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**Facilitating the effective regulatory protection of intellectual property rights
and strengthening their role in innovative development**

Synopsis of good practices and policy recommendations on the management of intellectual property in open innovation

Note by the secretariat

I. Introduction

1. The Programme of Work of the UNECE Committee on Economic Cooperation and Integration (CECI) for 2009-2010 mandates the secretariat to prepare a Synopsis of Good Practices with a tentative thematic orientation on commercialization and protection of intellectual property rights (IPRs) in universities and research organizations to be submitted for consideration at the fifth session of CECI. Based on experience gained and feedback received by the secretariat from stakeholders in the course of capacity-building activities in 2009 and 2010, the thematic orientation of the Synopsis has been concretized to focus on the commercialization of IPRs in public research organizations and innovative enterprises in the context of cross-border open innovation.

2. The present document draws on the main conclusions of the Conference “Intellectual Property Rights Enforcement: the Role of Intellectual Property in International Research and Development and Knowledge Transfer”, Geneva, 8 and 9 July 2010. The Conference was the Substantive Segment of the fourth session of the UNECE Team of Specialists on Intellectual Property.

3. The document is structured as follows. The second section discusses international trends in cross-border open innovation and the drivers behind them. Section III summarizes the main challenges which cross-border open innovation poses for intellectual property management and policy. Section IV presents an overview of international good practices and policy recommendations on how to overcome these challenges. It addresses good practices and policy recommendations for innovative companies, research organizations, governments, as well as the scope for international cooperation in this field.

II. Cross-border open innovation

4. Innovation is the key force driving economic development and prosperity. Innovation in turn is based on the creation of new, economically relevant knowledge. With the rise of digital information and communication technologies and the world-wide web, the cost of generating and transmitting knowledge has fallen significantly. This is true particularly of the cost of communicating across borders. And this trend is projected to continue, if not accelerate, over the next decade. As a result, the rate at which knowledge and information is generated has accelerated significantly and is expected to continue doing so.¹

5. After the globalization of supply chains and production networks through foreign direct investment (FDI) and the off-shoring of production processes and foreign sourcing of inputs, we are now increasingly witnessing the opening up and the internationalization of research, development and innovation through cross-border cooperation in academic and applied research and development (R&D), cooperation between science and industry, and within leading multinational companies which set up R&D centres or source R&D and technologies in different parts of the world.

6. While the overall share of enterprises engaging in cross-border open innovation remains relatively small,² there are a number of intellectual-property-related indicators that document the growing trend and the current significance of cross-border open innovation.

7. One indicator is the fact that in 2009, a quarter of all patent applications processed through the Patent Cooperation Treaty were submitted jointly by applicants from different countries.³ Also, the share of foreign applications in all applications was 44 percent in 2008, up from some 30 percent in 1990.

8. Another indicator is the so-called technology balance of payments of a country which measures the extent to which the country participates in international transfers of disembodied market-ready technologies. It mainly measures sales/purchases of IPRs, licensing and royalty payments, and cross-border investments in industrial R&D.

9. In addition to these transfers of disembodied technologies, technologies can also diffuse from one country to another in the form of technologies embedded in imported machinery and equipment, or in the form of knowledge workers moving internationally (including expatriates sent by parent companies to work in foreign subsidiaries).

10. Payments and receipts of income from disembodied international technology transfers have risen steadily in the member countries of the Organisation for Economic Co-operation and Development (OECD) as a whole and the European Union (EU).⁴ It is

¹ According to a recent study, the amount of digital information alone has grown by 62 percent from 2008 to 2009. It grew by a factor of 5 between 2006 and 2009, and is projected to grow by a factor of 44 until 2020, as the cost of managing information declines to a fraction of a dollar per gigabyte (IDC (2010), *The Digital Universe Decade – Are You Ready?* <http://www.emc.com/collateral/demos/microsites/idc-digital-universe/iview.htm>).

² According to a recent enterprise survey carried out by Eurostat, the average share of enterprises engaging in international sourcing of R&D was 2.1 percent in the period 2001-2006 (Eurostat *Statistics in Focus 4/2009, International Sourcing in Europe*).

