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(IPC UNION)**

COMMITTEE OF EXPERTS

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**ELABORATION OF A CONCORDANCE TABLE BETWEEN THE IPC
AND THE INTERNATIONAL STANDARD INDUSTRIAL CLASSIFICATION
OF ALL ECONOMIC ACTIVITIES**

Document prepared by the Secretariat

1. The Organisation for Economic Co-operation and Development (OECD), in collaboration with WIPO and certain other organizations, is currently carrying out the project on international patent statistics, methodology and analysis. The objective of the project is to develop new patent-based indicators of technology trends and innovative activities on the basis of published patent statistics.
2. One of the major parts of the project should be the building of a concordance table between the International Patent Classification (IPC) and the International Standard Industrial Classification of All Economic Activities (ISIC), which should allow matching patent data with such industrial data as R&D, employment, and external trade.
3. In view of the importance of the OECD project for the comprehensive use of patent statistics and the further enhancing of the utility of the IPC, the Committee of Experts of the IPC Union should be provided with information of this project. The Committee may also wish to give advice on the approach to be taken for the elaboration of the IPC-ISIC concordance table.

4. Annex I to this document contains a summary of the work already undertaken by the OECD in order to develop the IPC-ISIC concordance table. The current version of the ISIC (Revision 3) is reproduced in Annex II to this document.

5. The Committee of Experts is invited to take note of the OECD project and to give advice on the elaboration of the IPC-ISIC concordance table.

[Annexes follow]

ANNEX I

**CONCORDANCE TABLE BETWEEN INTERNATIONAL PATENT CLASSIFICATION
AND INTERNATIONAL STANDARD INDUSTRIAL CLASSIFICATION****Introduction**

While patent data are now readily available for most nations, these data are still of insufficient use for economic and policy analysis due to their mode of presentation. Patents are recorded for administrative purposes using the International Patent Classification (IPC) system, which categorises inventions by product or process. Instead, most economic researchers and analysts are interested in the particular sectors of the economy responsible for the invention or its subsequent use. In particular, economists and policy makers are interested in patents counted by economic sector in order to analyse trends across time and across sectors. For example, the propensity to patent, or the inventive productivity of a sector (in terms of patents per unit of R&D) may be useful in determining future sectors for government support. The effect of international trade on subsequent invention can also be determined using data configured for similar sectors. Economic (such as trade, productivity, value added, investment, etc.) and S&T (R&D expenditure, S&E, etc.) data are available at the industry level, whereas availability of patent data at the industry level are extremely limited. The main objective of the project is to classify patent data at industry level, by developing a concordance table between International Patent Classification (IPC) and International Standard Industrial Classification (ISIC).

Work by the OECD

Within the framework of the OECD patent project, one of the areas of research that is of importance is the development of patent indicators at industry level. This would involve developing a concordance table between patent classification, namely IPC, and industrial classification, namely ISIC (International Standard Industrial Classification). The goal of the IPC-ISIC concordance table is to map one classification system into another. In particular, it maps patent product or process categories into the economic sectors responsible for their creation and subsequent use. The work on the development the IPC-ISIC technology concordance was outsourced to a consultant and the result of this work was disseminated via STI working paper (The OECD Technology Concordance: Patents by Industry of Manufacture and Sector of Use). The methodology used to develop the OECD Technology Concordance (OTC) is described below. The STI working paper and the associated software can be downloaded from the following web-link: <http://www.oecd.org/EN/documents/0,,EN-documents-571-1-no-10-no-0,00.html>

Methodology used to develop OTC

Between 1972 and 1995, the Canadian Intellectual Property Office simultaneously assigned IPC codes along with an industry of manufacture (IOM) and sector of use (SOU) code to each of over 300 000 granted patents. Using the tabulated information on all 300 000 patents to determine the probability that a patent with a specific IPC has a particular IOM-SOU combination, Evenson *et al.*, (1991)¹ developed a concordance table between Patent and Industrial classifications, commonly referred to as Yale Technology Concordance (YTC). The original IOM and SOU assignments made by the Canadian Intellectual Property Office used the Canadian standards for industrial classification, a system known as the Standard Industrial Classification system (the 1980 SIC-E version). However, economic sectors are defined internationally using a slightly different system (the International Standard Industrial Classification system, or ISIC, Revision 3). Therefore, the OECD Technology Concordance (OTC) incorporates another concordance or translation, presenting results according to the international standard ISIC. It is conceptually expedient if the methodology of the OTC is presented in two stages, the translation of IPC to SIC-based sectors, and the translation of SIC-based sectors into ISIC-based sectors.

- Translation of IPC to SIC-based sectors

This process is borrowed completely intact from the original YTC, as originally presented by Kortum and Putnam (1997)². After reading all 300 000 patents that have information on IPC, IOM and SOU, probabilities were calculated for each IPC to determine the likelihood of any random patent in that IPC having a particular IOM-SOU combination. This processing transforms a vector of patent data (patents listed by IPC) into a matrix of interrelated patent data (IOM rows and SOU columns).

