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FINANCING UNIVERSITY TECHNOLOGY TRANSFER

Seminar Report

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1. The Organisation for Economic Cooperation and Development (OECD www.oecd.org) and the Civilian Research Development Fund (CRDF www.crdf.org) jointly sponsored a two-day workshop, "Financing University Technology Transfer," with St. Petersburg State University (www.spbu.ru) as the host. In developing the workshop, the OECD and CRDF worked closely with the Russian Ministry of Education and Science (www.ed.gov.ru). The workshop brought together technology transfer experts from OECD area and Russian universities, international organisations, governments, business and finance. It explored, through expert presentations and the ensuing discussions, several timely issues on technology commercialisation and the development of entrepreneurship (start-up activity) at Russian universities and its financing.

Workshop opening

2. Dr. Vsevolod Kortov (First Vice-Rector Emeritus of Urals State Technological University – USTU www.ustu.ru and currently Director, Institute of Innovation and Marketing, USTU), co-chair at last year's and this year's workshop, greeted participants. He noted that since last year's workshop at USTU in Yekaterinburg, considerable changes had occurred. Changes especially affecting Russian research universities were the joining together of the Ministries of Education and Science and the implementation in the regions of the START programme. He hoped that this year's workshop could continue the tradition of frank discussions of the issues surrounding the improvement of technology transfer practices at universities. Dr. Kortov introduced Dr. Vladimir Troyan (Vice Rector for Research at St. Petersburg State University), the session's other co-chair.

3. Dr. Troyan welcomed participants on behalf of St. Petersburg State University and expressed thanks to the OECD and CRDF for their support of his university's technology transfer efforts. He emphasised the importance of developing innovation and entrepreneurship at Russian universities and observed that Russian universities have a long-standing tradition of invention, which is evidenced by one of the founders of St. Petersburg State University – D. I. Mendeleev – who created over 50 inventions. The university actively supports these traditions at the present time. St. Petersburg State University was one of the three pilot projects for university technology transfer established in the OECD's joint work with the then Russian Ministry of Education and Dr. Troyan outlined the considerable accomplishments of his university in this area. In particular, he cited the university's attention to establishing an efficient administrative structure and pointed to on-going efforts, including the recent changes to its charter that aim to establish an integrated policy for overseeing the creation, legal protection and commercialisation of intellectual property (IP).

4. Following Dr. Troyan's warm welcome, Dr. Alexander Armensky (Department for Innovative Entrepreneurship) greeted participants on behalf of the Ministry of Education and Science. He briefly outlined the government's intention to continue reform efforts that aid Russia's transition to a knowledge-based economy. He saw the current workshop as yet another step toward accomplishing that goal.

5. After thanking the Ministry representative for its continuing cooperation, Mr. Ian Whitman (Directorate for Education, OECD) briefly outlined the past results in the OECD's joint programme with the Ministry on Russian university technology transfer. He noted that the programme began as an outgrowth of the OECD's education review of the Russian Federation. At first, several universities were chosen as pilot projects and support was given to establishing their internet capabilities and conducting a review of internal university regulations and how they interface with national legislation. At a subsequent workshop in Moscow, held jointly with the CRDF, the issues surrounding a university's rights and responsibilities in managing its IP resources were discussed. These discussions were followed by another joint workshop in Yekaterinburg at which best practices for managing a university Technology Transfer Organisation (TTO) were examined and an effort was launched to establish a Eurasian association for

university technology managers. Mr. Whitman also noted that the Russian Federation has been an observer to the OECD's Education Committee since 1992.

6. Marilyn Pifer (BRHE Programme, CRDF) greeted participants and noted that this was the third year of fruitful co-operation with the Ministry and OECD on this topic. She described how CRDF's Basic Research and Higher Education (BRHE) programme aims to strengthen the basic research capabilities of Russian higher education institutions in the natural sciences and how a need was recognised that this programme address the issue of technology transfer and innovation. CRDF gave grants to support this aspect and views the founding of a Eurasian Association of University Technology Transfer Managers as an important result of the project. She stated that the CRDF had strongly supported this year's agenda on financing university technology transfer and creating start-ups.

Session 1: State support for innovative entrepreneurship at universities

a. State regulation of innovative activity at universities.

7. In opening the session, A. Ye. Armensky (Ministry of Education and Science) emphasised the special attention that the State Duma and Russian Federation government devote to raising the level of economic understanding in Russia. The importance of having coherent and measurable criteria and indicators on the development of innovation in business and the state as a whole was noted. Especially new as a state policy was the concept that financing entrepreneurship created special efficiencies, because it raised economic understanding and brought in new tax revenues through the returns gained by investments in science-intensive business. In addition, while noting the importance of state financing for the development of innovative entrepreneurship, Mr. Armensky emphasised the importance of business' co-financing of innovative projects.

b. Foreign experience of state support for innovation entrepreneurship at universities.

8. While describing the German government's approach to improving technology transfer at universities, Johann Ludwig Duvigneau (Federal Ministry for Education and Research) remarked that university scientists are quite good at publishing and disseminating their ideas, but rather less adept at technology commercialisation. To support greater university efforts at commercialisation, the German federal government:

1. Changed the federal law to allow universities to own patents;
2. Established a network of offices for commercialisation;
3. Supported entrepreneurial individuals at universities, especially in spin-off generation.

9. Behind these changes was a realisation that innovation support needed to more than a series of ad hoc actions; it required the establishment of networks and the nurturing of a culture of entrepreneurial thinking.

