we need to support small businesses. But we should not expect them to become major drivers of economic growth at this juncture. At the stage we are at this role must be played by major economic players.

What are the latest changes in innovation policies in the world?

As a crisis management measure, developed countries have increased expenditure on fundamental research.

First of all, they have increased expenditure on the development of nanotechnology and energy-saving. As early as 2000, by way of response to the crash in the market for securities of high-tech companies, the USA launched its National Nanotechnology Initiative. The President has a National Nanotechnology Coordination Office. In the European Union, nanotechnologies take a place of prominence in the EU's [Seventh] Framework Programme for Research and Technological Development. But developing economies should have a different strategy. The global crisis is creating good conditions for import substitution and acquisition of marked-down solutions, for recruitment of experts who now find it more difficult to get jobs in their home countries. China is very active in this respect.

And does Russia have an innovation system, and what are its distinctive features?

Of course it has. We have been very busy these last ten years in setting it up. And it is in a very sorry state because it was built without rhyme or reason. It is a hotchpotch of various institutions set up by blind copying of Western ones.

It's a catch-22: we copy institutions in hope of acquiring an innovation mechanism. But what we need is exactly an innovation approach to form unconventional institutions to ensure effective borrowing. Borrowing is far from simple. Had it been simple, there would have been no developing countries left by now: they would all have become developed.

What research and development areas do you see as enabling a leap forward? Which ones can be expected to deliver the next technological breakthrough? After all, many believe that one of the causes of the crisis is the end of the previous technological cycle.

I do believe that new technologies must come into being: ones of wide application, i.e., technologies that can be integrated into a wide range of industrial applications, becoming a driver of economic growth. In the same way as, say, the computer was integrated.

Old technologies of wide application, such as the computer, the Internet, are gradually exhausting themselves. It means that they can no longer provide

a platform for rapid growth of advanced economies. In the final analysis, this is what triggered the crisis, which actually started not in 2007–2008 but as early as 2000, when a crisis occurred in the hi-tech market.

The Western nations seem to understand this. Maybe this hasn't been made explicit in so many words, but they are doing exactly what needs to be done. They are investing in new technologies, first of all in nanotechnology. It looks like nanotechnology is precisely the future technology of wide application. Experts say it will take quite some time for them to fuel new growth — up to ten years. So we shouldn't expect Western economies to grow at their former rates in the nearest future. More or less a similar situation prevailed after the 1930s crisis, with the aftermath of the crisis casting its shadow over an entire decade. And after the war the era of new technologies began, and eventually they pushed the Western economy to a new level.

Russia must find an institutional structure that would enable effective borrowing and a gradual transition to innovative growth. In my recent articles I have attempted to outline such a structure. It is based on the experience of the economic-miracle countries and factors in the development mechanisms that have emerged relatively recently. Its further elaboration is the subject matter of a multi-author book which I have edited, which is scheduled to appear in September. It is called "A Strategy for Modernization of the Russian Economy".

The keynote of the proposed strategy is as follows. In order for Russia to join within the next 20 years the group of developed economies (in terms of per-capita GDP, this means at least 50% of the US level), it needs a system of interactive growth management. Its major components are a system of regional agencies for interactive planning headed by a federal agency; a national innovation system, geared up for borrowing with a gradual shift towards innovation; and macroeconomic and foreign-trade policies aligned with the development objectives.

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V Nano & Giga Forum

V Nano & Giga Forum will bring together international leaders and young talents doing research in nanoelectronics, photonics and alternative energy. The Forum will take place in Zelenograd (Moscow region) September 12–16, 2011.

The event is organized by Moscow State University and NT-MDT — leader in nanotechnology instrumentation, and will include tutorial lectures (Summer School), scientific symposium, exhibition and satellite workshops on nanotechnology innovations, instrumentation and standardization. The conference organizers have made agreements with Springer and the Institute of Physics Publishing for publication of the papers from the NGC2011 meeting in a tutorial book and special issues of two high ranking international journals, Nanotechnology (IoP) and Nanoscale Research Letters (Springer).

www.asdn.net

VIRIAL Launches First Production Line for Nanostructured Ceramic and Cerametallic Goods

August 19, 2011 ceremonies were held in St. Petersburg for the first production line for new high-tech goods of nanostructured ceramic and cerametallic materials. The facilities belong to VIRIAL, a project company created with co-investment from RUSNANO.

The total cost of the new project is 1.7 billion rubles. Investment fund CapMan, a leading fund in direct financing in Scandinavian countries and Russia, and agriculture innovator Siberian Organics have joined RUSNANO as co-investors.

With the commissioning of VIRIAL's new plant, the company will be able to boost output to 1.2 million ready-made items in 2011, an increase of 0.25 million. Greater production and broader product offerings will drive company sales to 720 million rubles this year, 20 percent above earnings in 2010.

www.rusnano.com

He Invented a National Innovation System



Bengt-Ake Lundvall — Professor of Economics in the Department of Business Studies, Aalborg University, and Special Invited Professor at the International MPA-program at Sciences Politiques, Paris

Professor Lundvall, in the 1980's, together with Christopher Freeman, you have developed the concept of National Innovation System, a term that is widely used today and defined differently. In this regard, my first question is what made you research this particular topic at first place?

Most important was the analysis of innovation process at micro-level where we found that innovation is an interactive process. For instance, we illustrated this by the interaction between producers and users of product innovation. At the more aggregate level we found that national economies with investment in science were not necessarily innovative. Such paradoxes could be explained by the fact that innovation involves interaction and communication with feed-backs. "The quality of relationships" between agents and organizations is crucial for the performance of the system. It is not sufficient to enhance effort or performance of the single elements if the interaction does not work well.

What is innovation system to you? How do you define it?

I sometimes operate with two different definitions: a core and a wider setting. The core includes the firms, their mutual interaction and their interactions with the knowledge infrastructure. The wider setting includes education and training, access to finance and the public sector, including regulations and welfare state. If you want to understand the impact on economic growth you need to take the wider setting into account. Actually we find that labor markets and education systems are more diverse across countries than are the science systems.

You regard innovation as an interactive process. In what way is it "interactive"?

Almost no innovation comes out of individual effort and empirical data show that it is exceptional that a firm develops a new product without some kind of interaction with suppliers,

users or knowledge institutions. Within firms successful innovation depends upon close interaction between departments for production, sales and R&D.

According to the Lisbon declaration 2000 Europe was to become the most innovative and competitive region of the world with social cohesion. Today, 10 years later, what has changed?

My own opinion is that the policy developed was far from ambitious enough. The first priority should have been to lift the weakest parts of Europe (Greece, Portugal, Italy and Spain) through investments and a more rapid modernization of institutions. The current financial problems that slow down growth demonstrate that the regional inequality within Europe is its Achilles' heel. The idea that a single market and a common currency was sufficient for economic progress was wrong. The focus on lifting R&D-efforts also reflected a too narrow interpretation of the innovation process. Modernizing education and labor markets should have been given more attention.

What are the latest changes to innovation policy in the world? What do think about the given changes?

The most recent changes are reflected in OECD's innovation strategy and in the new European strategy EU2020. On the one hand, there is a general trend to broaden the policy to take into account organisational, institutional and demand side factors. On the other hand, the core analysis is based upon narrow economic models such as production functions and it is assumed that the rate of "total productivity" growth gives a meaningful indicator of innovation.

To your mind, what should be done to improve the innovation policy and foster innovations?

I think that there is a need in general to give more attention to the organisation of work. The involvement of employees of all categories in processes of change enhances both the capacity of firms to develop new products and processes and their capacity to absorb new technology developed elsewhere. This requires reforms in labour markets and education systems. Flexicurity¹ in the labour market and broad and egalitarian access to education and training are factors pointing in the right direction.

What would you call the best and the worst examples of governments' innovation policies?

In Europe I think that Finland is a good case and that the UK is a rather awful one. Finland has a pragmatic approach where the public and private sector interacts and develops a common strategy while the very negative attitude to the public sector in the UK and the bad industrial relations there hamper the development of balanced solutions.

Could you please give your opinion on innovation policies of the countries you are familiar with?

I have studied China's innovation strategy for some years. China benefits from a rather pragmatic approach where regional experimentation is allowed and where "good practice" is diffused through policy learning.

Over the last couple of years I have collaborated with

innovation policy makers in Sweden and Norway. I think that the Swedish innovation policy is too narrowly focused upon the transformation of academic research into innovation and that too little attention is given to the important role of work organisation in connection with absorption of innovation. Norway has recently developed a promising collaboration between trade unions and employer associations regarding a national competence strategy.

successful in developing new “business models” in the financial sector than in implementing ICT-solutions in the real production sector.

To your mind, what research and developments may assure a technological breakthrough in the nearest future? Do you think that such a breakthrough will happen?

Biotechnology is an obvious candidate. But I do not expect it to have as wide and deep impact as

I think that the most important weaknesses of the Russian innovation system have to do with “institutions” defined as norms, rules and relationships in the economy. Lack of trust and irregularities in economic life undermines the capacity of the system to learn and innovate

What are your thoughts on Russian innovation policy?

I am not an expert on Russia but I think that the most important weaknesses of the Russian innovation system have to do with “institutions” defined as norms, rules and relationships in the economy. Lack of trust and irregularities in economic life undermines the capacity of the system to learn and innovate. A strong effort to fight corruption and crime and to establish a new type of collective solidarity is a major task where government needs support from all layers of civil society. There is also a need for a change in the incentive system so that creativity is stimulated among employees as well as among entrepreneurs. Easy access to profit from financial speculation may undermine innovative efforts. Without such changes increased investments in science and technology may not be very helpful.

What are the peculiarities of the innovation system in Britain?

I have nothing original to offer here. In most innovation surveys the UK looks weak and the same is true when you look at the frequency of “organisational learning” at the workplace. There has been some successful transformation away from traditional manufacturing toward some high tech sectors. But especially there has been a strong growth in the service economy. I have a feeling that the UK has been more

ICT. ICT has still a big potential for raising living standards and solve problem — a potential that has not yet been exploited. The most promising breakthrough could come in relation to low-carbon technologies. But here a common global effort and strong national government intervention may be necessary to trigger and foster a new techno-economic trajectory. This is not different from earlier breakthroughs — it is a rule rather than exception that governments have played a major role for such breakthroughs. This last option is especially interesting for economic transformation in countries such as Norway and Russia where the current economy is dependent on the continued use of carbon technologies.

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International Training Workshop on Advanced Structural and Functional Materials

September 27–30, 2011 based on the Moscow Business School Skolkovo ROSATOM and Skolkovo Foundation jointly organize International Training Workshop on Advanced Structural and Functional Materials.

The Workshop is aimed at discussing the current status and evaluating perspective directions of the development of advanced structural and functional materials (ASFM). It will be run with participation of representatives of global technology companies that are customers of new materials, leading ASFM developing companies as well as Centers of Competence for ASFM development and R&D Institutions and Universities. The presentations of invited experts will serve as a frameworks and a basis for broad communication and discussions of certain development plans and strategic considerations regarding ASFM.

www.venture-news.ru

Russian Participation at the AdvaMed 2011 Conference

The Mid-Atlantic — Russia Business Council (MARBC) organizes the participation of a Russian delegation of businesses in the medical technological field to the AdvaMed 2011 Conference, which will take place in Washington, D.C. on September 26–28, 2011. The MARBC is a supporting partner organization of AdvaMed, the world's premier medical technology conference and exhibition in the Med Tech field.

After the conference has finished, the MARBC will bring the Russian delegation to Baltimore and other parts of the Mid-Atlantic region. The MARBC will conclude the program in Philadelphia where Russian executives will continue to follow an intensive program of engagements including a roundtable discussion and a meeting in the International Incubator at the Science Center.

www.ma-rbc.org

Innovation System: the Problem is to Get the Process Started



Jan Kregel — Professor of Finance and Development at Tallinn University of Technology, Adjunct Professor at Johns Hopkins SAIS (SAIS), Visiting Professor at the University of Missouri–Kansas City, permanent advisor for the Trade and Development Report of UNCTAD

Professor Kregel, to your mind, what are the latest changes in innovation policy in the world?

What we've seen is a very large shift in what we call the innovation paradigm, a general approach to innovation. Broadly speaking, we've shifted from a mass production paradigm that is based primarily on capitalist production and economy of scale to the one that is based on a more specific production — what we call the economy of scope. In general, this has to do with microprocessors, the use of computer technology, communications and the things of this sort.

The first important change that has led to this shift in innovation paradigm was a geographical dispersion of production. It means that you can access lower costs in specific markets. For example, if you are producing an automobile, you produce an engine in Indonesia because the wage costs in Indonesia are much lower than they are in European countries.

So you have dual impact. The idea of using computer technology and micro processing had an impact on the production process, and also you have this impact on other costs of production, and, in particular, labour costs that you can decrease by moving the particular parts of production process to different countries. And this you clearly never would have done with the old fashion. By old fashion I mean the first process that we talked about, which was mass production because all of this, by definition, had to take place in one particular place, in a very large producing unit. I think this is the most recent change.

Obviously, over the past 10 or 15 years we've witnessed

the process of globalization, which has been basically driven by technological innovations. The question is what is the next innovation wave? A number of people have looked at things like nanotechnology and biotechnology. But there is another side area — environmental technologies. We have a big oil spill in the Gulf of Mexico, and the technologies that are being used there are still, in fact, mass production type of technologies.

What do you think about recent changes in governments' innovation policy? Nowadays, governments are required to improve the efficiency of public research and facilitate the translation of research into commercial realities. Are there any changes in what governments do about it?

If you look at the US government — it has always had a very strong technology policy for the purpose of national defence. Take, for example, some of the innovations that we've talked about — microprocessors, micro technology, things like the Internet — the Internet was originally generated by the US defence department in order to ensure safe and secure method of communication in case of a national emergency or a national disaster. So, when the Internet was invented it wasn't considered as commercial thing, the government took no steps to ensure that it could be used as something that could bring a commercial value. The only thing they were interested in is whether or not the militaries and the government could communicate among each other. They never thought that the Internet would be something that you and I would use in our daily activity, or that it would be a commercial process. So this was something that was developed more or less spontaneously by the market.

Currently, the government provides support for research and development, which is done in a more balanced way. What they do is that they put out a tender or call a contest for a particular product, which they would like to develop. And then individual companies compete, offer different solutions. But when the government finds the most efficient, to its mind, solution, it also helps the company to make use of this technology in a commercial way — that is to build it as a viable commercial entity.

Once a company wins a contest, obviously, the government is going to buy its product. So it provides it with a market. But at the same time the government also gives the company support in terms developing a commercial market for that product. Say, for example, the defence department asks for some piece of equipment that is supposed to be used only in some secret airplane. Obviously, the company can't sell that product to the market because nobody else can use it. What the government does in this situation is that it helps the company to elaborate the product so that it could be used somewhere else and consequently could be sold in the commercial market.

So, instead of just supporting research and development of a product the government also supports the ability of the inventor of a product to form a company. Again, let's just take an example — Microsoft. Say, Microsoft had developed its operating software just for the government. The government then would buy the software but at the same time will help to form a company so that inventors could sell the software to the general public.

What about the market environment in general? I mean, another role that government plays is that it creates an environment where start-ups can easily operate. And it is indeed a hard thing to do. To your mind, what a government is to do in order to create an innovation-friendly environment?

Well, as I have already mentioned, first thing is in providing market for products. It is very important. The second thing, which has been very useful, in particular in the US, is industrial parks. This is what we call innovation clusters in particular areas. Now, it is a very long tradition that talks about industrial district or industrial zones. You create very large externalities by allowing firms that are working in a particular area be concentrated so that there is a dissemination of information and many other things.

You always have to keep in mind that there is a very strong link between the innovation side that is part of research and development process and the idea of implementation and commercialization. And if you can't generate a demand for the product and efficient sales then the entire process brakes down. It is impossible to have research and development just for the sake of innovation. You have to be able to implement and install the technology, and for this you are required a strong support of commercial sector. This is one of the reasons why, for example, defence department pays much more attention to the formation of successful commercial ventures supporting the research that they are interested in.

Another very important thing is coordination of financing, and what we call a permission of venture capital. For example, in the US the government sets up its own venture capital funds. It provides financing for new innovation and new technologies that it is particularly interested in. But there are things that the government can't support by means of setting up ventures.

So you have to do all these three components: creation of new companies and organisation of products sales on a commercial basis; research and development in industrial parks and innovation centres in order to produce technologies; financing or venture capital financing.

One of the difficulties is simply getting all this process started. Most

of the new start-ups are financed by already existing companies. So if you take a big company like Intel or Sysco, Intel and Sysco have their own venture capital funds. They simply finance new companies, and try to develop new products. Once the process gets started, it is much easier to proceed. The problem is to get this process started, and it is when the government plays a very important role in providing both the possibility of creation of industrial parks and in providing the kinds of venture capital funds.

So at some point innovation system becomes self-sufficient. In other words, it reproduces itself. But still, we cannot do without government in order to create a well functioning innovation system.

That's right. The idea is to get the whole process started. Once it gets started, then you get this sort of self-generated production. In general, we see in the US this sort of large and successful companies. You start up with a particular kind of innovation, and the companies that are interested in finding other innovations, which they can use, come. So, you get this process of inner venture capital funding. And many times this is what we call vendor financing¹.

For example, Cisco produces routers. Now, there is a company producing a completely different product but they need one of the routers that Cisco produces. Cisco will sell them the product that they can use in innovation process and Cisco won't charge them for it. That is they will not make them pay. They will say: "OK, we will lend you the money to buy our equipment, so that you could develop a new product. And then, if you are successful, you can pay us back in terms of shares in your company or in terms of profitability". So this process of internal financing within a sector, which comes as innovation process becomes mature. But, as I said, this is something that comes as a secondary stage. The problem is always to get it started.

Do governments always understand their role in innovation process? What government innovation policies are you familiar with?

In general, the governments don't pay enough attention to innovation policy. As I've already mentioned in the US it is primarily a defence-driven

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Training course "Certificate for environmental management ISO 14001"

The European-Russian Center for innovations, ecology and economic development EuroRus e.V. organizes training course "Certificate for environmental management ISO 14001:2004" which will take part September 19–23, 2011 in St. Petersburg. The environmental management certificate ISO 14001 opens for each company new chances and perspectives of success and prosperity and evidences about the social and ecological awareness of the company. The certificate ISO 14001 is advantageous for companies, which export their goods abroad because this certificate is one of the necessary conditions of the successful promotion of the products, technologies and services on the international markets. For example the EU countries have announced about their intention to deny access to the European markets for products and companies without ISO certificate.

www.euroruss-forum.com

IV St. Petersburg International Innovation Forum

IV St. Petersburg International Innovation Forum, a major event of the Russian innovation economic policy, will be held September 28–30 in St. Petersburg. This year it will be organized in collaboration with the Republic of Tatarstan. The Forum is not only a key event of St. Petersburg business life. It has also become a major event for the Russian innovation economy, a networking venue for professionals who join their efforts to define the prospects, possibilities and priorities of the innovation-based way of the development of the Russian economy. Last year the Forum welcomed over 11 thousand participants from 47 Russian regions, and 35 countries, including the US, Germany, Finland, etc. in 2010. Its congress program comprised 75 events, the business network exchange hosted over 300 meetings.

www.enforum.spbinno.ru

process. And the idea is basically that the private market should be capable of doing this by itself.

You do have very strong policies. For example, the Chinese government has a very strong policy in terms of using foreign direct investments and joint ventures in terms of generating technology.

In contrast, the Japanese government had a policy of buying technology from the outside and then developing it internally. This is a different sort of process, the one that comes from a country, which is in process of catching-up. After the war Japan was in a position in which industry was totally destroyed. So they had to start from scratch. What they did is that they went and bought technologies primarily from Europe and from the US. And then they set up a process of internal elaboration of those technologies.

So, basically, the difference in terms of governmental policies, say, between Japan, China and the US is that the US already being an advanced country faced a very different innovation problem than the Japanese government faced. Korean government was in a similar proposition. It bought technologies and then developed them internally.

This is more or less a decision of a country whether you are supporting what is called basic research or whether you are simply taking existing technology, trying to elaborate them.

And one of the difficulties here is that if you are already in advanced country, obviously, you have trained personnel that are able to work in this sector. Whereas, if you are in a country which is catching up, you need your own human capital in order to set up your own technological development.

Some countries succeed more in innovation, some less.

To your mind, why some governments manage to build more efficient innovation systems comparing to other countries?

Important aspect we found is that whether or not government policy strongly supports domestic expansion and domestic employment has a significant impact. Generally, the more successful the economy is (if it grows and uses its domestic resources) the more successful it is in providing innovation. Countries that have very low growth rates and

have high level of unemployment, in general, do not have the resources to devote to innovation strategies. On the other hand, the economies that are attempting to use policies to grow very rapidly and provide full utilization of the resources are the ones that do, in fact, end up with successful policies. I think it is a question that cannot be separated from overall approach to economic policy.

To your mind, what research and development may assure technological breakthrough in the nearest future? Do you think that such a breakthrough will happen?

As I have already mentioned, a lot of people believe that nanotechnology, the idea of this little micro engines is going to be the next level. So if you look at these sorts of innovations, and you ask what areas it is going to be, I would say that nanotechnologies would serve, for example, in area of health service. They have not yet been important, but they could be extremely important, for example, in development of medication, which could be used for targeting implementation. So instead of taking a pill which goes all over your body in order to produce a very precise impact in only one section, you will take a little nano-something, ingest it, and it will go directly to the place where the medicine has to be delivered.

So, things like this that are not being developed, may change quite dramatically the way we look at things like healthcare. Again, you have to separate innovation from implementation. Lots of innovations that come along are very interesting but we don't know whether they'll end up providing any sort of implementation that can be commercialized. In this regard, if we take nanotechnology and biotechnology — they set pretty clear impacts on sectors, which are crucially important, like healthcare. For example, in the US our healthcare costs are extremely high, and they do create difficulties in terms of overall economic development of the system. So if you manage to produce an innovation which can be used in order to bring down healthcare costs dramatically, then this sets a very big impact on the economy not so much as a result of the innovation but as a result of the way the innovation is implemented in the system.

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The Company Rusatom Overseas Registered

The Rusatom Overseas founded by Atomenergoprom has been registered in the Russian Federation. The company's authorized capital amounts to 1 billion rubles. Alexey Kalinin, the Director of the International Business Department at ROSATOM, has been appointed its acting president.

According to Kalinin, "a key area of activity of the company will be development of ROSATOM business related to implementation of nuclear construction projects abroad under BOO terms (build-own-operate). In this capacity the Rusatom Overseas will work to build up the outstanding portfolio, act as the customer and investment project manager, and manage project companies."

One of the first project ROSATOM is implementing using the BOO terms is the Akkuyu NPP construction project in Turkey.

www.rosatom.ru

Urals Scientists to Watch Health Condition via Mobile Phones

The Urals scientists are working on creating a system of monitoring health condition of patients through mobile telephones, news agency RIA Novosti reports citing Aleksander Petrov, the executive director of the Urals Pharmaceuticals Cluster. "It seems to be a simple idea: everybody has a mobile phone. We only need a chip that would measure pressure, pulse, level of potassium, cholesterol, sugar. Microchip would provide information to dispatcher station via mobile phone," Mr. Petrov said.

The Urals Pharmaceuticals Cluster unites pharmaceutical companies in the Urals regions. The decision to set up the cluster was made on February 24, 2011, at the meeting on development of production of national medical substances in the Urals Federal District. This alliance is to enable national medicines producers to jointly complete at the pharmaceuticals market and save up to 25% budget funds on state purchases of medicines.

www.marchmontcapital.com

«We Are Going to Deliver This Report to Dmitry Medvedev»



Ellis Rubinstein — President and CEO of the New York Academy of Sciences

There are countries that have already developed successful innovation systems and those that are just starting developing theirs. What would be the best strategy for governments that plan to develop an effective, full-staged innovation system?

Newly developing economies and nations, particularly the BRIC nations and other that are trying to begin to compete, they do not have the luxury of waiting for “Silicon Valleys” to develop on their own. That is obviously why we in New York Academy of Sciences provide advice in many settings including to your own President Medvedev. That is why we are building a report, and I will give you an unofficial title, I call it “The Race to Innovate”. Our report is all about what you are asking.

The challenge for the developing countries is to figure out where is where, how the national government can be helpful in creating what I would call regional or urban innovation cluster or communities. The most successful strategy is just as if you were an investor deciding how to make best use of your money to try to create a portfolio of activities, so that you are not overly dependent on only one strategy. And this is really one of the biggest challenges that are now facing leaders in developing countries. They need to be able to figure out where is where. They will not simply duplicate what already exists and particularly try to compete with countries or cities that are already ahead of them. They will try novel approaches that will allow them to catch up.

One thing that sometimes is an advantage for developing countries is that, if they have real resources when starting from scratch, they can leapfrog old systems that are not helpful any more. For example, many countries are talking about creating universities from scratch rather than trying to reform old universities. This is exiting but it is also a huge challenge. That would be my general remark about that. So, one advantage that developing countries have over developed countries is that they may be able to leapfrog established behavior by doing things in a completely novel way. For example, as I've said, creating entirely new universities from

scratch rather than trying to reform their old system.

In other words, just like in the world of corporate competition, sometimes the powerful and large companies have disadvantage because they have so much embedded history and tradition that they can't innovate easily. That is why small companies often can come out of nowhere as we have seen with companies like Google or RIM, to create a new structure, a new business model that is disruptive and then succeed in actually grabbing market share from all companies. The same principle might apply to developing countries.

Is this the reason why the Russian government, for example, decided to begin from scratch in Skolkovo instead of investing in older structures?

That is truly what the whole Skolkovo concept is about. And it is connected with frustration that some of your leaders have about Russian academy structure. No question about that. It is not easy to succeed, but that is the idea.

According to you, in order to create a good portfolio of a country there should more than one strategy. So, not only the government should invest in Skolkovo, but also support other innovation centers and research institutes of the old system?

I would not be that specific. I would say that a brilliant government strategy should involve portfolio of different activities that range from trying something that is entirely novel to trying to take novel approaches to reform the old structures where it makes sense. For example, you have embedded industry, old gas and oil industry. It does not mean that there are not innovative ways to convince those companies to try to become leaders in some area of clean energy or clean technology. You have embedded chemical industries. It does not mean you could not find ways to move some of those chemicals to corporate companies into green innovation space. You have great universities that have not operated as innovation system. But it does not mean that there aren't clever strategies that one can use instead of waiting for the creation of entire new universities. In order to be able to reform from within those universities maybe operating from low. So, those are the kind of advice New York Academy of Science is actually is going to try to provide to the Russian government. It is a new report we are working on now and in the future.

Would you please comment on innovation policies of the countries you are familiar with?

You are asking me to give the results of the report that we are going to deliver to President Medvedev. Just to give you few highlights and a little bit about that. Our report in particular interviewed roughly 40 experts from all over the world to ask them to help us to identify along with the literature that already have been written what are the best practices that exist in other countries that might be applicable to Russia and Russian situation? And what are the biggest dangers or mistakes that other countries have made?

And we ended up concentrating for this first stage on Israel, Finland, US, India, Taiwan, and Russia. And just to give you a little idea, I could say something of the following kind. Let's take Israel as an example. For 62 years one of its

strengths has been that it created a public-private partnership and a policy reform that encouraged the Israeli people and their entrepreneurial spirit to be innovative. And the result was that it has the highest per capita rate of entrepreneurship in the world. That is known. But that it is success does not mean it has no challenges. One concern that our experts say was that it has over focus on just information technology. The question is whether it will have a long-term sustainability if it cannot broaden the portfolio of innovation that it is engaging in? It is a challenge for a small country to do that.

Similar case is Finland. Everybody knows its very unusual national policy that opened the market, deregulated their industry, liberalized their trade and investment and actually provided state agency funding. They were able to encourage the creation of Nokia, IT sector explosion that for a while made Finland economy very strong. But once again, it is not a 100 percent positive situation because it is a small country. Nokia may lose market share. What does it take to be sustainable over a long run? These are the challenges of a small country. And Russia is a large country and it should be able to look beyond. If it could create 3 or 4 different areas of innovation so that it would not be dependent on one or two like Israel and Finland, it would be in a way better shape.

Speaking about Israel, wasn't it the immigration wave of the 1990-s that caused the "economic miracle"?

It is absolutely no question that the inflow of talent, whether it is to any given city or country, brought huge advantages. In case of Israel Russian talent alone brought huge advantage.

You are getting at a point that I was going come to later. One of the greatest weaknesses of national policymakers is that politicians can't think of building structures. They are building cities and infrastructures, but they don't actually develop a community of talent that is going to drive innovations in those structures. So absolutely correct that one of the Israel's advantages was the ability to attract new talent and keep it. They also have success in sending their young people to universities outside of Israel and then getting some of them back because they have pride in their country, which is, of course, a big challenge for many countries around the world.

Another example of success in that area is China. They did a spectacular job in bringing back roughly 20 percent of the most talented young people who get trained in the West. They come back to China and establish their own laboratories. There is no question, your point is absolutely correct. One of the most important elements in a great innovation system is talent. You can spend all the money in the world but if you have not fostered entrepreneurial talent you will not have any innovation.

Will Russia, like China, in the nearest future be able to bring back its scientists that moved away?

If Russia invests the energy to get young people to come back, they would. What China did was not a trivial activity. First of all, as you may know, China offered a huge amount of money to people to come back. If young scientists come back they get salaries that are higher than they would have had if they stayed outside China. Second, the universities and individual cities established laboratories with equipment so fantastic that even if they were working in San Francisco, or in great universities such as Yale, Columbia or MIT they wouldn't have better equipment. In some cases China gave them better equipment that they even had in the US to work with.

The third factor that is quite unique is that in many cases China wouldn't allow the old faculty members to be bosses of these young people who were brought back. They would give them independence; they would give them ability to have their own laboratories, to run their own students without interference from the leadership of the universities. It is quite unusual. Beyond all that, they permitted those young stars to retain half time positions in the United States or Europe in universities where they came from. So this appears to be doing a favor to those other countries. But what it does is that it establishes partnership or alliance with the best global universities and young people do not get isolated when they come back to China.

So that is just four examples of a very visionary policy that came from the top. In fact, I was the first non-Chinese journalist to interview Jiang Zemin the President of China in that time. He said to me straight to my face that his most important goal is to get these most brilliant young scientists of China out into the world even if it was politically difficult for them and bring them back to be the leaders of the next generation.

So if Russia has this kind of visionary devotion to its young people, I do believe it will bring many brilliant young people back who are in the Diaspora.

Speaking about the US, in what way the government is involved into innovation system and how does it help new companies to create innovation? How strong the government innovation policy is?

This is complicated question because one of the usual elements of the United States is that it is a mixture of competing policies — some are national, some are local and regional. Also, it changes its policy in many different ways. So there is a very well known long-time commitment to developing innovations through things like small business, loans that are given by the national government. Among more recent initiatives is creation of centers of excellence where funding is only given when partnerships are created between universities or even when there are public-private partnerships.

So the national government of the US has had a huge number of different kinds of policies that have had an impact on encouraging innovations. More recently, because of the financial crisis disaster in the United States, a lot of stimulus money has been provided mainly with the notion of creating new jobs. But where possible it would put in areas that could be the drivers of future innovation like clean technology. Also quite a lot of money is being put into public-private partnership of universities and industries. So that is just the national side. And in the US a powerful addition is that individual states and individual cities are trying to do similar things. So you have a huge system of different incentive that are trying to drive innovation. I would like to highlight one element that I think is crucial for Russia. That is the pushing up partnerships and collaboration across sectors.

The biggest single roadblock is that most countries that are trying to be innovative have what we call the silo mentality where individual universities, individual departments, individual faculty members all live in their little silos and do not operate in partnerships that would create synergy. And they do not get leverage from being allied with other thing. So you find this within universities; you find this between universities in the same city where they will not work together; you find it between the university and industry; you find it between the

science and finance communities within a city. This is what we call the silo mentality. And one of the most crucial policies that any government can do to try to improve innovation system is to create financial and other kind of incentives to break down those silos, to create network and bring people together, and bring institutions together to work for common good. And gain, it is very different from creating a single university in a single place.

I will give you one example — something that we would like to work on with Russia. That is, while they are building Skolkovo outside Moscow, we would like to try to help them develop mechanism that would identify the most promising areas within Moscow, promote public-private partnership between different institutions and create public-private partnership to drive innovation in Moscow region. Basically, Moscow right now is living in a silo mentality.

One of the biggest headaches for Middle East, places like Qatar, Abu Dabi, Dubai, Saudi Arabia with all that money in the Persian Gulf they have and a vision to create centers of excellence and innovative technologies, is that they have no students. In Russia you have students, but you are not yet investing the money in putting together the networks of innovation that are needed

Why in Moscow in particular? What about cities in Russia?

Same thing for Nizhny Novgorod, same thing for Novosibirsk, same for Saint Petersburg. Absolutely, I would think that a good Russian national policy would look at Tomsk and Omsk. What is crucial to the places I have mentioned? All of them have large number of talented young people. And you cannot create innovation without talented young people. One of the biggest headaches for Middle East, places like Qatar, Abu Dabi, Dubai, Saudi Arabia with all that money in the Persian Gulf they have and a vision to create centers of excellence and innovative technologies, is that they have no students. In Russia you have students, but you are not yet investing the money in putting together the networks of innovation that are needed. Young people have to be mentored, and they have to be taught to be entrepreneurs, they have to learn how to take risk, they have to be supported when they have failures. There should be prizes. All of these things are the things that Russia needs to do.

Right now, one of the most interesting trends in the world that we see at New York Academy of Sciences is that world has become like early Renaissance Italy. Instead of thinking about competition between nations you see this enormous competition between the great cities of the world, which all try to capture talent. So, you have Shan High versus Beijing, Deli, London, Paris, New York, Boston, San Francisco. All of these cities have a lot of students and talent. Moscow, Nizhny Novgorod, Novosibirsk, Saint Petersburg, Mexican city, San Paulo, Buenos Aires could all be in there. This is where the action is likely to be because they have talent.

The headache for the Islamic world is that all the students are in place like Karachi where no money has been invested in science and technology or Cairo where they do not have oil money. All of the riches are in the places where there are no students. So, right now, the people that have the most chances to success in a new competition for innovation is the one that has the most talent.

But those rich countries in Middle East you were talking about, with all their money they could have attracted scientists from all over the world?

They are trying to do this a little bit but they have no cultural tradition of welcoming people from other places as equal citizens. They have a bit of a problem with that. You have to have a country that does not only want to bring back most talented people that left it but you also have to have a country that wants to welcome people from other traditions and other societies. Which is why we admire Israel, and why the US has worked so well. Europe is now desperately trying to learn how to bring people from different cultures.

The President of China — Jiang Zemin —told me straight in the face: “I think the reason the United States will win against Europe is that I went to Intel and they introduced me to their employees. And I saw people from all over the world”. This is a single-minded idea but it is very important.

One of biggest things that national policy forgets is community development. This means that you make sure that you have students, that they are well trained, that they are mentored to be entrepreneurial, supporting them in being entrepreneurial, bringing in the one from other countries. All of that is often forgotten.

To your opinion, will Russia succeed in building innovation economy?

I will be able to answer this question if I am invited to spend the next six months or a year working with Russian leaders because I know that there are a lot of smart people that have concept. But there are a lot of great ideas in the world and the proof of success is when something is actually done. So until we see these ideas being put into practice it is very hard to say. For example, I am trying to work with universities in Moscow, to establish new alliances. I talked to minister Kudrin, he has a lot of good ideas, but I need to see what happens to them. I have seen countries that have very exciting start but then they have big challenges. India is a very good example. They have brilliant people imported by the government from the industry, but overcoming embedded tradition is so difficult. It will take some time to Russia.

As I have already said, in Yaroslavl we will be delivering a report to Russian president Dmitry Medvedev, and that will be the end of what we hope will be a stage one of our partnership with Russia and its leaders. The question for us is what happens after Yaroslavl.

When You Take Up the Innovation Business, You Must Always Think a Few Steps Ahead



Tatyana Alekseeva — Doctor of Philosophy, Head of a Chair of Political theory at MGIMO University, Honoured Scientist of the Russian Federation, member of Academy of Political Science and Academy of Military Science

Before taking up the subject of innovation policy, I think we should get a good grasp of the relationship existing between innovations and regular even-paced development of any country. If we fail to understand it, this way or another we will always end up in a void. There is a hypothesis which I think is quite convincing. Suppose we take up a development model and we live in the 19th century. Then we would face no problems whatsoever. We would know that development is linear, that all countries resemble long distance runners: some lead the race, some lag behind, some might shove another aside, even a scuffle might flare up, but they all run in one direction. Hence, the well-known theory of formations and the idea of progress.

Modern science drifted away from the outlook on development as a linear and progressive process. Differing views are expressed, including that the development can follow the «three steps ahead, two steps back» or «one step back» patterns. A complete rollback and degradation may well become a reality; there may be side steps or a great leap forward followed by complete failure. In other words, there is a great multitude of different models. Effectively, the progressive development is not a guarantee, and this is the first thought that I would like to emphasize. If any state claims to be something more than just a small neutral country, like a state with the past and the future with a more important role in international politics and global economy, it must go ahead and make a serious effort in choosing an appropriate model for future development. That's point number one.

Now let's move to point number two. Suppose a state decided to stage an across-the-board breakthrough. Let's dub it modernization, although, of course, it is a far cry from the modernization theory of the 1960–70's. The issue at hand today is slightly different. We still use the term, but its meaning has changed. If a state decides to join the advanced vanguard countries, it should realize that it should choose

such reference points, which will secure an innovative breakthrough and, probably, its presence in this vanguard.

The most important thing in this case is how these innovative programs are perceived by society. We can bring together gifted scientists, remarkable government officials and top-notch experts. They will think of a way to implement this breakthrough using innovations, but such innovations will lack the support of the society, or even worse, will be rejected by it. There is no end to such examples.

Therefore, the issue is not only about the innovation policy. The question is that this innovation policy should cover not only technical issues and ways to allocate money. There is need to understand how this innovation policy can be built based on the current social framework. Everyone criticizes it today. However, criticism is inconsequential in this case; most importantly, we should understand mechanisms underlying the societal evolution.

In other words, the question is can you make a society accept an innovation as something natural and then carry it forward? One can come up with a model, establish institutions, allocate major funds, start developing certain areas, but none of them will have anything to do with existing infrastructure whatsoever. How do you put them together? As a matter of fact, the innovation policy in Russia has no solution for that. This issue needs to be pondered. And it should be pondered by public opinion, not just decision makers. If we refer to the countries that managed to implement such innovative breakthroughs, such as Singapore, Malaysia, India, Japan, South Korea, or Israel, we'll see that normally, in addition to outstanding programs, serious funding, enlistment of renowned specialists, both domestic and foreign, all of them backed their respective breakthroughs with putting in place an entire infrastructural system. What do I include in infrastructure? First off, I include the availability of certain traditions in a given society, such as scientific, technical and even spiritual. I even include attitude toward success, implementation practices and values maintained by a given society. If there is a discord between innovation and such infrastructure, then the innovation will go belly up very soon and will just get rejected as another fleeting idea. There's need for something that would turn innovation into a tradition, when innovation itself becomes a tradition in the given society. This can be done in two ways. The first one is when existing traditions are displaced and coincident ways are sought for. What did the Japanese do? Let's take, for example, Meiji Revolution. At that point in time Japan was a society with the highest level of education and literacy. On top of that, there was a matching body of Japanese traditions, such as life-time employment, work ethics and a series of other parameters that facilitated modernization. Same thing occurred in South Korea, Singapore, and Malaysia. This briefly describes the first way.