³ This number has increased from 9 percent of all applications since 1990 (World Intellectual Property Organization (2010), *World Intellectual Property Indicators* http://www.wipo.int/export/sites/www/ipstats/en/statistics/patents/pdf/941e_2010.pdf).

⁴ OECD Science and Technology Scoreboard 2009 (<http://www.oecd-ilibrary.org/docserver/download/fulltext/9209031ec049.pdf?expires=1284566704&id=0000&accnam e=guest&checksum=AADF262C7C0CE4FB488FC2FA1EDA36E7>).

important to emphasize in this context that what matters is not necessarily whether the technology balance of payments is positive or negative.⁵ A negative balance can be a positive result if it reflects large imports of technology by a country with a strong domestic capacity to absorb and adapt foreign technologies in the process of catching up to the global technological frontier. This is the case for instance in some of the new member States of the European Union. By contrast, a positive technology balance of payments could be a negative result if it reflected a lack of openness to foreign technologies and a lack of absorptive and adaptive capacities.

11. The trend towards increased internationalization of R&D and innovation is being driven largely by leading innovative companies that have come to the realization that “not all the smart people in the world work for us”. These companies have therefore decided to open up their innovation processes to allow for the in-flow and out-flow of inventions and technologies at all stages of the process.

12. Before, the traditional approach to innovation was to rely mainly on in-house proprietary R&D and to be wary of anything that was “not invented here”. The open-innovation approach reverses this and actively seeks to tap into knowledge and technologies that were “proudly invented elsewhere”. This is achieved by cooperating in research and development with outside partners, such as research organizations or other innovative companies, and by buying or licensing in existing technologies.

13. At the same time, “open innovation” means that the company is also always open to the possibility of selling or licensing out technologies that were invented in-house, but which the company does not want to commercialize, be it for lack of resources, or because the possible applications do not fit the company’s core business model.

14. Because the main rationale for the open innovation approach is to be able to tap into as big a pool of outside talent and knowledge as possible, the approach is almost by definition international. Open innovation companies do not want to limit themselves to outsourcing and in-sourcing knowledge and technology only to and from partners within their home countries.

15. Just as not all the smart people work for any given innovative company, so not all the smart people live in a given country. And so just as leading innovative companies can benefit from cross-border open innovation by cooperating with some of the smart people not working for them, so countries can benefit from cross-border open innovation by enabling their domestic researchers, inventors and innovative companies to cooperate with their foreign peers.

16. National innovation systems typically lack the scale to be efficient and competitive at a global level in all, or even any technology fields. Even the European Union, which is the leading global producer of knowledge as measured by scientific articles, found that the national innovation systems of its members are lagging behind that of the United States in terms of knowledge transfer from academic institutions to industry and, as a result, in terms of commercialization success.⁶ The main reason is that the national innovation systems are too small and lack critical mass.

⁵ Typically, balances are small in leading countries, although both receipts and payments separately can be large. The average balance in the EU-15 and the OECD in 2006 was only 0.15 and 0.2 percent of GDP, respectively.

⁶ Surveys among US and EU universities indicate that US universities are significantly more active than their European counterparts in commercializing research results, as measured by invention disclosures, priority patent applications, options and licenses, and start-up companies.

17. In order to overcome this lack of critical mass at the national level, the European Union has made cross-border open innovation, i.e. creating the so-called Fifth Freedom (of movement of researchers and knowledge) and the integrated European Research Area, one of its priorities in order to close the innovation gap with the United States (US). Non-EU member States within the UNECE region face similar if not greater challenges from the lack of critical mass of their national innovation systems if taken in isolation.

18. Cross-border open innovation increases competition and hence the pressure for excellence in research, development and innovation. It holds the potential to accelerate innovative solutions to the problems facing modern economies and societies. It can make national innovation systems more efficient and can lead to increases in the return to investment in research and development. This in turn strengthens the incentives for such investments and leads to a higher R&D intensity and hence a higher knowledge intensity in the economy. In turn, this improves international competitiveness.

19. Because open innovation involves different partners, and frequently partners from different countries, it poses its own particular challenges in the management of intellectual property. The present note summarizes good practices and policy recommendations on how to overcome these challenges.