- Translation of SIC-based sectors to ISIC-based sectors

In order to present results compatible with international data on other variables, the IOM and SOU sectors must be defined by ISIC categories. Since these are not always equivalent to the Canadian SIC-based sector definitions, another concordance was required. Unfortunately, there is no available set of patent data that have both SIC and ISIC assigned, in order to calculate probabilities as above. For this project, researchers read through the definitions of each ISIC sector, compared them by definition to each SIC sector, and decided upon the best ISIC for each SIC sector. This stage of the OTC is therefore based on the written ISIC and SIC definitions, as provided by Statistics Canada. Some SIC sectors appeared to span multiple ISIC categories, which raised difficult questions. The primary problem became how to share a single SIC among possible ISIC categories. While Statistics Canada provides a guide between SIC and ISIC definitions, it provides no probabilistic information, simply indicating which SIC categories may be found in which ISIC categories and vice versa. With no probabilities to draw upon, this research decided upon one ISIC category as a destination for each SIC sector. To ensure accuracy, two researchers independently compared each definition, and the results are the consensus of that research.

¹ Evenson, R. E., Putnam, J. & Kortum, S. (1991) Estimating patent counts by industry using the Yale-Canada concordance, Final Report to the National Science Foundation.

² Kortum, S. & Putnam, J. (1997), Assigning Patents to Industries: Tests of the Yale Teconology Concordance, Economic Systems Research, Vol. 9, No. 2, June.

Limitation of the OTC

One limitation of the OTC statistical assignment is that the accuracy of the results is dependent upon the nature of the original IOM and SOU decisions made by officials at the Canadian Intellectual Property Office. Since decisions were made by patent examiners trained as experts in their respective fields, the accuracy is undoubtedly very high. However, service sectors were never considered to be possible originating sectors for inventions, so YTC results and all that use the same information (including this study) are limited by that decision. Thus, IOMs will always be primary or secondary activities, while SOUs may be primary, secondary or tertiary economic activity. Another point of concern is the evolution of both the patent and industrial classifications over time. This raises the question about the stability of the probabilities of IPC to IOM-SOU.

Possible future Work

The work carried out by the OECD, as outlined above is at an experimental stage and further work is required to refine the concordance table and to address the limitations mentioned above (inclusion of the service sectors and updating the IOM-SOU probabilities). There are various options that could be pursued to improve the existing concordance table or to develop a new concordance table. The best approach that could be followed to advance this work would be to encourage patent offices to assign IPC codes along with an industry of manufacture (IOM) and sector of use (SOU) codes.

[Annex II follows]

ANNEX II

ISIC (REVISION 3) GROUPINGS

- 1 **A - Agriculture, hunting and forestry**
- 2 ***01 - Agriculture, hunting and related service activities***
- 3 ***011 - Growing of crops; market gardening; horticulture***
- 4 ***0111 - Growing of cereals and other crops n.e.c.***
- 5 ***0112 - Growing of vegetables, horticultural specialties and nursery products***
- 6 ***0113 - Growing of fruit, nuts, beverage and spice crops***
- 7 ***02 - Forestry, logging and related service activities***
- 8 **B - Fishing**
- 9 ***05 - Fishing, operation of fish hatcheries and fish farms; service activities incidental to fishing***
- 10 **C - Mining and quarrying**
- 11 ***10 - Mining of coal and lignite; extraction of peat***
- 12 ***11 - Extraction of crude petroleum and nat. gas; services incidental to oil and gas extraction excluding surveying***
- 13 ***12 - Mining of uranium and thorium ores***
- 14 ***13 - Mining of metal ores***
- 15 ***14 - Other mining and quarrying***
- 16 **D - Manufacturing**
- 17 ***15 - Manufacture of food products and beverages***
- 18 ***16 - Manufacture of tobacco products***
- 19 ***17 - Manufacture of textiles***
- 20 ***18 - Manufacture of wearing apparel; dressing and dyeing of fur***
- 21 ***19 - Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear***
- 22 ***20 - Manufacture of wood and products of wood and cork, except furniture; manuf. of articles of straw, plaiting***
- 23 ***21 - Manufacture of paper and paper products***
- 24 ***22 - Publishing, printing and reproduction of recorded media***
- 25 ***23 - Manufacture of coke, refined petroleum products and nuclear fuel***
- 26 ***24 - Manufacture of chemicals and chemical products***
- 27 ***241 - Manufacture of basic chemicals***
- 28 ***242 - Manufacture of other chemical products***
- 29 ***2421 - Manufacture of pesticides and other agro-chemical products***
- 30 ***2422 - Manufacture of paints, varnishes and similar coatings, printing ink and mastics***
- 31 ***2423 - Manufacture of pharmaceuticals, medicinal chemicals and botanical products***
- 32 ***2424 - Manufacture of soap and detergents, cleaning and polishing preparations, perfumes, toilet prep.***