The second way has innovations implemented top down. We love this option a lot. Speaking of which, I enjoyed the fact that the participants, including foreign ones, discussed it again and again in Yaroslavl. I'm talking about the Peter the Great's reforms and reforms dating back to late 19th –

early 20th century associated with Vitte. Put differently, those were the breakthroughs in our history when a certain type was forced into application and then artificially spliced up with what was available. Fundamentally, schools and universities create new citizens. Not only they transmit culture and values, but also they have this “innovation gene” and make people more open minded. Sometimes it works, sometimes it doesn't. It works with the support of a very potent educational system. Therefore, if we speak of Skolkovo, I have a very good feeling about it. That's exactly the way it started everywhere. Never ever the innovation programs have been spread thin across vast territories of a country. There have always been vanguard outposts. I will give you just one case in point. It's very comforting to know that MGIMO University ranks first and MFTI University comes second in the Forbes ratings. From the very beginning there was an innovation approach to education at MGIMO, and the standards of education

product? I don't think so. When you take up the innovation business, you must always think a few steps ahead. The mere fact of declaring that nanotechnology is cool and we'll get into it is not enough. Ask any person in the street why we need nanotechnologies, and they'll fail to explain why. However, they do need to understand it. In order for people to understand, there must be a system supported by both major business entities and the government. There must be a host of popular science magazines similar to Znanie – Sila, Nauka i Zhizn, etc. Such magazines should be spread among the general audience. There's also need for high school lessons and relevant courses at colleges. If we manage to establish the right atmosphere around this issue, things will start ticking.

If we speak about innovations per se or the feasibility of an innovative breakthrough in Russia, I believe it would make sense to take a look at the academic schools in Russia, latest developments at such schools that didn't get any follow-through for some reason. There's no point in blindly pursuing the latest faddish idea, as we'll find ourselves always catching up with something. We need to take a thorough look and see if we have anything that we've put away and forgotten about, which might well constitute a 21st century breakthrough? I am positive that Russia has such things. However, this kind of job is best done by professionals. If it's delegated to people who put together reports about completed research projects, the whole thing would end up in total failure. There are world class experts in every area of knowledge who are in a position to say what was developed and where exactly Russia can make a breakthrough today.

I don't believe, either, that we can achieve concurrent fast modernization if we spread our resources thin across vast numbers of Russian enterprises. Therefore, I believe there must be certain single-point breakthroughs, which will tow everything else in their wake.

I have a very good feeling about the Global Political Forum in Yaroslavl, which was mentioned earlier. It was insanely interesting: A powerful shot of adrenaline, if you will. On my way there, I feared to become part of another pompous, ritualistic function, which I've my fair share of. I'm very pleased indeed that things turned out quite differently. I witnessed a serious conversation about very serious issues and, most importantly, conducted at the highest scientific level.

I attended three panels. I will not mention plenary meetings, the most interesting part of the Forum, but I'd like to emphasize that I was deeply impressed by two panels on modernization and on regional security. Almost each and every speech was a phenomenon and an event in itself.

First off, Skolkovo doesn't mean loss of interest in other already existing science cities. We are always facing the danger of getting carried away with a novelty and forgetting about and dumping everything else. We should think about a model whereby the existing science cities and research centers are tied in with Skolkovo, at least, when it's possible. Only then things will fall in place

today as high as they used to be back then. At some point in time MFTI introduced the Cambridge education system, which churned out a series of brilliant Soviet physicists who not only weren't inferior to their Western colleagues, but exceeded them in many ways. Therefore, there is need for both Skolkovo and a certain education model.

Here comes another interesting and very important contradiction. First off, Skolkovo doesn't mean loss of interest in other already existing science cities. We are always facing the danger of getting carried away with a novelty and forgetting about and dumping everything else. We should think about a model whereby the existing science cities and research centers are tied in with Skolkovo, at least, when it's possible. Only then things will fall in place. In addition to that, connections should be established with certain higher schools. I have no idea why they keep rejecting the idea of setting up a separate school for Skolkovo, but I believe that'd be the right thing to do.

Let me repeat it: Innovations should be based on the society infrastructure. Such backing might be there already, but it needs to be searched for. This issue cannot be resolved in one day. It calls for time to ponder, engage in public discussions and clear up the situation. Speaking of which, we have a very poor idea of what our society really is. Nobody has ever given it serious consideration. For example, let's assume someone comes up with an invention, no matter what kind of invention. Do we have everything in place in order to instantly issue a patent and, taking it up a notch, instantly implement it into production? Are we capable of running an adequate ad campaign to build demand for such

There Are Hundreds of Companies that are Capable of Making a Leap



Alexander Galitsky — Co-Founder of Almaz Capital Partners, member of «Skolkovo» Foundation Council, member of the Board of Directors of Runa Park

Are you aware of any latest policy developments regarding innovations worldwide?

The most recent world economic crisis, a genuinely global one, which emerged on the crest of the Internet technological revolution, made almost all of the G20 countries take a careful look at the innovative path of their development. For some, this is a way to retain their leadership of many years, for others a way to join the elite Ten or Twenty countries. Production implementation of alternative sources of energy, cloud computing and web 3.0, bio- and nanotechnologies will become the basis of this innovation race for the next fifteen to twenty years.

Living now is extremely interesting. We will witness great changes, including changes in the Top List. However, being a participant is far more exciting. Therefore, we'd like Russia to be more than just another participant, but rather one of the leaders of these processes. To do so, we need to have a clear assessment of our potential, our place in the global innovative system, remain consistent and, most importantly, create an atmosphere and environment for innovations, and practice tolerance with regard to our mistakes and shortcomings.

What can you say about the policy pursued by governments of the countries, whose experiences you are familiar with?

Everybody is looking for their own way. Certainly, the United States is a major benchmark. I'm sure everyone is aware of the road to success followed by the Silicon Valley. However, numerous attempts to copy it directly never resulted in anything even remotely successful. Similar to Singapore, there's no way to use existing recipes for turning any fishing village into an economically and technically thriving city state.

Thorough analysis of other countries' experiences allows building proprietary models. For instance, Israel is second only to California in the number of yearly high-tech start-ups. However, their production implementation takes place in the USA. India is making huge strides toward innovation policy having followed the path of a service Mecca for economically

developed countries. China follows in the wake of its Asian neighbors and quickly advances to the leadership position by way of organizing the cutting-edge high-tech and low-tech production.

One thing shared by all these models and approaches is battle for talent. The success of the Silicon Valley itself for the past twenty years, too, is mostly due to talent inflowing from all over the planet.

How is Russia's innovation system different?

During the 1980's I had a chance to oversee the development of major defense projects. During the 1990's, being an independent entrepreneur, I built five successful high-tech companies on both shores of the Atlantic and, over the past ten years, I funded and nurtured about ten start-ups acting as private investor and partner of the Almaz Foundation. Talented Russian engineers and researchers provide the link between my past and my present. Often, we think nostalgically about our past, but it's time to get over it. The USSR pursued "innovative policy" geared toward defending its "socialist achievements". There were leading enterprises, indeed. They used to commission jobs for applied research for academies and universities. They had an understanding of industrial needs and accumulated knowledge for innovations, and also provided training to world class specialists.

Things have changed drastically over the past twenty years. World-class companies in Russia can be counted on fingers. Normally, technical capacities are built for the next 15–20 years; however, no new capacity is currently being built in Russia. Science, as a process of knowledge accumulation, fails to perform as expected, although higher schools continually train talented experts in fundamental knowledge. Russia should "re-boot" and Skolkovo may well become such a rebooting tool.

As is known, great ideas, gifted people and developed infrastructure are building blocks of a successful business. To me, science is all about accumulation of knowledge, whereas innovation is a process of turning this knowledge into something useful, which can be measured in money. In addition, modern Russia has unfortunately lost expertise in the first process, and has so far failed to acquire expertise in the second one.

The university and academic science should be oriented toward industrial needs rather than engage in autonomous sailing as it did over the past few decades. This situation can be overcome using the R&D commissioning by industrial leaders as it used to be during the Soviet period and just like it's done in the rest of the world. Instead, universities and academies provide knowledge to society and become the source of innovative ideas, products and services. Most importantly, they train requisite personnel. Those who worked or studied during the Soviet times remember this system quite well.

The second issue is harder to tackle, since Russia lacks expertise in building innovation company processes, and there are only isolated instances of success based on enthusiasm of individual entrepreneurs. For example, in the software industry, process engineering and software account for as little as 25%–30% of all expenses involved in building a

company and taking it to the breakeven level. The remaining 70%-75% of expenses go into product development and building of business per se. Russia doesn't have enough entrepreneurs who are well-versed in building high-tech companies or specialist with keen understanding of the venture investment mechanisms.

Russia has much money, but little capital. A venture fund with 3 billion rubles normally makes two to three deals a year. Admittedly, even if you add up all the funds managed by the Russian Venture Company, the total will be around 20–30 companies a year.

On a brighter note, according to our experience, the Russian companies may at least foray the global IT market. The Parallels and Acronis companies, with which Almaz and I are directly related, are a case in point. In 2003, these companies' sales amounted to several million US dollars. Currently, these companies have become leaders on the global market in their respective niches with sales running into hundreds of millions dollars.

During the 1990's, we were effectively building R&D companies and acted as technology suppliers. Today, I'm aware of existence of hundreds of software companies alone that are capable of making the same leap as Parallels did in its own time.

Fast-paced growth of mobile and Internet market and, most importantly, its sheer size, make Russia appealing for European businessmen, since, if provided with decent business environment, they will think twice before venturing overseas. Living away from the loved ones isn't so good, I know it firsthand. Therefore, every effort should be made to make Russia attractive for any high-tech entrepreneur from Russia or Europe.

The availability of industry leaders provides good environment facilitating the implementation of efficient business hatching model during early stages around core business of the leading company. The model is unique in a way that the hatched companies gain access to product knowledge, as well as to marketing channels using those of the leading company. The idea of the RunaPark Hatching Facility and Runa Seed Financing Foundation advanced by Sergey Belousov, CEO at Parralels, and was backed by the Modernization Commission. Therefore, it will hopefully become a thriving Skolkovo project.

What do you think about the practice of building innovation parks in general and the Skolkovo Project in particular?

Success and faith in the Skolkovo Project is determined by how fast it will be launched. Therefore, its virtual start takes on a special meaning.

Given the current phase of the Internet technology development, the project should be viewed as a cross between physical and virtual models. The physical Skolkovo should become the heart of R&D global corporations, unique labs, target hatching facilities and infrastructure for innovations and commercialization of new ideas, the Russian answer to Sand Hill Road.

Already now, virtual Skolkovo can become the focal point of joint efforts by university and academic labs operating in Russia's technology parks and hatching facilities, as well as the efforts of individual researchers and engineers both in Russia and abroad. The right conditions and proper motivation come first. It's important to include in the Skolkovo effort the research already underway at the universities conducted with the participation of transnational companies.

Large companies often lack flexibility, and not all talented people are willing to work for major corporations. That's why large companies prefer to work with smaller start-ups. There is need to tie together smart ideas and talent and provide them an opportunity to get a start on new Skolkovo terms. You know, every third company I look at was initiated by people residing in different cities who at times haven't even met each other in real life. That's what the modern world is all about.

Which projects do you see as a basis for the next technological breakthrough? Do you expect such a breakthrough at all?

I am not in a position to cover all areas, however in what goes for the information technologies, I believe that a great technological breakthrough will continue in the area of cloud computing. This will affect hardware, including servers, PCs, telecommunication equipment and information storage devices and, certainly, software, such as operating environment and platform solutions, as well as applications. Above all, it will affect all areas of our everyday life.

I expect significant progress in biotechnologies, especially in biomedicine. Certainly, I believe that nanotechnologies, providing technical basis for all of the above, will undergo transition from the "alchemy" status to real molecular-level control in the near future.

What's your general impression of the Global Policy Forum?

Overall, the impression is good. However, generally speaking this forum isn't for me, I'm not a politician. Nevertheless, the session on modernization left a rather positive impression. It brought together interesting people, mostly politicians, who stood on opposing grounds. We heard the right words about areas of modernization, which sends a message that they know what they were talking about, indeed.

One other thing I'd like to mention is convergence of different thinking and political views on modernization and principles underlying its implementation, as well as on the paths of transformation per se. Well, this covers my main impressions and I believe that yesterday was a day well spent.

Whose speeches did you find particularly relevant and interesting?

I liked in-depth analytical speeches by foreign participants. Obviously, they are analysts and they came with existing materials covering experiences of their respective countries. I can quote many names, but I was particularly impressed by what Anatoly Chubais had to say, his thorough understanding of the issue, and Aneesh Chopra. Arguably, these were two most outstanding men, one of whom was emotional and the other insightful.

There is no Such a Thing as a Single Unique National Innovation System for the Whole World



Jomo Sundaram – Assistant Secretary-General for Economic Development in the United Nations, Department of Economic and Social Affairs (DESA)

What are the latest changes in innovation policy in the world?

Firstly, there is no such a thing as a single unique national innovation system for the whole world. For policy purposes, innovations are organized at national level. Sometimes, it is organized at the regional level, especially for big countries, sometimes even at the local level, for example, for major cities. So, there is no single system, and technology development and innovations have been taking place in very different circumstances. There is no single way, there is no single method, there is no single approach, and there is no single best practice.

What has to be decided is to develop a system, institutions and policies that are appropriate for a particular country's conditions. For example, Russia has the advantage of having many highly educated people, especially in engineering, mathematics and so on. But many of these people are now of the older generation. As far as the younger generation is concerned, that kind of emphasis seems to have been weakened. All this has to be taken into consideration in developing an appropriate national innovation and technology policy.

Of course, innovation is not just about support for technology development and innovation. It also involves the way people are organized — human resources. It is not just question

of education and training, but also involves methods of organization and management of people. And again, you have in Russia, many different experiences of how to organize people, different ways from the period before and during the Soviet period, there have been many different types of experiences, and in the post Soviet period, for the last twenty years, there have also been many different types of experiments. This vast experience of experimentation is very valuable, because in many countries, you don't have this variety of experiences.

This is basically what I'm trying to say: innovation policy ultimately has to be pragmatic, and in order to be pragmatic, it has to be appropriate. In other words, it has to take into consideration the current situation as well as past experience. But, of course, we want to expand opportunities for the future. That is the major challenge we all face.

What would you call the best and the worst example of innovation policies in the world?

As I said, there is no single best or worst example. If we look at what governments do, the governments are doing a lot in trying to facilitate innovation. They themselves are also innovating, and it's not true to think that these things are happening spontaneously.

The worst type of innovation policy is to deny the need for innovation policy and to pretend as if these things happen spontaneously, and you don't have to do anything to make it happen. And especially for Russia, which has experienced a huge economic collapse during the 1990's, you have the experience of a shock. Shocks can involve creative destruction but can also result in catastrophic destruction. Unfortunately, what happened in 1990's is closer to catastrophic destruction, not creative destruction. You need to be creative; you have to create the conditions for creativity and innovation. I would say that is dangerous to be dogmatic; in other words, you are inflexible and you presume you know how to do things, and you don't change strategy or course according to the facts. Another

INNONEWS

Glonass Secures Key Backing from Nokia

Glonass has secured Nokia's backing for its satellite navigation system in a major step toward securing second spot behind US-backed GPS in the global positioning technology. Glonass, along with European space program Galileo and China's Compass, are set to break more than 20 years of unrivalled dominance by GPS, or the Global Positioning System, as countries seek to cut reliance on the US technology.

The world's largest phone maker by volume, Nokia aims to release the first cell phone supporting Glonass as well as GPS next year. Russia has put 27 Glonass satellites into orbit and plans to have a total of 30, including six reserve satellites, to deliver full global coverage. The government has spent 140 billion rubles (\$5 billion) on Glonass since 2002.

NIS Glonass is already implementing several state projects, including a program similar to the EU's eCall emergency driver assistance system.

www.themoscowtimes.com

VIRIAL Launches First Production Line for Nanostructured Ceramic and Cerametallic Good

Ceremonies were held in St. Petersburg August 19, 2011 for the first production line for new high-tech goods of nanostructured ceramic and cerametallic materials. The facilities belong to VIRIAL, a project company created with co-investment from RUSNANO. The total cost of the new project is 1.7 billion rubles. Investment fund CapMan, a leading fund in direct financing in Scandinavian countries and Russia, and agriculture innovator Siberian Organics have joined RUSNANO as co-investors.

With the commissioning of VIRIAL's new plant, the company will be able to boost output to 1.2 million ready-made items in 2011, an increase of 0.25 million. Greater production and broader product offerings will drive company sales to 720 million rubles this year, 20 percent above earnings in 2010.

www.rusnano.com

danger is to be completely arbitrary; in other words, you let different people do different things without any sense of coordination, without any sense of the need to support successful innovators.

So, these are some bad things. Now, some good things. Innovation is not developed by government in isolation, but is developed after very careful consideration of the situation and close consultation with the private sector, with private corporations, and with all other actors involved, from the government side as well. You cannot ask government officials to do something, which they do not have the resources or the capacity for. A successful innovation policy has to be realistic.

In what countries do you think cooperation exists?

For example, if you look at the level of investment, which is taking place in research and development in countries such as Sweden, Republic

of Korea, and Singapore — these are very successful example. It doesn't mean that everything these countries are doing should be done by Russia, because Russian conditions are different, but you can always learn. You don't only learn from success, you also learn from failures. You must learn from failures, not only from your own, but also from others' failures, to avoid making those mistakes.

What is your general impression of the Forum? What ideas you think are important?

I was very impressed by the debate and the openness. It was interesting to see Mr. Zupanov and Mr. Chubais sitting at the same table. To me, it is very healthy. It means that there is a hope for the future of Russia to

What ideas you think are crucial for understanding for the officials in Russia?

As I said, there are a lot of things Russia can learn from the rest of the world. But, ultimately, Russia can only move forward on the basis of what exists in Russia.

To your mind, what exactly exists in Russia?

Vivek Wadhwa from Duke University was talking about how he was impressed by Russian engineers and mathematicians. He had this stereotyped image, a prejudice of the Soviet Union, that Russians are

incapable of thinking for themselves, that they are dogmatic, as this is what he presumed about a supposedly totalitarian society. What he found instead was that these engineers and scientists were very intelligent, thinking of many different things, and very innovative. What they couldn't do, according to him, was because they were not familiar with certain practical things such as business practices, management practices, raising finance, etc. But it was not because of lack of ideas, or willingness to explore and openness to new ideas.

INNONEWS

VII International Conference on Isotopes

VII International Conference on Isotopes is to take place September 4–8, 2011 in Moscow the World Trade Center. The International Conference on Isotopes, convened once every three years, is distinguished by the preeminence of its participants. Heads of companies and leading scientists from all over the world gather to discuss the industry's most pressing issues. Since the previous International Conference on Isotopes, held in Seoul, Korea, in 2008, concern has grown regarding production and distribution of isotopes.
www.ici7.com

Crossbeam and RTEC Form Joint Venture to Deliver Security Solutions in Russia and CIS

October 26–28, 2011 the Moscow Expocenter will host the IV International Nanotechnology Forum RUSNANOTECH 2011, a global venue for discussion of innovative development and nanoindustry establishment issues. The Forum is of relevance for all the innovative process participants: scientists, engineers, entrepreneurs, financial experts, federal and regional power representatives. Within the framework of the sections on the Business and Science and Technology Programs of the Forum one will be able to obtain information on prospective nanotechnology researches, find ways of their commercialization, investments attraction and nanotechnology products demand creation. For establishment of effective business-contacts between RUSNANOTECH 2011 participants "One on one" meeting organization and arrangement system is available.

International Award in the Field of Nanotechnology RUSNANOPRIZE is ceremoniously presented within the framework of the Forum. The Award is annually granted for technical scientific developments, inventions and their implementation in mass production in one of the following fields: nanoelectronics, nanobiotechnology, nanomaterials, nanodiagnosics. RUSNANOPRIZE 2011 will be also awarded in "Nanomaterials" category.

www.rusnanoforum.ru

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Many People Criticize Skolkovo for Nothing



Piotr Dutkiewicz — President and Founder of the Innovation Leadership Board LLC; Fellow of the Bay Area Science and

What are the latest developments in terms of innovations worldwide?

The countries that win in the global competition are the ones that think about technologies, which have not so far been implemented. They think about technologies, which will be implemented 15 to 20 years from now. To do so, there's need to establish connections between academic institutions, research and implementation. There is a very close correlation between what is called R&D and the firms and companies that implement new technologies. I have lately been at the Canadian Parameter Institute established by Blackberry. This is the third or maybe fourth, according to certain information, firm engaging in data transmission. Blackberry phone is among their products. This institute hires the best international talent from the area of physics and cutting-edge technologies on a competitive basis and asks them just one question: "What is your technology dream? Don't think about the possibilities for implementation". They pay very well, and the researchers think about the best ways to describe and word their technological dreams in such a way as to be able to put them into practice, not today and maybe not even tomorrow. In addition, the company provides a possibility to develop such concepts and apply the technologies it likes to industry.

Which worldwide innovation policies you believe are the most and the least successful?

I think if we speak about innovations then most likely it's the United States, where large corporations have close business ties with small firms using

what is referred to as venture capital. This is also China, where the role of the government is much greater. This is India where innovation policy is implemented in part with the help of the government and in part with assistance from business entities. Israel is also a good example, because the role of the government is very balanced. The government provides sponsorship to innovations only if private capital provides its fair share of backing. I believe these four examples are quite interesting for further studying.

In this connection, how would you describe Russia's innovation system? Is there such a system in Russia?

I believe it's in progress. Currently, I don't see such system. There are very good ideas. The Yaroslavl Forum is one of the sites where such ideas are being generated. At least, I can see serious interest on behalf of the state and on behalf of certain industries in adopting such a system. Such innovation system should combine elements of technical innovations, education, institutions, which can provide help and boost the development of such innovations. This system should be supported by banking system, government and special taxation arrangements. All of that should be supported by the bureaucratic system. What I see in Russia now are isolated elements of such system. They are not connected. Therefore, it's premature to speak of a system.

Skolkovo is also part of this system. For some reason, many people criticize Skolkovo. I don't think we should be so critical about it. Skolkovo is a good example of a site, which can be used for collaborative effort by Russian and foreign talent using Russian and foreign capitals to develop new technologies. I don't see anything wrong with it. The problem is with the end use. Who would buy these technologies? How will they be implemented? There is real danger that even if they are developed in Skolkovo, most of the new products might well go outside of Russia, because Russian industry is in a state where cutting-edge technologies can only be used in very narrow economic sectors.

INNONEWS

Cisco CRS-3 to Provide Simultaneous Internet Access to Millions of Subscribers

Telecom and networking equipment manufacturer Cisco has said that Mobile TeleSystems (MTS), the telecommunications service provider in Russia and other CIS countries, has deployed the Cisco CRS-3 Carrier Routing System to provide its growing audience of subscribers with Internet access despite the growing shortage of IPv4 addresses. The capability to extend the system to 80 million address translations will enable MTS to centralize Internet access for several regional mobile and fixed networks.

Cisco CRS-3 provides more than triple the capacity, from 320 gigabits per second to 1.12 terabits per second per shelf on existing power, cooling, and rack-space profile, significantly reducing the carbon footprint, said the company. Cisco claimed that with the new speeds, one could download the entire content of the US Library of Congress in a little more than a second and — in less than four minutes — transmit all the movies created in the history of humankind.

www.rusnano.com

Eleventh International Conference on Parallel Computing Technologies

The Institute of Computational Mathematics and Mathematical Geophysics of the Russian Academy of Sciences, Institute of Informatics (Academy of Sciences of the Republic of Tatarstan) and Kazan Federal University are jointly organizing the Eleventh International Conference on Parallel Computing Technologies (PaCT-2011). The conference will be held in Kazan, Russia, September 19–23, 2011.

The aim of the PaCT-2011 is to give an overview of new developments, applications and trends in parallel computing technologies. The conference will help the community to deepen understanding of parallel computing technologies by providing a forum for an exchange of views between scientists and specialists from over the world.

www.pact2011.antat.ru

Companies spend fortunes on technological innovations and establish research institutes at their production facilities. In its turn, the government provides tax havens for such companies. In your opinion, which countries have implemented this system with particular success?

That'd be China, Taiwan and Singapore, i.e. countries, which provide tax breaks to all firms engaged in development of cutting-edge technologies. Unfortunately, some other countries lack such arrangements. But then the technological developments are being paid for by private entrepreneurs. However there are instances when research is supported with government grants rather than tax preferences. Canada is a very good example of such policy. There are different systems. You can help by cutting taxes or do the same thing by providing target grants for such research.

What is more efficient from your point of view?

It's hard to tell. Things work where they work. That depends on traditions, relationships between private sector and the government, trust level shown by private sector with regard to the government and vice versa.

There are historical examples when an inefficient system became efficient after some time, like Estonia.

This has to do with the innovative nature of a system as a whole. The innovation system enjoys success if the government, science and people wish to become part of this innovation system, because they don't see any alternative to it. There is no alternative for Estonia other than be innovative. In other countries, such as Russia, there is a tempting idea to believe that exports of oil, gas and lumber will take care of everything. Therefore, crisis is sometimes a boon, because it changes the way of thinking and forces to be more efficient. Deep crisis is bad, but a medium-level crisis is quite useful in this sense.

What is your impression of the World Political Forum in general and of the modernization panel, in particular?

It was an extremely interesting panel for several reasons. First off, we found out that Mr. Chubais agrees with Mr. Zyuganov on issues of economic development in Russia. I've never thought I'd ever witness such

a fundamental agreement between these two men. That tells me that ideology isn't all that important in the development of government economic policy. The conversation between Chubais and Zyuganov demonstrated one important thing: there is a fundamental agreement in that Russia needs modernization, but here are differences with regard to the pace and depth of it; there are differences with regard to opening the Russian economy, etc. Certainly, there are differences. But there is a fundamental agreement that we won't be able to get by tomorrow using our proceeds from oil and gas exports.

Secondly, I think that this panel was useful in that it showed that there was need to develop innovation system rather than think about modernization as bringing the latest technologies into Russia.

Thirdly, it was very interesting to listen to what the President had to say and compare it with what was said during the panel. For instance, he emphasized that a free man can think free. This is also part of modernization, also part of innovation and part of new thinking about technologies. This means that political changes are needed for establishing an environment whereby entrepreneurs feel confident and undisturbed, so that they can invest in something that will pay back not today, but much, much later.

Finally, panel participants agreed that government plays a very important role in the national economy. What shape it will take, direct or indirect, in the form of grants or in the form of government purchases, is another issue. The fundamental idea that the government should play a substantial role was supported by Russian and foreign participants. Importantly, Jomo Sundaram, Assistant Secretary-General for Economic Development in the United Nations Department of Economic and Social Affairs, participated in the discussion. This is a man of knowledge who is in a position to run a comparison between several countries and speak from the point of view of comparative analysis regarding Russia's capability or incapability to modernize. There was a very important discussion covering this issue, too.

INNONEWS

Renewable Energy Technology Conference and Exhibition

The MARBC will bring Russian participation in leading clean energy events including Renewable Energy Technology Conference and Exhibition (RETECH 2011) in Washington, D.C. on September 20–22, 2011 and Phase II of Renewable Energy in America to be held in Washington D.C. from December, 2011.

RETECH is the American Council on Renewable Energy's premier trade gathering of the all-renewable energy industry in the United States. The event offers an unparalleled opportunity to network with industry leaders and forward-thinking, focused organizations with a global view.

MARBC is continuing its participation as a supporting organization of the RETECH/WIREC conferences and will work to expand the participation of the Russian delegation and to develop Russian business exposition in the events.

www.rusnano.com

EduTech Russia — Innovative Technologies in Education & Training

The main goal of the EduTech Russia Exhibition & Conference, to be held in Moscow on September 20–21, 2011, is to acquaint the Russian market with the latest trends and technologies in ICT-supported enhanced education and training.

Over 40 exhibitors from around the world will demonstrate their latest platforms, methods, tools and content for e-learning in education and the enterprise.

A two-day conference to be held alongside the exhibition includes master classes, workshops, round tables and keynotes by the leading experts. The aim of the conference is to bring together leading learning professionals and share the very latest methods and tools in e-learning and learning integration. A special focus of the conference will be the latest international innovations in e-learning (simulations, interactive video, serious games, skills and management applications etc.)

www.en.edu-tech.ru

The Americans Saw that Military Research was Mismanaged. The President Ordered to Fix the Situation...



Abraham Wagner — Adjunct Professor at School of International and Public Affairs (SIPA) at Columbia University. Mr. Wagner previously served for 30 years in the federal government at the National Security Council, the Intelligence Community, the Defense Advanced Research Projects Agency (DARPA), and as a member of various government boards and advisory panels

How does the system of development of new technology for use by the military work in the US?

Since WWII the US have developed a system of military laboratories, some of which are part of the Defense Department and some of which are independent laboratories. The best example is something like the Los Alamos laboratory where they developed the atomic bomb. We have a number of these technology laboratories like Los Alamos, Livermore laboratory, Sandia laboratory, Brookhaven laboratory etc.

What are national peculiarities of this system in the US?

We have developed a very peculiar institution called ARPA and later DARPA. The government gave the money to employ some of the best researchers doing military development. That system has developed over many years. Department of Defense has 15–20 billion a year going to military or defense related research, not just DARPA, which is only 3 billion dollar operation.

Private corporations are also contracting for the research. You have this whole infrastructure — laboratories and corporations using defense money for technology development.

What is the DARPA structure?

The director of DARPA is a civil servant. Generally, he is appointed by the Undersecretary of Defense who is in charge for research and engineering and all weapons programs. It's not a Presidential appointment. It doesn't have to be confirmed by the Senate. It's a civil appointment.

The program managers are recruited either by the director or the office directors. DARPA consists of a number of specific offices. It's not a huge organization. You have a director and a deputy director, and then some office directors. By at large office directors are themselves manage programs. They look around at their area to see who are the best people they can find and hire them to work for a few years. It's a very good system.

Is information classified in DARPA?

Only a little bit. The vast majority of what DARPA is doing is not classified. You can see it on their web site.

I think that we've been very fortunate in the US, particularly at a place like DARPA, where they do research. Not only they advertise on the web and in the government publications about their programs, but also a large amount of this information is unclassified and each of the programs has one or two meetings a year. They go to some hotel for several days and all of the people working on these things, give presentations about what they are doing. Every year DARPA has annual meeting fair when they talk about programs. Other than only highly classified areas, they've been very fortunate in sharing with each other what the research is, what the data is and trying to make it very widely available. You are never going to give away some duplication of effort, but I think that they have had a very good system for making people aware in the research community, getting data out, publishing things.

Did other countries, besides Russia, try to copy DARPA?

I was doing some research on that topic for the government of Germany who recently wanted to go down that path. And I've talked to government in Israel about this etc. One of the problems that most of these governments faced that the US did not have at the beginning was to take research out of the military itself and give it to another laboratory or some civilians. They just couldn't cope with it. Even though the Israelis are very innovative people they have very small defense industry.

We were fortunate early on that some very famous scientists forced the government to build these laboratories a half of century ago. The government got very comfortable with sponsoring defense research outside the Army and the Navy itself. So you have this half of century tradition and it's legitimate. You don't have this sort of military industrial complex in other countries. It just never evolved that way. For instance, the Germans were very innovative and even they've never done it. It's a huge problem. I think that maybe in the Soviet times you had some research done by the Academy, but not the way we did here with all these large laboratories.

DARPA's budget isn't too big. Why?

It's been stable at around 2.5 to 3 billion for many years. When DARPA was put into business the idea was to take 1 per cent of the defense budget and give it to DARPA for unconstrained research. When it was 300 billion dollars budget it was about one per cent. Now the defense budget got larger and the percent is less, but it's been pretty stable over time.

Do you think it's sufficient to DARPA?

That depends on what they see DARPA's role is and what is happening outside of DARPA. DARPA is a very specialized organization. You have to understand why DARPA came about. In 1957 the USSR launched Sputnik. In that time the US missile program was horrible, it was mismanaged by the army. During the Cold War time it was a huge shock to the President and the government that the Soviet Union was so far ahead of the United States in the technology development world. Then it got even worse in May of 1960 when the USSR brought down a plane with Francis Powers in the Soviet Union

because it showed they now had the ability to launch these kinds of defense rockets and get to a very high flying.

So, the Americans looked around and they saw that the defense development and research was in terrible condition. The President ordered studies done. One of the results of these studies was to say: “We haven’t invested wisely in defense research, it’s been terribly managed”. And they started some new agencies. One of the agencies that were started was DARPA.

The DARPA charter, if you read it, basically has only three words — avoid technological surprise. What it means is — “No more Sputnik! We don’t want the USSR have technologies we can’t get to for years”. And initially DARPA was told: “OK, take

So, there is a very extensive interaction with the military on how to develop materials to build these kinds of very advanced military aircraft. There are a lot of other programs like this.

How many DARPA's projects are successful?

In the old days they used to say: “If 10 percent of the projects are successful — that’s terrific”. Nowadays, with tighter budgets and expectations they would like a higher percentage to be successful. DARPA does a lot of projects: some of them are very small of two thousand dollars; some of them are huge projects with tens of hundreds of millions of dollars. You don’t want a hundred million dollar project to be a failure. The big ones they would like to be successful.

They don’t care that much if some of the small ones aren’t successful. The way it’s basically structured is that if they have a small program that is doing well, they put more and more money into it, make it grow. And if they see that it’s not good at all they get rid of it.

What are the main problems in this sphere?

DARPA isn’t the same as it was in 1960’s or in 1980’s. It evolved. It lost some of its character of bringing in the best scientists in the beginning or in middle of their career. They have people that have been there too long. The idea early on was to bring in people with good ideas and have them for few years to run a program, let them go back to the civil service or university and bring new people with new ideas. But now there are people that have been there too long, people that don’t have new ideas. The last director probably stayed too long.

What might be done about it? Is it inevitable?

In some ways it’s inevitable when you have an organization that ages. If you have a Secretary of Defense who is the boss, and he wants to make some changes, it can be fixed. William Perry¹ who was a brilliant scientist was the Secretary of Defense he knew DARPA intimately. A Secretary like this can make the needed changes. When you have somebody like Robert Gates² who is not that familiar with it and is busy with the war in Afghanistan and all these things day and night, he pays absolutely no attention to DARPA. Last director of DARPA was an old friend of mine. He never heard from the Secretary, he had no direction. You have to have a Secretary of Defense who wants to fix things and make changes.

What were the main challenges you faced being a director at DARPA?

We had a number of challenges. When I was around we were converting the ARPANET to the Internet. Senator Gore gave us a great deal of money to make this conversion, to take something that was developed as a Defense Department experiment over the years and give it away to the whole world. In 1989–1990’s we had this transition and created Internet that the whole world uses now. Also, one of the challenges at that time was Star Wars, the strategic defense initiative. They were asking us for the new kinds of ideas and innovation. At the same time we had war on drugs, and we were working days and nights to invent something that could help.

Early DARPA was spending money on this area and doing things like ARPANET. Now you have multibillion dollar industry in Silicon Valley and in Virginia. The seeds were planted by DARPA

some of the defense money and don’t be responsible if there is a failure, do things that are important”. The problem is that if a person from the military runs a program and it doesn’t work, it hurts his career. He doesn’t get promoted. It looks bad on his record. The institution in the Army and Navy in those days was against innovation, against taking big risk. The idea of DARPA is to make a separate agency where their job is to take risk and if something doesn’t work fine — maybe the next thing is going to work. So, the idea was to take some money, put it aside and have people take risk without telling them what to do.

In the beginning DARPA started working on space programs, to help with the missiles. A couple of years later we took it away from DARPA. Then DARPA took over things like advanced computer science, building ARPANET. They did huge work in material sciences — graphic composites. It was a whole range of areas that were very new and risky. They invited the brightest people, both civilian and military, put them in a place, gave them a budget and told them to think of the future.

With 2 or 3 billion dollars budget (it’s not a huge amount of money) DARPA tried to get things started. It was a catalyst. Good example is computer science. Early DARPA was spending money on this area and doing things like ARPANET. Now you have multibillion dollar industry in Silicon Valley and in Virginia. The seeds were planted by DARPA. DARPA made small investments and now you have big industries that come out them.

How do “the generals” and “the scientists” interact?

Over the years it has been sometimes fantastic, and sometimes not great. In recent years it has been much better. Most of the programs are partnerships. They would go to, for example, the Army, the Air Force or the Navy and talk to them about a problem that they have and see if they can help solving their problems.

Probably, one of the greatest examples — the stealth aircraft business. In the Air Force they were looking to build F117 but the materials didn’t exist. And DARPA had a very good program in graphic composites — the materials to make the airplane.

We Have to Find a “Russian McNamara”



Iosif Diskin — Academic Advisor of the Russian Public Opinion Research Center, a member of the Council of the Public Chamber of Russia, Chairman of the Public Chamber Committee for Development of the Civil Society, a member of the intercommittee work team for industry modernization

How does the system of innovation order for the military and industrial complex work in the countries whose experience you are familiar with?

I am familiar with experience of the USA and Israel. Let us consider the first case. The system existing in the USA today emerged in the mid 1960's. What did the Americans strive for? First of all, they wanted this system to become less bureaucratic. So they invented the method of securing inflow of new ideas to such highly specialized and tough area as the armament system. There was the Defence Advanced Research Project Agency (DARPA) set up.

How does this agency operate?

First of all, there are real systems of scientific and technical priorities created, based on the analysis of the current tendencies in the sphere of armament and developments in fundamental and applied research. In other words, there is an understanding of technical capabilities. These priorities are of the public nature. Every year there is a tender announced for continuation of applied research focused on bringing specific technologies and developments to a particular level. The following requirements are set: compliance with priorities and readiness of private companies to finance 50 percent of this project. This is the only case the project is admitted to examination. The remaining 50 percent are provided by the state on a gratis basis. Naturally, it is necessary to account for the project implemented. At the same time there is no need to repay the funds invested or pay interest thereon. That is there is a great incentive to invest funds, since it helps to decrease risks sharply.

Secondly, a significant part of the DARPA budget (up to

fifteen — twenty per cent) is allocated to the project appraisal. After an application is filed, it is subject to the anonymous appraisal. About three-fourths are rejected at this stage. Experts are independent and they get big money. Errors committed at this stage may result in the DARPA expert losing his/her status, which, in turn, means not only loss of income, but also loss of reputation. That is why appraisal is treated with all seriousness.

After positive results of the initial appraisal are received, the project has to be protected face-to-face. Experts literally dress out each project for a day or two. Only after this they provide an opinion constituting the base for DARPA management decision, if a project should be included in the financing list.

Who retains rights to scientific and technical developments under projects financed by DARPA?

Intellectual property rights are retained by private companies acting as co-financers of the development. In other words, the state actually grants these funds and oversees their utilization. DARPA has no relation to further purchase of particular developments. Purchases are realized by the Ministry of Defense, NASA and the Ministry of Energy.

What happens next?

Then the Ministry of Defense, Ministry of Energy or NASA announce a tender for the design production. It is performed under the direct state financing. There is a tender held with all participants presenting their projects. This stage also involves the USA Administrative Bureau of the Budgets that pays attention to the value for money, functional features, company's reputation and warranties provided. That is a normal tender is held. A winning bidder is granted a production contract.

When DARPA selects financing projects, may the Ministry of Defense express its opinion?

No, it may not. That is the problem. There is a so-called “firewall”.

How does DARPA learn what is topical now?

On the one hand, they have a problem area and key priorities formed; on the other hand DARPA engages experts aware of the current needs. They know both needs, and opportunities. They understand priorities clearly.

I would like to draw your attention to the things unique for DARPA: it continuously evaluates the possibility of realization of achievement of the same functional features at the expense of other physical and technological principles. For example, there was a serious discussion about the possibility of sharp increase of the Hard Drive density. Many experts were doubtful, but it turned out there was an entirely new solution of the computer memory problem — Flash Memory. Fundamental research is required because nobody knows what this or that thing result in. Resolution of the issue of the possibility to achieve functional features at the expense of alternative solutions requires experts to have broad competences and to understand what is happening not only in a particular specialized direction, but in related areas as well. Unfortunately we have no such approach to the appraisal. But it is possible to develop it, since our scientists possess unique broad competences.

Is there a valuation of the DARPA performance?

Yes, about sixty-five — seventy percent of success. It is easy to measure it: one is to find out whether developments financed by DARPA are purchased or not. Though, of course, other things being equal, all agencies try to purchase things created with state support. That is those products created with support of DARPA have some implicit benefits.

