

Committee on Development and Intellectual Property (CDIP)

Twelfth Session
Geneva, November 18 to 21, 2013

SUMMARY OF THE WORKSHOP "INTELLECTUAL PROPERTY, THE INTERNATIONAL MOBILITY OF KNOWLEDGE WORKERS, AND THE BRAIN DRAIN"

prepared by the Secretariat

1. The Annex to this document contains a summary of a workshop on Intellectual Property, the International Mobility of Knowledge Workers, and the Brain Drain, undertaken in the context of the Project on Intellectual Property (IP) and Brain Drain (CDIP/7/4/Rev.) approved by the Committee on Development and Intellectual Property (CDIP) in its Seventh Session, held in May 2011. The workshop brought together experts on the topic of skilled migration and the topic of IP, both from academia as well as from international organizations.

2. *The CDIP is invited to take note of the information contained in the Annex to this document.*

[Annex follows]

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BACKGROUND

In 2007, Member States of the World Intellectual Property Organization (WIPO) adopted the decision that formally established the “Development Agenda of WIPO” with the aim of placing development at the heart of the Organization’s work. The decision consisted of the adoption of a set of 45 Development Agenda recommendations and the establishment of a Committee on Development and Intellectual Property (CDIP). The 45 recommendations are grouped into six clusters reflecting the main areas of focus of the Development Agenda. Cluster E, “Institutional Matters including Mandate and Governance”, included recommendation 39, which reads as follows:

“39. To request WIPO, within its core competence and mission, to assist developing countries, especially African countries, in cooperation with relevant international organizations, by conducting studies on brain drain and make recommendations accordingly.”

The project entitled “Intellectual Property (IP) and Brain Drain” (CDIP/7/4 REV) implements this recommendation.

In line with the activities foreseen under this project, this report summarizes the main discussion and conclusions of the expert workshop organized at WIPO premises, on April 29 and 30, 2013. Under the title “Intellectual Property, the International Mobility of Knowledge Workers, and the Brain Drain”, the workshop brought together experts on the topic of skilled migration and the topic of IP, both from academia as well as from international organizations. It discussed several themes at the cross-roads of these topics – the program and list of participants are included as annexes to this document.

The present document does not necessarily reflect the WIPO Secretariat’s view on the topics discussed, but the workshop participants’ expert opinion.

WORKSHOP SUMMARY

The workshop was structured along 6 different themes. For each theme, an expert was invited to write and present a survey paper. Additional experts from academia and from international organizations were asked to provide, for each paper, comments in order to enrich the workshop discussion and encourage debate.

Seven papers were presented in six different sessions. In turn, one can group the seven papers into three broad topics, namely:

- (1) Studying the international mobility of high-skilled workers: data availability, stylized facts and IP data for migration analysis.
- (2) IP and the international mobility of skilled workers: a framework of analysis.
- (3) Innovation, knowledge diffusion and the international mobility of knowledge workers.

1. Studying the international mobility of high-skilled workers: data availability, stylized facts and IP data for migration analysis

For many years, one of the main problems associated with the study of international migration, and the brain drain in particular, was the severe lack of data on migration flows. Despite efforts to collect data undertaken by some international organizations, data on

tertiary educated migrants or migrants in high-skilled occupations – which characterize the bulk of the brain drain, were virtually unavailable until relatively recently. This lack of evidence translated into a debate on the brain drain and its associated consequences for economic development largely based on conceptual arguments.

The availability of census data starting in the late 1990s prompted a new strand of empirical research. In particular, census data allowed estimating the number of immigrants and emigrants, by decennial censuses, across countries. The underlying methodology consisted of collecting data from the population census of the educational and occupational structures of the foreign-born. At first, new migration data became available for selected countries of the Organisation for Economic Co-operation and Development (OECD), but they are now available for a considerable number of countries, including beyond the OECD.

Among other things, the availability of data has enabled better understanding of what the exact consequences of the international mobility of skilled workers are both for receiving countries as well as for the sending economies. These data have also made it possible to investigate the potential feedback channels that can turn the brain drain into a gain for the origin countries as well – namely, return migration with skills acquired abroad, human capital accumulation due to the future prospect of migration, and diasporas supporting home country development. In light of this latter evidence, workshop participants emphasized that the term ‘brain drain’ is slightly pejorative in a context in which the emigration of skilled workers could also be beneficial for sending countries. They argued that migration experts hardly used this term any more and suggested to adopt a different terminology to describe the phenomenon of high-skilled migration.