III. Challenges for IPR management and policy in cross-border open innovation

20. The role of well-defined, affordable and enforceable IPRs in an economy is to provide incentives to invest in innovation, support the emergence of markets for intellectual assets, and encourage the disclosure and thereby the dissemination of inventions and the diffusion of innovation.

21. It is important to emphasize that “open innovation” generally does not mean that this traditional role of IPRs becomes less important or irrelevant, i.e. that innovations, or the inventions underlying them, will be available to anyone for free. This may be the case, as for instance in open-source software development. But in most other fields, where R&D and the commercialization of research results require significant capital outlays, a sound management of IPRs, including and particularly in a cross-border setting, will be critical for open innovation to be successful.

22. The specific challenges which open innovation poses for IPR policy and management arise from the fact that open innovation involves either the generation of new intellectual property in cooperation between different partners, or the transfer of IPRs or of rights of use between different entities. Therefore, while in the closed innovation model the main purpose of IPR management is to obtain legal protection of in-house research results in order to be able to exclude competitors, IPR management in open innovation has to be able to balance the needs and interests of several independent parties.

23. Lack of awareness of the importance of IPRs and lack of competence in managing IPRs has been identified as a barrier to successful innovation and technology transfer in many countries with economies in transition. This includes capability problems of potentially innovative companies with preparing patent applications, among others. Existing advisory services offered to small and medium-sized enterprises are often inadequate as most of these services focus on patents and tend to cover only the pre-application stage. But there often remains a large gap in advice on how to use intellectual property more broadly in business strategies, including the use of non-patentable intangible assets.

24. Moreover, to the extent that open innovation is carried out across borders, additional challenges arise from the fact that IPR laws and rules are national. This means that the

parties engaging in cross-border open innovation need to be aware of differences in national intellectual property laws and rules, and need to find ways to achieve the above balance of interests while ensuring compliance with all relevant national laws and rules.

25. Acquiring the necessary expertise and negotiating IPR agreements across jurisdictions with significantly different rules can impose high costs on the parties involved. These costs may be an obstacle particularly for small and medium-sized innovative enterprises and academic institutions to participate in open innovation.

26. Reaching agreement on IPR management can be particularly challenging in collaborations between academic research organizations and industry because companies and academic institutions often differ in their awareness about the need for IPR protection, and in the priority they assign to protecting rather than immediately publishing research results.

27. Weaknesses in the legal and regulatory framework for IPR protection can reduce the incentives of companies to fund R&D, both in-house and in cooperation with research organizations at home and abroad. In some countries, such weaknesses are among the factors that lead to comparatively low contributions of the private sector to economy-wide R&D spending.

28. For governments, the international nature of open innovation implies that their national intellectual property systems will be measured against those of other countries. Robust national intellectual property laws and the ability to enforce them are factors influencing the decisions by leading global technology companies on the location of their research and development activities and their choice of partners for open innovation.⁷ The quality of national intellectual property law and practice therefore is a factor determining the extent to which a country will be able to participate in international innovation networks and the attendant knowledge transfer.

29. One of the main features of open innovation is the sharing of intellectual property with research partners. Since most innovation is incremental rather than truly revolutionary, it will typically build on existing intellectual property, particularly patents, of one or all partners. Cross-border open innovation therefore can be hampered if national intellectual property regimes do not adequately provide for the effective and affordable enforcement of foreign-owned patents.

30. One of the possible benefits of open innovation across borders is for an innovative multinational company to harness the local knowledge of foreign researchers or entrepreneurs to develop products specifically adapted to local conditions. The resulting product would then typically be marketed by the multinational company in the local market. This may require combining the intellectual property which protects the underlying technology, such as patents, with complementary intellectual property rights of the multinational firm, such as a trademark. The need to provide for non-discriminatory, effective and affordable enforcement therefore extends beyond patents to other forms of intellectual property rights.