And what system is used in Israel?

The Israeli system is extremely personified, it is based on the personal level of trust. The key figure in the Israeli innovative system is the senior scientist of the Israel Ministry of Industry and Commerce. First of all, it has a huge budget — two billion dollars (as of the century beginning, now it may be much greater). Secondly, such a person is selected much more thoroughly than the Israel prime-minister. It is not a political official, appointed from above.

All Israel ministries and agencies have the position of the senior scientist; save for the Ministry of Defense, as there is a separate structure with the General Staff. This is the senior scientist who arranges for project appraisal. Relative projects focused on creation of armament systems or new technologies receive direct financing. Though all are acquainted with each other, the appraisal is strict. The Ministry of Defense advises on the areas it would be great to achieve something. At the same time it does not decide what is more profitable to buy abroad, and what to produce independently. Where it is possible to gain profit from armament systems, they try to do it themselves. This is the stage when the senior scientist of the Ministry of Industry and Commerce is engaged. He bears responsibility for projects.

At this point I would like to tackle the appraisal issue once more. Both in the USA, and in Israel its importance is well understood, unlike in our country. There is a system of expert clusters created and they understand which group of people is specialized in a particular issue. And if we deal with a specific area, we should ask them and specialists operating in related areas.

What are the differences between the system of scientific and technical development order in Israel and the American model?

The Israel Ministry of Defense forms a close list of its preferences, unlike DARPA where such list is absolutely public. After that screening begins to find out what exactly this or that organization possesses. Possibilities of changes and adaptation of technically close developments to a particular project are considered.

If the American system is of the institutional nature, in Israel it is personified and is built on deep interpersonal trust. In Israel career development greatly depends on the forces one did military service. In the first instance, those who did the service in Special Forces, and analytical structures are promoted. But this approach may be applied only in a very cohesive and motivated society. In the USA, due to their specifics, everything is formalized. The USSR had a very person oriented system, and today — unfortunately this is not the case...

How would you characterize the system that existed in the USSR?

The main body that determined priorities was the Military and Industry Committee of the Council of Ministers. It was an interdepartment agency of the Council of Ministers

performing a coordinating function and effecting the day-to-day interaction with military men. Representatives of the Military and Industrial Committee participated in all trials, studies, etc. There was a continuous informal interaction effected, desired results of which were announced by military men who set particular parameters of the armament system, and the Military and Industrial Committee concluded if such results were attainable. For example, when it became clear that domination of the NATO fleets is a serious danger, military men raised the issue of the necessity to have submarines that would operate at a very high speed. That was the time when the military and industrial masterpiece was created: a project of the submarine with titanium hull with the atomic reactor replaced with a liquid sodium one. A very small volume was used to achieve enormous generating capacities. And that submarine had a minimum crew — only officers and subofficers. The submarine could develop a speed comparable with the speed of a torpedo. It practically produced no noise when approaching an object, and then its engines were launched at the full capacity and the submarine began approaching a squadron at the speed of a torpedo. It was impossible to hide from it. It is another issue that the price was ransom, and technologies were very dangerous.

Another example is the famous “Shkval” torpedo. When the intelligence service reported to the American specialists the speed at which the “Shkval” system was moving under water, they said that the service was mistaken. That system was designed with application of fundamental achievements: it was moving not in water, but in a gas-vapor cloud.

In the Soviet system military men interacting with the industry were engaged in a dialogue that served the basis for tactic and technical features. And the Central Committee and the Council of Ministers made a closed decision on the work launch. The chief designer played the key role in that system; he had enormous personal powers: money, management of all associate contractors and commanding plants, etc. If the decision on the armament system development was made, it was thought through to every screw. And the task to manufacture a screw with particular features was set to the responsible contractor, there being strict accountability: until 1953 lives were at stake and later responsibility was serious, as well.

During the period of its existence the Soviet military and industrial complex was operating under conditions of tough competition. Its products were systematically tested on the battlefield: MIGs — in Korea, and then in the Middle East, tanks — in the Middle East, air defense — in Vietnam. The whole process was based on personal responsibility of all participants. Whereas in all other sectors of economy there was no responsibility, the military and industrial complex was built on personal responsibility of the chief designer. But nobody cared about money.

One should also understand the following: the business of the large administration of the scientific and technical intelligence in the Committee for State Security was to steal everything it needed. And the military and industrial committee approved the plan stating which items and technologies were to be stolen. But if it was impossible to steal a technology, the general headquarters of the Soviet science — the USSR Academy of Sciences — intervened. Tasks to steal technologies and to develop proprietary technologies were often repeated. There was an institute of the Academy of Sciences set up, there were experimental units, laboratories and institutes created in the closed center. They engaged

best forces, gave apartments and paid good salaries, provided social security — every need was taken into account. It is another issue that the country was not that rich to stand such games.

But in the second half of 1970's — early 1980's, the appraisal gave ground and projects that were actually unrealizable began penetrating into the military and industrial complex. Drawing into "star wars", laser guns required enormous additional expenses. Besides, the system we are talking about had a great drawback: it was unable to transfer new visions of the military actions environment into new tasks of the military and industrial complex. Say, the country kept on producing a great amount of tanks, although the impossibility to hold large-scale tank battles became clear. They failed to clearly understand that the global dominance required quite a different armament structure. Defects in the political system inevitably affected the structure of the military and production complex. But the very mechanisms of the military and production committee, the famous "nine" (the military and production committee united nine industries) was a masterpiece of the administrative and bureaucratic system.

What is happening to the system of innovation scientific and technical developments order for the Russian military and industrial complex today? Is there such a system?

No, there is no such a system today. And the most crucial thing is that the existing system is a catastrophe for the country. According to the appraisal of Academic Fortov that was expressed by him during the meeting with the President, it takes eight years to move from the idea proposal to the commencement of the armament development. It means that the system is absolutely not ready to accept new methods of military actions performance, to accept armament systems based on new physical principles. And whereas military men make some progress in military orders, below there are no new revolutionary capabilities that may make a revolution in battle technique, seen. It is very dangerous since leading countries, the USA first of all, are moving towards creation of armament systems based on new physical principles devaluating importance of traditional battle technique, including nuclear-missile

shield. It is the first, fundamental, defect of the existing system.

Another problem is that the role of chief designers has become less significant. They may not manage funds. The system should provide the general designer with the possibility to place orders with companies capable of fulfilling such orders best of all; the general designer should hold all the money and should be able to place order as soon as an idea arises. These are not directors of institutes or plants who should hold all the money. A director would obviously place an order with its own institution. And under current conditions the general designer should, first of all, have money, big money. It is necessary to understand that breakthrough military technologies require big money. There is no sense in launching new projects for which ten million rubles are allocated. This money is insufficient to do anything.

The third issue is the necessity to restore an effective appraisal system, as our appraisal is absolutely poor. According to the law, experts bear neither administrative, nor criminal responsibility. Due to this the appraisal represents a huge channel of lobbyism and corruption.

What should we begin with to create an analogue of DARPA in Russia, and do we really need it?

It should be done obligatorily. First of all, we should select a person whom the President personally trusts and who is able to do this. It should be a person with real experience of through realization of a significant defensive project in Russia. It should be a person of relative scale who would bear personal responsibility for the process. We should find a "Russian McNamara" who would undertake heavy, without exaggeration, historical responsibility and would establish such system. It is quite a personal and personified business.

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The IX International Gas Exhibition

The 9th International gas exhibition of technologies for gas processing and effective use of gas will take place October 11–13, 2011 in Moscow at EcoCentre Sokolniki. Over 3000 specialists of leading oil and gas enterprises from 16 countries the world will take part in the event.

www.gassuf.ru

Industrial Trade Fair Moscow

Industrial Trade Fair Moscow (ITFM) will take place September 27–30, 2011 in Moscow at "Crocus Expo".

ITFM combines four trade events held at the same time in the same place:

- **CeMAT RUSSIA**

CeMAT RUSSIA is the new important international show for intralogistics, covering everything from forklift trucks to services and tailor-made solutions for individual sectors.

- **Motion Drive Automation RUSSIA**

The Motion, Drive & Automation RUSSIA is introduced all about power transmissions systems: mechanical, electrical, hydraulic, pneumatic. This is one of the largest sectors of the mechanical and plant engineering industry, power transmission and control.

- **Industrial Automation RUSSIA**

The Industrial Automation RUSSIA is introduced the latest technologies innovations for Process Automation, Factory Automation, Integrated Industrial and Building Automation Systems.

Industrial Automation gives you a uniquely comprehensive overview of all areas of industrial automation.

- **Surface RUSSIA**

Surface technology is a global industry. Surface Technology is the optimum platform for all the segments of the industrial surface treatment market — from pre-treatment and coating to final measuring and testing.

These four events make ITFM the cross industry marketplace in Russia and the CIS.

ITFM is a collaboration between Deutsche Messe and ITE Moscow. Combining local industry and market knowledge with international experience and reach will ensure unparalleled expertise in delivering a truly international standard event.

www.itfm-expo.ru

Secrecy Barriers as a Deadlock Over Innovative Development



Aleksey Arbatov — corresponding member of the Russian Academy of Sciences (RAN), Head of the Center of International Security within the Institute of World Economy and International Relations under RAN, member of the governing board of the Stockholm International Peace Research Institute (SIPRI), member of the Research Advisory Council of the Ministry of Foreign Affairs of Russia, Russian Minister of Defense counselor

What does Russia need DARPA analogue for?

Russia needs a structure similar to DARPA if it wants to keep focus on the most innovative research projects and cutting-edge technologies, which in long run can potentially bring up solutions for the military sphere. As a matter of fact defense agencies and defense industry bodies' emphasis is centered on technologies which directly may be put into practice and exploited in the military sphere in the short run, as such projects secure ongoing contracts and re-equipment with new hardware. Therefore many long-term projects are often left in the basket as today they seem the ones of little promise or too dreamlike, whereas in fact in ten, fifteen, twenty years perspective these projects may be capable of bringing into effect technological breakthrough to radically change the warfare in the world. Such a structure was established in the USA long ago, in the 1950's. All the most revolutionary and long-term innovations have been introduced for the American military forces within DARPA framework. I mean, for example, multiple independently-targetable reentry vehicles. They were conceived within DARPA to have determined the major direction of strategic armament race for many years. The same might be said about the systems built upon new physical principles, space weapons systems etc.

What contract schemes types regarding scientific and technological R&D projects attuned to defense industry around the globe would you single out?

They all differ a lot and depend on the political system and the specifics of a particular R&D project they refer to. But generally they are long-term research projects receiving state budget funding. As DARPA is a substructure within the Pentagon, our institute is accordingly perceived to be a subunit within the Ministry of Defense. And it will be funded through state budget.

The independent examination is of great importance as the vast majority of these long-term projects is never implemented. But the tiny proportion of them brought into effect and ultimately fulfilled will make a breakthrough to pay off all costs incurred. And a very significant mission of DARPA in the USA is timely discarding and blocking the research projects which are merely waste of money. The Agency calls on the most competent professionals, academic researchers, scientists from laboratories, institutes and universities. These specialists have self-interest in neither these contracts nor such projects and can therefore offer independent appraisal on the ongoing basis. It helps a lot to avoid waste of money and failure in spotting anything capable of bringing up great solutions for the military sphere. This problem is the most important for Russia because when it takes to defense contracts and state defense program we are first of all unfortunate with lobbying. Defense agencies and defense industry corporations lobby their projects and appeal to common good of the national defense as a whole thanks to smokescreens of warlike secrecy, while such push strategies being motivated by their corporate interests. As a result enormous funds are spent to finance parallel and duplicating projects, to buy stuff we don't need while the true projects are underfunded.

Today this is the main goal for us to pursue. It is really easy to establish a committee and name it Russian DARPA analogue. But another thing is to make it operate in a way DARPA does and prevent its transformation into another sinecure for red tapists and defense industry businesses, this is a very serious issue. Yet I haven't seen anything evidencing that this program is conceived deeply and thoroughly.

It is important to avoid imitating the façade. For example, as Silicon Valley does exist, let's establish our Skolkovo, as DARPA does exist in the USA — let's establish our DARPA as well. It is crucial to understand the operating principles of this system and to invest efforts to establish it within the Russian context.

It is exacerbated by the problems we have regarding our incredible secrecy, the lack of cooperation between our research centers, and the fact that our leading researchers charged with strategic studies and natural science issues within our institutes remain alienated as they are not granted access to these top secret materials. And as soon as they are granted access such scientists are labeled as top secrets holders and restricted in movement abroad to attend any scientific conference. The secrecy restrictions must be narrowed and applied exclusively to the most sensitive materials. Independent experts and close confidants should be involved in those fields where secrecy restrictions will remain; they will sign relevant papers but the way it won't

affect their lives negatively and so as to allow them to operate as ordinary scientists. Our problem is that scientists engaged in sensitive military projects live under microscope. They are cut off from any communication and have scarce access to scientific literature as they often simply do not speak English and are unable to become familiar with state-of-the-art advances. They have to read translated versions, which are often of poor quality. It is neither typical of the USA practices nor of those prevailing

high-profile insignias and golden shoulder straps and it needs to allow independent appraisals be carried out by the scientists engaged in the field in question and let them work upon long-term projects. While one team of scientists work upon the projects, the other team offers assessment without being guided by corporate interests of certain military agencies, corps or defense industry businesses who benefit from state defense contracts when they are placed.

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in Europe. The secrecy policies must be tuned up in such a way that all researchers engaged in sensitive military projects, on the one hand, had access to secret materials, and on the other, were not closely watched. And we are still fearful of discovering someone bribed or enrolled and afraid to see they disclose the most sensitive of our top secrets.

In what manner do researchers and the military men in the USA interact?

On the basis of mutual respect. But the generals in no way reserve the right of final say. Genuinely civilian top management within ministry of defense is designed exactly to guarantee that all scientists reporting directly to this top management won't be disregarded by generals and marshals on that sole ground that they have multiple stars on their shoulder straps. Within civilian-managed Ministry of Defense the voice of scientists will sound as impressively as the one of generals and admirals. The fact that researchers are not impeccable either is a question apart. They also can make mistakes. And certainly it all mustn't be interpreted in a simplistic way.

Such issues like long-term projects require to be shielded from lobbying by industry businesses as a first priority and, secondly, from absolute power granted to army men of

In what way are orders for scientific and technological R&D projects being generated?

The most advanced defense research centers, laboratories and corporations submit their offers. These projects are subject to assessment by independent panels of experts to result in a selection of the most promising ones. You don't have to suggest anything dreamlike here but offer potentially meaningful solutions for the national security.

What is the benchmark to measure DARPA's success? How is the performance of the Agency being assessed?

The performance is being assessed in accordance with the number and value of the engineering works resulted in military hardware and weapons and strengthened the national war capacity.

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SIMEXPO — 2011

Scientific Instrument Manufacturing EXPO — 2011 (SIMEXPO) is the V International specialized Exhibition of Instrument and Equipment for Scientific Research. Organized by The Instrument Commission of the Russian Academy of Sciences, E.J. Krause & Associates, Inc., and ZAO "Expocentr" the event will take place October 24–27, 2011 in Moscow.

SIMEXPO will gather representatives of key local and international manufacturers of scientific instruments and equipment for research in various fields of science, producers of materials and components for scientific devices, as well as representative offices and dealers of leading international companies.

SIMEXPO is B2B (business to business) oriented and attended exclusively by professionals, including top managers and specialists from scientific organizations, research institutes, companies, universities and media. The show provides an excellent opportunity for effective communication and networking of manufacturers and suppliers.

www.rusnano.com

Progressive Technologies in Automation Exhibition 2011

The PTA — 2011 Exhibition will be held in Moscow September 21–23, 2011 (Expocentr, Pavilion 3). PTA Exhibition history began in Moscow in 2000.

PTA has gained authority among specialists, as a result, it is considered to be one of the main trade-fairs for automation technologies and equipment. Since 2005 PTA exhibition is a member of World F.I.M.A. — World Fairs Association (Instrumentation, Measurement, Automation).

The fact that this fair will be held in Moscow for the 11th time proves its importance for manufactures and customers. PTA exhibitions — are the real key to the Russian industrial market. They have representative offices in different cities of Russia and Ukraine: Yekaterinburg, St. Petersburg, Novosibirsk and also Kiev and organize events there.

www.pta-expo.ru

DARPA Mission is to Prevent Technological Surprises



Erica Fuchs — Assistant Professor, Engineering and Public Policy (EPP) department in the College of Engineering at Carnegie Mellon University

How does the system of development of new cutting edge technology for use by the military works in the US?

It is almost ironic that Russia would be thinking about creating DARPA because it was initially created in the United States at the response to Sputnik. So it was founded in 1958 to prevent future technological surprises here in the US. The way it has worked since then is that at any point of time there are just over 100 program managers who have a budget of 3 billion dollars to fund projects. The program managers are brought out of non-government agencies for short period of time. So, they are taken out of Academia, out of the industry and they spend 3 to 5 years in DARPA with the ability to fund new technology projects anywhere across the nation. They have a lot of freedom. They fly around the country finding out what their colleagues, other scientists, are doing. They fund scientists that work either on similar projects or on competing technologies. Their goal is to connect people who work on similar projects. The amount that has to do with the military varied over the years. For example, in the 1960's scientific merit was considered much more important. In the other periods that's been different.

So, how much DARPA has played a

role in dual use technologies necessary for both the military and general economic advancement of the US versus military advancement — it is very debated by people who are involved in DARPA. And it's changed a lot over time. And I think it is represented even in its name. First it was just ARPA — Advanced Research Projects Agency with no “D” involved. Later, in the 1970-s, it became the Defense Advanced Research Projects Agency. Between 1993 and 1996 they excluded the word “defense” and it was ARPA. And nowadays it's called Defense Advanced Research Projects Agency again. So, you see that kind of push and pull changing over time depending on what the focus of the US is at a time, who is running DARPA, what their beliefs are about what the agency should be about.

Some directors can be more hands off than other directors of DARPA, but, in general, the program managers, about one hundred individuals, have extraordinary independence. During these 3-5 years (I think it's very important that they are not allowed to stay longer) that they are doing funding, the amount of money that they might distribute may vary on how successful they are. In general, what they give that funding to is very much at their individual discretion. They are acting as scientists almost like doing research in university where they might have 5-10 graduate students doing research for them. They fund the best scientists, bring them together at workshops to talk to each other about what they are doing. And then they go forth and try to use that and attract other people to work in that direction.

DARPA director might report to the US Congress on how DARPA is doing. But DARPA is not responsible specifically to any military agencies. And even with respect to outcomes — in DARPA you can have huge failures and that will be seen as a part of the investment in science.

How do program managers decide whom to fund?

It's all about relationships. DARPA program manager is an expert; he himself is a scientist who does service for the country. It's very prestigious to be DARPA program manager. So, because he himself is a leading scientist, he knows what the field is about. He might

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Russia & CIS Refining Technology Conference and Exhibition 2011

Russia & CIS Refining Technology Conference and Exhibition 2011 will take place September 22–23, 2011 at Marriott Grand Hotel, Moscow. This traditionally strongest and most established EPC Ltd event will cover latest updates and case studies on clean fuels technology developments, optimization tools, FCC technologies and will provide unique networking and marketing opportunities
www.europetro.com

Kaluga Pharmacists will be Taught by the Danish Program

The delegation of the Kaluga Region has completed its visit to Denmark company headquarters “Novo Nordisk”. Purpose of the trip is a practical study of methods of training for the pharmaceutical industry. Regional Development Agency area director of training in Novo Nordisk, Mogens M. Polsen, introduced scientists from Kaluga advanced methods of training in a training center. Guests explored environmentally friendly methods of processing waste products and how to use the international GMP standards in practice.

Recently in the Kaluga region was a coordinating council to the Governor for the development of the pharmaceutical cluster. The Council will ensure effective collaboration between the government and the enterprises participating pharmaceutical cluster, as well as contribute to solving specific problems of investors, implement in the field of pharmaceutical projects.

Meanwhile, the Kaluga region has already attracted six large drug makers. Among them: “Hemofarm” (the German group of companies STADA), “Berlin-Hemi/Menarini” (Italy), “Novo Nordisk” (Denmark), “NEARMEDIC Plus” (Russia), “Galenika” (Serbia), and the Swedish-British company “AstraZeneca.” Estimated amount of investment companies will be around 265–280 million euros.

www.bakutoday.net

have a vision for what kind of research he would like to fund. Who he funds is a combination of whom he knows in his field and a combination of flying across the country and talking to many people. And because he is a program manager and he has a lot of money people usually come to him with great ideas. In that situation the program manager might know another person in that area and he can promote collaboration. Program managers are trying to advance the field in which they are working.

How many projects each program manager has?

In any ways it's a combination of how much he can convince his office director

the development of something that the military will need tomorrow. That would be done by the actual mission agencies themselves, by the Army, Navy, Air force. This is very different. It is very hard to know what will come out.

What is the measure of success? How DARPA's work is assessed?

It is not hard to say what a failure is. Check and balances is a very interesting question in general and it's difficult to answer. Many people are doing research right now on how does DARPA know whether it reached its goal? In some way the people that are doing research are maybe the most responsible to program managers.

Check and balances is a very interesting question in general and it's difficult to answer. Many people are doing research right now on how does DARPA know whether it reached its goal? In some way the people that are doing research are maybe the most responsible to program managers

and the director of DARPA of how much funds he should have control over, and how he decides to distribute these funds.

Did other countries try to clone DARPA?

The mechanisms used by DARPA are not new. These are mechanisms that can be found throughout other nations with successful technology policies. In particular, the idea of leveraging social networks and bringing scientists together to work on particular ideas, or just bringing people together, the idea of network government, so to speak, I think you can see in Ireland, Israel and other countries. They aren't doing it in the same way that DARPA is doing.

What might be unique about DARPA is that it started in the US. And also that it's really crafting for fore fund of technology development in particular area that is of a high interest in that case to the military.

I think that there is no other agency exactly like DARPA. But there are many agencies that play a similar role in technology development both in the US and outside. In particular, DARPA's goal is to prevent technological surprises. This is a blue-sky research. It's not

DARPA is a really fascinating way to influence and to support advanced technological development. Whether it's military or not military development — it's a different question. The fact that they bring in great scientists, that these scientists don't hold these positions for a long time, that they have a lot of freedom in funding, and the fact that they develop and they maintain the trust within the scientific community so that people want to come to them with their bright ideas has very little to do with the military. What the military may provide to DARPA is very clear goals. So if you don't know where you are going it is hard to find a particular direction.

Is DARPA efficient?

I don't know whether DARPA is efficient. I would be very careful with the word "efficient". It's not clear at all what it stands for. But I know that DARPA is creative.

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Skolkovo Foundation Becomes Presenting Sponsor of 2011 George Brown Award

This year, CRDF Global is honored to have the Skolkovo Foundation as our Presenting Sponsor at the 2011 George Brown Award Dinner. The George Brown Award dinner will be held on November 2 at the Ronald Reagan Building and International Trade Center.

CRDF Global will honor: Dr. Craig Barrett, former CEO and chairman of Intel and International Co-Chairman of the Skolkovo Foundation; Dr. Rita Colwell, former NSF director and 2011 US Science Envoy, and Ambassador Thomas Pickering, former ambassador to Russia, El Salvador, India, Israel, Jordan, Nigeria, and the UN, and Department and Vice Chairman, Hills & Co.

www.crdfglobal.org

Ural Scientists' Innovative Viricide Backed by Skolkovo

The Skolkovo Foundation has joined the Ural scientists' effort to create a new antiviral agent, to be designated triasaverin, ITAR-TASS Urals reports, citing Alexander Petrov, head of the Urals pharma cluster. According to the source, the developers are gearing up for a third phase of clinical trials of this innovative drug. Mr. Petrov was quoted as saying, "in December 2011 we have plans to launch commercial production of triasaverin, and the first batch will go to market in early 2012."

The antiviral agent has been reportedly developed by scientists from the Ural Center for Biopharma Technologies, which is part of the Ural Pharma Cluster. The Center incorporates the Institute of Organic Synthesis and the Russian Academy of Sciences' Institute of Metal Physics, as well as 12 pharmaceutical companies. A reported 20 investors are said to be ready to put up funds.

As trials have shown, the new viricide effectively fights the deadly H5N1 and H1N1 types of flu and suppresses viruses over the entire course of illness, not just the first few days.

www.marchmontcapital.com

In the US Investment Incentives Provided to Corporations Help to Drive the Development of Renewable Energy Sources



**Alex King — Director of the Ames Laboratory,
Professor at Iowa State University**

Why alternative “green” energy is crucial today?

Public awareness of the global energy challenge is at a very high level, at least in the U.S., where I live, even though we do not have an energy crisis of the type that we saw in the 1970’s. Energy prices, e.g. for gasoline and electricity, are reasonably stable, and there are no supply shortages like the ones that led to long lines at gasoline stations in the 1970’s. Nevertheless, there are two issues driving a need to develop alternative energy sources.

First, climate change arouses concern among many people who wish to see a good environment for themselves and for subsequent generations. This is a very complex phenomenon, but it is clear that growing carbon dioxide concentration in the atmosphere contributes to it. To reduce carbon emissions, we need to find alternatives to burning stuff, whether it be fossil fuels, wood, or other biofuels.

Second, the U.S. imports a very large fraction of its energy, generating a significant trade balance challenge, overall, and resulting in reliance upon a few foreign countries, particularly for oil. Developing alternatives, especially domestic ones, diversifies the market and is a powerful hedge against price increases in any particular area.

What role national governments play in developing new energy sources? What is the ratio of public/private investments?

Governments take many different approaches to this challenge, but there is certainly worldwide attention to it. In France, where electricity is provided essentially by a government-owned corporation, there has been great success in developing nuclear power. Other countries foster

a much more diverse approach with a broader range of solutions, including combustion. In countries where decisions are nominally based upon free-market considerations, there still remain government interventions that tilt decision making in one direction or another. In Europe, motor fuel is taxed much more highly than in the U.S., resulting in a more highly-developed public transportation sector, and less reliance upon automobiles. In the U.S., investment incentives provided to corporations help to drive the development of wind, solar and other renewable energy sources, where they would not otherwise be able to compete with the low cost of coal, oil and natural gas.

Because of the complex interplay between private investments and government programs that take a wide variety of different forms, it takes some very sophisticated econometrics to make any reasonable comparison between different countries on the basis of the ratio of public to private investment. In all cases, however, the government plays some role, either direct or indirect, in determining what kinds of energy sources are developed.

Are there any government programs aimed at supporting research in this field?

Governments are the primary sources of funding for research in all of these areas, and even in the challenging fiscal environment of today, where large increases in overall research budgets are difficult to achieve, we have seen significant new investments in energy-related research. In the U.S., the Department of Energy has made a broad range of investments, and sharpened its focus on several specific areas that hold promise.

What are the latest technological trends? Can you elaborate on some recent breakthroughs?

There is no single approach, and no single breakthrough that will provide the world with plentiful, clean and secure energy over the coming decades. Established economies have the option to look at reducing their energy needs, while emerging economies have the option to build greener sources of supply than are being used in the developed world; but in the end, we all have to find new sources of energy.

On the energy reduction side, building efficiency advances have a huge potential to make significant impacts at relatively low cost. Transportation technologies also have great potential, although the costs of shifting to public transportation or changing over from traditional internal combustion power to other vehicle technologies are higher. Still, buildings have a lifetime on the order of many decades, while vehicles tend to be replaced on a timescale that is much shorter.

On the supply side of the equation, solar energy is technically viable in many parts of the world. Although it is still too expensive to compete on a straightforward economic basis with coal or natural gas-powered electricity, the cost declines with every solar unit that is installed. Government incentives to install solar systems accelerate the rate of installation, and accelerate the rate at which the price becomes competitive with fossil fuels. Similar considerations apply to wind-based electrical generation, but with the added

¹ The Ames Laboratory is a U.S. Department of Energy National Laboratory operated under contract by the Iowa State University of Science and Technology (ISU).

complication of the need for rare-earth magnets for the generators, and the current shortage of rare-earth metals on world markets. This shortage will certainly be relieved through economic and technological developments, though, and we are left with a situation where wind and solar, among other technologies, will slowly displace traditional power sources from the market. A major challenge, though, is that wind and the sun favor some locations more than others and these are not always where the energy is most needed. There is a need to distribute energy and store it for later use, much better than we do now. New “smart” grid technologies and new energy storage technologies are areas of great potential.

waste, rather than generating it, using “fast burner” designs. There remain several technological challenges to realizing these, however.

How is clean energy R&D incorporated into national innovation systems in general? What role do governments play or should play in developing clean energy?

The first “industrial revolution” was driven by the development of energy sources that produced greater power output than a horse or a man: it was really an energy revolution at its heart. In recent years, we have described our most important technologies in terms of living in the “information age” and along the whole span of time,

In recent years, we have described our most important technologies in terms of living in the “information age” and along the whole span of time, from the industrial revolution to the information age

Is there a progress or a standstill in the sphere of thermonuclear energy? Can it become a viable alternative to other energy sources? How “green” it may develop?

Some countries, such as France and China, have large investments in nuclear power generation. In others, public suspicion, regulatory controls, or even international pressure make it very difficult to succeed with nuclear power projects, and there has not been very much new investment in this area since the 1970’s.

Some new ideas are emerging, however, with small “modular” reactor designs starting to gain a lot of interest. These provide some attractive features, including being small enough to be manufactured in a factory, where quality control can be more rigorous, and economies of scale can be realized. Even with efficient and safe designs, however, there is still a need to deal with radioactive waste, making sure that it does not pollute the environment or fall out of the control of the government and into the hands of terrorists. New generations of nuclear technology, still on the drawing boards, may allow for operation that consumes radioactive

from the industrial revolution to the information age, the involvement of governments and financial markets has been essential. Governments and financial markets are both now much more complex than they have ever been in the past, and they play very complex roles in developing any new technology. As long as these institutions recognize that they can advance innovation by investing in clean energy, they will find ways to do so. In many cases, the methods may seem revolutionary, just as the banking innovations that enabled the first industrial revolution were revolutionary at the time.

What is your knowledge of the situation in Russia?

I am not really very familiar with the situation in Russia. I am sure, however, that just as in the rest of the world, a major issue is the development of expertise at all levels, including public awareness of the issues. Without broad awareness and deep expertise, no solutions will be implemented. Success will follow when knowledge about the issue, in all of its aspects, is widespread.

INNONEWS

Russian Pharmaceutical Group Invests in Bunardzik Industrial Zone (SUP)

A cornerstone laying ceremony kicked off a construction of a plant in the free economic zone of Bunardzik near Skopje, a 5 million million-investment of the Russian company “Prodis” — part of the pharmaceutical holding “Protek Group”. The project will be realized in two stages and open a total of 300 new jobs.

“Prodis” will manufacture homeopathic and herbal medicinal products, aimed for the Russian Federation and the markets of former USSR, Yugoslav and overseas countries. PM Gruevski expressed belief that many Russian companies would follow the suit of “Protek Group”. Foreign investments will keep entering Macedonia thanks to the Government’s policies for sustainable economic growth and constantly advancing of the business climate, Gruevski said.

Protek Group is one of the largest pharmaceutical companies in Russia. The Group has a diversified business structure and is active in all industry sectors, including production of medications, distribution of health and beauty products, and retail sales.

www.rusnano.com

The 2nd International Forum: Innovative Drug Research and Development in Russia

The 2nd International Forum: Innovative Drug Research and Development in Russia will take place 21–22 November in Moscow. This Forum is the only platform for key figures involved in developing Russia’s innovative drug market. Its 2 information-filled days are dedicated to all issues related to sector development. More than 40 expert speakers will analyze and discuss the most important tasks facing the sector today. They will also provide advice, expertise, opinions and forecasts on sector development. Participants will have access to unique information on the issues affecting the success of business today.

www.farmavita.net

“Green” Construction as a Fashion



Sergei Zhuravlev — Head of the project “Russian Future House”

When did the buildings cease to be “green” and for what reason?

As little as 100 years ago, a mud hut, a log or stone house (not to be confused with the brick one) or a yurt were not only environmentally friendly, but also energy-efficient buildings, since in most cases, they were heated and lighted with “alternative” and renewable resources.

History is a cyclical process, and will certainly bring back to the houses their self-sustaining and rational nature, but this time on a different technological, aesthetic and functional level.

In countries experiencing shortage of resources, this process gets boosted. In countries with excessive energy resources it is slowed down, since it obviously contradicts the sales policy pursued by energy and utility monopolies.

Which countries are at the forefront of “green” building?

First and foremost, these are the counties of Northern Europe and Great Britain. The US does a lot of innovation work. Deep down, it’s an innovation-oriented country. America is very good at commercialization in a sense that solar panels are much cheaper there than in Europe or Russia. Things that America does for environmental protection can be described as a straight-line process. They don’t make much fuss about it, which is partly due to the size of the country, fairly favorable climatic conditions and lack of strong energy dependence that is prevalent in Europe. Therefore, Europe is certainly taking the most drastic efforts to achieve autonomy.

How do Europe and America encourage private companies to engage in “green” building?

The way the US government provides incentives is unusual for us. There’s little of it in the form we are familiar with, such as subsidies, tax deductions, etc. However certain European countries come up with some serious incentives providing subsidies covering as much as 50% of such housing

construction. They subsidize materials and equipment used in improving energy efficiency. From the greening standpoint, they primarily support pilot projects with zero CO2 emissions, which implies the use of internal absorbents. The issue is about properly sealed homes, which use different CO2 disposal methods. For example, they use “green” walls or “green” ceilings, which are known to absorb CO2. Households emit low CO2 volumes, and the internal autonomous ecosystem can absorb CO2 in full using certain species of plants. This is the basic mechanism. In addition, they use environmentally safe materials and internal microclimate.

What is the percentage of “green” building in Europe?

In terms of volume, I would say the percentage is negligible. They have better progress with commercial buildings, because that’s where the financial system and the building certification system have their focus on. They are more cost-effective.

“Green” building also includes construction of various eco settlements. However, I wouldn’t say that it is a mainstream activity. Certainly, they increase energy efficiency up to about 85% as compared with conventional buildings. On the other hand, cost increases by 20%. The list of materials and equipment precludes any assumptions about this being a 100% environmentally friendly construction. Therefore, “green” innovations in housing construction have so far remained a thing related to enthusiasm, state propaganda, advertising and experiment.

How fast will these technologies be widely implemented and become common practice?

This will happen quickly, no doubt about it. I’d refer to what we do in the “Russian Future House” project as applied futurology. Ten years from now, this business will lose its status as something fashionable or experimental and become a routine occurrence. I think that this market will grow in Russia, as the market for imported materials for so-called «Eurostyle renovation” did in its time. Initially, these materials were used only by wealthy people, and later they became affordable to just about everyone. “Green” materials and equipment will get cheaper and become increasingly available.

It’s been almost 200 years since the photovoltaic effect was discovered by Becquerel, but “solar house” has so far remained an exotic dream rather than a mass phenomenon. What could turn the tide, and under what circumstances?

Energy systems efficiency based on this effect will inevitably rise; however, two problems need be solved before such a breakthrough has a chance to materialize. First, power engineering needs be localized in the smallest consumer niche available, which is an individual residential house, aiming at energy redundancy right from the get-go. Secondly, build a range of standard (all-purpose) integrated all-in-one energy solutions, which would bring the strengths of multiple energy sources and systems in a single package. Today, such combination comes as a result of isolated research efforts, and equipment suppliers are few and far between.

How efficient is the use of solar panels in Russia given climatic characteristics in central Russia?

Solar panels alone cannot be a fix-it-all solution even despite the potential increase in their efficiency. Area of land around a modern house is not large. There's no way one can cover it all with solar panels. In a similar climate in Sweden, an energy-active building requires installation of fifty square meters of solar panels. Fifty square meters doesn't look like a lot of surface. However if you place these panels on the ground, they'll add up to cover a very significant area. At the same time, the main objective is not to boost the output of generated power, but to cut the consumption. In other words, there's need to improve the efficiency of lighting, heating, ventilation, household appliances, etc. The overall consumption has to go down. Actually, this process began long ago. With large-scale replacement of lighting bulbs with cheaper LED ones, the change will be fairly significant.

Then again, solar energy should be used in combination with other steps. In and by themselves, solar batteries do not provide the solution. There's need for additional installation of heat supply autonomization system, such as solar collectors, both heat and infrared ones, heat pumps, etc. I can see a market-based, efficient solution enhancing the overall efficiency only as a complex solution. This complex should be treated as a whole rather than a bunch of isolated units randomly installed according to individual designs.

If we manage to figure out such a solution, we'll certainly start moving ahead at greater strides. I believe we are heading that way. How is it going to be, what will it look like? Most likely, it will come as an all-in-one modular unit, which will provide access to solar panels and pipes buried in the ground or taken to the outside and to the ventilation systems. So far, I haven't seen an integrated system like that. They are effectively a craft, an unbalanced combination of units built by different manufacturers.

What are the international "green" building standards? Where, do you think, the "green" building standards have been most appropriately formulated?

These are primarily voluntary certification systems for buildings and developments (such as LEED), which are the focus of the national financial systems and government programs. I believe they are all imperfect, or rather archaic, since they had been developed more than 20 years ago. There's need for expansive approach, or should I say for transition from ecological compatibility to comprehensive efficiency.

How widely is LEED-like certification used in Russia?

So far, not at all. LEED has been recognized by the Olympic Committee, which means that Sochi 2014 buildings will be certified according to the LEED system. In fact, they are developing a Russian answer to the LEED system. The issue is about the corporate Olimpstroy standard and Green Standards Project under the auspices of the Russian Ministry of Natural Resources. In general, it's a direct loan from foreign certification systems that have not yet been adapted to the Russian climate and resource base.

First of all, Russia should strive to improve and adapt foreign "green" building experience for its own benefit. It should also focus on export-oriented sector of environmentally friendly production facilities in order to find its niche in the international division of labor.

Is there anything that makes it drastically different from foreign certification systems?

Nothing drastic at all. Unfortunately, we are still mastering the ABC of certification based on foreign systems. Now, at least three of them are being implemented in Russia. Eventually, these systems begin to compete. Or, in fact, they provide protection to domestic burgeoning seedlings. Maybe, these problems are due to the fact that the accumulated foreign expertise should have been reconsidered and then used in developing more integrated, more coherent certification systems, which would be capable of evaluating living space in a more detailed manner.

How do research and development projects in the area of "green" building blend with the national innovation system as a whole?

Fashion provocation is the best way to secure across-the-board implementation of ecological knowledge, innovations and business solutions. Such fashion is created using fashion runways, i.e. demonstration sites. All countries practicing (not declaring) "green" building begin with a demonstration of samples, ultimate goals and "carrots", and then create an incentive system (subsidies, tax breaks, etc.) to promote such samples, goals, etc.

How does the use of "green" technologies increase construction costs?

By about 20% in Europe, and I think this number will be as high as 60% in Russia. This difference is due to the fact that all equipment is imported and we don't have enough experience. Therefore, each project in Russia is much more expensive in terms of physical costs and design expenses. In addition to that, they have certain subsidy systems in the West, which bring down the costs in various ways. We don't have such subsidies in Russia. Therefore, everything falls on the builders. However, this is a very approximate number, since we build too few such facilities in Russia. Also, these facilities are built with partial use of these systems. Comprehensive solutions aren't available. That's why the "Russian Future House", two boards on environmentally friendly construction business, the Russian Union of Architects, the Social Development Fund and three magazines launched the prize project entitled Dom-Avtonom (Self-Sustaining House). The goal is to hang a carrot in the form of a prize for effectively built houses that have proved their environmental and operational efficiency. If we get any responses, we will at least be able to draft a roster of projects for environmental and energy efficient construction business and individual housing projects.

What does the contest winner get as a prize?