10. To promote a culture of innovation at universities, the German Ministry launched the EXIST Programme (Existenzgründungen aus Hochschulen www.exist.de) in 1997 as a way of improving the start-up climate at universities and of increasing the number of university-based start-ups. Through EXIST, the Ministry supported the partnering of universities with regional governmental, industrial and financial counterparts. A competitive grant process selected the networks that received the Ministry's support. Currently there are now 15 such regional networks. Recognising that these regional networks should ultimately be self-supporting, the Ministry currently plans to support them for seven years only. In addition to support for innovative structures, the Ministry also offers some individuals pre-seed money (EXIST –

SEED) and it supports innovative education programmes. By mid 2004, about 250 applications for EXIST – SEED funds were made in the five original regions and about 150 of them were accepted.

11. Mr. Duvigneau closed by remarking that Germany needs to develop a culture of innovation at its universities and that he was quite impressed to see so much activity taking place in the Russian Federation.

c. Current practices of state support for innovative entrepreneurship in Russian universities.

12. Igor Leonov (Head, Department for Intellectual Property and Technology Transfer, St. Petersburg State University) asserted that the globalisation of the world economy and the growth of science-intensive production have resulted in some companies reducing their own research and transferring it to universities. The model of the research university therefore acquires a special significance under these conditions as it: “produces” new knowledge and science-intensive technology/innovation; realises a global exchange of scientific information and scientists; develops co-operation (partnerships) in technology transfer with business and industry (above all regionally); and prepares highly qualified specialists to manage IP.

13. Mr. Leonov reviewed the significant advances that his university has made in establishing an active TTO. He noted that while the university previously had an organisation to oversee intellectual property, his staff expended considerable efforts in reshaping this earlier effort into a TTO that corresponds to current economic conditions.

14. Among the macroeconomic problems restricting the development of a market for intellectual property, the following were identified: a low demand for scientific research; a lack of active state policies in the areas of intellectual property and technology transfer; underdeveloped legal and economic mechanisms, including those at the ministerial level; the low level of financing for science; the lack of preparedness of industry to take on innovations; the underestimation of the role of intellectual property in the innovation process; the absence of real protection for intellectual property from pirating; and the on-going discussion of strengthening the state’s rights over intellectual property created with state financing – a discussion that restricts investments in the development of intellectual property.

15. To relieve the above-mentioned problems, the following measures were suggested:

- Promulgation of legal acts that stimulate the innovative activity of universities in creating and commercialising IP which meets market needs;
- Securing targeted state financing for state universities in the area of intellectual property and technology transfer;
- Establishment in universities of policies, regulatory procedures and administrative structures for an intellectual property and technology transfer activity that meets contemporary needs;
- Monitoring university activities for managing intellectual property and technology transfer;
- Supporting professional training and retraining of technology transfer cadres.

d. Regional Programmes for technology-based business development.

16. Yaroslav Kovernikov (Director, Technology Transfer Department, Tomsk State University) reported that in 2002 the Tomsk regional government established an innovation strategy that proposed four types of support for innovative activities: financing, information, cadres and infrastructure.

17. Financing a technology transfer network was accomplished in three stages. The first stage (scientific research and development) was done through grants from: the Ministry of Education and Science, the Tomsk regional administration, the Russian Fund for Fundamental Research, CRDF, International Scientific-Technical Centre and others. The second stage of financing (prototype) was through the Tomsk Regional Administration, the Fund to Aid Small Enterprises in Science and Technology, CRDF and the World Bank. The third stage (delivery and development of production) used funds from ATO, business angels, venture funds, banks and enterprises. Moreover, if the university performed the work at the first stage, then the innovative enterprise received the investments at the second and third stages. The Tomsk regional government actively participated in financing the programme. At the first stage this was a system of competitions (one of them for young scientists); at the second stage, a regional thematic programme; and at the third stage, ATO stepped in to guarantee the bank credits or even subsidise them.

18. The infrastructure supporting innovation and entrepreneurship was comprised of eight offices for commercialising developments, three business incubators, a system of risk financing, a regional database on research and development, a regional exhibition centre and a consulting company.

19. Mr. Kovernikov emphasised the importance of developing business incubators – three types of which exist in the Tomsk region. The first type, a student business incubator, has the principal goal of teaching the basics of bringing innovation to business. After their studies, students may continue to work in one of the business incubator's companies or create his/her own business. The second type is set up on the basis of a non-commercial partnership with a successful entrepreneur who might participate in the formation of the original capital investment for the new company. The third type is realised on the basis of a former defence enterprise.

20. Informational support is achieved through a regional internet database on research and development, annual publications of research and development catalogues and innovation projects of Tomsk, and distribution of information on research and development through the Russian Technology Transfer Network.

21. In the Tomsk region special attention is paid to preparing cadres at institutions of higher education and at three supplementary resource centres. The training uses basic networked programmes with the participation of several higher education facilities. The training programmes are oriented toward preparing specialists at an accelerated pace. The programmes' special merits lie in their aim to give trainees special practical skills for managing innovative projects and to give them the chance to select their courses.

General discussion

22. Participants addressed the problem of Russian industry's weak demand for innovation and proposed developing a mutual study programme for technology transfer specialists from science and industry. It was noted that the movement of specialists from a university to an industry was such a type of technology transfer. In this regard, the availability of a new report by the British Council summarising the past decade's experience of British universities' links with industry was mentioned.