Overall, figures from the 2000 census – the latest available – show the overwhelming attractiveness of developed English-speaking countries for migrants. Indeed, the United States (US), but also the United Kingdom (UK), Australia and Canada, are the largest recipients of high-skilled workers. Although other countries like France and Switzerland receive a significant number of scientists and engineers, the magnitude of the flows cannot be compared with the one involved in the migration towards those English speaking countries.

Despite the availability of census-based data for migration analysis, the discussions also highlighted several limitations. A critical one is that migration figures can only be computed every ten years. This is precisely because population censuses – which typically occur only every ten years – are the ultimate source of the data.

Another important limitation concerns the definition of tertiary educated workers (and migrants), which lumps together a highly heterogeneous set of skills. In particular, workshop participants pointed out that census data cannot say much about the specific case of workers in Science, Technology, Engineering and Mathematics (STEM) occupations – ‘knowledge workers’, and therefore complementary data sources need to be assembled.

One alternative data source is students’ international mobility information. Indeed, a large proportion of skilled migration occurs first through student visas: young individuals from around the world enroll in bachelor, masters or PhDs degrees abroad and, if they are not forced to come back, often look for a job in the same foreign country that hosted them as students.

Participants also highlighted the possibility to use information on the migratory background of inventors retrieved from patent data (patent-inventor data). Migration research has the potential to benefit from using this type of information. In part this is motivated by the fact that, in the last 20 years, there has been a remarkable increase in global flows of scientists and engineers, both in absolute terms and as a percentage of total migration flows. This

makes the use of patent-inventor data for the analysis valuable, because these data capture precisely a very specific subgroup of highly-innovative people. Moreover, these data are retrieved from patent registers, avoiding the need for costly and time-consuming collection of statistics.

To date, the scarce but growing empirical literature on high-skilled migration and innovation focuses mainly on the US, plus the migratory experience of selected Asian countries, namely India and China. Much less evidence exists for other countries, especially on the role of diasporas in affecting innovation outcomes and international knowledge diffusion. Again, workshop participants highlighted the possibilities of patent-inventor data to overcome this lack of empirical evidence.

Using patent-inventor data for migration analysis does not come without limitations. A critical one is that, in general, the nationality or country of birth of the inventors is not reported – only the current country of residence. One technique to overcome this limitation, thoroughly presented during the workshop, is the so-called ‘ethnic matching’, or ‘ethnic disambiguation’ of inventor names (e.g., inventors with the names Gupta or Desai are more likely to be of Indian origin). By ascertaining the cultural origin of inventors, one can infer their potential migratory background.

An example of ethnic matching techniques, presented at the workshop, is the IBM-GNR system.¹ This is a commercial software that uses historical registers of immigration to the US to provide a comprehensive list of 750,000 full names, with an associated country of origin – which, in turn, functions as a ‘dictionary’ of names and cultural origins, over time. Using this software, one can estimate, with a certain probability, the number of inventors residing in countries different from their country of origin. Moreover, this software can also provide information on the number of inventors without migratory background but with foreign roots (second or third generations of immigrants), which are likely to play a role as skilled diasporas as well. Another advantage of the software is its ability to assign gender probabilities to inventor names, providing a window into the gender dimension of skilled migration. Although these techniques do not come without caveats, participants agreed on the need to make use of them in order to better understand the phenomenon of high-skilled migration, and the potential role of IP.

One important limitation in employing patent data as a source of migration information is the bias inherent to patenting activity. For instance, research has shown that more than half of inventions in high income countries are never patented. It has also shown the highly skewed distribution of patent values. For some inventors one never observes a patent and for many others, only a few patents. These biases need to be taken into account when mapping international mobility flows of inventors.

Finally, workshop participants discussed the measurement of return migration. Looking at returnee inventors as inferred from patent data would add an important perspective to the analysis. However, so far, the absence of unique identifiers for inventors has prevented analyzing how returnee inventors affect economic development outcomes.