They have just begun to raise funds for the prize. We have announced the start of the project on December 1. Our goal is to raise 15 million rubles for three nominations, 5 million per nomination. Currently, the total prize amount stands at 150,000 rubles, but sponsors are becoming increasingly active, so we are quite optimistic about the outlook for the project. Moreover, we have a whole year to discuss criteria for evaluating the efficiency of such houses, and will begin to evaluate candidates and analyze the actually built houses only a year from now. The claimants, whether potential ones or the ones who had registered with us, have an entire year to build and begin to operate, prove the efficiency and popularize their project.

Half of all Raw Materials that are Used on this Planet Goes into Building



Edward Schwarz — General Manager of the Holcim foundation for sustainable construction

Why is “green” construction crucial today?

I think that sustainable construction has always been important – but it’s only lately that people have become aware of it again. If you think about it — half of all raw materials that are used on this planet go into building. And over the life cycle of a building, it accounts for around 40% of total energy consumption and CO2 emissions. Building also produces half of the waste, so this is clearly the place where the greatest difference can be achieved to make a more sustainable world. “Green” building means a big change. Even a small percentage change generates an enormous difference.

When did buildings stop being “green”?

In former days, pre-history, we lived in caves. That was probably very sustainable in some way. But as soon as we began to develop more complex social structures and move away from subsistence, and the beginnings of urbanization — that’s when the balance began to tip and more energy and materials was used in buildings (heating, cooling, lighting, etc) than was used for their construction. We have since reached a point where the construction of a building only accounts for about 10% of the total energy and raw materials used throughout its life. It is the ongoing life of the building that uses electricity and produces waste. The building itself is only a small contributing factor to the total energy or raw material footprint of the building over its life span (construction, use, demolition and recycling).

Every industry is trying to reduce its footprint as much as possible and at the same time to create innovation. You try something — maybe it works, maybe it doesn’t, there’s a lot going on, there is not one particular thing, there are trends. Now there is a trend with alternative energy — everybody’s on energies.

There are different standards of “green” construction. Why do we need them?

There are certificate systems like LEED (Leadership in Energy and Environmental Design) — I think they are good

indicators. They indicate because they enable us to measure something that is otherwise just a perception. But I don’t think that there should be a complete focus on the figures generated by the process of certification. What counts is the building’s entire conceptualization phase from planning to construction — how much thought you’ve put into it and what you actually change. If you take ISO certification — everybody has that today. Twenty years ago nobody had it. There is no differentiation anymore. But getting there made everybody look through their processes, and achieve some degree of optimization — and I think with these certificates on “green” construction it’s a little bit the same.

So, it’s good to have them as indicator but you cannot rely on them 100% because you are measuring apples and potatoes. For example, you can have a fantastic building, but your employees all live in a nearest city 200 km away, there’s no public transport and they have to come by car. The building may in itself be brilliant — but its integration with the economic, social and environmental structures is completely flawed, and the certification counts for very little.

What does “green” construction have to do with the level of development?

Take Bangladesh — their key concern is to have a roof over their heads and they don’t evaluate levels of sustainability, they just don’t want to get wet. I exaggerate, but you know what I mean. In a city like Singapore where there is no space they have to be sustainable in order to grow. But I’ve seen excellent examples in Australia where they have space but want to discourage urban sprawl which moves people further away from employment and infrastructure and also encroaches on valuable agricultural land. Developing countries are also taking advantage of the lessons learnt and do not want to make the same mistakes that today’s so-called developed countries did 20–30 years ago.

Developing countries can “leapfrog”?

Exactly! I’ll give you an example from Bangladesh. Bangladesh used to have the lowest rate of telephone ownership per capita of any nation — around one connection per thousand people. But today, a surprisingly high percentage of the population has a mobile phone. They almost bypassed the conventional telephone system and its demand for physical infrastructure. They jumped and went straight to mobiles. And that’s what countries can do who haven’t yet been able to address sustainability in construction. They can “leapfrog” development phases by taking all the examples from the developed countries and implementing them in a new and improved sequence.

What role does the government play in “green” building in Switzerland?

Switzerland is rather complicated in organization, despite being relatively small: you have governments on various levels. They don’t always do the same thing at the exactly the same time. But in general there has been a large amount of legislation brought in to force, certain changes which have more to do with building, less to do with politics, and then more to do with politics and less with building. So, it’s a complex situation. But there is a growing awareness because

Switzerland is in the middle of Europe, we have very limited natural resources and have to import practically everything. There is strong public awareness of “green” issues generally, and of course there is a growing governmental pressure, also in terms of building and construction.

But personally I'm against governmental pressure because the industry has its own interest in being better, being, let's say, “green”. For example, Holcim reduced CO2 emissions. In Switzerland there was no legislation that forces the cement industry to produce less CO2. But Holcim did it all the same. The industry was faster than the legislation. Switzerland set a target to reduce CO2 to a certain level by 2010. The cement industry without legislation forcing it to action alone managed to reach the national goal! I'm much more in favor of initiatives taken directly by entrepreneurs than because legislation says you have to.

Why did the industry do that?

The industry can only contribute to a better environment and to society if it is able to remain successful economically; we talk of the so called “triple bottom line”. So, of course, reducing CO2 for the cement industry means developing new ideas on how cement that performs as good or even better can be produced using less raw material and energy. That's exactly what Holcim is doing: and when you can save costs in energy use, it enables financing of further innovation — or of activities like the Holcim Foundation for Sustainable Construction.

Government interference is not what is needed. A company that wants to succeed and wants to perform across the “triple bottom line” has to balance this. Legislation and sometimes even financial incentives from the state illustrate the direction the government prefers the industry to move in — but determining the best course of action on how to achieve ongoing sustainability is a matter for private initiatives — after all, it's our lifeblood!

Vision

Holcim's vision is “building foundations for society's future”. In order to do that you have to live up to the “triple bottom line”, balancing various issues to do with sustainability. It's important to have a balance: there are issues relevant to people — social responsibility; to our planet — environmental performance; and to prosperity — economic growth, which all have to be considered simultaneously.

In the center of all this is sustainability. So, it makes sense for a company in the construction industry to be engaged in sustainable construction. If you take the figures and the potential improvements across the technological, environmental, socioeconomic, and cultural issues affecting building and construction, you can see what an enormous difference we can make by building more sustainably. That is the whole idea of the Holcim Foundation. The idea is to influence the value chain of construction, to make all stakeholders aware of the fact that sustainable construction and “green” architecture can make a difference globally.

I have mentioned many times the phrase “sustainable construction”. Everybody has a different idea of what “sustainability in construction” is. The Holcim Foundation tries to take a holistic view of sustainability and translate the definition using a series of five “target issues” for sustainable construction. These five factors include the triple bottom line of environmental performance, social responsibility and economic efficiency. It's also critically important that

innovative approaches can be multiplied: breakthroughs and trend-setting approaches, irrespective of scale, must be transferable to a range of other applications — in one word: we seek progress. Finally, since we are referring to the built environment, a high standard of architectural quality in the way cultural and physical factors are addressed is important. With space and form of utmost significance, the construction must have a lasting aesthetic impact on its surrounding environment.

All activities of the Holcim Foundation must live up to these “target issues”. The Foundation also finances grants to PhD students working on research projects in sustainable construction and it also stages academic forums relevant to the topic of sustainable construction. And finally, but perhaps most prominently, the Foundation conducts regional and global competitions for projects and visions in sustainable construction, the Holcim Awards.

The 3rd International Holcim Awards for Sustainable Construction is open to anybody and any project, be it landscape infrastructure, urban design, building, civil engineering, products, technologies etc., that are relevant to sustainable construction. The only condition for participation is that production or construction may not have started before July 1, 2010. This emphasizes that we are not looking for completed structures, but for projects approaching the construction phase where the degree of sustainability could still be influenced and there is the greatest opportunity for knowledge exchange.

The total prize money per competition cycle is USD 2 million. In the 2nd competition there were almost 5000 submissions of which about two thirds were formally correct. 520 entries were evaluated by the independent jury for Europe — including 44 projects from Russia. Given the status of the Russian economy and the strong interest that appears to have developed in terms of sustainable construction, we look forward to receiving many more entries from Russia in the current competition.

Entering the competition is simple using a five step online entry form. In the spirit of an international competition, the entry form may be completed only in English, and a “Step-by-step” guide to completing the form is available in a number of languages at www.holcimawards.org/guides

The competition is open until March 23, 2011, and winners will be celebrated at a regional Awards ceremony in September 2011 in Milan.

Edward Schwarz, “Green Project – 2010”, 18.11.2010

The Role of Government is to Address Market Failures



Ruud Kempener — postdoctoral research fellow in the Energy Research, Development, Demonstration & Deployment (ERD3) Policy project

Major innovation trends in energy deal with its generation and saving reminding a centuries-old argument of who comes first a hen or an egg. Which sector scored more impressive results so far and why?

In the energy sector, the problem might be even more complicated than the chicken and egg one, because “generation and saving issues” transcend over time and interact not only with each other but also with geopolitical concerns. For example, after the first oil shock the immediate response by governments was to install energy savings measures in the short term, but simultaneously invest in new energy generation technologies that could increase global energy sources in the long term. Nowadays, the increasing growth of energy consumption with imminent finite fossil resources also creates this dual response: governments worldwide are investing in energy efficiency labeling to reduce vulnerabilities, while investments in alternative sources of energy are seen as a longer-term solution for a transition towards a low carbon society.

I think that both the generation and saving innovation in the energy sector do not perform very well in comparison to innovation in other sectors, mainly because incentives for innovation in both sectors are often temporary. Only in those countries and sectors where you see continuous, predictable and progressive incentives with a long-term focus (e.g. CAFE standards for energy efficiency of automobiles in the US, or energy efficiency housing standards in the Netherlands), you truly see progress. Unfortunately, limits to such incentives are in place in the generation industry (an exception is the biofuel production incentives by the Brazilian government), which has hampered technological progress.

What institutions set targets for innovations in energy?

In our latest report on energy technology innovation policies in the BRIMCS countries (Brazil, Russia, India, Mexico, China, and South Africa), we identify four institutions that currently play a role in setting national targets for energy technology innovation: 1) intergovernmental organizations, 2) energy ministries, 3) science & technology institutions (or ministries), 4) and, state-owned enterprises. The extent to which these four institutions are involved in setting targets differs per country.

The impact of national targets on energy technology innovation is also difficult to determine. First, the severity of national targets is difficult to compare. For example, Brazil uses electricity-specific targets for renewables (70%), South Africa has an absolute target (10000 Gwh), while other countries use growth targets (eg. Russia’s target to double nuclear capacity). Second, targets differ in the extent to which they are translated into responsibilities for individual actors. Except for South Africa (where the main electricity generator was responsible for meeting the targets), governments have paid little attention to translating national targets into tangible goals for individual actors.

In the last two decades international and national standards have been tightened dramatically. How did it affect national innovation strategies? Could you show some most eloquent examples?

Standards can play an important role in promoting energy technology innovation, as long as the standard setting is long-term and transparent. Furthermore, standards work best in environments where solutions for energy efficiency improvements are clear. For example, energy efficiency standards for refrigerators in the United States have created continuous improvement in energy efficiency.

Although government support for the development of standards and labeling for appliances, buildings, and consumer products has increased in the last decade (in Russia, the government has created biofuel standards and building codes), I think that there are still too few international agreements on harmonizing energy efficiency standards. The United States and Brazil are working on the creation of international standards for biofuels, but for most energy technologies there is no consistency between standards in different countries. For example, the fuel economy standards for automobiles differ in Europe, the US, and China.

To what extent energy innovations can be regarded as integral part of national innovation systems? Or perhaps they are efforts of individual companies either supported by governments or going alone at their own risk?

The concept of “national innovation systems” arose when scholars (Nelson, Freeman, and Lundvall) attempted to compare different countries (nations) to each other. However, this does not mean that the institutions constituting a “national innovation systems” need to be “national”, nor that it only includes those institutions that are supported by a national government. Instead, this literature emphasizes that the institutions themselves can be global, national, regional or sectoral (Edquist, 1997), and that the innovative performance of a country depends on how this set of institutions interacts

and affects national firms. In other words, although it is difficult to determine what institutions are part of a “national innovation system”, it is important to focus on how these institutions interact with each other and how their interactions affect the innovative behavior of national firms.

The extent to which the structure and interaction in a national innovation system affects the innovative performance of a country is still weak, despite a large number of comparative studies (e.g. Nelson, 1993). Some scholars (e.g. Smits, 2004; Sarewitz & Pielke, 2007) argue that an innovation system requires different actors (supply actors, demand actors, an intermediary infrastructure and a support infrastructure). Other scholars (e.g. Johnson & Jacobsson, 2001; Hekker, 2007) argue that the functions of innovation need to be supported, while others (e.g. Holdren, 1997) argue that a national innovation system requires support of the whole innovation process from R&D to demonstration to deployment.

Our study on Russia’s energy technology innovation system attempted to evaluate to what extent Russia’s government supports different actors, stages of R&D, and functions of innovation. This analysis took place in 2009 (before Skolkovo) and shows that the Russian government gives little support for demonstration projects for most energy technology areas. Furthermore, there are only a small number of policies in place that support the diffusion of knowledge throughout its innovation system, or support entrepreneurial activities. Finally, the Russian government has no tangible policies in place that promote innovation in fossil energy technologies and transmission, distribution, and storage technologies.

What role should national government play in innovation process?

Many reports argue that the energy sector is especially prone to “market failures”, because the price of environmental degradation is not internalized, knowledge created is not fully appropriable, there are long time gaps between R&D and deployment, and energy availability and reliability is a public good. From this perspective, the government role is often defined as “addressing market failures”.

Governments can address some of these market failures by e.g. creating a price for carbon (either through tax or emissions trading), R&D support, and incentives for energy companies to improve the energy efficiency of their generation activities. I do believe that taking away these “market failure” is a necessary condition in which governments play an important role, but I also believe that businesses have an important role in supporting government incentives that try to address these “market failures”.

However, I believe that addressing “market failures” is not sufficient for stimulating innovation in the energy sector. In particular, the fact that the energy sector is dependent on a very rigid infrastructure to deliver energy services to their customers warrants a more pro-active approach by governments. First, governments have to provide more incentives for customers and suppliers of energy to find innovative solutions. Second, the government has to support high-risk technology development that does not have any market potential now, but might have transformative power in the future or which

could provide the infrastructure of the future. Third, the government has to attract the “young and the bright” to study STEM, and instill a sense of urgency and pride in working on energy related issues. I believe that the nuclear energy sector in Russia still attracts young and bright employers, but that the Russian government can do more to stimulate human capital for other energy technologies.

In the age of globalization is it appropriate to say that a universal innovation system is in the offing? To your opinion how Russia may effectively participate in it?

In a preliminary analysis of scientific collaborations in “international highly ranked applied science journals” in the areas of nuclear energy, fossil energy, and renewable energy (to be published shortly), our data shows that between 2000 and 2009 the number of international collaborations by Russian institutions has increased between 2.5 and 5 times. Globalization of science collaborations is thus an ongoing process. However, the extent to which Russian institutes participate in international collaborations differ substantially between nuclear energy research, fossil energy research, and renewable energy research. For example, in our dataset Russian institutions collaborate in 2009 372 times on nuclear energy with 32 different countries, while Russian institutions only collaborate 5 times with 5 different countries. In the same database, Russia is ranked the 9th highest international collaborator in nuclear energy, while it is ranked 58th highest international collaborator in renewable energy.

However, it is important to recognize that scientific collaborations is only one of many avenues for international cooperation. Russia’s cooperation with the Chinese government on developing new nuclear reactors is an example of another, high-impact international cooperation activity.

No single country can participate in the fullest extent on all technology areas. It is therefore important to develop

Many reports argue that the energy sector is especially prone to “market failures”, because the price of environmental degradation is not internalized, knowledge created is not fully appropriable, there are long time gaps between R&D and deployment, and energy availability and reliability is a public good. From this perspective, the government role is often defined as “addressing market failures”

international cooperation strategies that 1) complement existing international cooperation activities, and 2) support national priorities. In a nutshell, an effective Russian policy on international cooperation requires a pro-active approach. It needs to 1) support Russian scientific institutions and companies to instigate international R&D activities, contribute to international demonstration projects, or provide support for international deployment opportunities and, 2) identify national problems that could benefit from R&D activities,

How tough is international competition in the energy innovation market? What did it bring about and what may it introduce in practice?

The economic downturn, and the increase in unemployment rates in many developed countries, did increase awareness about “green jobs” moving from one country to another. Furthermore, the combination of an economic downturn and concerns about climate change in 2009 made many countries invest a large proportion of their stimulus packages in green energy technologies. For example, a HSBC report estimated that more than USD 430 bn in fiscal stimulus were invested in climate change investment themes worldwide. Furthermore, our report on energy technology innovation policies in BRIMCS countries shows that almost all of these countries have policies in place that support the manufacturing, and deployment of renewable energy and energy efficiency technologies through tax credits, feed-in tariffs, loans, or grants.

So, the number of activities, and the number of companies, involved in the development of renewable energy and energy efficient technologies has increased in the last couple of years. Furthermore, we’ve seen a spectacular growth of manufacturing capacities in some countries, for example the production of PV panels in China.

However, I believe that the issue of international competition on energy innovation markets is more complicated than simply an increase in manufacturing capacity in individual countries. Most energy technologies, renewable energy technologies included, are complex technologies, which are often assembled based on multiple components. For example, the turbines of wind mills might be manufactured in China, while its gearboxes and propellers are manufactured in the US. Similarly, many of the manufacturing equipment for the production of PV panels in China are sold by US manufacturers. Furthermore, there is often a very important “local” component to energy technologies, which reduces the ability of one company to dominate the market. Finally, there is still an important role for companies in installing, maintaining and improving new energy technologies.

Finally, the growth in renewable energy technologies (PV and wind) is

continuing and with increased energy demand in emerging economies, the Middle East, and Africa there is a growing market for energy technologies. Finally, much of the energy infrastructure in the US. and Europe need to be replaced in the forthcoming years. All in all, this means that markets for new energy technologies will continue to grow. A growing market attracts international competition, but it simultaneously provides sufficient opportunities for a range of countries to participate.

How effectively energy innovation may influence national policies and international relations?

Energy is critical for economic and social development, and will remain to play an important role in both national policies and international relations. Furthermore, energy security is a key element in international relations.

It is important to recognize that there is a two-way relationship between science and technology and policy. New developments in science and technology will shape national and international policies. For example, the discovery of shale gas in America and Europe has shifted national policies and international relations very rapidly. Similarly, the development of nuclear capabilities in the US., Russia and a number of other countries has shaped national policies and international relations for centuries. Simultaneously, policy shapes the direction of science and technology. The cases in both Denmark and Brazil show how government policies can support the development of competitive technologies for wind energy and biofuels, respectively.

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Program on Innovation and Innovative Environments — Networking in the Baltic Sea Region

The Swedish Institute Baltic Sea Region Exchange Program invites participants to a Program on Innovation and Innovative Environments, taking place in Stockholm, Sweden during October 26–28, 2011. The target group for the program is researchers and individuals in management positions within high standing universities, institutes and science parks from the following countries: Belarus, Estonia, Latvia, Lithuania, Poland, Russia and Ukraine.

The program will include participation in the seminar Innovation for Growth as well as networking possibilities with Swedish university representatives. The program also comprises study visits, focusing on different aspects of innovation. The networking possibilities and the study visit program will be focusing on environmental/energy engineering as well as life sciences.

www.si.se

Successful Tests of Passive Heat Removal Systems at the First Power Unit of Kudankulam NPP Constructed with Technical Assistance of JSC Atomstroyexport

With technical assistance of JSC Atomstroyexport (a company of State Corporation Rosatom), within the framework of the performance of the works at the “hot run” stage at the power unit No. 1 of Kudankulam NPP in India there were successfully completed the tests of the reactor plant equipment within 200 hours with the operation at rated parameters of the primary circuit. The works for testing the drives of the reactor control and protection system were also successfully completed within the design scope.

In accordance with the agreed program, on one of the safety system channels there was tested the passive heat removal system (PHRS) which was for the first time in the world practice implemented in Russian design AES-92 at Kudankulam NPP.

www.rosatom.ru

How Can One Promote Innovation without Electrification?



The material is prepared by Sergey Serebriannikov, Rector of the Moscow Power Engineering Institute (Technical University) and other distinguished scientists from the MPEI

The Basic Innovative Trends in the Field of Generation and Conservation of Energy

The basic trends in the Russian power production sector that apply to generation, transmission and distribution have for decades relied on the construction of large generating capacities, unified inter-system electricity networks, and single operational management of a unified energy system. Thanks to this we have achieved impressive results such as reliable energy supply to large cities (agglomeration) and large industrial enterprises.

The offer right now to build gigantic power plants with capacity of up to 8–10 million kW, and the revisiting of the offer to build direct current transmission lines of 750kV (or transmission lines of 1,150kV) only emphasize this trend. Looking forward towards 2030, both in terms of energy strategy–2020 and on the basis of the general plan presented by RAO UES, Russia envisages meeting energy demands with annual growth of between 25 and 60 billion kWh, focused on doubling of maximum consumer load. Achieving such indicators is planned via construction of new generating capacity. Here it is important to note the intention to build nuclear power stations for 13 cities with population of over 1 million in the five years after 2015, and thermal power plants with capacity greater than 20GW.

It's worth saying simply: the electric power industry in Russia can be proud that in the past 20 years, the needs of industry, business, and the population have been fully met. We can't help but take note that even the accident at the Sayano-Shushenskaya plant did not lead to serious consequences for Siberian industry, particularly metallurgy, or for housing and public utilities. This was possible thanks to utilization of reserve capacity and redistribution of the load.

Setting Goals in Energy Innovation

We have maintained the approach wherein the goals and tasks are set by the President and the Government of the Russian Federation. In particular, they have identified the large investment projects up to 2020, which are included in the state sector strategies and targeted federal programs. These projects are published and are subject to discussion and oversight, including by the public.

In order for the consumer to evaluate electricity strategy, it is necessary to consider the structure of work being conducted in this field and the various forecasts for 2020 and 2030. The structure is governed in accordance with political decisions on energy in Russia, physical and technical fundamentals, and social, economic, and ecological limitations. On the basis of long-term forecasts, we have developed a general plan to place electrical utility installations and a program of

development for electrical energy. These documents detail the subjects of electrical utilities which are developing events, technological plans and program, and complying with the administrative and territorial hierarchy. Realising the general strategy is handled in the context of division of AO-Energo, which over the past decades have worked on the energy provision in every subject of the Russian Federation.

Work on the plan for development of the energy sector is carried out on orders of and under control of the Ministry of Energy and the Ministry of Economic Development, which prepare reports on the basis of decrees by the Government of the RF and legislative authorities. A unified concept for forming the development strategy is left to the President of the RF and the cabinet. The general strategy of development for economy and energy is entrusted to RAN (Russian Academy of Sciences), which in turn delegates to its institutes. Design studies are done by institutes which had started conducting such studies prior to 1990 (ENIN (Krzhizhanovsky Power Engineering Institute), Energosetproekt, Teploelektroproekt, and others).

The law On Electrical Utilities and the experience in working on the development of the electric power industry dictate the structure focused on the idea that the central requirement for a unified energy system is reliability. This reliability is guaranteed by innovations, investment, the guarantees of political development, and organizational management taking into account the consumer side. This excludes review of the "backcountry" (by which we mean the many consumers not connected to the grid, as well as small energy providers using secondary and renewable sources).

The influence of international standards is manifest in the required frequency maintenance. This limits our entrance onto the European energy system, which has led in turn to the construction of special equipment on the border with Finland, which converts alternating current into direct current and vice versa with the necessary frequency. We can't help but mention the switch to a five-wire power supply at low voltage, which dramatically changes circuit designs and requirements for electrical equipment. It's worth looking separately at the energy conservation program which envisages, in particular, new technologies and a switch to energy-saving lighting and new light sources.

Innovations in the Energy Sector in Russia as a Part of a National System of Innovations

Innovations in our country have been linked to the actual situation in the energy sector, which was characterized by average annual growth in demand for electricity between 2000 and 2005 in the amount of 1.7 percent. In 2009, private and state generating companies added generating stations with total capacity of 1,694MW, and the total input to wholesale power generators and regional power generators on agreements capacity supply amounted to 809MW on a plan of 4,826MW. For 2005–2010, the total investment program of all energy companies grew more eightfold. In 2010–2011, the plan is to add more than 10GW. The key aspects are Rostovskaya Nuclear Power Station (GK Rosatom) — 1,000MW, Kaliningradskaya TETs-2 (JSC Inter RAO UES) — 450MW, TETs-26 (JSC Mosenergo) — 420MW, Sredneuralskaya State District Power Plant (JSC Enel OGC-

5) — 410MW, Shaturskaya State District Power Plant (JSC OGGK-4) — 400MW, and Tyumenskaya TETs-1 (JSC Fortum) — 231MW.

Similar program in various fields of industry are being carried out by private investors, but with state support, for example the reconstruction of the Novolipetsky, Kuznetsky, and Oskolsky Metallurgical Plants included in the federal program. Reconstruction of the Oskolsky Plant is tied with substations 750/330 and 500/220kV and electricity networks that affect provision of energy to the centre, including Moscow (the ring is 750kV).

In defining the role of innovation in the energy sector it must be noted that power sector has taken upon itself the provision of energy and the construction of generating capacities of 25MW and higher. But at the same time the extensive area, serving 90% of consumers, who need from between 1-3kW up to hundreds and in some cases up to 1,000kW, some may slip through the cracks of innovation and investment. More precisely, most of the innovative discoveries in the field of generation and consumption are in fact borrowed and come to us from a number of countries, most recently China, although many solutions are still being offered by Russian scientists.

The fact that even now, not all of Russia is connected to the grid, that two thirds of territories remain without reliable electrical supply (this includes up to 20 million people), requires massive construction of small-scale generation, the distribution of which by capacity is regulated by fundamental laws not less important as the laws of development of large-scale energy. For example, we note that in December 2010 Belarus adopted the law On Renewable Sources of Energy. We have long needed a similar law, aimed at consumer electrical energy and offering structural diversity between networks and generation, to guarantee the connection (if necessary) to the electricity grid in order to distribute the surplus power generated by small-scale generators, and for payment. In Germany, such payment is guaranteed within 20 years for each individual person or corporate entity that builds a wind or biofuel plant, sun energy roof that provides energy. The situation is almost the same in the Czech Republic. Freezing rain, snow, wind, and other winter

surprises cannot block progress. We need massive individual construction of private generation and networks. And in Russia the renewable and secondary energy sector so far remains an incomprehensible and unpopular step-child to the energy industry.

The Government and Business: Determining Roles in Innovation

In order to intensify innovation and investment by attracting the widest possible circle of commercial interests, it is urgently necessary to adopt a law on the consumption of electrical energy (power). Essentially, alongside the electrical supply program anticipating the development of generation of 25MW and higher, there must be a program of consumer electrical provision that encompasses all far-flung territories and small businesses. It is expected that by 2030, the structure of electrical consumption in Russia will have been in the following proportions: industry — 48 percent, service industry — 16 percent, consumer (popular) consumption — 22 percent. In the USA, where by 2030 they anticipate electricity consumption three times greater than that of Russia, the proportions are different: service industry — 39.6 percent, consumer (popular) consumption — 34.3 percent. There, since 2003, industry has been significantly reducing its share of overall consumption, and the service industry has practically doubled. If we add to this that in China the total power output of wind generation reached 42 million kW (in the USA that figure is 35.2 million kW), while in Russia it is somewhere around 20,000kW (an unacceptably low figure for our country), then we should talk about the necessity of a fundamentally new strategy for development in electrical energy. In particular, we should address the development and adoption of those innovations such as are used in Germany, where for example by 2050 they anticipate meeting 90% of demand from renewable sources.

In summary, we can say that it makes sense to transit from single large investments to numerous investments in medium and small electrical power generation facilities that generally belong to consumers as private property.

Such a change in the structure of energy production is also necessary in connection with the stated plans to

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Russia Plans a New Science City

During a visit to Russia's Far East, Russian Federal Space Agency head, Vladimir Popovkin, reaffirmed that the government is ready to start construction of the Vostochny Cosmodrome this month. The construction, over the next five years, is budgeted at about 8.4 billion US dollars. Unlike Cape Canaveral, Kazakhstan's Baikonur, or any of the other world launch complexes, Vostochny will be a new science city, with research centers, an academy for young scientists, an astronaut training center, and space manufacturing facilities. It is estimated that about 30,000 workers will be involved in creating the facilities.

The top-level decision to go ahead with Cosmodrome Vostochny was taken by then-President Vladimir Putin, who has continued to push the project as Prime Minister, in the face of budget-cutting pressures during the past three years.

www.larouchepac.com

12th Russian Venture Fair

12th Russian Venture Fair will take place in St. Petersburg November 23–24, 2011 at Park Inn Pribaltiiskaya Hotel. The Russian Venture Fair is a meeting point for investment professionals. As Russia's premier annual event for the participants of venture capital and private equity market, it brings together leading local and international investors and innovative high-tech business leaders.

The business program includes interactive discussions and round tables, where participants can share their practical experience at the PE&VC sphere. Development of private equity investments industry in Russia, fundraising in Russia and abroad, state-private partnership, searching of promising companies and triggering deals in high-tech area, exit strategies, risks' optimization, international co-operation in high-tech sphere — these are some of the primary topics to be discussed at the Russian Venture Fair.

www.rvf.ru

build up to a million individual homes in the depth of the country, which will require electricity, leading to orders for equipment and creating several million jobs.

International Competition on the Energy Innovation Market

In the international energy system, Russia will for the foreseeable future retain its role as a raw materials power, with insufficient attention to improving industrialization, modernization of existing machinery, and heavy and light industry.

International competition on the energy innovation market is quite tough, and Russia does not play a part. In particular reference to our country, the issue is to replace electrical equipment, obsolete up to 60% and more. More precisely – we face the issue of a forced transition to innovative technologies, changing technologies, and parameters of getting electrical energy at thermal energy plants (in building 20GW

Forming a World-wide System of Innovation in the Era of Globalization. Russia's Place in That System

A world-wide system of innovation is being formed and determined by the USA, China, and the EEC. Russia's share of global GDP is somewhere around one percent. This, naturally, determines Russia's role in the modern financial system. The investment climate within the country is thus far not aimed at mass attraction of capital, the flight of which still exceeds imports from abroad.

The freezing rain in central Russia graphically demonstrated that modern electricity distribution networks cannot provide reliable power supply and cannot be quickly restored within the timeframes envisaged by the rules governing installation of electrical utilities. The only way forward, which many countries are taking (for example, California after their power crisis), is transition to individual power generation, but without disconnecting from the mains grid. In particular,

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Gazprom Neft and Total Sign Agreement on Aviation Fuel Supply

Gazpromneft-Aero, a subsidiary of Russia's Gazprom Neft, and Air Total International have signed an agreement on integrated supply of aviation fuel, allowing the partners to use each others' airport facilities. Air Total International is to grant Gazpromneft-Aero full access to its network of airport facilities.

Gazpromneft-Aero will gain access to new routes in Europe, Pacific, Africa and the Middle East, while Total will be able to refuel partner airlines in Russian airports. Air Total International is present in more than 270 airports in 70 countries. Gazpromneft-Aero has presence in over 40 countries in Europe, in the East and in Central Asia, the Mediterranean and Africa.

www.eng.spb-venchur.ru

Anatoly Chubays Showed Plastic Logic Reader to Vladimir Putin Saying that it Might Become Useful for Schools

The light weighted and extremely thin reader produced by RUSNANO-affiliated Plastic Logic was demonstrated to Vladimir Putin by RUSNANO CEO Anatoly Chubays. The technology for plastic electronics on thin and flexible plastic substrates was developed at Cambridge University's renowned Cavendish Laboratory in the 1990's. In 2000, Plastic Logic was born out of Cavendish Laboratory to develop a broad range of products using the plastic electronics technology.

RUSNANO invested 700 million US dollars in Plastic Logic. The investment project includes building the world's largest volume production factory for Plastic Logic's next-generation plastic displays in Zelenograd.

The new device does not contain glass and is safer than common LED analogs. Soon 1000 readers will be tested in Russian schools during a pilot project, which may lead to their certification, by the Russian Ministry of Education as a possible substitute for textbooks.

www.rusnano.com

A world-wide system of innovation is being formed and determined by the USA, China, and the EEC. Russia's share of global GDP is somewhere around one percent

Combined Heat and Power Plants after 2015, we can ask the question about closing and modernizing existing power stations).

The influence of Innovative Energy on the Policies of Individual Countries and on International Policy

In all countries, energy issues influence policy: should we or shouldn't we build nuclear power plants? Should we cover the entire country with wind turbines? Should we develop biofuels and geothermal? The increase in oil prices, continuing growth of the population, and intensification of global conflicts point to the need to open up new energy resources. The increased costs of extraction and delivery, including maintenance of global infrastructure, leads us to search for alternatives to oil and gas, erosion of old industries, and development of innovative technologies that can take the sting out of meeting our energy needs.

industry should look to provide its own power generation and fast-acting ATSS, which would prevent problems with IT in the event of an interruption in the power on the level of 100 milliseconds.

Our civilization is entering its sixth phase of technological development, marked most importantly by a radical change of priorities regarding the use of energy resources. Throughout its history, humanity has already undergone several key, or branching, transitions: from wood resources to coal, and from coal to oil and gas. Now all around the world we are seeing a shift towards new energy sources, most importantly renewables. We are approaching a transition to electrical transport, electro-technology, electrical heating, and so on. That's where the future lies, and Russia must play an active role in it.

Gold-Rush Like Moment in Solar Thermal Power Generation



Sean Pool — special assistant for energy, and science and technology policy, Center for American Progress

Who or what institutions set targets for innovation in energy e.g. consumers, producers, scientists, government etc.?

Almost everyone you've mentioned has some sort of target for innovation in energy. But because the US has a very decentralized political system, the question of who set the targets for energy innovation is more rhetoric rather than substance. Many different political actors have set targets, but few of them carry the weight of law.

Certainly the Obama administration has been very vocal about setting targets, maybe not necessarily very concrete ones — about raising the issue of energy innovation to one of the mainstream of national stage. His administration recently released a visionary document called the Strategy for American Innovation, which includes several references to clean energy innovation and deployment. In his State of the Union address in January 2011, President Obama called for our nation to achieve 80 percent clean electricity by 2035.

The Obama administration also created ARPA-E, or the Advanced Research Projects Agency-Energy. It was funded for the first time with the recovery act which Obama signed in his first month in office. This is an institution that fills a major gap in energy innovation lifecycle between research and development and commercialization of new clean energy technologies.

How efficient is ARPA-E?

Dr. Arun Majumdar who was the first and present director of ARPA-E, is doing a very good job. The agency is modeled after the Defense Advanced Research Projects Agency, or DARPA, which has helped to develop many of critical innovations in the defense and civilian sector, including the original idea that led to the internet. ARPA-E is setting targets for innovation and especially commercialization. They help to leap frog young technologies that would otherwise not be able to get private backing and help them in their research.

How do they choose projects at ARPA-E?

ARPA-E sets goals they want innovators to accomplish and then uses a competitive grant process to put money into the hands of the best candidates. Some of these goals include

better batteries, smart grid technologies, building efficiency systems, and creating fuels from sunlight using synthetic biology. It has to do with both clean energy properties of potential technologies, the quality of the business plan, and the ability for the technology to achieve megawatt scale and market penetration.

Who are the people who work there? Are they appointed officials or are they elected?

They are appointed officials, they aren't elected. They are working very closely with the private sector. It's a very innovative public-private partnership. It's a model where you have these appointed officials talking directly with people from venture capital industry and entrepreneurs who are developing these technologies. I think there is quite a lot of communication going behind the scenes and that's what helps these officials to understand what projects to take on. It is a very well integrated program. It leverages the unique capabilities and expertise of energy industry professionals and researchers from the private sector with public sector direction and funding.

The majority of projects that are funded by ARPA-E include private investors and entrepreneurs, but not all. The agency develops technologies at a range of levels of technological readiness, and helps move them from lab to assembly line. Some projects that they are funding are university-based projects, or projects run by national laboratories.

Which of the two sectors — generation and saving — scored more impressive results so far and why?

That's a tricky question. That being said I do think that at least in the US there are pretty systemic problems in keeping private investment out of energy efficiency innovation. Some of it has to do with split incentives between building owners and tenants, but there are a range of market barriers and information failures that make efficiency a particularly challenging area. At the same time, efficiency is also where the greatest opportunity lies for profitable, job-creating investments in new technology and innovation.

How do energy standards affect national innovation strategies? Can you name some of them?

For example, the EU ETS coming online and putting a price on carbon in Europe; Spain is putting very aggressive subsidies for solar-thermal, and it led to an almost gold-rush like moment where private investors were just pouring money into concentrating solar thermal power generation projects. In fact, the private sector response surpassed what the government was ready for and they had to scale back the program a bit. Many European countries have clean energy standards in addition. These policies have had a really big effect overseas in helping to build markets that drive innovation.

We've also seen standards being very effective at driving deployment in the United States. California for example, which has a very aggressive renewable energy standard is also home to about half of the nation's venture capital investment in clean energy startup companies. So the evidence does show that these standards can have an effect on not just

innovation: research, development, and commercialization.

California and Spain are just a couple of examples, but there are many similar ones where you've seen national standard coming on and shooting life into the industry.. When there are long term standards and ensured demand in the future, investors are more willing to pump money into risky innovative technology companies whose products may not be ready for 5 or 10 years. It's those kinds of investments that you need to make incentives for if you want to move innovation forward.

Is energy innovation an integral part of national innovation system?

Certainly energy innovation is a part of national innovation system. But when I think of national innovation system I think of it more specifically. You have energy national innovation system, and within that you have a wind energy innovation system, and within that you have off-shore energy innovation system. Each of these are overlapping networks of scientists, producers, entrepreneurs, and researchers working together and creating a sort of informal network. So it is all connected and energy is a part of our national innovation system.

Let's say innovation systems means there is a communication "chain" that links scientists, innovators, businessmen, universities, government. Given this we assume that success of innovation depends on how efficiently they communicate. To your mind, how efficient is communication in energy innovation comparing to other spheres?

Absolutely. The formation of productive and innovation networks with diverse actors all communicating is one of the most critical goals of clean energy innovation policy. Like

How much the government spend on energy R&D?

Government investments in energy R&D in 1980 's were 9 billion, and in 2006 it has declined to 3.2 billion. The stimulus bill put a big jolt of money into the system, only a small part of that went specifically to R&D. The stimulus bill did fund the creation of ARPA-E, which needs to continue. But overall we are investing about a third of what we were investing 30 years ago in energy. That needs to change.

How tough is international competition in the energy innovation market?

International competition in energy innovation is extremely tough. We have 2 reports that we have recently put out. One of them is from June 2010 and it's called "Out of the running." The other one we released recently is called "Rising of a challenge." Both of these reports go a lot into details about the extremely competitive nature of international investments in clean energy innovation.

In the more recent report we looked at China investments across the board of innovation. We looked a little bit at renewable energy within that. I was just telling you the US spent about 3.2 billion dollars in 2006 on clean energy innovation. China by some estimates spends up to 12 billion in dollars every month. So it's the whole other scale of public investment in driving clean energy innovation. In 2008, China had nearly twice the installed capacity of renewable electricity of the United States in absolute terms.

Six of the top 10 global photovoltaic solar cell manufacturers are now in China, and the country's solar manufacturers produced nearly 2 gigawatts of panels in 2008, or roughly one-quarter of global production. The question is whether making these technologies and selling them cheaply translates into long-run innovation that pushes the frontiers of new technology. China is good in copy method of innovation: they take something, improve it a little bit and make it more cheaply. But it remains to be seen, and the report talks about it much more in detail, whether that ability translates well into the ability to actually invent new technology and push the frontier of innovation in a new way.

So, certainly there is an acute international competition. It's not only China. It's also Germany, Spain, Denmark of course, depending on what sectors of the clean energy economy you are looking at. And the US is really falling behind because our public policy is not attuned to the opportunities of these new markets, nor to the risks of climate change. This is the take away. We Americans feel that we have contributed to these technologies. For instance, photovoltaic cell was invented in America and now it's mostly sold in China. We've developed one of the first wind farms and now they are made much more in China, Denmark, Germany. So there's a sort of American sense that we are falling behind in this race for clean energy innovation.