23. During a discussion of the experience of one British university's TTO, it was remarked that national cultural differences might undermine the usefulness of another country's technology transfer policies; moreover, it was observed that even in one country, universities and industries possess their own cultures. State policies need to recognise these cultural differences and support the development of a mutual understanding among technology transfer specialists in the industrial and scientific spheres. This idea received the support from other participants, who suggested creating a structure at industrial

enterprises similar to a university's TTO, but organised to receive technology, and reviving industrial branch laboratories at universities as important elements in bridging the cultures.

24. The question of the choice between forming a start-up and selling a license arose. It was noted that while licensing might seem more attractive, the underdeveloped regional market forced Russian universities to think more in terms of start-ups.

25. The participants agreed that the state support for links between universities and industry can and should be more substantial. The suggestion was made that together with the development of the legal and regulatory basis for commercialising technology, it would be necessary to establish some kind of co-ordinating council with the participation of representatives from the government, universities and industry.

Session 2: University start-ups and licensing

a. The alternative choice: start-up or licensing agreement.

26. Kevin Cullen (Director of Research and Enterprise, University of Glasgow) observed that while it is commonly accepted that universities disseminate knowledge through teaching and publication, what he termed "the third way" was less frequently acknowledged. The third way of knowledge dissemination includes such activities as: student placements, consultancy, contract research, continual professional development, licensing and company creation.

27. Each one of these activities represented an important mechanism for disseminating knowledge created at a university. At the same time, the principal justifications for each of these university activities varied, with some more justified for being in the public interest, others for academic reasons and others for profit generation.

28. University start-ups that are formed as student companies are most justifiable as being in the public interest, *i.e.*, they are a place for fostering an innovative culture and their success shouldn't be gauged in terms of profitability. Game Ninja, Scotland's first online video games rental business, and Hot English Russia were mentioned as examples. Both were Glasgow University student ventures. Venture capital start-ups, on the other hand, should be judged by their profitability. The University of Glasgow recently launched such a spin-out company from the Department of Psychology to develop a range of diagnostic and monitoring systems for Central Nervous system (CNS) disease states.

29. Mr. Cullen further cautioned universities to be clear about how they judge the success of university start-ups. University finance directors, who largely focus on revenue streams, will have considerably different views of success than regional governmental officials, who largely focus on the regional economic development impact. He depicted these two types of start-ups as outcome oriented and outreach oriented. In his opinion, universities should do both types of start-ups, but "Know what you're doing and why", he advised.

b. Why do some universities generate more start-ups than others?

30. Using a recently published paper on university spin-outs¹ as a basis for comments, Brian Graves (Imperial College London Innovations) discussed why universities create spinouts and examined the principal factors that influenced university success in spinout generation. The paper identified four principal factors in determining spinouts:

¹ Di Gregorio, Dante and Shane, Scott, "Why so some universities generate more start-ups than others?," Research Policy, Vol. 32 (2003), 209-227.

1. The eminence of the university;
2. The university's policy on sharing licensing revenue;
3. The university's policy on equity;
4. The availability of financing and venture capital.

31. Mr. Graves suggested that, while these factors certainly influenced university spinout generation, a deeper examination of the reasons for creating spinouts might lead to other insights and a better understanding of successful university programmes. He stated that knowledge dissemination is an important university role and that spinout creation can be viewed as an extension of that role.

32. University spinouts are created to take technology to market which satisfies a technical / commercial need profitably and is attractive to investors that have appropriate attitudes to risk and reward. In doing spinouts, a university TTO needs to address how it establishes the technical feasibility and market need for its technology. This in turn requires that university TTOs understand the barriers within companies and spend some time in educating companies.

33. The establishment of university spinouts also meant that the university researchers who had created the new technology faced a significant culture change – a move from the laboratory world to the business world. He counselled that university researchers accept that new managers would be brought in for the management of the spin-out. As for the TTO, Mr. Graves emphasised the importance of skill development in closing deals, as well as in other areas such as understanding the patent and legal issues and how to create value.

34. Establishing university spinouts requires a supportive set of government policies, especially in the areas of intellectual property, taxes, labour laws and the corporate framework.

35. Imperial College Innovations also takes advantage of its links with its business students and MBAs. It forms company teams on technology transfer (disclosure, etc.), new ventures (incubators, etc.) and asset management.

c. Making licensing agreements: lessons learned

36. Vladimir Zinov (Institute of Chemical Physics, Chrenogolovka) observed that pure licensing agreements occurred rather infrequently. The transfer of intellectual property rights usually accompanies a research and development contract. However, one peculiarity of Russian licensing practice is that when completing research and development work, as a rule, the party performing the contract does not discuss background intellectual property rights with the contractor – *i.e.*, those developments on which the contracted scientific-technical production is based. The settlement of this issue with the contractor, including payments for using the performing party's patents, is very important both from the point of view of the legitimacy of the use by the contractor of the intellectual property belonging to the performing party, which form the basis of the research and development results, and from an economic point of view as the real value of the production transferred to the contractor should take into consideration the value of the above indicated rights. On the other hand a licensing agreement quite often accompanies a whole package of tasks, such as the development of projects, training, the delivery of jobs and the inventor's supervision.