In parallel to the use of ethnic matching methods to infer the migratory background of inventors, workshop participants welcomed the work undertaken by the WIPO Secretariat on mapping the migration patterns of inventors using Patent Cooperation Treaty (PCT) applications. Participants agreed that these new data resemble skilled migration figures in general and, in particular, they resemble what anecdotal evidence and case studies have suggested about the migration of scientists, engineers and information and communications

¹ IBM-GNR stands for International Business Machines - Global Name Recognition.

technology (ICT) workers. Migration and innovation analysis stands to benefit considerably from using the PCT-based migration data for economic research. In fact, several participants encouraged WIPO to undertake further research on migration, IP and innovation using these and related datasets, as well as to share as much data as possible with the research community.

Compared to other patent-inventor datasets, PCT data hold several advantages. In particular, they include migration figures for a large number of countries; enable cross-country comparisons, given that the same application procedures apply to all applicants from across different countries; and are likely to include high value patents, as applicants are willing to bear the costs of obtaining protection beyond the office of first filings. Above all, PCT data offer direct information on inventor nationality and residence, thus avoiding the need to infer the likely cultural origin of inventor names.

Participants rightly pointed out that PCT inventor migration data likely underestimate migration flows, to the extent that they do not include those foreign-born inventors that have become naturalized in their host countries. They also do not include second and third generation migrants. Quite likely, the actual migration figures are somewhere in between what ethnic matching methods deliver and what the data retrieved from PCT applications say.

2. IP and the international mobility of skilled workers: a framework of analysis.

An important part of the workshop discussion focused on the possible links between the IP regime of countries, on the one side, and the out-migration of the most skilled workers, on the other side. Put differently, is there a relationship between IP and brain drain? And if so, does it differ across developing countries? Does IP protection affect scientists' and engineers' decisions about where to exercise their profession? Do gaps in the protection of IP nurture the brain drain of the most skilled workers? Do skilled diasporas and migrant returnees influence how IP is protected in their home countries? Are diasporas' and returnees' effects on home country innovation and development influenced by the IP regime?

There is no empirical research on these questions – in part due to the poor availability of migration flows. Only a few theoretical papers exist, which have concluded that a country can only attract international scientists and inventors through IP protection after reaching a critical level of innovation capacity.²

In addition, some scholars have shown that diasporas can strength home country institutions. Better institutional environment abroad may induce emigrants to directly and indirectly contribute to institutional reforms in their home countries. In terms of the IP regime, some workshop participants wondered whether the outward migration of skilled workers may impact on the effectiveness of the IP system in reaching its goals of promoting innovation and technology transfer.

Finally, an additional research strand has argued that the IP regime of sending countries can increase the benefits of diasporas and transform the brain drain into brain gain. The rationale behind this argument is as follows: the protection of IP may attract workers into the innovation sector; as a consequence, the knowledge sent back by the diaspora is received by a larger range of workers with better absorptive capacity to transform this knowledge into local innovation. Thus, strengthening the IP system amplifies the effects of diasporas on

² See, for example, McAusland, Carol, and Peter Kuhn. 2011. "Bidding for Brains: Intellectual Property Rights and the International Migration of Knowledge Workers." *Journal of Development Economics* 95(1): 77–87.

home country innovation. Some evidence seems to point in this direction, though it would be premature to draw any firm conclusions.

Workshop participants also highlighted that IP may affect the attraction of foreign direct investment (FDI) and trade. Through this relationship, in turn, IP may stimulate international technology transfer. In parallel, scholars have shown that emigrants can stimulate FDI flows and trade to their home countries – for example, by leveraging the reputation of their home countries in international business networks.

In sum, participants observed that the role of IP in the context of high-skilled migration is an interesting research avenue which is relatively under-investigated to date and which could be analyzed using patent-inventor data.

Many studies – including the mapping exercise conducted by WIPO Secretariat – have shown that African economies are the most affected by the brain drain of skilled workers – at least in relative terms. The workshop thus devoted part of the discussion to the particularities of African economies. Overall, data reveal that the US is the major destination for high-skilled Africans. However, beyond the US, other OECD countries benefit from skilled African immigration, notably France, the UK and Canada. Among the African economies most affected by the brain drain, Liberia, Ghana, Sierra Leone, Mauritius and Kenya stand out.