Why is America behind?

Part of it has to do with what you were talking about a bit earlier about standards and government policy. Certainly US has been one of the slowest among industrialized countries to adopt federal-level incentives to correct the market failures that are reducing investments in clean energy. We still don't have a national clean energy standard. China has a national

And the US is really falling behind because our public policy is not attuned to the opportunities of these new markets, nor to the risks of climate change. This is the take away. We Americans feel that we have contributed to these technologies

you say, you want researchers to be talking to investors, manufacturers, and ultimately to the end consumer of the technology, for example the utility who buys the wind turbines or deploys the solar panels. In productive innovation ecosystem, these different types of players are linked by exchanging money, information, and risk.

I don't have data to give a really definitive answer to that question but I think it's safe to say that energy innovation systems in the US have really started to crystallize in the last 5 years. By no means does energy constitute the largest part of our national spending on research and development or private sector investment in technology. Energy is not the most significant part of innovation coming out of the US But it's a growing part, rapidly growing part. Clean energy venture capital investments have grown nationwide from 2% of overall venture investments to 16% in the past 5 years. That's an indicator that you are starting to get better communication between researchers, manufacturers, investors, and consumers.

energy standard despite the fact that they are still a transitional economy. They have been more aggressive than we have.

Europe has the EU Emissions Trading System (ETS). Most countries have a number of other incentives. US federally has almost no structural market incentives to make investment in this kind of innovation profitable. That's been a major problem. Conservatives in American think that market should take care of it. And market doesn't take care of it because you have market failures around clean energy, climate change and innovation. In the US our policy does not reflect this realization. Our politics haven't caught up with what the economists have realized for decades, what Europe has realized maybe a decade ago, and what China has realized in past couple of years.

Government has a strong role to play in correcting for these market failures to promote the appropriate level of private investment in clean energy innovation. Without federal policy to be signaling to the market that they should be investing in this sector they aren't going to. Instead as we saw they are going to pump money into trillions of dollars of securitized mortgages because that's what seemed profitable to investors, and that's what caused a financial crisis.

We need to be figuring out how to use government influence to introduce higher standards that are clear, long term, and transparent. We need to figure out how get private capital off the sidelines and into investments in clean energy innovation, commercialization, and deployment.

What American Progress does? Do you consider yourself a part of innovation system?

There are two very specific things that we do. First, we provide a service for the people in government that they aren't able to do themselves. We are able to step back a little bit from the day-to-day politics and think a little bit more long-term and more structurally about policy. As in any country politicians are often so wrapped up in the day-to-day business of legislating and fighting political battles that they don't often have time to really think and develop long term policy strategies.

So, on the one hand, we try to provide that big-picture thinking that those in office can't often do, and then offer them our advice. On the other

hand we also have Center for American Progress Action Fund that is a sister organization that takes those policies and develops a message for them and an outreach strategy to help them get exposure and visibility in the media and on Capitol Hill. It's almost like marketing policy ideas. We are trying to put progressive energy values and ideas out into the mainstream political discourse and do active outreach not just by writing reports but also by talking with the media, getting on radio, by visiting Capitol Hill and talking to the leaders.

Can you name examples when you influenced the government policy?

In fact I can name a very recent example. We've put out a report called "Focus on competitiveness". It detailed a 5-point strategy for how the administration could build a greater awareness of international economic competitiveness into our economic development plan. It identified the fact that we don't have any long run competitiveness-focused economic policy. Most of other countries in the world do. Those governments are thinking that they are in this sort of a game, competing for technology and innovation. They act strategically to bolster those activities.

In the US we don't have a very coordinated policy to meet demands of international competitiveness. There is no planning process so that people think about it in a structural way. We made that report called "Focus on competitiveness" and within couple of months the Obama administration announced they were going to implement one of the policies pretty much directly out of this report. It suggested that the President form a council on competitiveness in the White House to promote cross-agency collaboration on competitiveness policy. The President actually enacted that Council and its being led by GE CEO Jeffrey Immelt. It's a very good example of a policy we've developed being implemented. Our report on "Green Recovery" also was very influential in helping guide the energy portions of the 2009 American Recovery and Reinvestment Act, also known as the stimulus bill. Of the roughly \$80 billion in energy investments that were made, about three quarters were tied to an idea that we had proposed in our report.

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Nanoindustria's UMKA Training and Scientific Nanocomplex Unveiled

Nanoindustria has developed new software for the UMKA nanocomplex it is creating for schools and labs. The new software is reportedly based on the adapted IBM Rational technology. The software makes it much easier to employ the nanocomplex, enhances visualization quality and also makes it possible for entry-level users to work with the system. The system can therefore be used not only in scientific and industrial R&D organizations but also at schools, colleges and universities.

www.rsf.ru

The III International Youth Innovation Forum "Interra"

The III International Youth Innovation Forum "Interra" will take place in Novosibirsk on September 22-24, 2011. The Forum is the biggest ground east of Urals for elaboration and experimental implementation of suggestions on the development of innovation economy and innovative society. Combining technocratic and liberal arts directions, Interra is aimed at unlocking people's creativity in different spheres.

Every year more than 2000 developers of innovative projects, representatives of federal and regional authorities, innovative business, scientific and expert community take part in the Forum. Most exhibitions and cultural events are open for all citizens and guests of the city.

During the two years of holding the Forum its participants discussed the constituents of innovative economy and conditions of innovative development in the regions. In 2011 the theme of the Forum will be "Innovative Person and Innovative State". The concept corresponds to the general trends of modern economic development, which were reflected in the project of the Strategy "Innovative Russia 2020". The Forum's goal is to facilitate the development of innovative society by forming effective models of interaction of people with the state.

www.interra-forum.com

Ultimate Innovations the English-Way



Keith Smith — Deputy director of Science and Innovation Analysis, Department of Business, Innovation, and Skills (BIS)

Mr. Smith, being a deputy director of Science and Innovation Analysis, you are, so to say, at the very top of the state innovation system. How long have you been working in BIS?

I'm not a bureaucrat or a civil servant. I came from university. And we have an interchange between universities and government. I've been working here for 3 years but really I'm a university professor and I'll be very happy to go back to the university at Imperial College in London. I'm an economist and I have worked on science and technology for a long time. The first thing that I did when I was an economist is that I worked on Soviet Union, on development of 1920's Soviet planning.

In some way innovations have always been with us. But when did the innovation process intensify and, so to say, become visible?

I think that UK is a very important country in this respect. As you say innovation has been a characteristic of human society for a very long time. Humans have always used tools and equipment, from the Stone Age when we used stone tools and stone equipment. Technology and innovation evolved in a very long run. We made stone tools, we developed technologies in many areas — agriculture, making metals and things like that. These are extraordinary achievements. But things really accelerated in the XIX century as Britain was the first country to create a really intensively capitalist economy. And capitalism is a system which creates technological change — because the competition which characterizes capitalism is not about prices. It's about the quality of a product. So, when capitalist production emerged in Britain which was in the late XIX and the early XX century it brought for the first time a system which was strong in innovation, continuous innovation. It has really been a character of the world ever since. It started in Britain and spread to other countries. British manufacturers were selling machines all over the world by 1850. British skilled workers were going to other parts of the world, including Russia, as early as XIX century. I would say that a real breakthrough in the world economy and in Britain occurred 200 years ago. But what we are now living with is a long term impact of that, as we see more and more radical innovations appearing.

What were the main turns in innovation policy after the WWII?

The Second World War was extremely important for innovation policy because the war was fought in different ways. This was of course an industrial war in which countries had to produce on an industrial scale the weapons and equipment that were needed. And they had to innovate in doing that. Now, the Soviet economy was actually very successful in this, but as we know, at enormous costs. The Soviet Union took the heaviest toll in the war and fought significantly more German armies than anyone else and produced more tanks and guns in this industrial war. And this was a very important thing. In the West it was slightly different because we fought not only in an industrial war but also a scientific war. And that is, I think, the difference between the Western allies and Soviet Union. Britain and the US were much more heavily involved in scientific ways of fighting and development of technologies such as like radar and telecommunications and ultimately the atomic bomb. All that research started in Britain and then shifted to the US. Coming out of the war people realised that, as you know, this scientific effort has been extremely important not only to the military but also it had important implications for other sectors. For example, in Britain we developed penicillin — an antibiotic drug — on a large scale during the war and this became the basis of a huge industry. And of course there were military implications as well. But I would say the real lesson of this was the role of science in the West.

After the WWII did there remain military facilities that were turned into research facilities?

Yes, we never stopped what we began during the war and either turned this into military or civilian application. For example, developing computers. I'll give you an example of one of the things that we did in the West which was unique. The Germans used a coded radio system to communicate with their armies, navy and air force. The British were able to break the codes but in order to do that they had to first develop computers. People began to realise that this was very important. That led to the whole developing process of computing after the WWII. So, I don't think we should make a great distinction between the war and the peace.

The government did support the innovation at those times. What happened later on in the 1970s and 1980s?

Government has never stopped supporting the innovation process. It just changed in its forms. We had government, so to say, more committed to market solutions or to supporting companies.

Like Margaret Thatcher?

Yes, such as Margret Thatcher, but even Margaret Thatcher never changed the science system, she never changed our scientific effort. She needed it, all governments needed this.

May we say that what we are observing is a shift towards market again?

Yes, but I'm not sure how long this will proceed. One of the things that we are facing in the world is a number of very big technological challenges. We have a problem of a climate change, we have a problem of infectious diseases,

problems of aging population, and so on. We are not going to solve these problems unless we innovate more. And agencies that will do that are government agencies.

How important is the role of government compared to that of market forces in the innovation process in the UK?

Well, this is a market economy. It's really driven by major market forces and that affects both consumer demand and demand from companies. But it would be wrong to think that the government is not important. The government has played a major role in either developing or fostering or regulating new innovations. Many of the innovations our system uses are things which in some way have been supported by the government.

What BIS is specifically responsible for?

This department is called Business, Innovation and Skills and what we are responsible for is all legislation relation to business and industry — competition policy, regulation and things like that. We are responsible for all of the higher education system, all of universities and that includes both teaching and research; we are responsible for all skills training, all innovation policy instruments, all of the science system. We have a special area which is known as the science budget that means basically 7 large Research Councils and funding for the university system. In a way we attempt to integrate all of the major elements of the innovation system — education and training, business regulation, investment policy, things like that, innovation policy instruments and the science system. These are the key elements of the innovation system and we are responsible for them. And we try to integrate them and to produce an integration policy across them.

The budget of your department is about 16.7 billion UK pounds. What this money is going to?

The two biggest elements of this are the Science budget and the Education budget. The Education budget is changing quite significantly at the present time. The government is switching funding of the education system away from central government and financing it more through university fees which students pay. I

think, probably, the biggest single item in the overall budget is the Science budget. This is funding that goes firstly to our system of Research Councils and secondly to universities. We fund approximately 2.5 billion pounds to the Research Councils, about 2 billion pounds to universities. There is another block of funding which funds infrastructure and capital goods in the science system. This funds a big scientific research effort and a big effort of maintaining laboratories and capital goods, scientific infrastructure and so on.

How does this system of Research Councils work?

We have 7 Research Councils. Two of them are related to social sciences, arts and humanities. The others of scientific Research Councils are organized roughly according to function. There is one in biology and life sciences, one on engineering and physical sciences, one on natural environment and so on.

It works like this: the Research Councils make a proposal for funding to us, to BIS. This is a strategic proposal, outlining their priorities and how much they would like to spend. We then assess these proposals and make funding decisions according to views of ministers. We also talk to many scientific stakeholders, interested parties. We have an extensive discussion inside the ministry and out of that comes allocation of funding to each Research Council. They then invite applications from scientists either for programme in some particular area or specific project areas or more general things which scientists can propose. The proposals made from the science community then evaluated by other scientists. There is an extensive peer review system and out of that comes funding decisions. The Research Councils also fund a number of institutes. We have quite a few Research Institutes just as you do in Russia. We have approximately 140 institutes and they also get direct funding from the Research Councils.

The same happens when you give money to universities?

No, it's a slightly different system. We have an organization called the Higher Education Funding Council. It's independent of government. We give a certain amount of money to the Higher Education Funding Council.

They then have the job of allocation it to universities. They do this on the basis of a quality assessment. They monitor and access the output of the universities and they make funding to universities depending on their judgment of the quality of their work over the past 5 or 6 years. The practical effect of this is that we have about 20 or so top universities who get most of the funding. Most of our funding goes to a relatively small group of elite universities. Outside that we have approximately 150 universities in England and many of them get some level of research funding. But usually funding is very concentrated on the top universities.

Do you give the money for specific programmes they apply for or you just give them a certain amount of money and it's them who decide how to use them?

No, they decide. This is money which is based on judgment of their quality and they can use that money in any way they like. So, if they want to build up a completely new area of work then they can use money for those purposes.

You give money for building infrastructure, right?

Yes, that's the third stream of funding. We have a particular Council which is responsible for this called the Science and Technology Facilities Council. They are responsible for financing infrastructure and equipment.

On top of that we would also have funding which is separately provided and goes to things like CERN which is a practical physics organization in Switzerland. We fund a certain amount of international collaborative projects outside of all this.

You build all these facilities. But who can use them?

They are designed for use by research community. Often they will use research facilities in collaboration with other people including companies. For example, we have a big synchrotron that is used for research into molecules and that would be used not only by academic researchers but also by academic researchers working with business companies. For example, Rolls-Royce which is a very big aircraft engine company, would use that facility both by themselves

and with university scientists. Look for example at the materials that they are using in their engines.

Do they pay for using these facilities?

Yes, they pay, that's right. Well, if you are a university researcher and you want to use the synchrotron you have access to it free for a scientific project. For a large company then you'll be paying a fee which might be somewhere in a region of 10 000 pounds per day to use it.

By 2014 your budget will go to 13.7 billion pounds. At the expense of what areas this is going to be?

The science budget in the UK was not cut significantly in the last budget. The government is reducing public expenditure as you say by about 15%. But this doesn't apply so much to science. Science budget has been frozen in cash terms. But we do have a decrease in budget for capital equipment and facilities and so on which is much more substantial. I would say a big area which will give us a problem from now on is capital equipment for science meaning laboratories, scientific instruments, large facilities – that kind of thing. There funding will fall. That's the real area that suffers. The science community is going to have to figure out how to handle that.

You won't be able to build as many facilities as you used to build?

We will be building something. We do have some priority projects which we are still continuing to build. We have, for example, new Centre for Medical Research and Innovation in London which will cost about 750 million pounds. It's quite an expensive operation. We will continue to build that. We are also building some new Technology and Innovation Centres. The first one will be on advanced manufacturing technologies. We do have areas which are growing.

Do you expect the private sector to participate and invest more including in building these facilities?

The private sector is participating in some of them. I've just mentioned the Centre for Medical Research and Innovation. That is collaboration between the government, the Medical Research Council and foundation called Wellcome Trust which is a

private sector foundation. There will be some participation from the private sector, from charities and foundations.

You've also mentioned business regulation as one of the areas of your specialization. In case businessmen or researchers feel that some regulations need to be changed how can they affect the policy process?

We have a continuing discussion about regulation. Some of our ministers including our Secretary of State believe that the system is too regulated at the present time and they are in favor of deregulation in a number of areas. There is a kind of a dialog between researchers, companies and government about where we need regulation. I don't think we have major problems there.

Where I think we have difficulties, which many countries have, is how we create regulatory systems, for example, for health and safety regulation, environmental regulation that will actually promote innovation. That's a more difficult thing. But we are not trying to use regulation to inhibit or stop innovation. We are trying to use it to promote innovation. Environmental regulation is often directed towards encouraging people to use innovative products that are more environmentally friendly.

Are there any councils where academics can talk to people in the government?

Yes, we have forums. We have a special agency inside this department, for better regulation and they have a continuing dialogue with companies, researchers and universities, people in the health system for example. That's a discussion that is just continuous and never stops.

It's widely discussed at the moment that, the fees for education are going up. What do you think about it?

The basic idea the government has is that education is really quite expensive. There has been expansion of the access to the education in the UK. We now have a million students in this country which is much more than we ever had before. The government finds it difficult to finance all this. That's one problem. We have to find some other ways to finance the system.

The second consideration is that education provides many benefits

INNONEWS

Business-Incubator InCube Launches Accelerator for IT-Startups

Business-incubator InCube intends to launch an accelerator for IT-startups InCube Accelerator. InCube Accelerator is the first business-accelerator in Russia that has been set up using approach of the Western programs. The accelerator goal is to grow high-quality and strong technological projects in Russia. In the West the model was used to grow a number of successful startups, including service of online-presentations SlideShare, the most known online-storage of files Dropbox and many other.

The accelerators provide young teams with conditions for efficient working on the projects during several months. The main difference of the accelerators from incubators is that the accelerators provide teams with startup capital and sector expertise. In three months the project authors build the concept plan, get needed connections, start sales and raise additional investment.

The accelerator is launched on premises of business-incubator InCube. The investment partners of the accelerator are Yandex, investment fund Runa Capital and a number of business-angels. The program is designed to work with projects in the sector of mobile and Internet services, startups in the sectors of electronic commerce and SaaS-solutions.
www.eng.spb-venchur.ru

Data Centers 2011 — VI Annual International Conference

Data Centers 2011 — VI Annual International Conference is to take place September 6, 2011 in Moscow. Russia's main event on the fast-growing data center market, organized by IKS-magazine, a leading resource covering Russia's telecoms and IT industries. Among expected participants are owners and top-managers of data centers, IT-directors, building directors, heads of operations departments, experts from IT and engineering departments — all in all over 400 participants.

www.iksmedia.ru

to students. We do very detailed studies on what happens to students after they graduate and we look at whether or not they earn more money. So, the argument here is that those students who earn more money than they would have earned without education should pay fees for it.

I should emphasize that in this new system the students don't actually pay upfront. What happens is that the government pays and then the students repay the government. But they only repay the government if they achieve a certain level of earnings. If you don't achieve a basic level of earnings — then you don't pay. If after 30 years you will not repay the debt then the debt is removed, you don't pay anything. It's not complete system of students paying. They only pay if they have a level of income that justifies them repaying.

Why did the government decide to change the policy for foreign students who won't be able to stay in the UK and work after they graduate?

The students can remain in Britain after they graduate if they are able to get jobs and visas. It's not automatic however. But it's important to distinguish between two categories here. There are students who come from the EU into Britain and students from the outside EU. Anyone who comes from inside of the EU has a right to remain here. They can do that, there is no change. The government has tried to reduce the number of visas from people outside the EU.

I think it's reasonable to say that this is a subject of big debate at the moment also inside the government. Our minister, for example, Vince Cable, is opposed to this policy and he has said so. He wants to see more visas for foreign students in the UK. Essentially what is happening is that the people who are responsible for immigration want to reduce immigration, and people who are responsible for innovation want to increase it. We have this disagreement.

How will it influence the innovation process?

We have historically relied very much on flows of people coming into and out of this country. Last year, I mean if we just look at science, Britain won 4 Nobel Prizes with which we are very pleased. One of those people was Greek and two of them were Russians. We are happy that these people are working here but they all are immigrants into our country. We recognize that the flow of people from outside makes a big difference to the scientific capability of this country. This can have a big impact on innovation as well.

There has been a shift from regional to national approach in innovation policy. More specifically, Regional Development Agencies will be cancelled. What idea is behind this change?

I think that the government felt that the Regional Development Agencies were not effective enough. And so it has abolished Regional Development Agencies and replaced them with two things. One is that some of these funding goes to Technology Strategy Board. There will be a more strategic and centrally directed use of resources. There will also be something called Local Enterprise Partnership which will provide, for example, consulting services and venture capital finance for small firms in regions. The government is really looking for organisational changes that will improve how the system works. In government you'll never find a complete solution to these problems. It's very rare that you are completely happy with it. I think the government in this case just thought that a different organization would work better.

The government assumed that Regional Development Agencies were not that efficient. How did you measure their efficiency?

We collect a wide variety of data. When we provide finances for the Research Councils or the Technology Strategy Board, for example, we look very much at what they do with that money. We try to look at the outputs of that as well. We'll be looking to see how many scientific projects are led successfully in scientific terms, did they lead to scientific publications, and how important are these publications. If we are funding something like the Technology Strategy Board we are looking to see what emerged out of the projects, do they develop new products, new prototypes, new processes of production, have made advances in some area. We tried to develop metrics, measures for those kinds of areas. We also collect a lot of data on R&D, and we also do a big survey of innovation firms in Britain. We survey something like 25 000 to 30 000 firms every two years to see what their innovation output looks like. We do have a range of measures adapted for different purposes that we try to use in making policy.

What is the main difference between these two systems – between Regional Development Agencies and the Centres of Excellence?

The Regional Development Agencies were mainly concentrated on small firms. I think that Centres of Excellence are much broader or will be much broader. We are only just establishing them now. They are meant to provide much bigger critical mass of technological expertise. The Regional Development Agencies were too fragmented in support of different sectors of the economy. Centre of Excellence, Technology and Innovation Centres will be more focused on core technologies with a large number of people working on them, a lot of the expertise.

One of these Centres of Excellence will be for manufacturing, correct? What will be the other seven?

It isn't clear what they will be yet. The first to be established will be the Centre for the Advanced Manufacturing. And that would be looking at issues like the development of use of advanced robotics in manufacturing, the use of new materials. So, that will be a range of areas. It will also look at design processes, design and prototyping using new IT solutions. That will allow a very large amount of firms to participate. There then will be a centre which will focus on life sciences and pharmaceuticals research and the other centres are not yet decided.

My view of these things is that in some areas we've concentrated too much, on areas like informational communication technologies and biotechnologies, life sciences. These are important areas but they make up a relatively small part of our economy. If we look at what the structure of our economy is you would find that it's actually very similar to the structure of the Russian one. That is to say that we have a large food sector, food production and food distribution, we have a large construction sector, large transport, one of the biggest sectors in our economy is health. We have a resources sector, not as big as Russia but we still produce natural resources, and that's big. I think if I was going to say what I would think about, it would be some of these very large sectors of trying to induce more innovation and raise the technological levels of these sectors.

If You Have Someone at the Top – Just Do It!



David Baghurst — Head of Isis Innovation,
University of Oxford

What are the specifics of the innovation system in the UK?

Historically the UK has always had a very good basic research. So, obviously the universities are part of the innovation system. The government had a role in formulating various policies to include exploitation of innovation from the research base and to support the growth of companies. Maybe this is a cultural thing but everyone in the UK is open to an idea of running a business. We are a nation of shopkeepers, a nation of people with the desire to be an entrepreneur which I think is not the same in other countries. Historically there has been a financial community willing and able to support the investment that is needed in innovation to take things forward. I do think we have a tendency maybe to be a little bit obsessed with high tech innovation and probably not to recognize the strength country has in media, arts and design – the softer areas of innovation. The guy who designed Apple iPod is an Englishman who was in London. So, innovation can become too closely associated with high tech rather than just good products.

Do you think that innovation system of the UK was initially planned by the government or it evolved spontaneously?

It's a common problem in many democratic societies that the government changes every 3, 5 or 7 years. The problem is that there isn't a consistency of policy: as governments change new policies come, innovation ecosystems take a lot of time to develop and everything is broken. So, after 5 years, just when things are starting to work, a new government comes in and you start from scratch with a new set of initiatives and policies. I think that's an issue.

The other issue is that the UK tends to behave as if it's still a massively powerful country with unlimited resources. We try to do everything instead of concentrating in selected areas. So, when you compare the system here to the system in Singapore or a system in China this isn't very good.

What are the major participants of the innovation process in the UK? Could you please name any specific organizations?

This is difficult because of the current changes that are going on after the impact of the financial crisis and the new

government. It must be very frustrating for you trying to research this.

Historically there have been a number of different government schemes at different levels. What do I mean by level — I mean local, regional, national. There used to be the Department of Trade and Industry. They used to run all these schemes from there. And there was a period of time when Regional Development Agencies were active. And within those regions there were sub regions that would do things in the area of innovation.

I am a participant in something called the Oxfordshire Innovation Growth Team which covers Oxfordshire. This was sponsored by the South East England Development Agency which covers the South-East of England. It was a regional body. That regional body got its funding from BIS which is a department of government that replaced the DTI. So, money from the national level goes to regional level and then goes to sub regional level. And at the sub regional level there are people like me who help companies to innovate. This is all in the process of disappearing.

Today we have a group called the Technology Strategy Board which is a national level body which is trying to find some priorities to invest the limited money that we have available in some key areas. They have groups of people that have written reports and that is leading to creation of so-called Technology Innovation Centres.

The concept of the Technology Innovation Centre is this: it's modeled on very various different schemes overseas, one of which is German Fraunhofer Institutes. The concept is to bring together government with industry with universities to do some collaborative work that helps the industry innovate. The financial structure that is being discussed is a third of the money comes from the government as a grant; a third of the money is secured by the universities who write grant applications to the government. This is a competitive source of funding. And a third of the money comes from industry. There will be 8 of them in the country and they will be targeted in particular areas where the UK has industry-university-governments cooperation.

If you were to decide in what areas would you create these centres?

That's a very interesting question. At the moment one of the projects I'm working on is trying to make this decision for Oxford. So, there is a government programme which is very competitive, not clear with the structure, I don't really know what the outcome is going to be. You have to invest a lot of time into preparing an application for one of these sources of funding. There is a little amount of money available.

Separately you can try to decide how to position yourself as an institution in this new environment. I'm working on this project where we are trying to work out what it is what we have here that we can take further along the technology development pathway. And there are a few different areas which I'm not ready to share though where there is a significant strength in the university and there is an opportunity to collaborate with industrial companies to do some early stage industrial R&D rather than just do pure basic research. And where do we go from there? We have to find a different way of funding.

I think what our country needs is a radical change. And I don't think you can run a radical change with an all encompassing inclusive committee. The UK has become a committee. The leaders consult with other people who have their own viewpoint. And the focus is diluted in part to satisfy the desires of powerful parties. I think if you have someone at the top you just decide what you are going to do and make a choice. Just do it. If you want to make a radical change you don't involve a committee because a committee just takes a lot of time and doesn't have the guts to make hard decisions. They tend to achieve compromise.

If you were to decide, would you have done this kind of changes that are occurring today?

If I was in charge, I would make the decision just which sector we are going to invest in from the centre, from central government.

You wouldn't have kept the regional approach?

Yeah, I wouldn't do that through regions. I would do it centrally but I wouldn't consult for very long. I would just make a decision. We don't have enough money to invest in a large number of different sectors. We need to pick a small number and pour in the money that we have into those sectors.

How important is the role of the government compared to that of the market forces in the innovation process?

It's important in two ways. One it's important because early stage innovation is risky. So, it's quite difficult to do it successfully in a purely commercial way. Because you spend money and the most of it doesn't work because of a very high level of risk and failure. The role of government is in taking some of the risk out of the investment for other investors.

Where the government can have a sort of negative role is when they change the legislation and the consequences are that it stops, hinders some part of the innovation mechanism. There is an example from 2003 in the UK. The government wanted to stop the banks using a tax loophole to reward their employees. So, they put in place some new policies. The new policies meant that academic researchers who got shares in spin-off companies would immediately receive a very large tax bill. This stopped the creation of innovation companies from universities research base. The government sets legislation for good reason, but it has damaging consequences for the overall picture of the economy, particularly in the area we are interested in. When the government messes with the tax it's dangerous.

Investing in innovation is very risky, so we need to put some public money in there. You can't do it purely for the market because the market doesn't work. If you look at the financial performance of the early stage venture capital companies the average is that they make a loss if you look at the statistics. Some of them would be very successful, some of them would be very unsuccessful, but the average is poor. The market doesn't work. It's too risky. The investments are too risky.

Does that law you've mentioned still exist?

No, we had a campaign to have this law changed. So, in the case of the university spin-off companies we've changed it.

How does the legislation regulate the innovation process?

There are some tax rules. One of the interesting changes recently was in the area of patents. If you spend money on patent you can get tax breaks. Historically there has been an

R&D tax credit. So, if you spend money on research you get tax breaks and there have also been incentives for investors to invest in early stage, risky businesses, so that if those businesses are successful you don't pay as much tax.

What about grants, direct incentives?

As for direct incentives there was a scheme in the UK called SMART scheme. SMART — Small Firms Merit Award for Research and Technology. Its name changed to R&D grants or something but the structure remained very similar. For a relatively small amount of money, maybe a project of 60 000 pounds, 15 000 is provided by a company and 45 000 by the government under the scheme. That was a very, very successful scheme and it's there to encourage the smaller firms to invest in innovation.

What helps and what hinders the development of the innovation system in the UK?

What makes the good kind of mechanisms for making innovative companies succeed seem to be things which bring companies in a similar circumstances together, so that they can learn from each other. There are business incubation programmes. Most of the incubation programmes we see around the world when we visit them, they don't feel like the innovation centres that I was involved in. Because in the ones I've been involved in there is much more collaboration and communication between people leading those companies, much more interaction, much more of a networking community. Everyone is trying to succeed and helps everyone else and there's a very high level of trust.

In some territories there is no trust, so people don't share problems and ask for advice because they don't trust each other. In the UK people in our community trust each other, help each other. So, one of the key things about innovation centres is that you have to have a facilitator that knows all the companies and helps to create this community, it make difference, big positive difference. When we've established companies, the trick seems to be to get the chief executives of those companies to come together to help each other — we call this peer support. That seems to work quite well.

What doesn't work is where you've got a government official who gives advice to a company but because the government official doesn't or hasn't run a company usually, what do they know about it? The trickiest thing is trust. We work across Eastern European countries and there is a very low level of trust between people who run the companies.

To your mind, what is the reason?

Culture.

How can one build trust if it doesn't exist?

By having a skilled facilitator, someone to bring those people together, to convince them through experience that it's OK to work together, collaboratively, to be helpful to each other. You don't have to be in competition. Usually these businesses are in completely different industries, but they can help each other because they share some of the same common problems.

In what areas the results of innovation has scored the most impressive results?

I think the ones that aren't recognized are the ones related to relatively low technology or design. You know that kind of area. It's frustrating that those aren't recognized. The things which are recognized are the strengths in pharmaceutical

technology, the strength in aerospace, the historic strength in cars. More recently there is a lot of innovation in film, very well design products, that kind of area.

What were the areas where innovation failed to produce a breakthrough despite the efforts made?

I think we have very few mega-companies, companies that have become world leaders. We've got very few of them in the last 20 years. And where there are companies that have gone to become world leaders in the last 20 years we haven't been very good at communicating to ourselves and to the rest of the world. We've got very negative attitude toward our own capacity to do this, to innovate really big. We naturally talk ourselves down. As a country we are very critical about our own performance and this becomes self fulfilling. If you think you are bad at something long enough, like turning basic research into innovative products, then you become bad at it. Or you don't recognize a success of it. A good example is a very interesting company in Cambridge. They make computer chips. And they make computer chips that power lots and lots of devices. They have an enormous success story which few UK people have heard of.

How important are innovation or technological parks?

That depends. Most of them add little value because they are just premises. A proper park is more than that — it's got a community, it's got inter trading, it's got companies talking to each other. When you have that kind of environment then a new company that goes into that environment is supported by the community and is helped to win business and join this park. There are projects with other companies. There are lots of things called innovation parks, but very few of them are actually anything more than just property.

So, it depends on the quality?

I think it's the environment. I used to recruit clients for innovation centre. I recruited clients on two criteria: the business plan and the willingness to become part of the community, part of their own support network. I even had to reject good businesses because I had more people who wanted to come than I had space. And as the result of that I've created sort of a community of 30 who did lots of stuff together, who grew and they all are mostly still trading.

What is your forecast for the development of the innovation system in the UK?

I don't know. I think that we are in a period of change. And I don't know how things are going to be. I'm worried. I don't see anything focused: I don't see a leader, I don't see initiatives that will make a difference, I'm not confident that we are going to come out of this very well.

What research and technological achievements may assure a technological breakthrough in the years to come?

I follow with interest the trends in the investment community, they are very amusing. There is a period of time when the trends appears to be the emergence of biotechnology. Everyone is very excited about this area. And then there is a trend towards clean energy and the environment. These new technology areas become a focus of interest — a little like a fashion. I think people forget the basics which are that we need water, food, more energy and better healthcare. Some of these industries are not very sexy but they all need big innovation. I would go to basics — water, food, energy and healthcare.

What does Isis Innovation do?

We link the people that make new technology, the technology providers, with the people that are looking for technology in industry, the technology seekers. The technology providers can be university researchers, early-stage companies, and established companies — any source of a new technology anywhere in the world. We link them with the people who are looking to get hold of that technology and turn it into innovative products or services again anywhere in the world.

We sometimes do that on behalf of governments. We are involved in the process in different countries where there is an interested government. At Isis we are good at recognizing the potential of an early stage technology based idea, we know how to communicate it to people who want to take that technology idea and make it into a product.

Do you work in Russia? If yes, is it easy or difficult to work there?

We work in Tomsk. We collaborate with people in Moscow. This whole area of technology innovation is an international, global thing. In terms of working with Russian people I think the level of trust is lower than in other countries and I don't understand why. People are more protective, they are very suspicious. If you go and say: "I can help your business", the response could be: "I'm threatened by that", "I'm not going to give you any information", "I don't trust you". And I think that's cultural. I don't know how do you fix that unless you've got some people that are just very good at encouraging people to come together.

There is a lack of trust, but in Russia you have the advantage of a government that can take a decision and go in a direction for as long as it wants. It has the capacity to choose a direction of travel, to stick with that direction of travel for 5, 10, 15 years; as long as it takes. You can do that. You can't always do that in West. That's great. The problem is that you have a bunch of people that don't trust each other. That's my perception.

The nice thing about Russia from my point of view is because the technology economy has been kind of closed for a period of time, there is not much trading across international borders. The government has always invested in innovation, technology and research. So, from my point of view it's really exciting because whenever you visit the Academy of Sciences research centres there's always a chance that you find things that are unique and very special. Because when you are in the West and you visit people because there is a much more free flow of people around, you are very rarely surprised by the exceptional quality of what you find. In Russia you've got a chance to be surprised more often and have something which has been developed for the Russian market which is fantastic. When you take that out to the global market it just blows away the industry. That's the excitement of Russia. At the same time you can come across something which some people in Russia are very excited about but which is so out of date, you are not so surprised.

I think this is a great time because if we find things which are unique and special and if we can get the level of trust, then I hope we can collaborate in helping Russian companies to take their products overseas. For more information on Isis please see our website at www.isis-innovation.com.

Try – Fail, Try Again – Fail Better!



Garrick Jones — Partner in the Ludic Group and Visiting Fellow in the Institute of Social Psychology at LSE

How the government can stimulate R&D activities?

All governments in history have promoted R&D, particularly for defence purposes. Going back to Leonardo da Vinci and before and ever since: lot of Leonardo's work has been for defence, his ideas of helicopters and submarines for instance, new types of armament. The Mongolians used stirrups on horses. Throughout history many innovation which came to the market have had origin in defence. All the way through history innovations have come down into the market and to common people. This is not new. What is new is a phenomenon of an innovative behavior becoming a driver of the economy.

So, typically the UK government like many governments has invested in primary research, R&D through the academy, engineering for example, new ideas, and then over time ideas have made their way into the market.

The British have a particular history, a cultural history of being very good innovators. I don't know why but it is the way it is. A British has that meter for the inventor in his shed or his garage, at the bottom of his garden, working at his workshop. And this is the way things like hovercraft or the sandwich or jet engine emerged — all these have been created by private initiatives which then have been picked up for further research. This was for example how railways started: George Stevenson from Newcastle perfected the first steam-powered machines and built locomotives which inspired construction of the world first freight and passenger lines. In the British context there is distinction between invention and innovation, we defined innovation not only as an idea but as an invention when it comes into the market.

What Britain has not been very good at was a value-adding part of the process which is taking those ideas and bringing them into the market quickly and effectively. Often the ideas originating from Britain, like a jet engine, have been taken and commercialised very successfully by the United States.

Why did it happen?

I think it was because we had an empire which was doing all that work for us, we just needed to feed new ideas into the empire. With the collapse or loss of the empire there was no appreciation of the world as the market the same way. And it took a long time for Britain to reconfigure itself and to reimagine a new place for itself in the world. Now we are a small nation, we don't have the same access to the markets we used to have in the age of an empire, so we have to re-negotiate our

relationship with our trading partners. And commercialisation of ideas is much more focused on nowadays than it used to be. We never in the past had innovation focused on at an entrepreneurial level, even in things like fashion, music (and we have a very powerful music industry), television. For example, we may have invented computers like Univac but then it went to the United States and it was the United States that created Apple and a PC for example. Many people do not know but the very first laptop computer was invented here in the UK. It was called a BBC computer and an Acorn computer. But it never developed into a market product.

The culture of the UK is very inventive but commercialisation is not something we are good at. Having said that there has been government support for things like science parks, the Oxford and Cambridge ones being very powerful... This kind of relationship between the academy and industry is designed to speed up and to commercialise. And we have been doing it for the last twenty years, and that is becoming more and more effective. But again we must make a distinction between creativity and innovation.

Probably this is related to some legislation problems. How does legislation regulate innovation process?

I would mention two things. There is nothing like tax exemptions, they have always been limited. Yes, there are R&D tax exemptions but they have to be limited to pure science and some forms of industry. But also there is a cultural factor: we are not a country that easily deals with failures or bankruptcy. For example in our culture if you went bankrupt and more so if you went bankrupt by law you can never run a business again. It damages your reputation not only legally but also socially. But what you need is an entrepreneurial activity prepared to fail, because innovation is so much about potential failure — learning from the States and the famous story about Edison making one thousand light bulbs to come up with a successful one. So, this idea of bankruptcy and understanding that small failures in entrepreneurial activity are not a disaster is something that we are starting to change.

Could you give some examples from other countries where they want and they know how to risk?

Take the US: great businesses fail now and then and that's OK. And that's what promotes entrepreneurialism. When I lecture on innovation I often start with a slide from Samuel Beckett, an Irish playwright. On his desk there is a card saying: "Try — fail, try again — fail better". And this attitude towards failure is very important not only in generating new ideas but also in commercialisation of those ideas.

In a pure market capitalism failure can be very harsh, it can be catastrophic for people and their families. That's why, I believe, it requires from the state to provide people with cushions for failure, because risk is inherent in innovation.

Are you aware of any recent government initiatives aimed at promoting innovation?

Yes, the one is coming through from the new government. It is called Technology Innovation Centres. These are based on a European model actually, which works very well in Germany and in France. Technology Innovation Centres will be linked with the academies but they are specifically centres working

on the relationship between new ideas and research and commercialisation.

Basically they will be places where companies rent some space and may use the equipment?

Yes, that's one model. But the idea also is to facilitate new ideas and project management, so that these ideas of different stakeholders can work together throughout these projects. A very good example is Frankfurt Institute in Germany which can serve a model.

Important point is that these centres are multi-disciplinary, you have to facilitate the overlaps, you have to work very hard on it. For example, you might have a medical company which has dissemination into hospitals. Then you might have a design company which is doing interaction design. Then you might have a technology company that owns the technology for a new piece of medical equipment. And then you might also have a finance company that can help structures to finance all the way through. So, they are multi-disciplinary projects, and it is not a serial approach, it's a parallel approach.

Can you elaborate on major participants in the UK innovation system, i.e. universities, research labs, companies — who plays a bigger role?

It really depends on an industry. Like Canadians we have clusters of excellence. For example London has a very powerful cluster for filmmaking, new media, music, advertising, arts — all sorts of creative industries. Soho in London is a cluster around filmmaking industry. People must have a place to come and to talk. It rarely happens in an official structure: you don't have the same quality of conversation that you can have over meal, or cup of coffee, as you have when you are in a formal academy seating. So, in Soho we have a lot of clubs, member clubs where people from film industry — actors, producers, cameramen can hang out, party together, drink together, enjoy social life together — and talk. And through this talking ideas are found, the UK is very good at that. In the XVII century not far from this area, in the Fleet street zone we used to have coffee houses which emerged before pubs. Coffee came from the New World and was an attraction: people went there and out of coffee houses came new ideas for politics, industry, culture and arts. Newspapers come out of the coffee houses because people were writing down their ideas and sending these sheets to their friends. It became published and Fleet street developed into a centre of newspaper production in the UK — just because the coffee houses were there. So, Soho is an up-to-date version of those coffee houses for the film industry for example.