37. Of particular interest was Mr. Zinov's description of the schema for commercialising technology. The essential idea of this was the creation of a "product" or object of sales/purchase and also the formation of supplementary organisational structures oriented toward the preparation and adaptation of technology, *i.e.*, a "seller-organisation" and a "buyer organisation". The organisation-seller ought to develop and sell

technical documentation, technical knowledge and experience. The task of the second organisation (the organisation-buyer) is the preparation of production using the developed technology. The purpose of creating such structures is dictated by the fact that, as a rule, the organisation-developer and the organisation-buyer are not functionally capable of that kind of activity. The following conditions play a determining role in the accomplishment of this scheme:

- Strategic decisions by senior directors of licensee and licensor agreements;
- Demonstration and testing of prototypes and working models;
- Creation of a “third party” company and selection of an experienced director;
- Developing the vendor’s technology using his own resources according to the terms of the buyer;
- Long-term relationship of the buyer and vendor.

d. Methodological aspects of TTO work in the assessment of technology for start-up or licensing

38. Yu. A. Artyunov (Moscow Engineering Physics Institute) discussed aspects of a TTO’s technology assessment and how to join the benefits and deficiencies of partners, the university and the start-up, during start-up creation. Project management requires the interaction of both the start-up and the research organisation when conducting the evaluation of the marketability and commercial potential of technology. As to the choice of various ways to commercialise technology – creation of a start-up or the conclusion of a licensing agreement – he suggested a method based on the evaluation of the income of the licensor under various alternative situations.

e. Start-up creation and oversight. The Nizhnyy Novgorod experience

39. Sergey N. Ershov (Nizhniy Novgorod State University) summarised the experience of the Niznyy Novgorod Technological Innovation Centre in overseeing of projects accomplished under the START programme.

40. The basic forms of overseeing start-ups are:

- Consulting, teaching and training;
- Monitoring the completion of projects;
- Specialised services, including seeking investors;
- Resolution of intellectual property issues, including patenting;
- Conducting research and development work;
- Direct management.

41. The speaker emphasised the timeliness of such support forms for start-ups as “direct management”, *i.e.* the selection and assigning to start-ups of managers capable of guaranteeing the success of the project. The demand for this service is determined by the differences in managing research and

development and managing start-ups, from the point of view of a business model and the personality type of a scientist and an entrepreneur.

f. The collaboration of TTOs with small businesses, created with the help of the FASIE programme – The Ekaterinburg experience

42. Dr. Vesvolod Kortov (Director, Institute of Innovation and Marketing, Urals State Technological University – USTU) explained that the TTO from USTU participated in preparing 15 START applications and according to the results of the fourth round, the USTU researchers received financing for ten projects. The first project competition revealed, on the one hand, the high creative potential of the developers and on the other hand, that the majority of scientists were poorly oriented toward business. To resolve these problems, TTO specialists conducted a series of seminars and consultations on marketing issues, the management of intellectual property, business planning and the management of innovation projects. In addition, the TTO aided spin-outs in preparing business plans, designing presentation materials and accompanying developers to Russian and international fairs.

43. The involvement of the developers and the help of the TTO introduced changes into the structure for financing the projects – funds from other investors were added to the funds from the START programme.

g. Working with university start-ups: problems and prospects

44. Ivan M. Bortnik (Director, Foundation for Assistance to Small Innovative Enterprises – FASIE) presented some general statistics and described several tendencies and issues related to accomplishing the goals of the START programme. Out of 2 762 applications made to the START competition, 474 projects were financed at a cost of RUR 375 million. Thirty per cent of the START-funded developments were created at universities. Mr. Bortnik emphasised the largest flow of applications came from regions with active infrastructures that support technological innovation. He also stated a desire to establish a database of university intellectual property.

General Discussion

45. According to some participants, many Russian university leaders hold the general opinion that start-ups ruin a university's structure by offering scientists alternative careers and giving them the chance to earn money through their own businesses. The basic way to resolve this conflict is by broadening the university leadership's knowledge, establishing internal procedures for technology transfer and seeking a consensus that is based on the understanding that start-ups are a necessary step for transferring technology to industry. The understanding that start-ups are one instrument in achieving the chief mission of universities – the dissemination of knowledge – should be a new element of university culture.

46. While a university cannot control absolutely all of the knowledge which it generates, sometimes creating start-ups is its only real choice and the immediate problems concerning property rights for intellectual activity require a legal formulation of the relationships. The importance of establishing formal contractual relationships between universities and start-ups for the use of IP was raised, and it was noted that using an informal letter from a university official giving a company permission to use technology that belongs to a university (as is required by the START programme) was no substitute for a legal document. Moreover, it does not suit investors at all. The sole legal form for the transfer of intellectual property rights is a contract registered according to the established legal procedure.

47. In discussing how best to “manage” university inventors, it was agreed that one should not manage them – more accurately one should speak of influencing them. In this light, it is especially

important that the university's policy for technology transfer be clear in the area of providing for a fair level of rewarding inventors and for an active support for the technology transfer process.

48. While discussing the significance of managing conflicts of interest, the need to promote good relationships between inventors and the university was recognised, *i.e.* one should take away barriers and provide inducements. Establishing a good climate for such relations was considered especially important. Furthermore, it is crucial that universities establish the details – of particular importance the definition of how the income from university technology will be divided before an income stream occurs.

49. During further discussion of resolving conflict of interest issues between a university and a start-up, one Russian participant noted that since 1992 USTU – UPI had created about 25 start-ups and at the same time many people thought these firms were “stealing” from the university. This was not the case. The start-ups' managers were university department heads and, in spite of the fact that the agreements between the parties were more of a moral character, the start-ups made a noticeable contribution to the university's development. Relative to this circumstance, it was thought that FASIE was mistaken to insist that directors of a new company created within the conditions of the START Programme leave the university. This observation was supported by other participants.