31. At the same time, empirical evidence suggests that excessively broad IPR protection can be detrimental for foreign direct investment, knowledge transfer and hence innovation. Patent thickets (i.e. collections of patents in a given technological field obtained by a company with the intention of blocking competitors' R&D) and patent trolls (i.e. firms

⁷ For instance, a recent survey of U.S.-based electronics manufacturers found that concerns about weaknesses in intellectual property protection was the second most important obstacle to the offshoring of new product development activities (J. Dedrick et al. (2009), *Offshore New Product Development: Survey Results*. University of California Irvine).

which buy up large portfolios of low-value, non-practiced patents and then use them to threaten truly innovative companies with law suits) are examples of phenomena that can reduce the level of innovative activity and knowledge diffusion. This danger is particularly acute where pro-competition policies are inadequate.

IV. Good practices and policy recommendations

32. The following section offers good practices and policy recommendations for innovative companies, research organizations, and governments, and discusses the scope for multilateral cooperation in facilitating IPR management in cross-border open innovation.

A. Innovative companies and research organizations

33. The experience of leading innovative companies that have successfully embarked on open innovation shows that it is important to create an institutionalized policy of regular intellectual property audits in order to make sure that the company is aware about all the knowledge available inside, and knows about third-party intellectual property that might constrain the company's R&D and operations.

34. Along the same lines, successful open innovation requires developing an intellectual property management strategy which identifies opportunities to generate optimal value from existing knowledge by deciding which pieces to commercialize in-house, which pieces to make available for third-party commercialization, in which fields to invest in in-house R&D and where to license in or buy technology from outside, as well as how best to protect different types of knowledge, including through an international intellectual property protection strategy.

35. It should be emphasized in this context that not all innovation is technology-driven. A significant part is in improved business models or finding new applications for existing technologies. Hence, both auditing and intellectual property strategy need to include non-patent modes of IPR protection.

36. Leading open innovation companies also have clear policies on how to handle the intellectual property of potential and actual external partners. Good practice includes ascertaining that potential partners have obtained adequate protection of their own intellectual property so that the company can secure legal rights to the use of that intellectual property by negotiating a license with the partner.

37. Where the technology of the potential partner is still at a stage of development when it is too early to seek legal intellectual property protection, it is considered good practice to sign confidentiality and non-disclosure agreements before entering into negotiations about cooperation, and to educate the potential partner about the risks of disclosing confidential information, which might compromise the ability to obtain IPR protection at a later stage.

38. Research organizations and innovative small and medium-sized companies looking to partner with leading global technology companies in R&D need to be aware not only of their domestic IPR frameworks, but also of international IPR protection strategies and how to properly manage both the intellectual property they contribute to such cooperation and the intellectual property that results from it;

39. Research organizations seeking to partner with industry need to develop a policy for effective intellectual property management, covering goals, rules and procedures, incentives for university staff, and awareness raising and training measures. The policy needs to be in line with the overall mission and long-term strategy of the institution,

including education and basic research. The policy should also be communicated clearly both internally and externally.

40. The intellectual property management policy should include clear rules for addressing issues such as:

- (a) Researchers and staff regarding the disclosure of research results to the university's knowledge transfer professionals for potential intellectual property protection and commercial exploitation;
- (b) The ownership of research results;
- (c) Keeping proper records of research activities, so that the contributions of different participants can be documented;
- (d) The management of potential conflicts of interest; and
- (e) Engagements with third parties.

41. Relatedly, research organizations should set up knowledge transfer policies focusing on the active transfer and exploitation of intellectual property and including guidelines for exploitation strategies and policies such as licensing and start-ups, access to professional knowledge transfer services, and appropriate sharing of financial risks and returns between the organization, its departments, its researchers and any outside partners. Like the intellectual property policy, the knowledge transfer policy should be in line with the long-term strategy and mission of the institution, and it should aim at maximizing benefits to society and the economy at large, including, where appropriate, the decision to put research results into the public domain.

42. In this context, it is advisable to develop a policy on publication and dissemination of research results, which manages the trade-off between broadly disseminating research results and accepting a delay in publication while options for IPR protection are being considered.

43. In order to make the intellectual property and knowledge transfer policies operational, it is good practice to provide appropriate incentives to all staff concerned. Such incentives may include financial benefits, but also career prospects, i.e. including success in generating and exploiting intellectual property among the criteria for promotion or tenure.