Clusters of excellence. If you go to Oxford for example, engineering and biomedical science are very powerful there; Cambridge — technology, also biomedical, computer science. In London we also have climate change and sustainability clusters of excellence. These clusters allow people from different industries but working in the same domain to talk together and work together.

You've been to Russia. Communication infrastructure and project management, to your opinion, does it work there?

I haven't been to Russia long enough to know in depth, I can only report on what I saw. After the fall of the communist era your heavy industry is not that big as it used to be and it has become very primary, oil and food for example, manufacturing industry doesn't really exist — it is very small. But Russia is very powerful on a cultural side, your cultural industries are

astonishing, lots of discussion and exciting things happen, but only on a very small layer of the society. But I saw a very large part of the population is denied access to those kinds of opportunities. I don't know enough about Russia to comment on it as an expert, but if you want a culture of innovation and a culture of the economy that is driving innovation and entrepreneurship you have to involve people at every level, especially your middle classes and below. You cannot have just oligarchs and workers.

How did crisis and budget cuts affect the innovation policy?

The major impact on innovation policy produced change of government. Under the previous government we tried to support various groups dealing with innovation. I think a lot of those have been cut although less severely than some more basic cultural things like theatres and arts which have been cut really badly.

You have said what hinders development of innovation system. Now what helps development of innovations?

Right structure: you need a policy that supports it, you need education at every level. We start teaching design thinking at schools for children of 6–7 years of age. There are also programmes across the UK for children at the age of 11 and also at the age of 19 to do join-up and design thinking at schools, they are all to make design thinking a part of school experience.

How does it work in practice?

Every project is absolutely unique for a particular school. There are groups working with children to redesign their schools. The children work with architects, inside and outside. I can give you examples when schools have been destroyed completely and then rebuilt entirely new, following the designs done by schoolchildren working alongside with architects. It stimulates creativity and innovative thinking. For children it is very important to participate in a project all the way through from beginning to the end. Also, we have a lot of actors working at schools on creativity. We have children involved in making films and they work with people who did Star Wars for example. So, they are working with professionals and they go through the whole process. Britain is very good at that. Another thing is appreciation of arts and culture, specifically contemporary arts and conceptual arts. Every gallery and museum in UK has educational programmes that touch all the schools. Tate gallery had 5 million visitors last year, 2.5 million of them being schoolchildren. And appreciation of arts, and arts practice and arts thinking is also a very important component of creativity.

So, education, infrastructure, tax regime, policy regime with clusters for innovation, and access to finance. Our problem is that our venture capital is very good in projects over 250 thousand pounds but there is so little venture capital for projects between 30 thousand and 200 thousand pounds. And this is really an important part of the economy where new ideas can be tested. We are promoting social entrepreneurship at that level, and lots of prizes and foundations are emerging, mostly private, some public, which allow ideas to be formed.

In which areas the results of innovation have been most impressive?

Well, I think our multimedia have been world beating, our music industry is the best in the world, our television industry is the best in the world and they export a lot. Also a precise

engineering, for example Roll-Royce manufacturing new engines and so on. If you go to Trent in Derbyshire you can see the impact of innovation on very skilled engineering, audio technology etc. Our health care industry is and has been very innovative and very powerful. Creative industry is very strong. Many people just don't know it but creative industries like advertising, design and others contribute to GDP on par with finance: 5 to 7 per cent, which is very large.

What do you think about a recent trend of medical and pharmaceutical companies to close production here and move it to India and other developing countries where workforce is cheaper?

That's a good thing I think. Also the model of innovation has changed very quickly in those areas. Innovation used to be based on what we call "skunk works" where you put a group of several clever people in a room and let them get on with it. This has not proven to be the most effective way to generate innovative ideas and get them through to market. The fact that Pfizer has closed this facility does not mean that innovation has gone out of England. What they have done is a change of model, so that innovation is happening on a broader and much more open way.

What were the areas where innovation failed to produce breakthrough?

You have to have failures all the way through to get a success, and there is enormous amount of failure in testing and prototyping before getting successful. The UK has invested heavily in energy innovation and has a lot of projects, government-funded projects to look at new energy forms, government funding for academies, for new sustainability, engineering, new battery technology and new storage technology and so on, all these are emergent and growing. A key success was a global shift from incandescent light bulbs to new types of light bulbs – this is being done globally in five years, it's remarkable. But in order to get to that particular light bulb how much failure was around! So, I think sustainability engineering or "clean tech" is no failure, it's emergent. And where there is something new there is always lots of experimentation and failure is built into it.

Does the government somehow regulate the innovation process?

What you have to understand about the UK is that we don't have central planning at all. We resist central planning. I think we are opportunists and when we find areas we are good at we tend to rush after them, but we are no good central planners at all.

How important are innovation parks? Can you elaborate on most impressive examples?

They are absolutely vital especially for mid-level small to medium enterprise. All of them, I cannot say a particular one is the most impressive because they all concentrate on different things. And I think this is where the key is: the age of massive big industries is over and coming is the age of multiplicity and massive investment into small to medium enterprises. And this is the shift that happened over the last 20 years.

In one sentence, what is the major purpose of an innovation park?

It is to promote connection between laboratory work and commercialisation, and to nurture small organisations,

sometimes startups but also small and medium enterprises when they are young and trying to grow.

What do you think about Skolkovo?

There are always differences, you may call them differences of cultures but I'd rather call them differences of perception. I welcome the initiative in Russian Federation to be more innovative and to open new business opportunities for its population. I also welcome links that are being made with the rest of the world. So, projects like Skolkovo which is about promotion of international standards of business practice must be welcomed. I think Russians are often too inward focused, Russians look to Russia and not necessarily to the rest of the world. Now I see these perceptions changing. And vice versa: rest of the world sometimes see the Russians as aggressive or opportunists or not to be trusted when doing business, and I think that perception also needs to change. For example, endeavors like Skolkovo, when you read here journalists' reports showing young Russians alongside international students learning international business practice are very important for the perception of Russia as a place to do business.

To your mind what should be a proportion of big businesses and smaller companies and startups to operate in Skolkovo?

I think it depends on what your capital requirements are and what your investments are. I think a proportion of 20 per cent of very large industrial companies and 80 per cent of small to medium enterprises is about right. It could be 25 per cent and 75 per cent. I believe large organisations benefit from having so many smaller organisations around them in, the first bringing investment and the second generating new ideas. You have to subsidise small and medium enterprises and inviting large companies in science and technology parks helps to do right that. You have to create a different regime for the small to medium enterprises to flourish, you cannot ask them to behave the same way you ask large organisations, otherwise they just cannot survive.

What is your forecast for the development of innovation system in the UK?

Within the last 20 years and certainly after the Lambert report in 2003 there has been massive investment in various centres for innovation, in the academies. There is much greater appreciation that you need to facilitate that relationship between academies and small and medium enterprises and science and technology. This will obviously go on.

In what area there will be built a bridge between nowadays and future?

I think it's green technologies. In two words, battery technology and sustainable production of new energy sources. I think the new technologies are to come very quickly, within the next 20 years.

The Cluster Phenomenon Is Here to Stay



Sven-Gunnar Edlund — Senior Advisor, the Swedish Agency for Innovation Systems (VINNOVA), in 2004–2009 Director and Head of Division at VINNOVA

You were one of the founding fathers of VINNOVA...

Not really but indeed I've been part of the management of VINNOVA during almost all the period it existed and up to now, and I've been in charge of developing quite a few innovation programs that VINNOVA today has. To some extent I have really been in the heart of the developments working very closely with our first Director General Per Eriksson who is now vice-chancellor of the Lund University. Right now I'm also a coordinator for research and innovation within the EU Baltic Sea Strategy Action Plan in which capacity I'm very much involved in discussions on innovation not only in Sweden but in the whole Baltic area. Russia is also a part of it, and it is my hope to see a more close collaboration with Russia on innovation within the Strategy. It has started with one project right now, the one on water-cleaning technologies: a world-leading consortium is being built with participants in different countries around the Baltic Sea. Vodokanal company from Saint Petersburg is one of the partners in this project and some of new water-cleaning devices will be developed and tested with their support. This is the first project that Russia will be involved in and we hope that Russia will take part in more projects in the future.

Comparing to other countries' innovation systems what makes the Swedish innovation system special?

There are some very specific characteristics. One is that we have several huge multinational companies operating in sectors where research is a precondition of being competitive like pharmaceuticals or telecommunications. This means that they are focused heavily on R&D in their business. And that is basically the reason why Sweden tops the world chart of countries investing in R&D. Investment in R&D in this country stands at about four per cent of GDP and 75 per cent of this

figure come from 10 to 20 large companies.

The second characteristic is that we have a relatively small research institutes sector unlike other countries where big research institutes work very closely with industries. In Europe only Switzerland has a research institutes sector as small as in Sweden. Consequently it is expected – both by the government and the public, that this role must be played by universities which is quite unusual compared to other countries. This was reflected in government regulations for the universities adopted in 1997 where the universities were given a third mission. The first two were education and research; in addition the task was set for them to support and to work closely with the society and with the industries.

Another characteristic or rather a weakness of the Swedish system is that small companies do not invest enough in research. We are struggling with that. We are trying to encourage smaller companies to invest more heavily in research, to get more and more small and medium-sized enterprises connected to the research network and innovation system, to encourage them to be more innovative, to develop new products and also to increase their knowledge. Obviously Sweden is not unique facing this type of problem and now we are trying to do something about it. And I was responsible for developing a special program "Research and Grow" addressing exactly this matter. It was inspired to some extent by the SBI (Small Business Innovation) program in the United States in the framework of which the US government supported small and medium-sized companies doing research. "Research and Grow" was exactly the program to fund R&D in smaller and medium-sized companies and it became extremely popular. With an annual budget of 120 million Swedish crowns the number of SMEs which want to apply is high, but only 10 percent of those who apply can get funding.

Within this system what is the role played by the government and government agencies such as VINNOVA?

The first thing that the government does is to secure an infrastructure of the innovation system: funding bodies for research in universities and research institutes, bodies that encourage cooperation between business and academia. This includes regulations for universities, for agencies like VINNOVA and all the intermediate organizations working with government funding. Talking about VINNOVA we have a specific mission to fund such research which is carried out in cooperation with industry and business and to secure that the interactions in the innovation system really works. We support connection between business and universities, between business and research institutes and between research institutes and universities. Our task is also to support the commercialization of the research results. We as well underline that an information flow between universities and businesses goes in both directions, not only the classic way that is to take the result of research and try to commercialize it. It is not less important that the business needs for new knowledge and new technologies will be submitted to universities so that academic researchers understand and focus on the need for specific new knowledge, its future market merits and value. A working dialogue is needed between the business sector and universities so that research is inspired to be oriented towards needs of industry. If you do that it becomes much easier for the companies to use the results of R&D.

Does the government set some concrete benchmarks of what it expects the money it allocates to the research bring?

They do not set quantitative targets for us to fulfill. Instead they have given us a task to show that our work is important. What they are expecting is what we call "impact". We have to document that there is return on investment, to show that the industry has been able to be more competitive, to develop new products and to gain new markets, to hire new workforce and raise their competence as a consequence of our funding.

Do you feel innovation in Sweden needs a particular support from the government in form of specific legislation acts?

I would say that the restrictions we have in Sweden are not laws in proper sense of the word. The restrictions are majorly in minds, they are part of culture. What is really needed here is to develop a more entrepreneurial mode of thinking within the research system. As long as I have been in the system it continuously has been involved in discussions and sometimes in conflict between proponents of "pure research" for the sake of new knowledge and their opponents who insisted that the ultimate goal of the research should be improved quality of life which demands that research should meet needs of society and business and be utilized. These two camps have always been in debate, if I look back for some 30 or 40 years this discussion has been going back and forth. One decade more accent was made on utilization, and then the pendulum would go back towards more fundamental research.

How did VINNOVA contribute to the development of the Swedish innovation system?

I think we have done quite a few things that have really made difference. One thing is that we have strengthened cooperation between various actors in the system: not only businesses and academy are now working more closely with each other, we have also got the public sector involved in that, and political system too. During the last decade there has been a lot of discussion about the concept called "Triple Helix". By "Triple Helix" it was meant that the academy, the public sector and business leaders form some kind of common vision and common priorities. I must admit that in several areas we have been quite successful with that. I am especially satisfied to see how many Swedish regions where the Triple Helix approach is working now. Ten years ago the cooperation in regions was almost negligent to identify the strong points of a particular region and to focus the research, innovation and business development in these areas of strength. Through VINNOVA we have encouraged a much closer collaboration between the business, the academy and the political structures of different regions. This in turn has helped to set goals for regional innovation systems, to develop a strategy for each region how they should most effectively use their resources to become more competitive.

Secondly, the already mentioned program "Research and Grow", which is a program for SMEs. I believe this program has also made a difference: large number of SMEs now are able to do research and up to 80 per cent of these companies have been able to develop new products based on such research. All of them have also developed links with the research network which did not exist before.

We have a concept at VINNOVA called "Strong research and innovation milieus". These are located either at universities or at research institutes. The major characteristic of these milieus is that they have multidisciplinary research teams working very closely with business, while their funding is divided in equal parts between VINNOVA representing the government, the

industries and the universities themselves. At these milieus the entrepreneurs and companies can have a dialogue with the researchers, discuss the most important problems that researchers should address. I would say we have improved the skills in universities to cooperate with industry, helped them to understand better the business psychology and reasoning which all resulted in improved cooperation between the two. And I also think many companies now also understand better the academic logic and the researchers' way of thinking. This improved cooperation I think, was to a considerable extent the result of numerous programs that VINNOVA has worked out, designed and has been running.

What are the particular Swedish advantages that help develop innovation system here, and vice versa what are the major obstacles?

Sweden is a small country; this is both an advantage and disadvantage. The advantage is that we are very dependent on export which means that Swedish companies are competing with their foreign counterparts. To be in the global market and to compete successfully with the best companies is a very effective driver for innovation. Here in Sweden every company understands it has to develop, it has to improve, it has to acquire higher skills, to be innovative to stay in the forefront. The disadvantage is that domestic market is very small. If you compare us to bigger European countries like Germany, to say nothing of the United States, their small companies can develop comfortably in their home market alone. Swedish firms in order to develop must at some point go abroad which is always a tough challenge for smaller companies. Incidentally this was one of the ideas behind the Baltic Sea Strategy: to make the whole region a home market for the companies from the neighboring countries thus increasing the size of their domestic markets. Being involved in this cooperation project I see two important arguments in favor of this strategy. The first is that most countries around the Baltic sea are too small in order to be, in the long run, attractive and competitive actors globally, while combining competences of participants in neighboring countries would place them in much better and stronger position for competing internationally. The second is that all SMEs can enter and operate in a home market which is ten times bigger than their owns.

How long does it take to turn new ideas into innovations?

Sometimes you have to wait perhaps twenty years before all the fruits become evident. Some 15–20 years ago we started funding research of an issue which caused a big problem in the society – injuries in car accidents. Special attention was given to an effect of neck being broken as a consequence of a car being crushed into from behind. After years of medical and engineering research a company in Western Sweden started producing special safety equipment to minimize neck injuries in that type of accidents. The company name is Autoliv and now it's the world leader in this sector with turnover counted in billions and exporting their equipment all over the globe. It is very clear that the success of this firm was brought about by that research, and the insurance companies have models to calculate the economic value of this innovation. This was a very concrete example that can tell how much the society has gained from a research effort.

I can give you another example, a completely different. You know that universities have money to endorse research, fundamental research are also funded by research councils.

The priorities of both are mainly traditional. If you go back 20–25 years ago the predecessor for VINNOVA saw very clearly that IT would be in future a most important field. However at that time the research in that field were scarce, nor were there adequate investment in education in IT. So VINNOVA's predecessor allocated money to support technical universities, to develop research, to train researchers and to prepare education programs in IT. Today it is very clear that the success of Ericsson would not have been possible without VINNOVA's predecessor funding all those research and education of so many young people in the profession.

A third example. In 1990s we started setting up a strategy to develop new renewable materials and products from wood to replace petrochemicals (plastic etc.). Today a number of small and larger companies develop new renewable and environmental friendly products from wood materials. And again the foundation has been put by VINNOVA and its predecessor in the form of a strategy and finance.

How did the role of science parks evolve as the time passed by?

The role of science parks has changed a lot with the time. Initially they were no more than some rented premises and office space. The idea however is that they are places where a number of companies may locate their R&D, launch start-ups exploiting research done by universities, and also where big companies as well may put their R&D departments or parts of them. It's a meeting place where people from different companies, large and small can meet, talk, exchange ideas and inspire each other thus making innovation process more efficient.

Apart from science parks there are also incubators which are now in high demand because they offer business assistance services which is crucially important for start-ups and early-stage companies. So around the universities you need to have several innovation support systems with different functions, and both science parks and incubators are parts of that. Also, as an example, at IDEON in Lund they have such a structure called Technopol where there are experts in many fields who could give professional advice. Also there is in Sweden an organization named the Innovation Bridge which also has a specific role in the innovation support system.

Science parks work differently in different parts of Sweden depending on how the innovation support system looks like and works in places where they are located.

In Stockholm, in the so called Kista Science City we have an incubator and business accelerator in the IT field called Sting (Stockholm Innovation and Growth). That incubator is very successful. It supports the building of new global growth companies by attracting the best innovators and entrepreneurs, offering them world-class business development support and networks.

Also in the Stockholm there is Karolinska Development — an organization and a system initiated by Karolinska Institute to secure financing and support for the many innovations coming from its researchers. Karolinska Institute is one of Europe's largest medical universities and Sweden's largest center for medical training and research, and Karolinska Development together with Karolinska Institute provides access to world-class life science innovations. The management team contributes with senior R&D and commercial expertise which accelerate both product and business development. It employs specialists and project managers with solid industrial experience.

In Gothenburg the Chalmers Technical University and the Gothenburg University are developing a very interesting project with assistance from VINNOVA. They are creating a common innovation support system, called Golnn, aimed at commercialization of research. Its mission is to facilitate a shift to a knowledge-based economy. Specifically, Golnn shall work to support industry, academia and society as a whole to build wealth and welfare from early-stage innovation.

I also would mention Linköping. The university there is small but they work very professionally. And the fact that they have a marketing director at the university management speaks for itself.

What is your vision of innovation system in Sweden in 10–20 years?

That's a rather difficult question. I think the cluster phenomenon is here to stay. Ten years from now they will multiply in numbers and a much bigger portion of the innovation system will be organized in clusters which will include universities and the research centers as an effective means to utilize the research. I also hope that ten years from now a much larger portion of SMEs will be involved in R&D and develop contacts with the research network. The degree of products that have high knowledge content in the Swedish industry will increase and that also requires that universities and the research system cooperate more closely with industry. I think universities in the future will be more profiled: the percentage of universal knowledge universities will go down, they will be more focused instead on several priority fields, and the global competition will force them to prioritize. I think they will target these priorities in line with the needs of business infrastructure in the region where the university is.

So an alliance will be formed between the choice of priorities by a university and the needs of the business infrastructure around it. The funding of the universities has already started to change: what is now introduced is that funding of a university will be to some extent based on its performance. This has not been the case. Traditionally older Universities have had a good funding, while new younger universities enjoyed much less budget funding. We will progressively introduce a system where the government funding is distributed basing on performance so that every university will be keen to perform, to achieve results in accordance with a specific individual strategy set for this particular university. Putting the universities in a much more competitive environment will make the whole innovation system more effective.

Country Without a Functional Innovation System Is Lost



Sven-Thore Holm — Founder of IDEON Science Park, CEO at Technology Transfer Foundation, Lund

Being a founder of IDEON Science Park, could you please tell how it all started?

We started in 1983 in a medieval city of Lund because it is a scientific center of Southern Sweden with a huge university with 45 000 students and 7 000 people involved as teachers and researchers. In a tiny city with only 110 000 people everything is very much about knowledge, innovation, industry, science, new companies, economic development. From the very start we involved major Swedish industries like Alfa Laval, Tetra Pak, Gambro, AstraZeneca.

Around that time, the Skåne region suffered from recession, and a large number of basic industries such as shipbuilding and textiles, were hit by closures. We had the best shipyard in the world – Kockums, but it could not compete with the Koreans, so it was shut down, together with several other enterprises.

At that time I was responsible for environmental control in connection with industry. The government said: “Since you know something about our industry, we would like to see you as a manager of a new thing there. We are going to develop a brand new industry based on science, technology and knowledge in general generated by the Lund University”. The purpose was to take advantage of the expertise that existed at the University and to create new growth companies with local ties, thus increasing the employment level in the region. Inspiration was taken from the USA where similar activities had been successfully operated for some years. The concept was adapted to Swedish conditions and the work on creating the first science park in Scandinavia commenced. The site was chosen adjacent to Lund’s Faculty of Engineering and, starting in September 1983, the first five companies moved into Ideon. It was rapidly growing because there were a lot of people with bright ideas and each year we were adding about 20 new companies. During its first 27 years, more than 800 companies have operated at Ideon Science Park, 76 per cent of them have, over the years, had some kind of close connection with Lund University. The survival rate has been excellent and, in during almost three decades only about thirty companies have had to close down.

Then we started to do this in connection with other universities as well. In 2005 it was all transformed to a national

company “Innovation Bridge” which now has its headquarters in Stockholm. Innovation system is really a part of a brand new infrastructure. It’s more valuable than highways and motorways, and things like that. I usually say that a country without a functional innovation system is lost.

What government agencies are responsible for innovation policy in Sweden?

Within the government it is the Ministry of education and research – they are heavily involved and they set the budget for it. Then we have agencies like VINNOVA and the other one, the Swedish Agency for Economic and Regional Growth — Tillväxtverket which deals with small and medium size companies. We have universities, institutes and, of course, our industry. “Innovation Bridge” is dealing with commercialization.

The problem is to explain to high-level politicians what’s the difference between inventions and innovations. Inventions in most cases are scientific findings with no value. Innovations come when you have it on the market, when you earn some money or somebody is using the results of the research. And suddenly you have a value for society or for business. To turn inventions to innovations — that’s now my business.

How can that be turned into economic growth? We have been dealing with this for two decades, trying to learn what works and what doesn’t work. We have been around the world several times trying to follow what people are doing in other countries. The first step is to acknowledge that a full scale innovation system is a vital part of modern infrastructure. I’ve been to Russia several times. I tried to convince your colleagues which proved not easy. Take the Skolkovo project: you are trying to attract foreign investors, Microsoft and companies like that. While here in Sweden we are turning our own efforts into research and development, so that our own companies could go global.

Nobody in my neighborhood here owns a single Russian product. It doesn’t exist though it could. So, the problem for Russia is that you have no system to turn your own knowledge that is brilliant into globally traded products. Instead of attracting already existing foreign companies you should concentrate on developing your own ones. That must be a political commitment on federal, regional, local levels, and they must play the same game simultaneously, in the same direction with the same goal, and it must be run on a professional basis.

What should be the starting point?

We have created what we call innovation chain here starting with feed stream. You have to have some feed into the system, you have to have some professional coaching, some soft financing, patent licensing, equity – things like that. And feed stream in our country starts with increasing of the entrepreneurial spirit to get more people to think in terms of doing more than they usually do. Creative thinking starts with education. In a traditional schooling system the mind will more or less be spoiled. They tell you “Read this, do that calculation!” The imagination just disappears. We teach creative thinking in fourth grade here to get the mind going. In remote areas we use Internet. Then at the college level we have national and regional competitions for students in

creation of true business plans. I'm a chairman of Swedish Venture Cap system. This is a competition, which starts in September and goes for a year until June next year. Yearly we involve about 1000 teams each consisting of 2 to 5 people. And we are engaging all 40 universities of the country. During the last 10 years we have educated more than 30 000 people and now we see almost 6 000 brand new companies coming out of that. And even if they didn't start a company it was still good for their future whatever they are doing.

And, of course there is a need to establish financial structure for scouting inventions on the university level. You need to know who is doing what and why, whether there is a commercial potential. You have to organize a TTO — Technology Transfer Office. You have to hire people with industrial background. Then we come to physical structure. We have in Sweden a national incubator system. In incubators potential entrepreneurs find professional business and education support to turn paperwork, a business plan into a working company. And this would take from 6 months to 5 years depending on what type of company you are trying to establish. In most cases incubators are located in science parks because when startups leave an incubator they can grow and expand there, hire more people and in few years some of them would even outgrow it and move out.

Then you have to have a financial toolbox to support it all. We have an opportunity of getting grants, but first you need to verify scientific findings: is there a commercial potential, is the technology working, who is going to run it, is there a market? A lot of money so far comes from government. We have soft loans for startups and we have early stage equity where we buy parts of a company. If you are doing this properly you will have a manifold payback, so it's not a cost but an investment.

I see Skolkovo as an investment project. And I would like to see Russian people to invest and to be invested in there. When we were at a Global Forum there was a person from Israel and he just stood up and said: "I would like to thank the former Soviet Union and Russia for one million people that have been expelled because they are the engine of our economy". And they are skilled, well-educated and entrepreneurial people. They could have done this in Russia but where is the mechanism? I know that feed stream in Russia is good, your education is great, people are great, but the coaching needs be improved.

What is the role universities play in innovation process?

Well, there is legislation here, which tells universities that they have three tasks: education, research, and distribution of knowledge. They have to package things for the benefit of the science. I'm hired by a university, and we have a huge project which we call "Experts for hire". So, the university is going to be turned into a major consultant organization of 9 faculties, so that we can sell people from 9 faculties to industry, to the society in general. For the first time we found the way to distribute all the knowledge inside a university on a commercial basis.

What are the latest trends in the Swedish innovation policy?

The latest trend is that the government at this very moment has started a new agenda called "The new innovation strategy of Sweden". It's a matter of collaboration between ministries of education, industry and finance. This will be launched in December this year. The purpose is to further improve the national innovation system even though we are considered to be one of the most innovative countries in the world.

What helps and what hinders the development of the innovation system?

One of the problems which goes around the world is the lack or scarcity of private capital in the early stages because people are afraid to invest too early. It must be a part of a national policy to do that. Our structure of venture capital is that you are investing in 10 projects and within couple of years half of your investment is gone down the sewer together with the projects. You are lucky if two or three will pay their own cost. And you are even luckier if one or two will pay back. In China such things are impossible because Asian mentality does not accept failure. But in venture capital business it's normal that you fail here and there, and return all your losses in one or two cases of success.

How important are science and technology parks?

I would say that such parks are important, and Sweden has about 38 or something innovation parks around the country. I'm talking of the kind of the innovation parks like Ideon involving different companies. They are meeting places to get people together, to create the crossroads where people with different backgrounds meet – lots of people who never knew each other before. They meet, they talk, they start planning together.

What is your forecast for the development of the innovation system in Sweden?

Innovation will be a core political theme. Sweden is not living on oil or metals. The development of this country is based on sophisticated industry and products with a high added value. That must be interesting for Russia which is now trying to turn from an economy based on commodities to the one much more based on R&D, and we are looking forward to future Russian products which we could buy as easily and cheap as Chinese.

What research and technological achievements may assure a breakthrough in the years to come?

I think the major investment is around the European Spallation Source (ESS), which is a major investment in the world. It is the name of a materials research facility for scientific research using the neutron scattering technique. The facility will be built in Lund, starting in 2013 and is expected to open in 2019 and to be fully operational in 2025. Research on materials will be done as part of the scientific front line in energy, telecommunications, manufacturing, transportation, information technology, biotechnology, and health. ESS is a multibillion investment project and it is going to become ten times more powerful than facilities in the US and Japan and it will provide the users with a 100 times better experience than present day neutron sources. From that a lot of new inventions will come, and innovations, and companies and in the end economy. And in connection to that Lund will establish a scientific city like Skolkovo based on these major investments and will let start hundreds and thousands of small companies based on national investments in education and research. Tradition of the city is to stay on a frontline of the knowledge.

“It Is Important That Prime Minister in Person is Involved”



Bengt Molleryd — Executive Secretary, Technology Policy & Research Management, Ingenjörsvetenskapsakademien (IVA) (The Royal Swedish Academy of Engineering Sciences)

Magnus Breidne — Executive Director – Projects, Ingenjörsvetenskapsakademien (IVA) (The Royal Swedish Academy of Engineering Sciences)

What are the current trends in development of the Swedish innovation system?

BM: What is now called an innovation system started to develop in Sweden more than a century ago. Sweden as a country prospered to a large extent thanks to innovations. Inventions in most cases came from abroad while innovation spirals so to say were developed here, and major engineering companies were built on innovations. So the history of Sweden over the last 100–120 years is a history of innovations, although nobody at that time used this word, and the name itself became popular within the last couple of decades.

Certainly the political climate and the economic framework have been very productive for innovation in general terms. We are now discussing how to make it better.

MB: In the last ten years there has been a lot of push from the government: “let’s innovate”. A problem that we came across is that we’ve got a lot of small companies but they are not greedy enough to grow bigger. One of the debated topics is how innovation can uplift them to increase their income, to employ more people. And there comes the most basic question of how you define innovation. I think it’s getting more and more blurry in Sweden what should be meant by innovation. Many people now use ‘innovation’ and ‘invention’ as kind of synonyms. It shouldn’t be done that way. I think those who really understand or believe they understand what it is all about talk less and less about product and more and more about services, etc.

BM: Yes, substance of this feature is more abstract or diffused, multifaceted so to say, it is rather difficult to have proper indicators or statistics on innovation capabilities or outcome in the European Union countries. According to the data they use Sweden is at the top of the list, but still I am a bit skeptical and I believe the ‘measuring’ does not give an adequate picture because it is difficult or diffuse, too often than not it’s a matter of subjectivity.

MB: I think the Swedish problem and why it becomes ever more urgent is something that is called “the Swedish paradox”: we pump a lot of money into the system in terms of percentage of the GDP, and very little came out of it during the last twenty years or something. There are very few new big companies and this is the paradox which makes the government worry. We have scores of publications in scientific journals and papers but no products. The R&D should be more applied. I think it’s true in Russia too: scientists are overwhelmed with science, they feel rewarded if they publish a lot and they are referred to a lot, and not if they create new companies. Or if they help achieve some technological advances but that is not yet innovation. Originally there was a belief in Sweden that what is needed was to push scientists to create new companies to deliver their ideas to the market. Then the understanding came that it was a rather simplistic perception and the relationship between creation of new knowledge or new technology and the market is more complex and you need specific media for that rather than merely expanding your laboratory to commercialize your great ideas.

What makes Swedish innovation system distinct compared to other countries?

BM: I would say Sweden is kind of engineering society with a strong creative element inherent in national culture.

MB: There is close collaboration in the triangle between industry, research and the government agencies. One of the parts of it is VINNOVA, a government agency with a

Russia can effectively study the challenges it is facing in its own infrastructure sectors such as the energy sector, and work towards finding a solution to meet them. The Russian Government could thereafter draft the policies for its own national innovation system

specific aim to support the development of the innovation system. Also we have funding agencies. And those bodies help to tie businesses and universities together, showing the entrepreneurs what is going on in research labs and what might be of commercial interest for them, and vice versa helping industrialists to set practical tasks before the researchers. I think we’re kind of breeding and promoting that idea.

BM: Maybe the driving forces are not in balance, but interaction between the three makes sort of philosophy we are going to pursue.

output is really difficult to measure. Consequently we are not sure that we are that good. Of course we have Skype and several other good new things. Skype is not extremely high-tech, it's a smart idea. And much of innovations are in fact simple things meeting the needs of customers.

In this system what is the role of your Academy?

BM: Being a promoter of innovation, of the use of technology has always been a basic role of the Academy.

MB: About a year ago IVA started a big project called 'Innovation for growth'. It deals with things that could have been done but haven't been done in the Swedish society in the field of innovation. Normally IVA is a think-tank. In this project it acts more like a lobby organization. This project is about innovation in a very general sense. What to do to ensure that the

Do you feel taxes should be somehow adjusted to serve the needs of the innovation process?

MB: It's a good question because there is always a lot of party politics in it. In general I believe there is a consensus that the lower the taxes on the companies the easier it is to start new ones. We have been discussing for years an 'expert tax' the idea of which is that we as a small country need to attract knowledgeable people in various specific fields. Living abroad they are accustomed to pay much lower taxes compared to 50 per cent they are going to lose after coming to Sweden. Of course it does not encourage people to come. I don't want to overdramatize but there is indeed a big issue whether we should allow foreigners coming to stay in Sweden for long (and the length of stay is a point for further discussion) to have lower taxes. And this is also

We as a small country need to attract knowledgeable people in various specific fields. Living abroad they are accustomed to pay much lower taxes compared to 50 percent they are going to lose after coming to Sweden. Of course it does not encourage people to come

system has all the players and these players easily meet, that's what it all is about.

BM: The academy encompasses all the vital stakeholders so to say in innovation, so we are working on a rather high level in that sense. Actually we are not innovating things, we are not a research laboratory or an institute, we do not produce but we are helping the system to develop and to change, helping people involved to align with each other. We reach the key figures from all quarters of the society and in that sense we have a rather good impact.

MB: We provide sort of neutral arena for key players including ministers, industrialists and others to come and to discuss...

BM: And doing that we get quite an eager and positive response from all kinds of stakeholders: from the government, from industry, from research institutions and scientific community.

part of what we are working on now: get more knowledge; make it easier to bring knowledge to Sweden. Scores of medical doctors and other medics coming here are cleaning floors because they are not allowed into the professional labor markets, because first you have to learn the language, then you have to pass all the medical exams in Swedish. And there are many similar and other hurdles.

BM: Another side of the coin is taxing the company owners, but I think Sweden has moved already from a very prohibitive model of the past which pushed many inventive and entrepreneurial people to go to Netherlands, or to the UK, or to Switzerland instead.

How did the innovation landscape change within the last decade or two and what are the major trends in the innovation process nowadays?

BM: Globalization although not quite a new phenomenon obviously is

INNONEWS

Partners in Modernization: New Opportunities for Doing Business in Russia

Partners in Modernization: New Opportunities for Doing Business in Russia Conference will take place September 23, 2011 in St. Petersburg. This major Forum, organized by the Association of European Businesses in partnership with East-West Digital News, aims to provide a professional platform for discussion of the challenges of modernization in Russia. It offers networking opportunities with top-level executives from the biggest Russian and European companies.

Representatives of top Russian and European companies and institutions will share their experience and discuss the perspectives of the Russian market. Special roundtables will be dedicated to Pharmaceuticals, HR, Manufacturing, Customs, and other industries.

www.aebrus.ru

Moscow Eyes Energy House Innovation Energy Park

Innovations in Electrical Energy, a Moscow-based not-for-profit partnership working to support the interests of Russia's 30 largest energy sector players, has announced plans to create in the Russian capital the Energy House innovation energy park. The prospective energy park will reportedly bring together intellectual and technology resources for developing and commercializing innovation in the electrical energy sector as well as present cutting-edge R&D projects in the sector.

Energy House should be set up as a private-public partnership (PPP). The project will require an estimated 207 million US dollars in investment, of which most would cover construction. The construction phase will take 40 months.

The future energy park will help link science and practice through venture business that turns ideas into technology. The partnership is in talks with potential partners; Russian Venture Company and a number of energy firms have reportedly shown interest in the project.

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the major trend affecting all spheres of activities, innovation included. In the past all the headquarters of our big companies were located in Sweden and so were the enterprises' manufacturing. Today however we live in more internationalized world where national roles are not so clearly codified and we have to compete more rigidly than in the past to attract talented people, investments and technologies. That's one major change, most visible and profound perhaps. A deregulation in government politics should be mentioned too.

MB: In the past some public owned companies specifically in the field of telecommunication or in energy sector proved to be rather innovative or at least technically advanced. The characteristic trend was a close collaboration between the government and several big companies in which their research and production

advances the success so far has been limited and there is much more to be done in that area. I think there should be a balance between the research based innovation in universities and institutions and other more market oriented mechanisms and structures. Both streams are important.

What helps and what hinders Swedish innovation?

MB: There is a special role for the government to play. We are one of the organisations that are pushing the government to have an agenda, a strategy for innovation. We think it is important that prime minister in person is involved, that he feels that he owns that agenda. In Finland they have a special council for innovation with all central stakeholders present, and the chairperson of that council is the prime minister. Many people here recommend a Finnish model. It does

people to be creative, stimulate them with higher pay or other bonuses.

BM: And of course innovation is a risk-taking enterprise, one shouldn't forget that. There should be ways and mechanisms to accommodate and to absorb risk, people must feel they are secure and safe to take risks. And the system, the society must grow openness to new solutions and new opportunities, not let itself be monopolized.

Speaking about risks and inherent failures are there areas where from your viewpoint Sweden has failed despite efforts and money invested?

MB: May be I'm biased because I came here right after a discussion about Swedish biotech industry and it is obvious that one or two of major and very good pharmaceutical companies have been turned down, and now it is realized that was a huge mistake.

BM: Of course in that particular case a lot of accumulated knowledge and competence have successively been utilized, but some ten or fifteen years have been lost.

MB: Another sector we can speak about failure is automotive industry, but one should be realistic: we are too small to afford luxury to have two automotive companies and expect them to withstand the pressure from the world market.

And of course innovation is a risk-taking enterprise, one shouldn't forget that. There should be ways and mechanisms to accommodate and to absorb risk, people must feel they are secure and safe to take risks

have been supported by massive government orders and procurement. Such were the cases with Ericsson in telecommunication, ABB in electric power or SAAB in aeronautics. Then it was more or less restrained, if not prohibited after Sweden joined the EU and WTO. Now it is coming back but in a different form. If we turn to most interesting features of today I would mention so called innovation procurement. That means promoting innovative companies from the position of a smart customer. And if you are a big customer like the government you can do a lot. Look at the healthcare: public authorities and agencies are huge customers there. On the practical side turning more towards services rather than manufacturing can be stressed. And the government increases funding of research.

BM: And perhaps it is also worth mentioning that there are big expectations that universities and technological institutes deliver more innovations. However despite some

not seem that it would happen here or happen exactly in the same form, but that is one thing that we discuss and that we believe must improve in our innovation system.

Also there is lot of discussion about financing: whether the funding must be more specialized, more narrowly channeled, or since you cannot know exactly what innovation would show up – always a risk affair, you need to invest in it rather broadly, as it is being done now.

BM: General attitude towards innovation, and other investment into the future, is also a very important factor and you need to get people interested to innovate, to keep and to increase an interest and willingness to innovation in the society.

MB: And another key word often to be heard at the discussions is 'leadership'. It is not only about government and a prime minister, but also business leaders must promote innovation in their companies, maintain an atmosphere encouraging

And to the contrary what were the areas where the progress was most impressive?

MB: It depends on what timeframe you choose. In telecommunication Ericsson has been very good and there have been many startups around it. But then there are in a superficial perspective simple service industries like IKEA: it was an extremely good idea to invite a customer to do everything to his liking providing him with everything in a flat box.

BM: On a grassroots' level you may find fantastic examples – in the biotech and nanotechnology.

MB: Still I would repeat it is very difficult to predict winners, so I think we must keep an open mind that it is hard to ask you and your company to be inventive, and even if you invest heavily you cannot be sure it would pop up exactly there – it may pop up somewhere else. You must always have more than one focus area.

“President Medvedev Understands the Importance of Rules”



Henry Rowen — Senior Fellow emeritus, Shorenstein Asia-Pacific Research Center, Freeman Spogli Institute for International Studies, Stanford University; former Assistant Secretary of Defense for International Security Affairs, US Department of Defense; former President, RAND Corporation (1967–1972)

In the years 1967–1972 you were the President of the RAND Corporation. Could you please tell about this experience and about the role of RAND in regard of the US innovation system?