Session 3: Financing Innovation and Entrepreneurship at Universities

Types of financing for university start-ups

50. Robert Okabe (Managing Director, RPX Group LLC) distinguished the following principal types of financial support available to university TTOs:

- Direct participation, with the use of the university's infrastructure and its personnel;
- Indirect support, whereby the university offers joint help with other organisations (such as government or business);
- Sponsored activities, where providers are screened by university and expect lower than market returns as they receive other benefits;
- Independent efforts, which reflect current market returns for providers.

51. A university's policy commitment to support innovation plays an important role when financial support is realised through direct participation. In this case, the university draws on its academic resources by tapping the inventor's academic unit and other support components, such as its other academic departments, TTO, legal department and financial investments (endowment). Mr. Okabe emphasised that a university policy to be directly involved in entrepreneurship must be detailed in a university's mission statement. In these types of financing, he has observed a direct link between greater university support and a greater university equity share.

52. The indirect support generally uses a university joint venture or other structures. The joint ventures are frequently with a federal or local government entity, or with business. The support for technology transfer via infrastructure is achieved through incubators or laboratories. Other indirect support comes via services, grants or capital contributions. Typically such projects have a large knowledge dissemination component. Mr. Okabe cited several cases in which the university's contribution to a project proved crucial in getting the state to contribute.

53. Using independent support required that the technology transfer project meet strict marketplace performance requirements, with a full return on capital or services used. The sponsor's involvement was limited to its reputation, and financing often required venture capital, an exchange of rent for equity or obtaining professional services on a reduced-fee-for-equity basis. In general the university does the screening of sponsors as researchers do not usually have the necessary background for this.

54. Venture capitalists usually become involved in financing mature projects when "the child leaves the nest". Such capital-raising efforts are highly professional tasks and outside university structures. He also noted that there is a direct relationship over time between a growing university return on a project and a declining university involvement.

55. Mr. Okabe briefly described how the University of Chicago draws on all four types of financial support in conducting its technology transfer programme. The various technology projects are all managed by its active TTO. In his work with the University of Chicago, he estimates that about one out of every 200 business plans are funded, thus he stressed the importance of relationship building when looking for funding. Further, he noted that only about three-fifths of the University of Chicago's start-ups become successful. Emphasising the sobering arithmetic, he summarised by noting that the above rates suggest that out of 2000 business plans, ten will be accepted and four of those ten will fail. He suggested that universities carefully look for non-cash types of support whenever possible. The University of Chicago has established a successful technology transfer programme by making careful choices in its search of financial support.

The ABC of financing on the basis of intellectual property

56. Ms. Roya Ghafele (World Intellectual Property Organisation – WIPO) noted that the willingness of investors to finance projects that had future intellectual property potential depended on their understanding of the commercial potential of intellectual property. During her presentation, Ms. Ghafele carefully outlined the potential sources of capital, the intellectual property investment criteria and how intellectual property should be factored into business and research plans. She noted that many universities needed to move from a protection view to an assets view of intellectual property. Moreover, they should also understand the importance of leveraging intellectual property as a means of economic development.

57. During her presentation, Ms. Ghafele described her organisation's University Initiative, which seeks to enhance technology transfer from universities to industry and to create a better awareness of the intellectual property system. It currently counts 35 countries and 45 universities as participants. Participants are given a toolkit on intellectual property management. Although no Russian university is currently a member, she noted the willingness of WIPO to hold relevant seminars.

The university seed fund: Oxford University's experience

58. While Oxford University is over 900 years old, Tim Cook (Managing Director, Isis Innovations) explained that its technology transfer company began in 1997 after fifteen years of internal negotiations. Isis Innovation is 100 percent university owned and helps staff members who *wish* to commercialise. The long negotiation period in the formation of Isis reflects, according to Mr. Cook, the importance of recognising that universities are defined by their great academics, not their administrative and support staff, and that university policies on technology transfer need to have the support of their researchers to be successful. He noted that basic elements of Oxford University's policies are the following priorities:

- The rights to research conducted by employees or students belong to the university;
- The university aids researchers who wish to commercialise their developments through patenting, licensing, the creation of spinout companies and consulting;

- The advantages to researchers include receiving part of the licensing royalties, part of the spinout company's capital and related consulting contracts;
- Isis Innovations pays for the patent costs, covering them from the royalty incomes. Furthermore, it retains 30 per cent of royalties and transfers any net revenue to the university, which distributes it among the inventors, the department and the university.

59. Oxford changed its approach to technology transfer with the establishment of active seed funds in 1998 and saw the number of spin-outs increase dramatically. The Oxford University Challenge Seed Fund, which also includes non-university funding, resulted in 21 spin-outs, four completed licensing deals and 35 active technology projects. A subsequent Isis College Fund was launched to fund further spin-outs.

60. Isis relies on getting outside managers for its spin-outs, as commercialisation requires significantly different skills from those of a successful university researcher. At the same time, Isis recognises the importance of maintaining the technology interchange between the university researchers and the research director of the spin-out company. Oxford has a 30 day per year consultancy limit on its university researchers, and this limit seems relaxed enough to permit on-going technical consultations between the spin-out and the university research group.

61. In closing, Mr. Cook stressed two important aspects of university TTOs. The first role he named was their lighthouse role and the second was their role in effecting a culture change. TTOs should act as a lighthouse to attract researchers – they need to be active in attracting the attention of the university's research staff by doing public relations, training and participating in the researchers' world. TTOs should provide a contact point for researchers and potential investors. As a technology transfer resource, the TTO needs to promote the development of the university's entrepreneurial culture and its local professional environment. Support from the head of the university is critical to achieving this culture change.