Workshop participants highlighted two important considerations in relation to Africa. The first concerns the implementation of policies requiring skilled emigrants – including inventors – to return home. Although many African governments have considered such return requirements, implementing such policies without good conditions at home may be counterproductive. The second relates to the impact of diasporas in the development of African economies. As an example, the workshop focused on the case of South Africa. Mindful that the country's situation is not necessarily representative of lower income African economies, South Africa provides an interesting case study as it suffers from the brain drain of its skilled labor force but, at the same time, it attracts a considerable number of talented workers from other African economies; the latter workers, in turn, either remain in the country or use it as a bridge to migrate to more developed economies. In the meantime, South Africans abroad are seen as successful professionals and entrepreneurs. However, they do not seem to engage much with their home country's National System of Innovation. At the same time, South Africa's National System of Innovation is capable of maintaining scientific and industrial links with institutions and researchers abroad, but not necessarily with South African nationals. More generally, the audience observed that African countries do not know much about their diasporas. This potential disconnect between some African countries and their skilled diasporas needs to be taken into account when designing policies to mobilize overseas diasporas for domestic development.

3. Innovation, knowledge diffusion and the international mobility of knowledge workers

Finally, workshop participants explored the links between high-skilled migration, innovation, entrepreneurship, and the diffusion of knowledge.

The innovation literature has long argued that geographical proximity between knowledge workers is associated with the formation of social relationships that ease the transmission of tacit knowledge – explaining, for example, the clustering of innovation activities in the Silicon Valley.

However, social relationships between people are, in turn, influenced by many factors, aside from the geographic one. One such dimension is co-ethnicity – i.e., sharing a common

culture and country of origin. In particular, co-ethnicity affects knowledge diffusion between co-ethnic immigrants that reside in the same host country. Co-ethnicity is also relevant in relation to the role of high-skilled diasporas. Indeed, high-skilled intellectual diasporas can constitute invisible nations abroad that convey information to their homelands. Even though the empirical research is not abundant, this latter consideration has attracted the attention of academics and policymakers alike, especially from the perspective of lower income sending countries. Skilled diasporas residing in technology leading countries can be important to convey knowledge back to their homelands.³

Is there any role for IP? IP protection facilitates trade and the international diffusion of ideas, for example, through patent disclosures and licensing. However, IP protection may also raise the costs of using ideas for further research, hampering the diffusion of knowledge – the so-called anti-commons effect. If IP protection indeed facilitates trade, and if diasporas are disproportionately likely to engage in ideas trade with their home countries, then patents and diasporas may well be complements with respect to international knowledge flows. For instance, recent research shows that the Chinese diaspora is much more effective than the Indian diaspora in transferring knowledge back to their home countries.⁴ Workshop participants discussed whether the IP system has any role in explaining this outcome.

A considerable amount of empirical evidence exists on the contribution of migrants to the scientific and technology advances in their host country. For instance, in the US, estimates suggest that immigrants produce around 25% of all US patents – as inferred from data from the US patent office. As a result, how to attract skilled migrants that foster domestic innovation and entrepreneurship has become a prominent policy topic in the US and, indeed, in other high income countries.

Aside from documenting the contribution of immigrant workers, a lively academic debate exists on how skilled immigration affects innovation outcomes and economic performance. For example, recent research seems to show that once the educational background is taken into account, immigrants are not more innovative than natives – but not less either.⁵ In other words, controlling for skills, migrants and natives are comparable.

Workshop participants also explored to what degree do migrants substitute or complement native workers? In a simple framework, more skilled immigrants shift the labor supply curve downwards and, in turn, decrease wages of those natives in their same skills group. Interestingly however, most empirical studies show that wages of natives of the same education and occupational segment actually increase. One plausible explanation for this result is the possible existence of technology shocks that increase employment (and wages) of both natives and immigrants at the same time. Another explanation may be the potential existence of externalities that raise the productivity of skilled native workers thanks to the knowledge spillovers brought in by skilled immigrants.