44. To facilitate commercial exploitation, it may be advisable for the institution to create portfolios of related patents in particular technology fields, or even to create intellectual property pools involving intellectual property generated by other public research organizations. This may reduce the costs for potential commercial partners of negotiating access to all intellectual property necessary for bringing a particular innovation to market.

45. The intellectual property and knowledge transfer policies should be broad enough to allow for all possible commercialization mechanisms, including licensing of intellectual property and the creation of spin-off companies, and for cooperation with all relevant potential partners, including existing small, medium-sized and large companies, other research organizations, financial investors, or public innovation support agencies.

46. Guidelines on licensing should be developed which spell out criteria for which kinds of licenses to grant (exclusive versus non-exclusive, global versus territorial, unrestricted versus restricted to certain applications, etc.).

47. Research organizations should regularly monitor and publish the results of their IPR protection and knowledge transfer activities in order to make their technological expertise, research capabilities and available intellectual property more visible to potential commercial partners and thereby to promote commercialization.

48. Additional rules should be established for the management of intellectual property in collaborative and contract research agreements, including across borders, i.e. for cases where industry partners provide funding and may participate actively in the research (rather than just licensing the results).

49. IPR experts should be involved in negotiating such agreements from the beginning in order to make sure that both the existing intellectual property (background) and the intellectual property to be generated during the project (foreground) are managed and used properly.

50. In collaborative R&D agreements between academic institutions and businesses, a good starting point is the principle that the party that has generated a particular research result should own the associated intellectual property. However, all partners should be granted access and user rights on terms that appropriately reflect the parties' respective contributions to the project and their needs for commercializing their own intellectual property. The IPR protection strategy, including whether or not to patent a particular invention, should be agreed among the partners. The division of responsibilities of the parties for protecting and enforcing resulting intellectual property rights should be established at the outset in the cooperation agreement;

51. In both licensing deals and collaborative research agreements, it is advisable to ensure that university researchers retain access to research results for further research in the future, and that the interests of university researchers in publishing their findings in academic publications are adequately balanced with the need for keeping results secret until patent applications have been filed.

B. Good practices and policy recommendations for governments

52. National innovation and intellectual property strategies need to be based on a solid evaluation of the economic situation and development priorities of the country in question. In order to be effective, innovation and intellectual property strategies also need to be designed and implemented in tandem with strategies to improve the business environment more generally.

53. Access to existing technologies, including from abroad, is a key pre-condition for innovation, since most innovation comes out of incremental changes to existing technologies, including their adaptation to the specificities of different local, regional and national markets. Success in innovation also depends on the ease with which the economy takes up new technologies and on the development of markets for new technology-based products and markets.

54. This means that it is important for governments to invest in strengthening national capacities for absorbing foreign technology in order to attract FDI and other forms of knowledge transfer and to benefit from the associated knowledge diffusion, and to put in place policies that foster the up-take of new technologies and the emergence of markets for innovative products and services.

55. By the same token, participation in cross-border open innovation is facilitated by general policies favouring economic openness and integration, including openness to foreign trade and foreign direct investment, and the international mobility of knowledge workers.

56. To maximize the benefits of participating in cross-border innovation, governments should aim to create or maintain a balanced intellectual property regime, which provides adequate incentives for research and development, while at the same time assuring that knowledge can diffuse and existing knowledge can be used as the basis for new research

and development. The right balance may depend on the level of development and the structural characteristics of the economy in question.

57. Governments should ensure that appropriate pro-competition regulations and policies are in place to complement the IPR system and to ensure that intellectual property rights will not be used to unduly block legitimate competition.

58. One way for governments to stimulate cross-border cooperation in R&D and commercialization while also promoting appropriate IPR management policies is through public research funding programmes. Such programmes can be designed so as to require or reward beneficiaries engaging in cross-border cooperation. They can also be designed to require beneficiaries to employ good practice for the use of intellectual property (background) and the exploitation of intellectual property (foreground). And they can be designed to provide financial support for intellectual property management and IPR protection.