Russian venture capital as an instrument for financing innovative companies

62. Ms. Oksana Mironova (Project Manager, Russian Association for Venture Investing – RAVI) presented a short overview of the latest trends and problems in forming a Russian market for venture capital. According to Ms. Mironova there are currently about 50 venture funds in Russia. The growth of venture capital funds has slowed. From 1994-1998, they recorded almost USD 3 billion in assets; from 1999-2004, USD 1 billion. At the same time the share of Russian investments has increased in comparison to foreign investments. The average size of a deal was about USD 7 million, which to her indicates that the Russian venture capital market represents more a fund that invests in existing companies and very reluctantly invests money in the early stages of the development of a business. Nevertheless, an increasing interest in investing in the earlier stages can be observed, which she termed the "venturisation" of the industry, as the opportunities to invest in already functioning businesses are ending and investors are showing a willingness to take the risks associated with investing in young companies or those companies being started in incubators. Nevertheless, the group of early and seed companies continues to lag significantly behind those companies that are expanding.

63. Ms. Mironova considered it noteworthy that in the last few years there was a clear trend for Russian capital to enter venture business. Russians are becoming an important source of venture capital and of management for venture funds. Internal organisations at large corporations are being created to conduct venture investing, such as IFK OPK (Venture Fund for the Aerospace Corporation), Alpha Group's "Russian Technologies", venture groups at Lukoil and "Basic Element". In 2003-2004 funds were created along regional (Perm Fund for the Creation of Venture Investing) and industrial sector lines (Innovation Venture Fund for Aerospace and the Defence Industry).

64. In July 2004, on the initiative of RAVI, a telephone survey was conducted with the goal of studying the readiness of start-up company developers and researchers to work with venture capitalists. The survey was conducted using a database of the Centre for Scientific-Technical Information, "Russian Scientific-Technological Developments". It was determined that practically half of the surveyed companies claimed they needed investments of at least USD 500 000, but 23 per cent of the surveyed companies claimed they needed investments of less than USD 100 000. Ninety per cent of the respondents were hearing about venture financing for the first time. Moreover, those very companies that tapped into venture investments encountered definite problems.

65. The chief reason for the negative results of discussions between companies looking for venture investments and investors were, in the view of the venture funds, disputes on the methods for evaluating the price of the target company – 43 per cent of investors raised this issue. The essential problem appeared to be the principal unwillingness of the entrepreneurs to give up the controlling shares in a situation when the volume of requested investments and the evaluation of the company's worth resulted in a transfer to the investor of more than 51 per cent of the company's shares. Moreover, it was obvious that the higher the level of the risk, the greater the share of the company which investors wanted, maximizing in such a way the potential profits and increasing the degree of their participation in the management of the company (12 per cent wanted a controlling share as a minimum, 64 per cent a blocking share). In addition, the survey identified a low professionalism of management, including the low quality of their business plans, a lack of knowledge of market demand for the products and a lack of negotiating skills.

66. Many of the surveyed companies could not even imagine that such types of investors as venture capitalists existed. This fact substantiated the need for a more efficient distribution of information on the details and principles of venture investments, on the demands venture investors make on companies who seek investments.

67. RAVI has provided help on some of the above-mentioned issues in the context of venture fairs. The Russian Venture Fair is a project that RAVI has successfully realised over the past five years. During that time over 218 companies from 21 Russian cities and over 200 investors took part in the fair. The Venture Fair was a meeting place for companies and investors. It demonstrated the investment business and provided a place to exchange information on the investment climate conditions in the country.

General Discussion

68. In discussing the role played by university rectors in developing financing programmes for technology transfer, the participants observed the important role of the government in motivating university entrepreneurship. The German experience was noted as an example, where the government has participated in venture funds by supplying 40 to 50 per cent of the capital and encouraging private venture capital to make up the rest. While neither the federal nor regional governments participate directly in spin-off companies, changes to this approach are being discussed.

69. According to one participant, the flow of oil money into the state budget has proven particularly problematic and holds back the development of innovation activity in Russia, for it has numbed officials to the importance of rejuvenating Russian industry through innovation. In spite of this and the incomplete legislation covering venture capital financing, the market for venture capital as a system of non-secured financing is growing in Russia. Moreover, the group of Russian business angels has become quite large. The average return from such investments is about ten per cent. However, the market for financing the early stages of technology businesses continues to develop. The major ways that venture capital exits from the business are the sale of stock to management and to strategic investors.

70. The essential difference between seed and later stage venture financing was noted. Seed venture capital investments carry an extraordinarily high risk. Seed ventures needed a bridge and a non-cash way to get them to later stages of development to attract venture capital. Only by reducing risk, would one be able to get venture capital to come in at an earlier stage.

71. In discussing the outlook for financing the early stages of innovation projects, participants agreed that currently (while innovation activities are not formally within Russian universities' mission statements) the creation of seed funds at the majority of universities was unrealistic. Business, which is the most realistic source of financing innovation projects, still remains largely uninterested in them. Thus, while universities absolutely need seed funds, the only realistic hope for state seed funds is through organisations like FASIE.

72. During the discussion of foreign experience in financing technology transfer, it was noted that foreign universities do not find the search for licensees or investors in Europe or the United States much easier than their Russian counterparts. Further, foreign universities encounter the same problems, *i.e.* "repairing the university's library roof" is always more important for university administrators than is commercialising a new technology. Innovation comprises less than one per cent of a university's research budget.