The RAND experience was important to me. When I was quite young I was a researcher at RAND Corporation. Then later on I became President of RAND. It all was before coming to Stanford.

RAND is a very important organization. It was founded as a project at Douglas Aircraft Company in Santa Monica, California, to look at future technologies after the WWII. And in 1948 it was moved from Douglas Aircraft Company and became a non-profit organization with the help of the grant from the Ford Foundation. Being a non-profit organization it does no commercial work. It does a lot of work supported by the government or private foundations. The research there is very broad. They do a lot of work on nuclear technology, weapons technology, aviation, but also in the social sciences — it did a lot of work on international affairs, and on game theory, which was a new field. So it works in many different fields.

Being the President of RAND, how did you measure the effectiveness of the organization?

You often can't tell. But the standard academic answer would be publications in leading journals. This how it works around here.

What about companies that were built around the ideas created in RAND?

That's one measure. But let's not confuse it. In academic world what matters are publications and prizes, such as Nobel Prize (there are quite a few Nobel laureates in RAND) or National Medal of Science. But RAND is a different matter. Some of its work was secret, some of it was not. We were less interested in publications and more interested in the quality of the ideas essentially judged by peer groups around the country or beyond.

One of the ideas that was invented in RAND, which is very important idea, was packet switching in telephones. It used to be that you had to have telephone system, a couple of wires from point A to point B. RAND came up with an idea to take the message at point A and break it up into little pieces, and within a fraction of a second all these pieces will be assembled at point B in a right order. It was a marvelous idea, and somebody in RAND had it.

What are the specifics of the innovation system in the US?

I'll say a couple of things. Our universities play a larger role in innovation system. Industry is always important in overall scheme of innovation, but leaving industry aside, we have much more on universities than most other countries do. That's one difference.

The other difference is connected to the ease with which one can form companies. It is really easy to form companies, in Silicon Valley in particular, but elsewhere as well. If you have a reasonable idea, the chances to get funding are pretty good.

How long does it takes to start a company?

The legal procedure is very short. In California you do that in a week. The more difficult part is finding the money. But this is an issue basically anywhere else. And most of these new companies fail.

What is the role played by the government?

There are 3 roles the government plays. One is that it sets the rules. When President Medvedev was here last year he talked about this new high tech zone being created in Moscow — Skolkovo. And he said there would be special rules in that zone that make it easier for companies to move forward. President Medvedev understands the importance of rules. So the government sets the rules. It's very important. And the rules are favorable to creating companies, to the private sector.

Second one is that the government finances most of the basic research that is done, research with no obvious applications. The third category which now isn't so important but a long time ago was quite important — that's the Defense Department — creating products for military use that also have civilian uses. For instance, jet engines — they are military, but it turns out also that it has civilian purposes. That's a really good example. The Internet was an interesting example. It was funded by DARPA not because at the beginning everybody foresaw the Internet but because they saw this as way of advancing computer technology and they thought military could use better computers. But then the National Science Foundation picked that up, and it ended up

in Internet. Those are three national government roles. Local governments, such as State of California government, play basically no role.

Speaking about the first role you've mentioned, could you please specify some important laws that regulate the innovation process?

There is a large category of organizations “not for profit”, the tax code 501C3. It could be a research organization; it could be something to help the poor etc. And universities also are not for profits, and they don't pay taxes. They have to serve a public purpose. And they do — they educate, they do research.

In terms of the money from the government — I mentioned basic research, but there is another, more applied research that is supported. There is a particular category of work that needs to be done but not a specific product. Take vaccines against communicable diseases. Maybe the drug companies won't do enough research on that. Maybe they don't see that is profitable. It can be not very profitable in most cases. The government — the National Institute of Health — would set a program, saying: “We need better vaccines for some disease”. And then the government may have a program, which would support the university or maybe drug company to develop these categories of vaccines. That's more targeted research. Or right now there is a lot of interest in low carbon fuels because of the global green house problem. There is a lot of support being given to low carbon fuels.

If there is a new idea that a group of people from a university would like to work on and they need money to develop it, where would they go?

Say, if there is a group of people here, and they think they have a good idea but it needs research, it's not ready for the market, they might try to get some money from the National Science Foundation. It depends on the field of study. If it's in biology and medicine area — they go to National Institute of Health, or they might go to a private foundations, or they may try to get some money out a university, or maybe a company but it's less likely.

What is the procedure?

There are specific procedures at government agencies such as the National Science Foundation or the National Institute of Health. It has a lot of these requests. They have panels of experts that review applications and rate them. Then they fund the best. This is done anonymously. People who submit the application don't know who the evaluators will be. No names.

People from the National Science Foundation, are they scientists or bureaucrats?

They are scientists.

Who and how assesses their work?

That's a good question. There is a small unit that is attached to the Office of President, which is an Office of science and technology; there is an outside kind of an advisory board to

each of these agencies — National Science Foundation and others — they would look at it; and there are committees of Congress. The money has to come from the Congress. The committee of Congress has oversight for the National Science Foundation. They will pay attention. If they see something wrong, they will certainly erase it. So there are several mechanisms of checking on what they are doing.

The budget for basic research grew. Do you think that's good or the government should instead spend more on applied research?

In general, I believe it should concentrate on basic research because that's where the need is the greatest because industry won't support it. And the more applied it gets the less useful is the role of the government.

There is a large category of organizations “not for profit”, the tax code 501C3. It could be a research organization; it could be something to help the poor etc. And universities also are not for profits, and they don't pay taxes. They have to serve a public purpose. And they do — they educate, they do research

What helps and what hinders the development of the innovation system in the US?

One of the things that hinders is uncertainty about future financing. The Congress appropriates money each year. But big projects take years. Of course, the government may have a plan to fund it but it doesn't worth much because the congress decides year by year. That's a big problem.

But this is how the government works. Are there any alternatives?

I think other governments are better. Most governments have longer-term decisions.

What helps?

The legal rules are helpful. We've developed some good institutions; the university system is quite good. Something else is very good — we get smart people from all over the world. You walk around Stanford campus and you look at the ethnic mix there. You'll see people from all over the world. You might have noticed — there are a lot of Asians, a lot of Chinese, a lot of Indians, some Europeans, which you can't tell. But they are from all over the world. That's needed for a research establishment. We wouldn't be able to function if we didn't have this degree of openness to people from elsewhere in the world. It's impossible.

How does the law regulate the immigration?

Immigration laws right now are in a bad shape. In the past and to some extent still today — we are able to attract people from all over the world. They come here for schooling, and many of them stay for a while. They may go home afterwards (many people are going back to China and India — I mention these two places because they are so important here), but they stay for a while to work. I have a suggestion for you. If you are really interested in this, take a list of the largest

companies in Silicon Valley, and look at the names of the top leaders — these people came from all over the world.

In what areas the results of innovation were the most impressive?

Around here people would say information technology. But if you take a broader perspective, I think, that would be in aviation, in biology, in medicine. Maybe that's a wrong order — biology and medicine, obviously, are more important.

Why the progress happened in these areas?

Part of it was a progress in science. Advances are being made, take biology — these are big advances. A lot of them occurred here. But then they led to all kind of things happening — companies have been formed and so on. The IT story has to do with an invention in Bell Labs 1947 — the transistor was invented there. That's the basis for all communications. Basic advances accrued and then the whole industry is created.

To your mind, how important are innovation parks?

They are quite unimportant. They don't do anything. You should regard it as a market phenomenon, something that the market creates, bottom-up. In a sense Silicon Valley is an innovation park, but nobody created it. I mean nobody decided to create this place. If some politician or a bureaucrat puts a finger on the map and says: "Lets create a park here" — nothing interesting happens, at least here. I wonder about Skolkovo...

In cases where there is no innovation infrastructure, these parks might be helpful in facilitating the flow of people and ideas between research community, private companies, and government agencies responsible for innovation policy. If not these parks, who will facilitate the innovation process?

The market.

But what if the market is not mature enough?

When the government gets involved into "picky places", you can be pretty confident that it will get it wrong, in American context at least. There have been attempts to do this. There was a call for creating a biotechnology parks

25–30 years ago. Each of them has failed.

Why?

Because it won't work if somebody says: "Lets create a park in this town, and give people a tax break and so on". That is not important. The other things are much more important.

What things?

Are there really good people? Is this a creative town? Is there someone with a bright idea? So, first of all, it's good people. And we have them here, and they are associated with the university. If you have a good university, by definition, you have good people there.

But you have really good universities that don't have parks, or, I would say, clusters. Take a really good place like University of Chicago. This is an excellent university. But Chicago doesn't have much high tech industry. Why is that? For some reason able people just never wanted to create companies and locate them there. But Boston is very good. Bay Area, Austin in Texas, San Diego in California — they are very good.

Actually there is a partial exception to what I've just said. The Research Triangle in North Carolina — Duke University, University of North Carolina. Many years ago the government of North Carolina decided it had these good institutions and it would provide some benefits for companies who locate there. It's been a moderate success. That is a partial exception of what I've said.

But in the other places people have tried and it didn't work. Sometimes even in good universities it won't work. It's tricky. There should be something that attracts smart people, which then attract next smart people, and they all are to be focused on creating companies. That is very strong around here.

But it's a part of the scene. There is also something that other countries don't have so much — it's venture capital. This is a world center of venture capital. Again, this is not invented. If you go back 50 or 70 years ago, you would see that venture capital wasn't very important around. But it developed here. That's a key element of innovation system — venture capital.

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The Startup Sauna in Moscow

AALTO Venture Garage and HSE{Inc} proudly present The Startup Sauna in Moscow. The Startup Sauna starts as a series of one-day-coaching-events held in different cities in the Baltics, Russia and the Nordics region, called Startup Sauna Warmups. It's targeted for early stage startups that want to get mentoring from the best serial entrepreneurs and investors from the region.

Based on the applications we will invite 10–15 teams to take part in each Warmup event. The best teams found in each Warmup event will be selected to the Startup Sauna program. Applications for Warmups will also be part of the open call process from where we will select couple more teams to take part.

www.rusnano.com

Yandex Rolls Out New Search Platform

Yandex launches a new search platform Reykjavík. The new version delivers search results based on the user's language preferences. It displays more links to English-language websites among search results for those users who often look for web resources in English, and, conversely, those who do not need search results in English, won't see them. This is the company's first step toward personalized search.

Reykjavík responds only to search queries in English. It filters out transliterated searches in Russian, web addresses, keyboard layout errors etc. Reykjavík also accounts for searches like [beatles] or [rothko] which might not necessarily require results in English. The new search platform delivers results based on how often the user follows links to English-language websites.

Ranking its search results, Reykjavík uses the information about the user's demand for websites in English. Those who do need them will see links to these websites among top search results. According to the Yandex's new stats, about 8 percent users of Yandex prefer search results in English.

www.maps.yandex.ru

The Innovation Road Map: 15 Steps to Success



Richard Bendis — President and CEO of Innovation America

Mr. Bendis, you were one of the invited speakers to V International Forum «From science to business» that was held in St. Petersburg on May 11–13. Tell us about the Forum and your participation in it.

National Research University of Information Technologies, Mechanics and Optics in St. Petersburg organized V International Forum “From Science to Business”. They invited several speakers from Russia and abroad including Oleg Alekseev (Skolkovo), Oleg Strelkov (Rospatent), Ivan Bortnik (Foundation for Support of the Small Business Enterprises in the Science-Technical Area), Thomas Beacon and Torsten Clive (Muenster University of Applied Sciences, Germany), and many others. I was invited as well as a representative of the organization that I founded — Innovation America. Also we had some people from other regions around Russia that were interested in learning about developing innovation ecosystem. I did a workshop for a full day on how to build an innovation ecosystem and develop an innovation roadmap.

There seems to be a lot of communication and collaboration going on right now in the sphere of innovation and commercialization...

Yes, there is also an interesting project between an organization in the US — American Councils — and Russian universities called EURECA. They are matching up Russian universities with US universities around technology research and commercialization.

How does Innovation America contribute to the innovation process?

Our organization is privately funded. Its goal is to advance the innovation economy of the American and global innovation environment. Innovation America has 5 full missions. The main one is an advocacy mission. That is to help advocate with the Obama administration as well as the US states' leaders on how to be more engaged in entrepreneurship and innovation. So, basically, Innovation America is a public advocate that encourages both the public and the private sector to be more innovation engaged and aware.

Beyond that I am the editor of a Newsletter called Innovation Daily. There are 25 new articles every day from

around the world about innovation, entrepreneurship, venture capital and innovation based economic development. The Newsletter is designed for practitioners around actual practice, implementation strategy and best practices rather than just theory.

Also, I am a global speaker on these topics (the texts of speeches I gave can be found on the innovationamerica.us website, as well as the Power point presentations; plus there are over 11 thousand articles in the database now, so it is a great source of information and best of all — it's free).

In addition to that Innovation America has a consulting team that helps cities, regions and countries develop their innovation strategies. And Innovation America has created a 15-step proprietary innovation roadmap process, which is the following:

1. Innovation roadmap process
 2. Literature Review of Comparables
 3. Key Stakeholder Interviews/Recommendations
 4. Asset Mapping/Cluster Analysis
 5. GIS Innovation Mapping
 6. Innovation Benchmarking/Index (Peer 2 Peer)
 7. Innovations and Entrepreneurship Resource Identification (Entrepreneur Resource Guide and Database)
 8. Innovation Economic Development Organizational Analysis and Matrix
 9. Innovation & Commercialization Gap Analysis (programs & services)
 10. Innovation Ecosystem Public Policy Recommendations
 11. Develop Strategic Plan
 12. Organizational Leadership and Staffing
 13. Operations/Implementation Plan and Program Portfolio
 14. Branding/Marketing Strategy and Market Research
 15. Economic Impact Analysis
- Celebrate Success

You work all over the world and you can compare. What countries or regions are most interested in innovations?

Western Europe of course (there are a number of countries within Western Europe, but especially Scandinavia), Canada, United States, South Korea, Singapore, India, China. And there are about 18 countries that have developed what they call innovation strategic plans and those are the ones that, probably, most dedicated to innovation.

What are the key actors of the innovation system in the US?

The key actors would be government at the federal, state and local level, academia, industry, foundations and non-governmental organizations.

When you look at government, you have all of the National Research Laboratories, which the federal government funds. Then there are also a number of private research facilities. These are focused on both basic and applied research, with an increasing emphasis on translational research.

The federal government also tries to stimulate innovation through a series of cluster programs that are supported by a bureau within the US Department of Commerce called Economic Development Administration (EDA), Small Business Administration (SBA), and the National Science Foundation. These agencies all have innovation as a part of their mission.

Another way that the federal government supports

is with a program that has been around almost 30 years called Small Business Innovation Research program (SBIR). It is an annual 2.5 billion dollar program, which supports innovative SME's in America. That's the government level.

The university role is to do basic and applied research, and create new innovative ideas that can move from proof of the concept into the commercial market place. But in order to do that, they need to interact with the private sector and industry. Universities traditionally do not do commercialization well around the world. They do much better when you match their research capabilities with people from the private sector — entrepreneurs and experienced business people.

Industry or the private sector has a major role because most of the major innovation that gets commercialized in the US comes from private business, whether that would be large business, or SME's, or entrepreneurs. Their role in innovation is primarily to get products into the market place to be commercialized rapidly and find a way to make them profitable, so that they can reinvest in addition in new innovation.

Another key actor that is emerging to play a greater role right now is what I classify the non-profit charitable foundations. Charitable foundations are starting to make investments in innovation and the innovation based economies within the

Dole act. The Bayh-Dole act gave the rights to universities to own the intellectual property, which was develop utilizing federal grants or research money that was given to them by the federal government. That enabled the universities to take the leadership in commercializing technologies, and also incentivized the faculty members to be more entrepreneurial.

Russia created its program a couple of years ago, and they are just in the implementation phase to try to create similar incentives for the Russian scientists and researchers in the universities.

I would say the Bayh-Dole act was one of the most important pieces of legislation that the US passed to stimulate innovation in the universities. Another one would be the Small Business Innovation Research Program (SBIR).

Before the Bayh-Dole act, who would own the IP rights?

The government would control the IP for the things that they funded. Basically that was transferred to the universities.

What are the latest trends in the innovation policy in the US?

The Obama administration focuses a lot on Regional Innovation Clusters (RICs). Competitions have been conducted for regions to compete for federal grants to help grow clusters around specific industries or technologies within their regions. That has been a new trend under the Obama administration. And the Department of Energy, the Department of Commerce, the Economic Development Administration (EDA) and other federal agencies have all participated in these trends. The Obama administration is also trying to increase the research budgets of the research based federal agencies. Of course, there are significant budget challenges within the US at this time but the Obama administration is supportive and understands the importance of the research, entrepreneurship and innovation economy.

Federal Law 217 was modeled after the Bayh-Dole act. The Bayh-Dole act gave the rights to universities to own the intellectual property, which was develop utilizing federal grants or research money that was given to them by the federal government. That enabled the universities to take the leadership in commercializing technologies, and also incentivized the faculty members to be more entrepreneurial

regions where they exist. Also, their missions for existence might be related to trying to come up with innovative solutions and cures to potential medical problems or diseases, or to try to stimulate their regional economy by creating jobs within certain US regions.

Another key actor would be the financial or the investment community. And that would be all the way from individual private angel investors to venture capitalists and the public sector at the state or national level. A lot of the states in the US have direct investment programs to support innovative SME's.

So you can see, it takes all these actors, which we talked about — government, industry, academia, foundations and the investment community — working together to create a real robust innovation ecosystem.

On the governmental side, what were the most important legislations that influenced innovation policy and promoted innovations?

Probably, one of the most important laws was the 1980 Bayh-Dole act, which is similar to rule 217 that was passed in Russia in 2009. Federal Law 217 was modeled after the Bayh-

Are there any figures as of how much the government spends on research and development per year?

There is a National association called the American Association for the Advancement of Science (AAAS) which tracks all dollars the US government spends by federal agency every year, and it has been tracking it for years. As a matter of fact I just spoke at their annual conference about a month ago. If you go to their website you will see a break down of the federal expenditures for research and development over the years by the US government.

What helps and what hinders the development of the innovation system in the US?

Let's talk about what hinders innovation. First of all, it is culture. The federal laboratories that do research tend to focus more on basic research and mission specific research for their agencies, and have not been as successful in developing innovative commercialization research or transferring technology.

The universities that do innovation and research also have not experienced as much success as they could in technology transfer and commercialization. And that's due to the different

types of incentives and leadership priorities that are established within their individual universities because university research priorities vary from institution to institution. Some of them are very proactive in innovation and others are not.

Another thing that is a challenge right now is early stage investment capital. There is not as much money to invest in early stage ventures today as there used to be, and venture capitalists tend to be investing in more mature companies or later stage companies rather than in early stage companies. We have a much wider and deeper "Valley of Death" in the early stage investment world today.

The other thing that hinders is really the short-term investment mentality and philosophy. Big business is focused on short-term returns because

the Silicon Valley or Boston. There are many regions in the US that are very innovative but unfortunately most people around the world only focus on the things that they know the best, which are Route 128 in Boston, Silicon Valley, and Research Triangle, and, maybe, Austin, Texas. But a lot of the regions in the US are very innovative. And they have to be more innovative because they don't have access to all the venture capital, or they don't have Stanford, MIT, or Harvard in their backyard. That means they have to be more creative and they have to leverage resources more effectively.

What are these places?

There are many of different places in the US: the State of Utah is very innovative right now, with many spin-offs that are being created out of the

Now, the positive to that is that big businesses are actually acquiring or doing joint ventures with smaller businesses, which creates an opportunity for SMEs to interact with big business. Big businesses are looking at the SMEs to potentially do a lot of the research and development; they want to do it outside their large companies rather than inside. That is a positive development for SMEs in innovation in the US

they have to look at quarter-to-quarter profits, which means that they don't focus as much on long-term research as they did in the past.

Now, the positive to that is that big businesses are actually acquiring or doing joint ventures with smaller businesses, which creates an opportunity for SMEs to interact with big business. Big businesses are looking at the SMEs to potentially do a lot of the research and development; they want to do it outside their large companies rather than inside. That is a positive development for SMEs in innovation in the US.

I think one of the biggest aspects of positive elements is that a lot of the innovation is stimulated at the regional level and the state level. Most of the innovation is occurring regionally in the cities or major regional areas across America, and it's not just in

universities; Cleveland, which is north-eastern Ohio, has been very innovative in bio-science and clean technology area; the State of Pennsylvania has been very innovative for almost 25 years now because they created an Innovation Based Economic Development program called Ben Franklin Program; the State of Kansas has the Kansas Bio-Science Authority, which is only 6 years old but it has been very effective as an innovator in their region; Georgia has a program called Georgia Research Alliance which has been one of the leading States for eminent scientist recruitment, etc.

In closing, I believe Russia has an excellent opportunity to accelerate its own innovation strategy and global position, if it develops its own innovation roadmap that leverages its greatest assets and resources.

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VII Central and Eastern European Software Engineering Conference

VII Central and Eastern European Software Engineering Conference will take place October 31 — November 3, 2011 in Moscow. CEE-SECR brings together researchers from computer science, IT and software engineering academia and practitioners from industry and government. Up to 1000 participants from over 20 countries are expected to attend the event in 2011 presenting and discussing innovations, trends, results, experiences and concerns in the field of software engineering.

www.rusnano.com

Qivi in Talks with Major Western Mobile Operators for Creation of New, Offline Payment System

Leading Russian payment operator Qivi is in talks with Western European mobile operators, including Orange, Vodafone and Telefonica, about launching a new, offline payment system for mobile phone bills in Europe. The Russian operator is also considering entering the US market.

Since 2004, Qivi has developed a network of offline electronic payment terminals that are now widely available throughout Russia. Russians have grown accustomed to paying for virtually everything through these terminals, from mobile phone bills, orders at e-commerce sites, utilities, taxes, and fines.

Qivi already operates in a number of countries outside Russia, from former Soviet republics and China to the Democratic Republic of Congo. Last January, Japanese holding company Mitsui & Co. bought a 15 percent share in the company, announcing a "potential opportunity" for the company's development in new countries.

Over the last few years, Qivi has also grown online through its electronic wallets. As a result, it has trended towards becoming a universal payment system allowing its users to transfer money to or from their accounts at banks, mobile operators, and virtual currencies.

www.ewdn.com

Generation X — the US Secret Weapon



Tamara Carleton — President and Founder of the Innovation Leadership Board LLC; Fellow of the Bay Area Science and Innovation Consortium

What are the specifics of the US innovation system?

It's a very broad question, and the answer depends on whom you ask about the innovation nation. There are several factors that affect a country's success and ability to innovate on a regular basis. At the top, we have talent to innovate: you need to have right people, and a critical factor is that the US is very open to having people come from outside the country, and having highly skilled and educated immigrants plays an important role. You need to have people with a certain hunger for creating new ideas who are eager to bring those ideas to life. That was certainly one of the reasons why Silicon Valley has been able to thrive, and, in fact, Silicon Valley is over 50 years in the making. The entire region has really evolved and undergone several transformations from early agricultural roots to now Internet solutions, social media, new working tools, and all of that. Therefore, people — that's the first important element.

Second is having an opportunity to be able to create. I travel often to different countries, and sometimes there is a different view of risk. Risk is one side of a coin with opportunity on the other side. You need to realize that for every risk, there is an ample opportunity, and people have to be willing and open to find opportunities and having optimism to pursue these opportunities. One really needs to have an open mind and a positive attitude. You have to be able to envision a better world in order to actually have that world come true, because in the end we are all responsible for building the future that we want to live in.

And the third factor, which is important, is the resources. What I mean by resources is being able to have access to raw materials, to the elements that you need to innovate. For some regions within the US, there may be more emphasis on basic research, fundamental discoveries; therefore you need to have lab facilities to support that. For other regions, it may be access to venture capital funding to accelerate product development. That's the case in Silicon Valley where you have different groups, which take advantage of being close to venture capitals here on Sandhill Road, and entrepreneurs

use venture money to help accelerate their companies' growth. In many ways, Silicon Valley is a commercialization incubator. The focus here is on getting new ideas faster to the market than other regions, both in the US and abroad.

The fourth factor is the culture. And that's a hard one to pin down, in many ways it goes hand in hand with opportunities, the type of people who can find and see new possibility. In Silicon Valley, there is a belief that everybody can be an entrepreneur; that everybody deserves to have a chance to create one's own business, that anybody can do that from any background — women, minorities, etc. Here at Stanford University, we encourage students to start their own businesses, which further contributes to a rich environment that allows all of this happen. Education is important, but you find from many entrepreneurs and people who are innovating that they are often self-trained and they believe in learning but that doesn't necessarily have to be formal education, it's just opportunities that allow them to find and create these new ideas. The right innovation culture is based on a powerful mix of formal and informal elements that creates its own ecosystem.

Is government policy also an instrument to influence innovation process?

Yes, although it doesn't create innovation, government policy can help foster the conditions that enable innovation. In particular, government plays a critical role in several areas by setting policies that provide the right infrastructure, allowing immigrants to work and collaborate with citizens in the country, and encouraging the flow of new ideas and people who feel that they have freedom to create. But you cannot force innovation: many regions around the world have tried to replicate the Silicon Valley formula and they found it didn't work for them, or they mimic the motions for what should be the obvious factors, and after a few years, they find they don't have the same output.

What else apart of things that you've mentioned earlier such as education and culture drive innovation?

Each region has its own temperament when it comes to innovation. That is what people consider the magic of Silicon Valley: many people come to this area and enjoy the sunshine, the cafes, and the relaxed energy — all those elements are considered vital and intangible parts of the Valley culture. This magic is hard to explain to outsiders and often required to experience personally. Many visitors tell me that they can't leave Silicon Valley after they've been here for a very short time. And many find a way to return, so that they can re-experience that magical feeling. In contrast, Boston has a different type of culture that allows innovation to occur within its own environment. Seattle and Northern Virginia also have their own feel.

How does legislation regulate the innovation process? What laws facilitate it, are there tax breaks for companies that do R&D, etc.?

The term "innovation" covers everything; in fact, it is used interchangeably for both process and output. Ultimately to bring about innovation, multiple types of organizations have to work together from creation to development of a new

idea, to its commercialization and transfer of technologies. Government plays a role at all those levels. Ideally, in the beginning, legislation should allow the right groups to come together to create, and often there is a fair amount of forming and reforming. I mentioned immigration earlier, and government policies for educated and skilled foreigners are very important. AnnaLee Saxenian, a dean at UC Berkeley, has written a book called “The New Argonauts”. She has gathered ample evidence about the importance of foreign talent: they are critical to start and to develop innovation, particularly in the history of Silicon Valley.

What are the major participants in the innovation process and what are their roles?

Has anybody mentioned the concept of Triple Helix to you? It's a simple academic model that describes three institutional spheres that work together in innovation: industry, academia, and government. The belief is that you need all three to collaborate together for effective progress in innovation. There is also recent dialogue underway among scholars that it is actually not a Triple Helix, but more of a Quadruple or Complex Helix. For one reason, the consumer or the citizen plays an important role in providing feedback, interacting and influencing the directions of new technologies. Particularly we see that in the space of social media.

Ultimately when you search for the heartbeat of innovation, it comes down to the entrepreneurs who have the abilities to establish new businesses, and these entrepreneurs find the right people to support what they want to do: such as the investors to fund them, not necessarily venture capitalists, but any willing funding source. The government could be one of these friendly funding sources. Entrepreneurs also need markets to sell their new ideas into, and this is again where government policies can influence. If entrepreneurs can sell easily outside their area, and they are not forced or required to sell always to domestic market, they can look outside for other customers and generate new growth and wealth for their home country. All of these different avenues really enable entrepreneurs to succeed, and then everyone else can play a supporting role to make sure that new ideas come together or that basic science breakthroughs can be transformed into new engineering applications, and so on. It's a broader system view of innovation.

From the state perspective what are the major government agencies involved in promoting innovation?

I can describe at least several influential agencies in the US. A popular player that is always mentioned is the National Science Foundation that funds basic science. They stimulate much academic research around new scientific ideas, but one criticism is that the agency doesn't truly drive or measure innovation or take a broader view of the innovation process, particularly past the stage of science. The National Institutes of Health, which looks at medical applications and advancements, has had a big boost in federal funding to explore new areas related to health and medicine. This agency has been helping drive an ambitious research agenda for many research labs and medical centers.

I would also add DARPA, which stands for the Defense Advanced Research Projects Agency, which find and funds big ideas in technology, often for military applications. My research at Stanford looks at why DARPA has been so successful for so long. Since 1958, the agency has followed a government mandate to pursue high-risk ideas, ideas considered highly

disruptive or radical. Over the years DARPA's funding has led to the Internet, the GPS navigation system, aircraft stealth technology, the earthquake monitoring system, and more. All of these technical inventions have impacted society in incredible ways. Can we imagine a world now without the Internet or GPS? My research with DARPA looked inside the agency's “black box” to discover how DARPA innovates and what processes have been consistent over the agency's lifetime to produce these amazing advances in technology. Some of these processes make DARPA quite special and it's good to see the US government support agencies like DARPA, plus spinoffs of DARPA created in recent years like IARPA, ARPA-E (for energy), and Homeland Security ARPA. All of them are trying to imitate the culture of success at DARPA. DARPA is an excellent role model for other countries to look to because the agency has had such a long track record of success for radical innovation, a big impact on society, and ultimately created the right conditions for all its stakeholders to achieve their mission of innovation.

Are there any approximate aggregate figures of state funding?

I don't know off the top of my head. While it's important to look at the government's role, government also needs to encourage industry to take a role. There are also annual R&D scorecards that track the amount of research dollars that companies are putting toward innovation efforts.

You mean government gives money to companies as well?

They can. These scorecards actually track overall budgets for R&D for companies, like Coca-Cola or IBM and so on. I think it might be interesting to look at leading institutions within industry — for example, the Battelle Institute produces an R&D scorecard, and R&D Magazine compiles another. All of this data can affect the way the government thinks about their policies to enable company growth.

How important are innovation parks?

Innovation parks can be useful because they bring together like-minded individuals. Often these parks aren't very active because there are few places where people can congregate informally — cafes, terraces, little park areas. You want to encourage spill-over between an office and what is often called “a third place” — neither home, nor office but a middle ground that people create. The belief is that a neighborhood cafe or pub allows this territory in informal creation. Typically technology and innovation parks don't create that physical environment and these spaces for people to come together, so they often feel like a sterile hospital or cold desolate building. You want to feel there is warmth, a reason to come back, and a sense of group comfort. I think often soul is missing from a lot of innovation parks around the world.

There is also a belief here at Silicon Valley that the entire region itself functions as an innovation park because there is an ecosystem in place. By ecosystem, I mean multiple players working together like an ecology. We are all interdependent, and Silicon Valley is a large ecosystem, so there is a fair amount of inefficiency and chaos happening. There is a lot of fails but at the same time there are more chances for other things to be created. Ultimately the net result is that innovation occurs because there are so many little experiments happening at the same time. What people often forget is that Silicon Valley is not a geographic place; you cannot find it on a map; there is no town or a city called

Silicon Valley. It's a shared concept that people recognize and define regionally in vague terms. All the local areas are parts of a bigger agglomeration that creates a cluster effect.

Silicon Valley as a concept, did it originate from Stanford?

Stanford played an influential role. Actually, Silicon Valley started in the area between Stanford and Mountain View. In the early 70s the name Silicon Valley was coined by a reporter who was trying to describe the rise in the semiconductor industry here where all this silicon was used to build into semiconductors. He called it "Silicon Valley" and the name stuck, and part of the irony, of course, is that over the years Silicon Valley has lost or closed down almost all of its semiconductor business. The landscape has shifted, and we do more light manufacturing, but the name still stands and it's symbolic now.

Where do rookie entrepreneurs go to, is it incubators?

Classically you would work out of your garage like Hewlett and Packard did. Today, some budding entrepreneurs have a chance to work on the Stanford campus, say in the new engineering building. In the building's basement Stanford has recreated the Hewlett & Packard garage so that you can see how these two guys and the idea started. Now because properties are so expensive in Silicon Valley, fewer people own a garage that can serve as a workplace, so there came some creative solutions. While there are a few incubators here in the Valley and broader area, that is not the first impulse that many entrepreneurs think of. Instead they get together and work out of their home or at a cafe. Going to Starbucks for a price of a cup of coffee is cheap rent; you can stay for two or three hours without worrying about the usual office bills. And you don't have to go to an incubator to find people because here you can find people everywhere. That brings us back to the belief that the Valley is in itself a giant incubator. In contrast, Sweden has an amazing system of incubators: almost every university has an incubator or two across the street and they have a national system that brings them all together in a much more structured and formalized process. I think that is working for Sweden but you can see how different Sweden's system is compared to the US and in particular to Silicon Valley.

Why are people here more autonomous so that they believe they do not need support which in Sweden they find in incubators? Is it because the Americans have more entrepreneurial skills?

I think it comes down to a difference in community and culture. In Sweden it's often harder to find other entrepreneurs like yourself, to find a right community, and part of it comes to the culture as well. There is a Swedish belief called lagom, which translates as "not-too-little, not-too-much". It's not that everybody accepts a mediocre solution; rather, it's a mutual understanding that you should serve the common good which is right for everybody, it's a very stable response, and works well in a group setting. However, applied to the context of entrepreneurship, you want to do something different, change something, and you don't want to go along with the status quo because you are looking to break it or transform it in a way that may make others uncomfortable. In Sweden the culture traditionally did not allow that kind of change to happen. When you come to Silicon Valley, you are always expected to talk about new ideas. You want to lead or produce change.

What are the major trends in the government's innovation policy?

One big trend is modeled after industry, and the US government created the position of a chief technology officer. There is a real push in Obama's administration to create a kind of a chief innovation council member — I don't remember what the latest title is, but essentially functioning as the CTO of the US government, looking at what the US can do to find and grow its technology leadership and investment. It's a symbolic role that can help emphasize and bring back a lot of positive energy around technology and engineering in the US. Many Americans from the older generation can point back to the moment when Sputnik was launched because that created a real decisive movement in the US history to evaluate our funding and priorities for science and technology and make a change to catch up with Russia. Now I think there is renewed interest to find what is the new Sputnik moment, that another Sputnik is needed to transform the way the US government prioritizes its investments and its support for technology.

Of two types of research — basic research and applied research — what is the government priority to support moneywise?

I would say at the moment there is a greater support for basic research, and often universities rely heavily on the government to provide that funding. In addition there has been a trend in the last few decades for companies to rely on universities to provide their knowledge and energy in basic research. I think the US government can do more around applied research, not necessarily in funding but by creating policies that allow for a range of tax breaks, different types of commercialization, and transfers of technology to occur. Apart from R&D credits, there are other ways the government can enable innovation activities to occur, such as supporting small businesses in certain industries and sectors where we know new developments in engineering and technology occur regularly. For example, an idea could be for new businesses less than three years old can write off a certain amount of their expenses because the government knows that these businesses are in the formative stage of innovating. The government should do all that it can to allow more of these businesses to be created, and ultimately these businesses will produce opportunities and new jobs to support growth in the American economy and economies around the world.

What helps and what hinders the development of the innovation system in the US?

Many of these topics have a dark side as well. Government policy absolutely influences and also creates obstacles for innovation to occur. The State of California has been cutting back tremendously on education. These decisions have an impact on the opportunities that students in California might be able to pursue, and also on the research work for the faculties.

Immigration is another critical area. US immigration is distributed differently, and when I looked at data for venture funded start-ups in the US, I found that the highest proportion was funded here at Silicon Valley, led by foreign entrepreneurs. This region relies on talented immigrants to be able to come here, become excited, get involved with the local community, and create new companies.

A sense of serendipity is important to innovation. Consider Google, which was founded by Sergey Brin who has Russian

roots. He came to work on an early notion of online search at Stanford and then he was able to take his idea and turn it into a business with support from Stanford. This is just a little example but this case is something that could easily been lost if we didn't have an ecosystem in place to allow it to happen. Not always to actively find a new idea or help it, but just allow it to happen in some way on its own time.

If a student comes here and obtains a degree at Stanford or any other university is he or she allowed to stay and work here for some time, several years perhaps? I'm asking because in the UK the government is going to cut short their stay in the country after graduation, and people involved in innovation consider it a big mistake.

This is where the US federal government takes a conservative approach. If it was up to Silicon Valley, of course, there is a greater recognition that foreign talented people are needed, who build new companies, give back to the community, and hire locals. Right now, if students are here on a student visa, they cannot stay past graduation unless they are able to find a company to sponsor them to continue working here. I know some companies' executives — from Intel, Sun, and Microsoft — are incredibly vocal in lobbying the government to change its policies, so that any student who has a diploma from a US school essentially gets a working visa staple to it. Right now, that doesn't happen and it is a lost opportunity.

In what areas the results of innovation have been most impressive?

It's an interesting question and depends on if you interpret impressive as importance, impact, or even boldness. I'd like to come back to DARPA because the agency's efforts have had a big impression on society: the agency is focused on the US, but the various inventions it has funded have influenced new solutions, services, and user populations around the world. DARPA is great at introducing audacious visions that create the innovation spark, and then the program managers use funding as the fuel for different implementation groups. For example, DARPA funded the GPS navigation system, and we now see the technology in cars, mobile solutions, and elsewhere around the world. Also, sending a man to the moon has been an impressive and symbolic event in American history.

As more recent changes, I think we're right at the point where we're going to see a hand-off between the American generations: the Baby Boomer generation are now in positions as role models for the next generation. There is a fair amount of attention placed on the Millennials generation, born roughly in the late 1970's to the early 2000's, and they are a huge, massive population in the US looking to step into roles that can make change in organizations and government. This group represents the rise of innovation workers in the US. But there is also a little generation squashed in between, called "Generation X", and they tend to be overlooked. Gen X is actually the sweet spot for where a lot of innovation occurs. The Kauffman Foundation, an American think-tank in the Mid-West that studies entrepreneurship, studied the average age of entrepreneurs and found the age to be — what do you think it is? — 39! At that age, a person has had enough time to gain life and work experience, try some ideas, understand more about the nature of business, and develop expertise in a particular domain. Well, a 39 year old fits right into Generation X, and this is the age that they will be innovating, that they

feel comfortable, have confidence, and have the resources. In short, it's their life moment. This is the age group where I wish the US government would encourage more because the current attention is on quantity. The Boomers and the Millennials are simply very big population groups, but at the same time, if we use the lens of quality, then Gen X will have a considerable amount of influence and may be a secret weapon for the US in terms of its innovation power.

What is your forecast of the development of the US innovation system in the future?

Forecast is a tricky word because nobody really can forecast the future, even weather forecasters. I think we can make several educated guesses. There is something called a naive forecast, which is a term used by futurists to say that what happens tomorrow will be the same thing which happens today. In many ways that is true: some things don't change as fast as we think. Certain aspects about society remain constant; what Shakespeare wrote about, what the Greeks captured in their comedies and tragedies — still hold true today in many ways. I certainly think there are some trends that we can follow, such as areas of investment, certain preferences around educational priorities, demographics, elements like that. Take California. You can predict that the state's educational system will worsen tremendously due to heavy budget cuts and other factors. I think it is more interesting to ask, are we teaching people what they need to know for the future, and are we providing people with the right tools to plan for the future? Even if we can forecast that it will be a rainy day are we giving them the umbrellas they need? In other words, are we giving people the materials they need to survive wherever they go? That's part of what we are doing in our program at Stanford in long-range planning and foresight: helping people to understand how do they prepare long-term, search for opportunities mid-term, and ultimately connect the action that they need to take today to their vision of the future. Stanford is a wonderful test-bed for developing and teaching these foresight and innovation tools, but people outside Silicon Valley want to learn these tools and philosophy too. For example, I'm going to South Africa next month, and I have more trips planned to Finland, Sweden, Germany, and South Korea, and all this is to help bring our knowledge and experiences to those countries, plus learn from them too. This global network is all around sharing our insights and practices in foresight knowledge and innovation strategy.

What entrepreneurial and management skills will you be teaching?