59. Such support can be complemented with programmes which reduce patenting costs, particularly for innovative small and medium-sized enterprises. Special financial support for international IPR protection may also be warranted.⁸

60. Experience from many countries in the UNECE region suggest that there is a strong need for policies to strengthen the awareness of all actors (researchers, management of public research organizations, small and medium-sized enterprises, and policymakers) of intellectual property management issues and improve their understanding of existing laws and regulations and the special challenges of IPR management in international collaborations.

61. Voluntary guidelines on how to properly manage IPRs in open innovation can be useful to raise awareness of the issue and to stimulate discussion, to send a clear signal to stakeholders that proper IPR management in open innovation is a policy priority, and to establish minimum standards for this.

62. It can be useful for governments to establish, possibly in cooperation with other stakeholders, centralized IPR advisory services to which universities and innovative small and medium-sized enterprises, but possibly also larger companies can turn to clarify intellectual property issues in the context of cross-border open innovation.

63. In view of the fact that cross-border open innovation frequently relies on the sharing of existing intellectual property during research and development or on the deployment of complementary IPRs during the marketing of resulting products, governments should ensure a level playing field for domestic and foreign IPR owners in terms of enforcement.

C. Scope for international cooperation to solve intellectual property issues in cross-border open innovation

64. There is a growing body of experience available within the UNECE region, at the level of multinational companies, research organizations, innovative small and medium-sized companies, and government policies. There is therefore significant scope for

⁸ The costs of a patent application to the European Patent Office covering 12 member States and Switzerland are over 20 times higher than the costs for a United States patent application, and 13 times higher than the costs for a Japanese patent application. The costs of maintaining a granted patent in the 27 EU-member States are over 60 times those of maintaining a US patent (European Commission (2008), A more research-intensive and integrated European Research Area – Science, Technology and Competitiveness key figures report 2008/2009).

exchanging experiences, learning from each other and international cooperation in capacity-building.

65. Another potential area for international cooperation is the harmonization, where appropriate, of IPR laws and particularly the national rules governing intellectual property management at research organizations and in R&D cooperation between research organizations and industry in order to reduce the costs of obtaining protection across national borders and the costs of negotiating cooperation agreements between partners from different jurisdictions.

66. In recent years, a number of countries in the UNECE region have taken policy measures to improve the framework conditions for knowledge transfer from academia to industry in a national context. Such initiatives include the abolition of the so-called professor's privilege (i.e. the right of professors to claim ownership of intellectual property generated through research under their leadership), the development of commercialization guidelines, model licensing contracts, the creation of networks of technology transfer offices or agencies, the professionalisation of knowledge transfer. In order to make open innovation across borders a reality, these initiatives should be broadened to strengthen their international dimension.

67. At the level of the European Union, there are a number of initiatives to provide for trans-national coherence and compatibility, which can serve as useful examples for other countries. Some of these initiatives are also open to participants from non-EU member countries.

68. These initiatives include pan-European stakeholder associations (such as the European Knowledge Transfer Network ProTon Europe and the Association of Science and Technology Transfer Professionals (ASTP), and the Responsible Partnering initiative), the European Commission's Scientific and Technical Research Committee (CREST), and actions within the promotion of the European Research Area, including the European Institute of Innovation and Technology (EIT) and Marie Curie actions).

69. Specific initiatives to provide for a more coherent approach to IPR management in pan-European open innovation include the "intellectual property Charter for Europe", the European Commission recommendation on the Management of Intellectual Property in Knowledge Transfer Activities and Code of Practice for Universities and other Public Research Organizations (April 2008), and an associated European Council Resolution (May 2008), the intellectual property management rules for the 7th Research Framework Program, and the CREST toolkit to assist cross-border collaboration between industry and research organizations.

70. These documents contain key recommendations and good practices on creating a more coherent approach to cross-border intellectual property and knowledge transfer policies.

71. The EU CREST/ERAC Group on Knowledge Transfer is in the process of developing guidelines for knowledge transfer and intellectual property management in international R&D cooperation between the European Union and third parties.

72. There is scope for additional international cooperation in adapting and disseminating existing guidelines, recommendations and toolkits.

73. Given the negative impact which inadequate IPR enforcement can potentially have on cross-border cooperation in innovation, and given the significant and growing international trade in IPR-infringing products, there is also scope for additional international cooperation on strengthening IPR enforcement.