73. Developing good relationships and understanding between the leading scientists and the university administrators is important for a university's technology transfer programme. One participant noted that it was extremely important to organise the financial support of innovation from the side of the researchers. For example, at Petrozavodsk University they earmark for innovation a part of the funds that come in from university contracts. Such support is especially directed toward graduate student innovation projects.

Session 4: Possible changes needed to promote university entrepreneurship in Russia

Regional changes: the experience of the Far East

74. Evgeniy V. Pokanevich (Far Eastern State University) reported that the Primorskiy Area has created a "Council for Scientific-Technical and Innovation Policies" in the office of the President's Executive Representative to the Far East (DVFO). Representatives from higher education institutions, the Far Eastern Branch of the Russian Academy of Sciences and the regional government administrations are represented in the council. As the academy organisations are too widely dispersed, universities play the most important role. The council has developed a regional policy for developing an innovation system for the DVFO.

75. The region's policy efforts have shifted from creating the infrastructure units, such as university TTOs, to taking more direct measures to support innovation. Nevertheless, it remains problematic to have continuous support at the local level.

76. The governor of the Primorskiy Area has issued several decrees in support of innovation, including: the creation of special economic territories that financially support innovative start-ups; provision of special certain tax breaks, rent subsidies and grants; and training personnel for start-up management. The implementation of these programmes is reportedly uneven; for example, some of the grants didn't motivate innovation and resulted only in a series of formal reports.

77. Twenty four regional enterprises also successfully competed for START projects, of which two are managed by graduate students. The universities are proving to be a focus for training resources for successful innovation managers.

Regional changes: the experience of the Northwest

78. Genrikh Stefanovich (Petrozavodsk State University) noted that Russia lacks a proper legal-regulatory basis, both federal and regional, for supporting innovation activities. The regional government gave Petrozavodsk State University the responsibility for developing the regional innovation system, including: development of the legal basis, establishment of an infrastructure, initiation of international cooperation, development of finance methods and education. Mr. Stefanovich noted that the region's budgetary means were limited, but it was looking at developing private financing and engaging in some financing for small and medium-sized enterprises. There was also co-operation with Finland in helping some of the region's start-ups begin in Finnish techno-parks.

79. Most of the university's efforts in technology transfer have focused on teaching. In addition there are university-industry consortia, e.g. with the Koistamukshkiy Mining Kombinat, the Nadvoitskiy Aluminium Factory, the Segezhskiy TsBK and the Onega Tractor Factory. The university has also engaged in some licensing and start-up work.

Fostering coherence between TTO strategies and government policies to improve industry-science relationships: some lessons from the OECD countries

80. Mr. Mario Cervantes (OECD) referred to the research conducted by the OECD on national science policies and his own research on university technology transfer policies to reach some general conclusions about the evolving policy framework.

81. He outlined several key messages, namely that:

- The context for public and private research is changing internationally;
- Government policies need to evolve to support research and innovation in this new global context;
- Policies to support industry/science relations are becoming more important, but require further adjustments;
- Legal frameworks, while important, are not sufficient to foster technology transfer;
- A wide-range of innovation policies are necessary to improve TTO performance;
- Getting an appropriate “innovation policy mix” remains a challenge as there are many possible combinations of regulations, policies and incentives.

82. According to OECD data, gross domestic expenditures on research and development (GERD) as a percentage of GDP have grown in most OECD countries. At the same time, the data show national policies shifting away from direct support to business research and development – such as subsidies – toward more indirect support measures such as tax incentives and public/private partnerships. Furthermore, public research funding has expanded more in the higher education sector than in national laboratories.

83. This environment has led to a greater interest in establishing university TTOs, with some OECD countries making legislative changes. For example, the success of the U.S. Bayh – Dole Act, which gives universities ownership of intellectual property rights from government-funded research, has influenced legislative changes in Japan, Germany and Korea. In addition, Austria, Denmark, Germany and Norway have reformed their employment laws, abolishing “Professor's Privilege” at universities. Canada and

Ireland have issued National “Codes of Practice or “Intellectual property policy guidelines” relative to ownership and royalties.

84. Private corporations are also changing their research and development model, shifting away from a virtuous circle/linear model to a more open one. Instead of depending entirely on research and development done “in house”, firms are increasingly reaching out to external sources and using licensing, corporate venture capital, mergers and acquisitions, and collaborative research as sources of innovation. This trend is reflected in the increasing total number of university-industry collaborative papers and in the greater share of industry’s scientific papers published in collaboration with university researchers.

85. OECD research on university patenting reveals that university TTOs are a relatively recent phenomenon, with most of them less than ten years old and relatively modest in size (generally less than five full time staff members, although the U.S average is 10 to 12). Moreover, most university TTOs are integrated into the university and perform other functions, such as managing research contracts. In addition, studies have shown that informal relations are the main channel of technology transfer (such as the university’s or researcher’s contacts). Mr. Cervantes’ research has found that university intellectual property policies need better dissemination, including amongst faculty and students, and the establishment of administrative or legal requirements on invention disclosure. In addition, some barriers not related to intellectual property remain.

86. Subsidising patent and licensing costs, establishing technology transfer networks and developing training and awareness are some of the principal OECD government initiatives in supporting university and other public research organisation intellectual property management. In short, OECD governments are making efforts to link TTO strategies to broader innovation policies.

Entrepreneurial education

87. Paul Waugaman (Technology Commercialisation Group LLC) observed that entrepreneurship is generally learned in business schools, engineering schools and technical universities and by doing it, *i.e.* through the so-called school of hard knocks.