In this context, some workshop participants observed that research on immigration and innovation needs to put the role of firms at the center of analysis. Firms are the ultimate beneficiaries of human capital and knowledge transfers from abroad through immigration. From the firms' perspective, foreign knowledge can be accessed in two alternative ways:

³ Agrawal, Ajay, Devesh Kapur, John McHale, and Alexander Oettl. 2011. "Brain Drain or Brain Bank? The Impact of Skilled Emigration on Poor-country Innovation." *Journal of Urban Economics* 69(1): 43–55.

Kerr, William R. 2008. "Ethnic Scientific Communities and International Technology Diffusion." *Review of Economics and Statistics* 90(3): 518–537.

⁴ Kerr, William R. 2008. "Ethnic Scientific Communities and International Technology Diffusion." *Review of Economics and Statistics* 90(3): 518–537.

⁵ Hunt, Jennifer. 2011. "Which Immigrants Are Most Innovative and Entrepreneurial? Distinctions by Entry Visa." *Journal of Labor Economics* 29(3): 417–457.

first, the hiring of foreign researchers and other high-skilled workers (immigration); and second, moving closer to the source of foreign knowledge (R&D off-shoring). Theoretical and empirical research on immigration and innovation needs to recognize the potential trade-off between these two channels, and, in this context, explore how IP may play a role in affecting firms' hiring and R&D location strategies.

Workshop participants pointed out that in some countries – for example, the US – immigration is firm-sponsored, whereas in others – for example, Canada – it is supply-driven, in the sense that migrants are selected according to their educational background and experience and not according to firms' needs. Understanding what role firms play in different immigration systems is important in evaluating how immigrants contribute to the economies of their host countries. Fortunately, the development of new employer-employee matched datasets offers new opportunities for conducting research in this area.

CONCLUSION

The workshop concluded with an open debate on all the topics covered and sought to distill recommendations as to what type of analytical work WIPO could conduct in the future.

First, there was wide consensus among workshop participants that it is unlikely that there is an important “first-order” relationship between the IP regime of countries and their in- and outflows of skilled people. Indeed, if any empirical relationship between the two emerges, it is probably governed by the level of development and employment opportunities of countries. In addition, workshop participants added that studying this relationship is conceptually challenging, because IP and brain drain operate at different levels: the IP regime of countries is at the level of institutions, at the macro level. The decision of an inventor, or other high-skilled workers, to emigrate, is at the individual level. Thus, conceiving an appropriate framework of analysis to associate both levels is challenging.

Despite this overall skepticism, IP may well play an indirect role in determining migration outcomes. One potential link could be through FDI. IP policies may influence the decisions of foreign investors and FDI flows, in turn, may lessen incentives for outward migration – as firms from high income countries provide employment opportunities in less developed economies. However, dynamic effects need to be taken into consideration: some literature has shown that skilled diasporas abroad foster FDI to their home countries.

Participants concluded that, given the high mobility of inventors, WIPO may be well-placed to continue researching the causes and consequences of skilled migration. While the creation of the PCT inventor migration database was already a valuable contribution to the research community, more efforts in this direction could follow. A large number of research questions on the topic of high-skilled migration and innovation remains to be answered.

Some of the workshop participants recommended that WIPO engages in research to disambiguate the likely cultural origin of inventors using their names and surnames, in order to characterize who are the inventors and their migratory background. In parallel, some participants highlighted the importance of conducting surveys of inventors. Survey evidence could help characterize inventors and their patenting practices, provide evidence on the reasons inventors migrate in the first place, and lead to a better understanding of how inventor migration affects home and host country innovation outcomes. Finally, surveying inventors directly could also help in understanding whether there is any relationship between IP protection and the international migration of this subclass of skilled workers.

As for the substantive direction of future research work, the debate re-emphasized two points. First, migration analysis needs to pay closer attention to the behavior of firms.

Second, there is need to better understand the phenomenon of high-skilled return migration, which remains severely under-investigated, but may ultimately be one of the most important vehicles for spurring economic development in sending countries.