We teach about a dozen different foresight and innovation tools to help senior managers, entrepreneurs, and all types of practitioners, even people involved in government, to understand how they find and plan for opportunities in the future. A big emphasis is on understanding innovation as a system, and how different stages of planning and doing complement and influence the other stages. I am now developing an innovation workbook that companies around the world can use to boost their innovation capabilities, and this project is funded by Tekes, the Finnish funding agency of technology and innovation. Every little step helps.

Why Does the Silicon Valley Need Large Companies?



Richard Dasher — Consulting Professor at the Department of Electrical Engineering, Stanford University; Director of US-Asia Technology Management Center; Executive Director of the Center for Integrated Systems; member of the Board of Directors at Tohoku University

What are the primary goals of the US-Asia Technology Management Center?

As a research and education center in Stanford's School of Engineering, we are looking at interphases between business and technology. We do research on various management of technology and management of innovation topics. The things I enjoy the most are looking at a new technology and how it affects an industry's structure and dynamics. I also look at national innovation systems. I'm called on to interact with people in universities and companies elsewhere, and the innovation systems are quite different. People need to understand their systems. And now I find that that's a very good area of research — government, industry, and university sectors interact in various ways to form such a complex system. We also look at a certain amount of R&D management, research globalization.

Most of our studies are about 1 or 2 years long and involve Masters students. In contrast, PhD level studies would usually require 3 or 4 years. Most of my studies are really about 2 years of length and they don't really turn into academic publications that often. Our sponsors find them very interesting, and they are great for the students — our students often are getting great jobs at consulting companies after graduating, and so they are able to go out and use what they learn in a practical way. I hire graduate students in technical fields as research assistants to study about business problems. On the education side we present university seminars about management of technology and innovation and on an international scale about entrepreneurship. I'm also a specialist in Japanese business. So I teach a course on this.

The Japanese culture is very closed. How did you manage to be on the Board of Directors at Tohoku University?

The specific story is that I've been known as someone who has worked a lot with Japan for many years. The Japanese Consul General in San Francisco introduced me in 2001 to the Cabinet Minister in charge of Science and Technology Policy (a Member of Parliament), who needed an international committee for one of his projects. I served on that international committee. He then recommended me to the Tohoku University President in 2003 as they were preparing for the new law that would make Japanese national universities into "university corporations". When the new law took effect in 2004, Japanese national universities were no longer part of the government, and they could include foreigners in positions that previously were only open to Japanese citizens. So I became the first non-Japanese person ever asked to join the board of a Japanese national university. Although I'm not Japanese most of the time people in Japan are very interested and find it useful to hear outside points of view. I know the system well enough to understand what's going on inside the system, and can bring something from outside — that's really my value to them.

To your mind, how will the earthquake influence the Japanese innovation system?

First, and this is background to the innovation topic, the disaster is going to have a huge negative impact on the national government budget. There may actually be many opportunities for financing government bonds. The government will have to issue a lot of bonds for reconstruction and rebuilding. They'll be expensive because the government already has a heavy debt load. So the investors stand to make a lot of money. The Japanese will rebuild.

They cannot afford to stop making automobiles just because they can't get the parts from one area. That won't happen again. The auto companies now will make sure they have suppliers in multiple areas

And the earthquake will have immediate bad impact on GDP that will gradually improve as rebuilding proceeds. I also see an impact in the supply chain itself; from now, companies will make extra efforts to do more multiple partnering with component suppliers in different geographic regions. That's critical because they cannot afford to stop making automobiles just because they can't get the parts from one area. That won't happen again. The auto companies now will make sure they have suppliers in multiple areas.

As for the innovation system itself, I think the biggest danger is how much the Japanese government can continue its efforts to improve the system despite having to deal with this massive huge problem of reconstruction. I think it's a financial problem for the government. The biggest trouble with the Japanese innovation system is that it has not been open enough: universities are too self-contained, and big

companies are too self-contained. It's very much like a model the US was using 70 or 80 years ago.

But maybe in a long run those companies and the system in general will become more open...

I think it can. I do think it can become more open and I think that I see tendencies towards that.

When you have the industry it's hard to make changes. But once its destroyed, it's easier to make changes, because you will use the newest technologies. And once you rebuilt it, it will be the most advanced in the world.

True. There were some good universities in the part of Japan that was hit with the disaster, including the university I was on the Board of the Directors — Tohoku University, which is in Sendai. They were hurt pretty badly but should recover. A lot of small manufacturing was destroyed, so the disaster hit the supply chain hard. But in regard to the actual innovation system itself, I'm sorry to say about for the people of Tohoku, but they were not the critical place where the innovation is happening in Japan. If the same thing had happened between Tokyo and Osaka, in that corridor, Japan would have a really difficult time getting out of that.

You've studied national innovation systems all over the world, and you can compare. To your mind, what innovation systems are the most improved in the world?

I've been looking primarily at Asia and the US. I have to say that the balance of the US system is truly remarkable. It's better balanced than the systems in just about any Asian country I've looked at. I haven't done sufficient study of Denmark, but I've heard really good things about it. I've heard good things about Finland. So I'm very interested in looking at Northern Europe.

What are the specifics of the US innovation system?

By innovation system I want to look at the flow of people from one organization to another, the flow of money from one sector to another, and the flow of ideas (e.g. intellectual property) across organization boundaries, as well. By sector I mean university, or industry, or government. In speaking about the characteristics of the US innovation system, first, it's important to remember that there is a lot of regional variation. We have a more open system here in Silicon Valley than a lot of other places, especially places with more of a manufacturing-based economy. Silicon Valley is really an innovation-based economy, and so here the flows of people, capital, and ideas characterize a robust innovation system.

There are some dominant characteristics. First of all, we have a very fluent labor market, so that the people will change companies often and be in contact with many other people outside their company at any point at their career. That's important because it allows for efficient allocation of resources. The best projects tend to attract good people to work for them. We also have a well-established legal framework for managing intellectual property; that actually enables a lot of discussion, which leads to transfer of intellectual property. If the legal system were not clear or well enforced, you would not be able to have transfer of intellectual property. And such transfer of property is essential in order to make innovation happen. It's very rare for an idea to stay in the same person's hands from its original conception to the market.

With regard to the government's role in the innovation system, the national government provides a lot of research and development money. A distinctive feature of the American

system is that the government expects universities to compete for almost all of their research funds, and one of the biggest competitive tools is to match the government money with funding from a company that is interested in the same area of research. For example, if I apply for 1 million dollars of government money, I will make a promise to do a 1.2 millions dollars of work, or even more — 1.5 million dollars of work. That extra money can only come from industry. The government has the right to make sure that I secure and spend those matching funds in support of the research that their grant has supported. In this way, the government in effect forces universities and industry to cooperate with each other in order to obtain government funding for research.

What are the major participants of the innovation process in Silicon Valley and the US in general?

Let me talk about Silicon Valley first. I think that Silicon Valley is famous as a place where there is a great environment for starting a company. The knowledge and expertise, and also the availability of investment money are very strong. And in some ways that makes it like Hollywood for movies. You have to have a really good idea here. It's actually harder here because there is so much competition. But people know how to start companies here. That's famous. What's not so famous is that big companies in Silicon Valley are a very important part of the system. In some ways, they may not want to be so much a part of it, because they are the source of most of the employees of start-up companies. That's the first function of big companies in the innovation system here.

The second thing is that they will often be the first customers of a start-up company, becoming a reference customer whose purchase validates the technology of the start-up and provides valuable revenue. Companies here also do some corporate venture capital investments, and they are very good at acquiring companies. Consequently, the big companies here are a very important part of the system.

As for the rest of the US, it is more difficult to promote the flow of innovation in areas whose economies focus on manufacturing industries. The job skills that they require from the labor market are more about following assigned tasks very well than about creating new ideas. Even in precision manufacturing — a lot of work can be done just with a high school degree. In contrast, the level of university education is quite high in the population of the Silicon Valley. You find many more PhDs and Masters graduates than in the general US population. And with manufacturing based economy, manufacturing does not lend itself to switching to new lines of business. In Detroit, when the automobile industry goes down, what new work can the autoworkers do? Their skills do not easily translate to other industries. Here in the Valley the employment situation is always uncertain and unstable. People are laid off all the time. But they manage their careers, and so in some ways they are used to that insecurity. And now we see hiring again this year, and people who have saved all their money because they were afraid to be laid off — they spend their money now and get next job.

How important are innovation parks?

The innovation parks are good if they have programs that really help the people who locate their companies there. If they do what they really can do, they can be very useful parts of the system. They are not just real estate developments. Programs that they put on for the tenant companies are important. It's important to have places where people can

meet each other, hear new ideas. That's one of the most important needs in an innovation system — to hear a new idea that is different from what everyone in your existing organization thinks. The innovation park can really help that. They can help bring together investor and entrepreneurs. With university participation they can facilitate university-industry knowledge transfer. But it really requires a very active gifted manager who works very hard to provide good programs to the people there.

To your mind, what distinguishes the local innovation park from other innovation parks all across the US?

The day of the Stanford Industrial Park is really 1950s and early 1960s. I would like to go back and do a study to see. May be it was very successful because we don't need it any more.

You don't need it?

I think that the industrial park is a great place for HP and other companies to have their own offices, but the entire area developed this openness and ability to meet people with different ideas. I do think the Park played a big role in that in the 1950's and 1960's. I don't think it's that significant now. But it still exists and it's a good income for the university — we are renting out our land. And it's convenient for the companies. The terms are as good as in any other industrial park. But I don't think you see the kind of the promotion of closeness to university through that park that you used to. Now companies have close connections already. And now with the Internet you don't need the physical closeness so much.

But where would small start-ups go?

But Stanford does not have an incubator. It's because we don't really need one. There are plenty of incubators around the area. I think that the incubators have helped but the primer responsibility rests on the entrepreneurs and the investors. The incubation facilities helped bring them together but what really matters is whether you have good ideas being able to attract sufficient funding to become real.

How does the legislation in California differ from regulations in other US states?

Most of the laws are national; they are not state. Situation is not really

so much a function of the State of California (the government), as it is a function of innovation activities and innovation industries that have clustered so much in California. There is at least 50 years of clustering that have led to a very strong economy here. The one thing that you can say that the government does here is that it's relatively transparent. You can understand what the regulations are. But tax is expensive in California. The environmental regulations are very tight in California. So, if anything — that would be a negative, that would not encourage people to do their business here because taxes are high. People want to be here because the cluster of the economy itself.

What is the key to understanding the phenomenon of the Silicon Valley? Why did it cluster so well at first place?

There was a combination of factors. At the end of the WWII a lot of government money was going to support research and development. A lot of money did come to universities and existing high tech companies here. Stanford attracted a lot of research and development money. I think that because we are so far away from Washington DC there was a freedom.

It's hard to say what is the one thing is. I think that a combination of a lot of money after the WWII, people who felt free to try to start their own companies. At the same time Stanford wanted to build itself into one of the best world's universities. And they had some very good leaders who made good investments not only in people, in good young professors, but in the fields that those professors were teaching. Stanford was one of the first places that saw the growth of microelectronics, and then one of the first places to see the growth of computer science. Professor Miller was the first person in computer science here at Stanford, the founder of computer science department.

In some way we were very lucky. During the WWII almost all America's advanced electronics research was done in the East coast. And after the WWII the American government realized that this was a dangerous thing to have everything done at the same place. So it was easier to get money here. We did have some basic industry from before WWII. HP was founded before WWII. So there were people here who knew how to get money. Then you had Stanford doing some

INNONEWS

Investor Day — IDCEE 2011

Investor Day Central and Eastern Europe 2011 is an annual international conference for leaders and innovators in the sphere of web-related technologies throughout Central and Eastern Europe. The event will take place October 25–26, 2011 in Kiev, Ukrain at the Acco International Exhibition Hall.

The event will include keynote speaker presentations, panel discussions, a startup competition, and meetings with prominent world experts. Not only will Central and Eastern European startups have an opportunity to pitch their projects to investors, selected startups will be eligible to participate in a competition for grant funding.

Investors and entrepreneurs will have the opportunity to discuss competing projects one-on-one. The three top rated startups will be awarded cash prizes to fund their activities, with the first prize winners taking home 60 percent of the conference prize fund, second place winners 30 percent, and third place 10 percent.

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Russia Offers 5 Billion US Dollars Stimulus to Banks to Avert Possible Crisis

Russia's Finance Ministry has offered to place 160 billion rubles (5.4 billion US dollars) on domestic banks' deposit accounts to avert a possible liquidity crunch in the wake of the spreading global market turmoil. The move follows Russian Prime Minister Vladimir Putin's instruction to carefully monitor liquidity in the banking sector to prevent a repetition of the 2008 financial crisis, the paper said.

Russia's Finance Ministry started placing federal budget funds on domestic banks' deposit accounts in April 2008 as an instrument to help them replenish liquidity and survive the crisis. The Finance Ministry offered a record 600 billion rubles on September 22, 2008, of which banks took over 330 billion rubles, the paper said.

www.rostechnologii.ru

brilliant things, I mean, really kind of unusual for university things to strategically put Stanford into where the leaders thought the world would be 30 years later. You really need to look at your strategic investment in young professors in fields that would change the world. And at the same time you have this kind of mood that starts to develop in industry, where if you don't like your company — go and start your own. There was a lot of informal interaction between people at the university and people in industry here.

So Stanford itself did not really try to build the industry. They were after being a great university. But a lot of communication — consulting by professors, industry people who would come to the university to meet with PhD students to hire them — that kind of close communication was, probably, the biggest thing.

Are there special classes where students are taught how to be innovative?

There are programs now. But the system here grew up before the education programs. Stanford's program to teach entrepreneurship started in 1995. And the system grew up before that. Most of it is informal where the knowledge is transferred not through university but from person to person. And the students at Stanford are very good at getting out and meeting people before they graduate. Now there are good education programs, not only in Stanford but also in other universities too. But I think that without a practical side the education programs would not be successful. I bring in maybe 35 speakers from industry to lecture in my classes every year. And I know half a dozen of other professors here who are doing similar things. Students can talk to them, and hear a real-world, practical point of view. The students are studying with professors at the same time, but there are so many places to go and hear about new opportunities in a particular area like biotech or electronics. So there are plenty of places to hear about opportunities. There are also plenty of places to see real projects — projects that fail as well as projects that succeed. Watching your friends' projects is an important thing that young people do.

If a research takes place in a university, who would own the IP rights?

Stanford will own the IP. But, of course, the reason that system works is because universities don't make products. For universities the IP to benefit society at all some company has to buy it. Without motivation to license the IP it stops at the university. I think it's important to university to own it because one alternative would be for researcher to own it. Most of them are too busy doing research to go and found their own company. And if a team here at Stanford does form a company they have to buy the IP back from Stanford. If I invent something — Stanford owns it. If I create a company around my invention, first thing I must do is to negotiate a license arrangement with Stanford for my own IP.

Being an inventor, would you have a priority to buy it?

There is no written policy about that. I think Stanford would want the people who are likely to use the property to buy it.

Once a company buys it, how much would you get?

That's where I have 2 things. I would have to pay Stanford for my own intellectual property to start my company and use it, but as an inventor who works for Stanford I would get part of the royalties back to me as a person. So I pay money

to them and I get some back.

Stanford system has been very generous. The office of technology licensing takes 15 percent of the royalties off the top because they have to support their own operations. Then the remaining 3 shares, the remaining 85 percent, are divided 1/3 each to the inventors, to the inventor's departments, and to inventor's school. You know in the US system you have department like Electrical Engineering inside a school like the School of Engineering (some places call those faculties). Nothing goes back to the central university budget. It stays relatively close to the research area that led to the research, which is good.

What are the royalties?

It would be 1/3 of 85 percent of the royalty to the inventor. But the exact amount of the royalty itself — that's decided case by case. It has to be negotiated. The reason that Stanford office has been so successful is that they realize that IP is important but it's not the reason for the university to be here. They have to put themselves in a supporting role to support research, and sometimes that means taking a lower royalty, so that you encourage people to use the intellectual property more.

Were there any recent changes, under Obama administration, for instance, in the innovation policy?

I think that the biggest change has been more money flow in the science and technology during the Obama administration. The budget of the National Science Foundation almost doubled.

Is this money for basic or applied research?

It includes everything. Still, only the government can fund more basic research. But, you see, that provides a stronger base for other people who do innovations.

So the budget for science grew. What might be achieved through this change?

First of all, I think that we have a delicate situation in government this year. And the economy is in a difficult situation. I'm not sure how well the government can maintain its support. I think that you will see a lot of efforts in areas that are clearly of interest to the Administration, like energy and environment. In some ways the US was behind its big competitors — Japan and Europe in those areas. That's one thing that I see. Medical research will continue to be strong, but the health care system is uncertain. How it's all going to work? Medical devices, new pharmaceuticals have taken an awfully longtime. Right now I see 3 to 5 years boom in environment and energy related industries.

Will the government be able to handle huge spending on health care system?

Probably. There will be a lot of fighting about how to work. It will be in danger for a long time, but I think it has to. That's one of the basic things that people depend their government for. So I think the medical system will eventually work itself out.

To your mind, was it a good decision to increase spending on it?

There was not so much an increase in spending on health care research. There was but that wasn't the real source of the problem. The real problem was our equivalent of national

health insurance. And I know that some people in the basic biomedicine research area have been concerned that more of government money is moving away from basic research and are going towards health care delivery. Maybe it's unavoidable. That's one of those things that the government has to do somehow.

What helps and what hinders the development of the innovation system in the US?

I think that it has an incredible flexibility. It's very good at being responsive to changing needs of society and yet allowing leading institutions to come forward and promote new things before people know they need them. And to a certain extent universities have that kind of role. We are looking for alternative solutions to problems. Big companies like Google have that role. They are developing new ways of approaching problems as well as being responsive to the market. I think that's the greatest strength. My biggest concern about the future of this system is really the quality of education for children. The colleges are fine, but the quality of education at the school level in all fields is a very difficult question.

In what areas the results of innovations were the most impressive?

We are living in a middle of a third industrial revolution. I would say the third because I think the first was basic mechanization of industry in the late 1700s and the early 1800s, and then mass manufacturing techniques was the second from the late 1800s and the early 1900s. The information technology and communications (ICT) has had an incredibly huge impact on people's lives over the last really 15 or 20 years. I think that was an outcome primarily of the innovation system. You had the government that supported projects like what later became the Internet. You had companies that were able to take advantage of that. You had the openness of the system. The http protocol came from Switzerland, from CERN. So we took advantage of it here, in the US, and the universities had people coming up with new ideas and new things to do. I think that's a real casebook study of, probably, the big story of innovation over the last hundred years. More recently it's been interesting to see this pattern of waves where something would bubble and then burst, and then you have a real growth. So electronic commerce bubble burst in the year 2000. And really everything that has happened with Google and more recently with Facebook and so forth since about 2003 is the real growth of that bubble that first burst in 2000. So that's kind of an interesting pattern that I see repeated over and over.

Do you see any other sources of growth in the nearest future?

There are many opportunities, and there are many challenges. The energy environment is an industry sector that I see growing. I also think that one of the changes that happened along with this industrial revolution is global business. And certainly the growth of economies not only of China but all of the BRICs presents great opportunities for people everywhere, not just in the four BRIC countries. I do think that business globalization is an opportunity for greater economic growth. It's also a bigger challenge because your competitors are everywhere. You can't have your own little market and be happy with it, because as soon as you bring

the product to market anywhere, people all over the world know.

What is your forecast for the development of the US innovation system?

I would do a forecast like some people draw a business plan. I would have one line for what I really hope for to happen; one line for worst possible scenario; and then in the middle is the line where I think it will really go.

The best thing would be a continuation of the best aspects of the current system, including good decisions made by the government and a continuation of the openness and flexibility of the system. This system at present is remarkably balanced between university, industry, and government. No sector really controls all of it. And that balance is its best part. That means that government puts money into areas it thinks are important and without company people and investors pushing the government forward into self-centered directions. One reason the government does so well is that it has experts from the university and industry, who take leave from their regular jobs to serve as its program managers for two or three year terms. I think that from here best possible world would really be a continuation of that balance where government provides money to stimulate the system but where university and industry really exercise their unique roles and help the system to move forward in the most reasonable direction possible. In the best possible scenario, good people will continue to come into the system from elsewhere. One reason Stanford is successful is that we are trying to get the best students in the world. So you need good people coming into the system. That's the great thing. It's more or less a continuation of what we have. I think we have a pretty good system.

Worst possible scenario — it gets out of the balance and either the government tries to exercise too much control or the continuation of funding programs become so unreliable that researchers cannot engage in long-term innovation. Many advanced technologies require long periods of time to incubate before they are ready for commercialization. And, if you cut a research program one year it takes 5 years to get it back. So I do worry that we will lose some areas due to uncertain funding and that will make us behind the rest of the world quickly. And I worry about the education system in the US (for children). To a certain extent I'm a little concerned that government seems to be having a harder time to keep going. I don't think that the government will fall but it may become inefficient.

Somewhere in between those two: I think we will continue, we will eventually stop being the biggest economy in the world because China has so much room to grow. Sometime in the next 15 or 20 years, probably, the economy of China will be as big as the economy of the US. I think that part of the US future depends on how well we manage our own position in the world where there such large newcomers appearing.

“Brain Drain” or Circulation: It Depends



Dorothea Rüland — President of the DAAD
(Deutscher Akademischer Austausch Dienst —
German Academic Exchange Service)

Ms. Rüland, what is your assessment of the scientific potential of Germany?

It is a very complicated question. First of all, it is necessary to choose the indicator of assessment. I have chosen the number of the patents registered. You know, it may be proposed that a country with a lot of patents registered is rather innovative. To look globally, according to the recent data I have — these are figures for 2005, about one half of all patents in the world were registered in the USA, and if we look at 27 countries of the EU, Germany accounted for over 40 percent of patents registered in the EU, while in the UK and France only 10 percent to 15 percent patents were registered. I mean the number of patents evidences that Germany remains a scientifically developed country.

And what role does international exchange of scientists and students play?

I guess such exchange plays a key role. Just look at the themes that remain today central for the science and economy, what themes the science and economy are most concerned with — these are climate change, and energy. All of us know them. And no country of the world, no scientific school is able to solve these problems on its own. They may be solved at the international level only. Generally speaking, science and research are international in their nature.

I came back from Russia yesterday — I visited the opening ceremony of the Russian year of science and innovations opened by the Russian Minister Andrey Fursenko and by the German Minister Annette Schavan. At the ceremony it was emphasized (by the Russian representatives as well), that scientific research is becoming international in its nature. And Russia is launching a lot of programs aimed at attracting a lot of highly qualified scientists. There are numerous initiatives

that are to internationalize the Russian scientific system, and DAAD together with the Russian Ministry of Education performs activity according to such programs to give a chance to young Russian scientists and researchers to go abroad for some time. During our recent visit we prolonged existing contracts and signed new ones — for example, a contract with the Lomonosov Moscow State University, as well as with the Saint Petersburg State University.

You mentioned programs aimed at attraction of foreign star scientists to Russia. What do you think is more important for the science support — attraction of individual stars or mass exchange of medium level and young researchers?

I believe both are important. Naturally, young scientists should be given a chance to work internationally. First of all, because modern scientific research is becoming international. Secondly, to give young students a chance to move around in the international environment, to gain international experience, primarily intercultural, language, methodical — all this should be learned as early as possible. That is why today many governments willfully support and stimulate these processes. On the other hand, if you invite a scientist of global renown, a megastar, a Nobel laureate to Russia, it will strongly motivate other researchers — this scientist becomes a leading light, a model for them. Nevertheless, broad basis support of science is of great importance, as well.

In DAAD they often speak about importance of “innovations in education”. What is particularly meant here?

Yes, you are right, there is even a special premium named this way in DAAD. We consider it important that the students unable to afford studying abroad (for financial or any other reasons) be given an opportunity to gain international experience in their university here, in Germany. This means that education should be internationalized. For example, foreign professors and teachers may be invited. New methodical models may be introduced. In particular, a number of things may be performed via videoconferences with the help of on-line modules. There are a lot of possibilities to make education international.

Naturally, young scientists should be given a chance to work internationally. First of all, because modern scientific research is becoming international

DAAD has also set up the German Innovation Award premium. The premium in the amount of 4,000,000 yens corresponding to almost 40,000 Euro is granted to Japanese innovators. Are there any other DAAD grants supporting innovation projects?

I would say that each DAAD grant is issued on the basis of a serious competition. It is awarded to the best scientists, and the decision is taken not by us, but by a committee consisting of scientists; the decision is taken based both on

education diplomas and achievement certificates, as well as assessment of the project proposed. The committee assesses what particularly a student wants to do, to what extent his/her project is innovative. So our grants promote innovations. There is a number of areas in which we try to support promotion of innovations. For example, there is a project of the German Federal Government called "German Houses of Science and Innovations". Such German houses may be found in Russia, New York, Sao Paolo, Tokyo, Dehli. They are designed to show new developments in Germany, scientific progress and shall form the platform, become a forum for scientists, for example, from

Are economic and scientific connections today really important? Can one say that modern science and economy are closely connected?

Right, there is such a phenomenon. Obviously, science and economy strongly depend on each other. Companies depend on innovative research in science, and companies in turn actively support science. As regards DAAD, we realize a whole number of programs aimed at interaction strengthening. For example, we have a program called "Language and Practice" realized together with China, Japan and India. According to this program a person learns a language for a couple of months and then does practical

researches showing how many Germans go abroad — in the sphere of medicine, for example, and in other areas. For a German citizen it is no problem to stay for work in another EU country. We know that after getting a diploma most German students are strongly interested in going abroad for a more or less long period of time. I mean such interest is clearly traced. A lot of Germans go to the USA, including young scientists. And we try to keep in touch with them. You know the discussion about "brain drain". It is different now, one would rather speak about "brain circulation". I guess young people will become even more mobile. They will work there for two years, then for a couple of years in another place, then they will come back to Germany. It is also caused by the fact that modern companies are becoming more and more international.

And what can you say about foreign young scientists and students coming to Germany?

It has become much easier to do so recently. Foreigners graduated from German institutes may stay in Germany for a whole year after they complete their studying. During this term they may perform a particular volume of work and may look for a constant employment in a German company. We know that already today about 30 percent of the graduates take advantage of this chance: in 2009, 4,800 former students managed to get a job in Germany during a year and, at least, stayed in the country for some time.

How important is inflow of foreign graduates for German companies?

Very important, I believe. To see this, it is sufficient to read any German newspaper. We lack scientists and specialists in natural and scientific areas, first of all. The demographic development we faced is very similar to what is happening in Russia. In the long term we are likely to require even more foreign specialists. No doubt, we need our own resources, for example, in Germany more women may be engaged in work — there is a potential for growth in this area. There are also initiatives that help young migrants to more efficiently look for a job in the labor market. I think in the long run we won't do without a significant share of the foreign labor force.

You know that Germany already experiences lack of qualified employees. And this is true not only for Germany, but for Russia as well. Economy needs wise heads. And where can they come from, but universities? So I suppose that connection between science and economy will be strengthening

Russia, who could receive information on new trends in particular areas. For example, this is what we were doing yesterday in Moscow: we organized a round table in the Kempinski hotel with two famous Russian and German scientists, to discuss new research trends, share our opinions and speculate on the projects we could implement together.

Creation of German houses of science and innovations is a new idea realized by various organizations. For example, in New York this is done by a German research society DFG (Deutsche Forschungsgemeinschaft) together with DAAD, in Russia — by DAAD, in Japan — by a conference of rectors of German institutes together with the Foreign Chamber of Trade and Commerce. That is it depends on the place. We implement other projects with view to higher education, as well. We do this in various parts of the world: in Asia, America, and Africa. We always try to find out what we can do for our higher education system and the partner countries system to become more modern and innovative.

work in a company in one of these countries. Together with a number of companies, for example, Siemens, we also issue grants in the areas of particular interest for them.

You know that Germany already experiences lack of qualified employees. And this is true not only for Germany, but for Russia as well. Economy needs wise heads. And where can they come from, but universities? So I suppose that connection between science and economy will be strengthening. Besides, DAAD is implementing another large-scale program throughout the world — the program for exchange of trainees. It allows young people to gain experience, and today such program often becomes a part of the university education.

How easy it is for young German specialists to find job abroad and vice versa — how easy it is for young scientists from countries not belonging to the EU to get a job in Germany?

Unfortunately, I have no official data on number of Germans working in various countries. There are

“We Give Advice to Politicians”



Heinrich Höfer — Executive Director of the Research, Innovation and Technology Committee within the Federation of German Industries (BDI — Bundesband der Deutschen Industrie)

Mr. Höfer, Germans like labeling Germany as a country of ideas. Germany is perceived around the globe as a home for radical innovations. But to what extent is actually German economy innovative?

The innovative strength of German economy is generated by two components: on the one hand, by innovative potential of companies and, on the other hand, by the fact that Germany is a large country and each technology is developed inside relevant industry clusters. Consider, for example, our automotive industry. It is robust in Germany owing not only to our five automobile manufacturing companies but also to those multiple spares parts suppliers successfully standing by them.

The same scenario can be seen across different sectors. Consider, for example, chemicals industry. The major leading chemical concern BASF is simultaneously a high-performance supplier for other companies, for automobile concerns for example. Considering an important up-to-date issue as an electric vehicle is, we see that it takes to chemicals companies to design and develop the most important device involved, which is a storage battery. And generally all export statistics show that German companies are demonstrating strong innovative performance. The same conclusion may be drawn on the basis of the innovation indicator our association BDI refers to. However we have to perceive the difference between the innovative strength of companies and the one of a country as whole. And when we consider the strength of the country our innovation indicator reveals that Germany is only ranked as the 8th among 17 industrial nations. It means that there are countries to have built their innovation framework in a better way than Germany.

Which indices does this indicator take into account?

It takes into account both economic and scientific indices as well as the educational system. If I am not mistaken it embraces roughly 180 different indices classified according

to diverse characteristics. Endless methodology-oriented discussions might take place here but it is nevertheless a convincing indicator of a Germany being quite successful without being the most successful. We mean here the country and not our companies as they are very successful within innovation framework.

This means that the worst problems regarding the innovativeness are found in the same sector the results of research within the Program for International Student Assessment (PISA) indicate, and that is the sector of school education being inefficient, including problems with mathematics teaching?

Yes, that is exactly so.

What is above all understood as an innovation in Germany? Is it an engineering and technological solution or a financial, administrative and marketing tool?

The last thing you've mentioned is perceived as an innovation as well. Our understanding of what an innovation is cannot be limited to exclusively technology-oriented aspects. An innovation is anything to have paved its path into the market. Otherwise it cannot be qualified as an innovation. Upon that we differentiate between an invention and an innovation. An invention might be an engineering solution or a scientific discovery but it cannot be classified as an innovation until one wants to put it into practice.

I've still meant a slightly different aspect of the topic. There exists a mindset pattern that there are nations to prioritize administrative and market innovations such as financial instruments, commerce arrangements like eBay or Amazon. And alongside there are nations saying: we would better invent an engine consuming 10 percent less fuel as it is a genuine innovation. I've asked you whether such differences are actually relevant and if German companies are likely to rank engineering innovations higher than all other innovations.

I believe that German companies are closely tied with engineering innovations. But nobody is sure to ignore the fact that technological innovations must be marketable as well. In Germany we see it plain that the two elements must be intertwined: the manufacturing of a product and follow-up services. Services must be more closely related to the manufacturing process. Our innovative managers have to bear these aspects in mind. We observe that Americans and, for example, IKEA is very successful in it. Therefore we should also pay enough attention to this issue.

Which sectors are the most innovation-centered in Germany? You have already mentioned the automotive industry, chemicals industry...

The automobile manufacturing industry is sure to belong to the most advanced sectors of German economy. The same might be said about our chemicals industry. The electronic industry must be pointed out as well and I would put emphasis on the pharmaceuticals industry as an integral part of the chemicals industry. It is a special zone. In addition there is a number of sectors to be critical despite reduced dimensions in figures — it is our optical industry or medical devices manufacturing. I'm convinced that Germany is one of the worldwide leaders in medical devices manufacturing.

What precisely do your activities inside the Innovation Committee within the Federation of German Industries imply?

First and foremost we work upon issues of research and innovations policies adjustment. BDI is a political alliance. Our main goal lies outside the economic domain as it is literally perceived and outside an inward-looking management of the economy. We are engaged in shaping of the consolidated stance of all industries — from car-making companies to sugar growers — and getting it across to policy-makers. If you want to put it this way we give advice to politicians and instruct them how, in our opinion, adequate and healthy policies regarding innovations and research should look like.

And how do they look like?

First of all, we believe that we need the same financial and tax support for innovation activities as any other 21 member states within the Organization for Economic Co-operation and Development enjoy. Today such support is missing in Germany. The current Cabinet has introduced this paragraph into the treaty to underlie the establishment of a government coalition but until now it still has not been brought into effect. Therefore we still advocate the implementation of this provision. The government officials covering science and industry policies favor the suggestion but state officials from treasury departments consider it as an excessively costly project.

However we must think within a long-term perspective. Within a context featured by the worldwide competition we must offer our companies assistance with retention and extension of such valuable resources as knowledge. It goes without saying that if other countries offer more advantageous conditions we may expect that our companies will relocate their research units to those countries. If we are unanimous to believe that know-how constitutes a very meaningful asset for Germany, we must make any effort to create as favorable conditions for research within Germany as possible.

What is the main problem the German government faces when addressing innovation issues compared with similar policies other states within EU as well as the USA and Japan pursue?

I may give you a very simple example; it may be even too plain. Consider the state support offered for research projects within companies through public funding. In Canada its rate is very high and amounts to more than 20 percent of all money invested by a company. The same rate in Austria and France totaled 17–18 percent, in the United Kingdom and the USA — 11–13 percent while in Germany the figure is less than 6 percent.

It is a huge gap indeed.

Our opinion is the same.

Germany is however traditionally treated as a country where the state is more likely to support companies than to let them freely decline.

These figures demonstrate that it is not quite so. And these are official figures made available by federal governmental bodies of Germany. They cover all aspects of corporate

activities. Upon that we specify that a decent and well-functioning system of project assistance happened to shape up, for example, within certain fields like the electric vehicle manufacturing and yet this system may be extended and that is not bad. But at large when compared with other countries we observe specifics that are considerable. And one serious reason for such a gap is explained by the lack of tax incentives applicable to research projects the companies implement. There are such benefits within a number of major EU countries. They are the vastest in France and Spain, the United Kingdom offers an extensive program of tax incentives for research projects, they also exist in Netherlands and Belgium. Such programs are missing in Sweden and Finland but both countries have their industrial businesses almost plainly visible and the state can offer assistance in other ways — for example, through establishing a university for Nokia — that's what Finland has done (I go a bit too far here) it constitutes a kind of business support.

You know that Germany already experiences lack of qualified employees. And this is true not only for Germany, but for Russia as well. Economy needs wise heads. And where can they come from, but universities? So I suppose that connection between science and economy will be strengthening

Is support of innovative companies in Germany a mission first of all pursued by the states or by the federation?

The support provided by states' governments is reduced compared with the federal one. Some support is sure to be provided for industry clusters but it is estimated at millions of euro at its best. As compared with the federal support it is quite few.

Do private funds have capacity to offer assistance for innovations comparable with the one provided by the government?

There are examples of private support for innovations worthy to be praised. First and foremost it refers to initiatives of major companies. For example, there exist a joint initiative launched by five or six large-scale concerns and the FRG government, it being a supporting fund for the benefit of high-tech companies' founders. But generally the venture capital and development financial package issues are not full-blown across Germany. As compared with the USA or the United Kingdom we have too few companies newly set up and here again it is our tax policies to blame. Consider our bitter controversies with the treasury ministry. For example, a couple of years ago all expenditures on high-tech companies' development were barred or reduced in a significant way to be tax-deductible. It means that if you are selling a technological start-up which at the beginning has required vast expenses and now it starts yielding profit, then all losses sustained during previous years cannot be tax-deductible and it is a very low-gain deal. For about two years we've been conducting negotiations with the governmental agency to have this possibility restored.

Are there any other impediments to innovative companies that hinder them from flourishing — for example, the intellectual property legal framework? What complexity do German laws regarding innovations attain in fact?

This topic is highly debatable. For example, we have the law on inventions conceived by employees. It may be qualified as good or bad. We had been arguing about the issue literally yesterday. But anyway I do not believe the legal framework to be a decisive determinant. Much more depends on the commitment of the universities to cooperate with the scientists willing to set up their own companies. Some universities are readily responsive to their needs, others are reluctant. But it is a practical and sporadic issue and

which helped German companies to dominate the technology field when the crisis was over as well.

How does the total amount of investments in innovations made by major concerns correlate with those of medium-sized businesses?

The total amount of investments driven by major concerns considerably exceeds the one made by medium-sized businesses. Roughly 80 percent of expenditures on innovation fall within big businesses' projects. It is however to be understood that such investments are often driven by concerns hand in hand with medium-size companies. Many contracts placed by concerns within medium-sized businesses imply expenditures on innovations.

INNONEWS

Russia May Allocate 340 Million US Dollars for New Technoparks

The Russian communications ministry is hoping to receive an additional 9.9 billion rubles (340 million US dollars) from the state budget for the construction of new technological clusters. The Russian government has already approved the allocation of 6.09 billion rubles (209 million US dollars) for the development of technological clusters in the country by 2014 as part of its efforts to diversify Russia's energy-dependent economy. In 2008–2010, the Russian technological clusters' joint incomes stood at 22 billion rubles (755 million US dollars).

www.epicos.com

Drchrono raises 650,000 US dollars from Yuri Milner

Drchrono, a startup that simplifies the professional lives of doctors by bringing electronic health records and much more to the iPad, has raised another 650,000 US dollars in seed funding from DST founder Yuri Milner and General Catalyst. In July, the company raised 675,000 US dollars in seed funding from General Catalyst, Charles River Ventures, 500 Startups, Gmail creator and FriendFeed co-founder Paul Buchheit, Google's Principal Engineer Matt Cutts, and the Start Fund.

Drchrono's iPad app allows doctors to schedule patient appointments, dictate notes via audio, take pictures, write prescriptions and send them to pharmacies, enable reminders, take clinical notes, access lab results, and, most importantly input electronic health records.

Now, Drchrono is looking to disrupt another part of the medical office experience by providing a new iPad app, called OnPatient, which replaces the patient check-in process. So, as soon as you enter a medical office, you are generally given a clipboard with a number of forms to fill out in the waiting room, including general information, medical history, confidentiality agreements and more.

www.techcrunch.com

You know that Germany already experiences lack of qualified employees. And this is true not only for Germany, but for Russia as well. Economy needs wise heads. And where can they come from, but universities?

the legal framework is not brought into play here. But we are sure to be able to generate additional possibilities through legislative initiatives and to grant universities more broad powers and let them subscribe for share capital and be participants of companies set up by their employees. By the way it is being halfway brought into effect. Certainly these initiatives may be developed further on.

How does the dynamic of private companies' investments in innovations look like across Germany and how efficient such investments are?

In our opinion, through these investments a critical contribution to the national economy is being made. Even during the crisis period German companies refrained from cutting off their expenditure on scientific and engineering R&D projects. Certainly some of them might have curtailed the investments but taken in total the figures have gone up. And now during post-crisis period we expect their further increase. The crisis being rapidly surmounted in Germany we directly relate this fact to the scientific and engineering R&D sustainability

Consider our automotive industry. Automobile manufacturing concerns offer incentives for suppliers to be involved in innovation funding, even if their suppliers do not welcome it. The foundry industry and alike are however compelled to do it.

As for the ratio of expenditures on innovation to the overall budget of a company, the answer is also not that evident. On average our concerns invest a greater part of all their expenditures on innovations. But it is partially due to the specifics of the accountancy. Just one example, medium-sized businesses are especially good at machine-tool manufacturing. However in this sector expenditures made to directly manufacture machine-tools cannot be qualified as innovation investments even if in a particular case — as it happens quite often — one concrete machine-tool is designed as a single copy to operate under unique working environment. Therefore you may conclude that actual expenditures on innovations within medium-sized businesses are often underestimated.

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