88. In business schools the curriculum for entrepreneurship focuses on how finance, marketing, sales and management all work in small enterprises. They also include some practical experience by providing field internships. Nevertheless, business schools entail some drawbacks for entrepreneurs for these schools require two years of study, are expensive, do not always concentrate on entrepreneurial issues and can show no proven correlation between the formal education received and later entrepreneurial success.

89. Engineering schools and technical universities, in addition to offering a core technical curriculum, provide some teaching on how to: conduct research and development in a small company environment, compete successfully and gain practical experience. On the other hand, technical university training is usually informal and secondary to its technical curriculum.

90. Entrepreneurs often learn through practical experience, or the school of hard knocks, even if it sometimes results in expensive mistakes. The experience they gain in this “school” is more useful and, as a rule, more important than any theoretical study of entrepreneurship. The results of learning achieved by working in a real business indicate that entrepreneurship is more a personal psychological gift relating to an individual’s temperament than it is the results of university study.

91. University leadership can help the process by encouraging lifetime learning so new skills can be taught, challenging faculty members to think “outside the box”, and by including regional and community economic development in their university’s stated mission, as many American universities are now doing.

92. In Mr. Waugaman's view, a TTO should not be teaching entrepreneurship. A TTO's basic training tasks should focus on teaching researchers the basics of innovation, forming an innovation culture, evaluating the commercial potential of inventions, seeking potential licensors and the accompanying licenses. According to Mr. Waugaman a TTO shouldn't try to teach entrepreneurship to the research faculty. The efforts of some faculty members to manage new business can prove fatal for the business, *i.e.* the business model for a start-up company is very complex to achieve. Scientific-technical issues are no less complicated, but researchers should concentrate on them.

The formation of the Eurasian Association of Technology Transfer Managers

93. Dmitry B. Shulgin (Urals State Technical University) observed that that technology transfer managers play a key role in the process of transferring the innovation developments of universities, academic institutes and other research organisations in industry. They are professionals capable of managing the process of creating innovations and transferring them from research laboratories to industry. Technology transfer manager is a relatively new specialty, which is still not taught in Russian institutions of higher education, and the lack of such professionals is now one of the most significant factors constraining the development of innovative activity in Russia.

94. In conditions when specialists are necessary today and higher educational facilities do not offer a corresponding specialisation, one of the most efficient ways of forming a profession of technology managers is by creating a professional association to disseminate successful practices in the area of commercialising technology and by providing professional training (improving skills and professional retraining) for technology transfer specialists. This is equally important for the creation of stable links between universities and industry. Such associations already exist in Europe (ASTP), the United Kingdom (AURIL), the United States (AUTM) and the countries of south-east Asia and Australia. In particular the American association for technology transfer managers celebrates its thirtieth anniversary this year and has reached 3 000 managers. The basic forms of such associations are conducting conferences, seminars, training, publishing newsletters and even information and consultancy help for specialists on technology transfer.

95. In June 2004 at Ekaterinburg's Urals State Technological University, a working meeting, supported by CRDF, established the Eurasian Association of Technology Transfer Managers. The group's initiative united nine institutes and higher education schools from Russia and the CIS. The initiative group established the association's mission as developing the profession of technology transfer manager by disseminating successful experience in commercialising intellectual property and by creating stable links among scientific and scientific-teaching institutes and industry for the creation and use of the results of scientific activity. The basic task of the association is to:

- Support the association's members by using and developing a network of contacts for the resumption of relations in the scientific and technical spheres among CIS countries;
- Provide legal help on questions of patent law and licensing;
- Prepare and help the association's members establish an educational programme for technology transfer;
- Provide free access to annual information surveys on licensing agreements, on the dynamics of patenting, the exchange of ideas and practical experience with Russian and foreign professionals in technology transfer;

- Aid the acquisition of professional training and greater skills in Russian and foreign education establishments that have teaching programmes on technology transfer.

General Discussion

96. The larger part of the discussion centred on how a university can establish and develop an innovative culture. Participants emphasised the importance of studying the questions of technology transfer as part of the curriculum for technical and scientific specialties, as well as within Masters programmes. Moscow State University's (MGU) experience was viewed as a possible alternative to special programmes for technology management. At MGU the Chemistry Department also includes teaching innovation-related topics in its Masters programme. In addition, it was judged advisable to take on a programme for providing university teachers with retraining on innovation.

97. Injecting elements of practical training in the curriculum was also considered. A number of universities, taking into consideration a high interest among students in founding their own businesses, actively incorporate the preparation of a business plan as part of the coursework. The discussants also noted that practical elements could come from university-related techno-parks and start-ups, both of which provided excellent opportunities for preparing specialists and managers.

Conclusions

98. The representative from the CRDF offered a brief summary of the discussions, noting that they were comprised of an excellent exchange of ideas and opinions on how to support the development of an innovation culture in Russia. The workshop was not meant to reach definitive policy conclusions or decisions. It sought to bring together experts working on these issues as a way of helping them to develop their own innovation programmes. The CRDF representative encouraged participants to maintain communications with the CRDF and OECD on what types of programmes would be useful in the future.

99. A representative from USTU, noting the instructive value of the presentations and discussions, suggested that they be published as a special edition of the official "USTU – UPI Bulletin". The representative from the OECD offered his organisation's support in the task. He noted that rapid progress seems to be occurring in developing innovation programmes at Russian institutions of higher education and thanked the participants for their efforts at making the workshop a useful exchange.