[End of Annex]



WORKSHOP

**WIPO/EXP/IP/GE/13/INF.1
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**WIPO Experts' Meeting on Intellectual Property, the International
Mobility of Knowledge Workers and the Brain Drain**

organized by
the World Intellectual Property Organization(WIPO)

Geneva, April 29 and 30, 2013

PROGRAM

Prepared by the Secretariat

Monday, April 29, 2013

- 9.00 – 9.20 Welcome address and introduction by:

Mr. Carsten Fink, Chief Economist, Economics and Statistics Division (ESD), World Intellectual Property Organization (WIPO), Geneva
- 9.20 – 10.50 **Session 1: The International Mobility of Skilled Workers: General Overview**

Speakers: Mr. Çağlar Özden, Senior Economist, World Bank, Washington D.C., United States of America

Mr. Christopher Parsons, Professor, Oxford University, United Kingdom

1st Commentator: Mr. Michel Beine, Professor, University of Luxemburg, Luxemburg

2nd Commentator: Mr. Bela Hovy, Chief of Migration, United Nations Population Division, New York, United States of America
- 10.50 – 11.10 Coffee Break
- 11.10 – 13.30 **Session 2: Using Patent Data to Track the Migratory Patterns of skilled Workers**

Speaker: Mr. Francesco Lissoni, Professor, University Bordeaux IV, Bordeaux, France

1st Commentator: Mrs. Bronwyn Hall, Professor, Department of Economics, University of California, Berkeley, United States of America

2nd Commentator: Mrs. Theodora Xenogiani, Senior Economist, Directorate for Employment, Labour and Social Affairs, Organization for Economic Co-operation and Development (OECD), Paris

The international mobility of inventors: a mapping exercise

Speaker: Mr. Ernest Miguelez, Research Economist, ESD, WIPO
- 13.30 – 14.30 Lunch provided by WIPO
- 14.30 – 16.00 **Session 3: Diaspora Networks and International Knowledge Diffusion**

Speaker: Mr. Ajay Agrawal, Professor, Rotman School of Management, Toronto, Canada

1st Commentator: Mr. Hillel Rapoport, Professor, Bar Ilan University, Ramat Gan, Israel

- 2nd Commentator: Mrs. Roberta Piermartini, Economic Research and Statistics Division, World Trade Organization (WTO), Geneva
- 16.00 – 16.30 Coffee Break
- 16.30 – 18.00 **Session 4: International Migration, Innovation and Entrepreneurship**
- Speaker: Mr. William Kerr, Professor, Harvard Business School, Boston, United States of America
- 1st Commentator: Mr. Jinyoung Kim, Professor, Department of Economics Korea University, Seoul
- 2nd Commentator: Mrs. Christiane Kuptsch, Senior Specialist in Migration Policy, International Labour Organization (ILO), Geneva
- 19.00 Dinner hosted by WIPO

Tuesday, April 30, 2013

- 9.00 – 10.30 **Session 5: Intellectual Property (IP) Protection and the Brain Drain**
- Speakers: Mr. Alireza Naghavi, Professor, University of Bologna, Italy
- 1st Commentator: Mrs. Chiara Franzoni, Professor, *Dipartimento di Ingegneria Gestionale, Politecnico di Milano*, Italy
- 2nd Commentator: Mr. Julio Raffo, Research Economist, ESD, WIPO
- 10.30 – 11.00 Coffee Break
- 11.00 – 12.30 **Session 6: Brain Drain and IP in Africa**
- Speakers: Mr. Francois P. Kaboré, Professor, Georgetown University, Washington D.C., United States of America
- 1st Commentator: Mr. Michael Kahn, Professor, University of Stellenbosch, Cape Town
- 2nd Commentator: Mr. Igor Paunovic, Economic Affairs Officer, Division for Africa, Least Developed Countries and Special Programs, United Nations Conference on Trade and Development (UNCTAD), Geneva
- 12.30 – 12.45 **Wrap-up**
- Speaker: Mr. Carsten Fink
- 12.45 – 14:00 Lunch provided by WIPO



WORKSHOP

**WIPO/EXP/IP/GE/13/INF/2 PROV.
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**WIPO Experts' Meeting on Intellectual Property, the International
Mobility of Knowledge Workers and the Brain Drain**

organized by
the World Intellectual Property Organization (WIPO)

Geneva, April 29 and 30, 2013

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prepared by the Secretariat

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III. SECRETARIAT OF THE WORLD INTELLECTUAL PROPERTY ORGANIZATION
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[End of Appendix and of document]