- 33 2429 - Manufacture of other chemical products n.e.c.
34 243 - *Manufacture of man-made fibres*
35 **25 - Manufacture of rubber and plastics products**
36 **26 - Manufacture of other non-metallic mineral products**
37 **27 - Manufacture of basic metals**
38 271 - *Manufacture of basic iron and steel*
39 272 - *Manufacture of basic precious and non-ferrous metals*
40 273 - *Casting of metals*
41 2731 - *Casting of iron and steel*
42 2732 - *Casting of non-ferrous metals*
43 **28 - Manufacture of fabricated metal products, except machinery and
equipment**
44 **29 - Manufacture of machinery and equipment n.e.c.**
45 **30 - Manufacture of office, accounting and computing machinery**
46 **31 - Manufacture of electrical machinery and apparatus n.e.c.**
47 3130 - *Manufacture of insulated wire and cable*
48 **32 - Manufacture of radio, television and communication equipment and
apparatus**
49 321 - *Manufacture of electronic valves and tubes and other electronic
components*
50 322 - *Manufacture of television and radio transmitters and apparatus for
line telephony and line telegraphy*
51 323 - *Manufacture of television and radio receivers, sound or video
recording/reproducing apparatus*
52 **33 - Manufacture of medical, precision and optical instruments, watches and
clocks**
53 331 - *Manufacture of medical appliances and instruments and appliances
for measuring, checking, testing, navigating and other purposes, except
optical instruments*
54 3311 - *Manufacture of medical and surgical equipment and
orthopaedic appliances*
55 3312 - *Manufacture of instruments and appliances for measuring,
checking, testing, navigating and other purposes, except industrial
process control equipment*
56 3313 - *Manufacture of industrial process control equipment*
57 332 - *Manufacture of optical instruments and photographic equipment*
58 333 - *Manufacture of watches and clocks*
59 **34 - Manufacture of motor vehicles, trailers and semi-trailers**
60 **35 - Manufacture of other transport equipment**
61 351 - *Building and repairing of ships and boats*
62 352 - *Manufacture of railway and tramway locomotives and rolling stock*
63 353 - *Manufacture of aircraft and spacecraft*
64 359 - *Manufacture of transport equipment n.e.c.*
65 **36 - Manufacture of furniture; manufacturing n.e.c.**
66 **37 - Recycling**
67 **E - Electricity, gas and water supply**
68 40 - *Electricity, gas, steam and hot water supply*
69 41 - *Collection, purification and distribution of water*
70 **F - Construction**
71 45 - *Construction*

- 72 **G - Wholesale and retail trade; repair of motor vehicles, motorcycles and personal**
73 **and household goods**
- 74 50 - Sale, maintenance and repair of motor vehicles and motorcycles; retail
sale of automotive fuel
- 75 51 - Wholesale trade and commission trade, except of motor vehicles and
76 motorcycles
- 77 515 - Wholesale of machinery, equipment and supplies
- 78 52 - Retail trade, except of motor vehicles and motorcycles; repair of personal
and household goods
- 79 **H - Hotels and restaurants**
- 80 55 - Hotels and restaurants
- 81 **I - Transport, storage and communications**
- 82 60 - Land transport; transport via pipelines
- 83 61 - Water transport
- 84 62 - Air transport
- 85 63 - Supporting and auxiliary transport activities; activities of travel agencies
- 86 64 - Post and telecommunications
- 87 641 - Post and courier activities
- 88 642 - Telecommunications
- 89 **J - Financial intermediation**
- 90 65 - Financial intermediation, except insurance and pension funding
- 91 66 - Insurance and pension funding, except compulsory social security
- 92 67 - Activities auxiliary to financial intermediation
- 93 **K - Real estate, renting and business activities**
- 94 70 - Real estate activities
- 95 71 - Renting of machinery and equipment without operator and of personal and
household goods
- 96 7123 - Renting of office machinery and equipment (including
computers)
- 97 72 - Computer and related activities
- 98 721 - Hardware consultancy
- 99 722 - Software consultancy and supply
- 100 723 - Data processing
- 101 724 - Data base activities
- 102 725 - Maintenance and repair of office, accounting and computing
machinery
- 103 729 - Other computer related activities
- 104 73 - Research and development
- 105 74 - Other business activities
- 106 741 - Legal, accounting, book-keeping and auditing activities; tax
consultancy; market research and public opinion polling; business and
management consultancy
- 107 742 - Architectural, engineering and other technical activities
- 108 743 - Advertising
- 109 749 - Business activities n.e.c.
- 110 **L - Public administration and defense; compulsory social security**
- 111 75 - Public administration and defense; compulsory social security
- 112 **M - Education**
- 80 - Education
- 801 - Primary education

- 113 802 - *Secondary education*
114 803 - *Higher education*
115 809 - *Adult and other education*
116 **N - Health and social work**
117 85 - *Health and social work*
118 **O - Other community, social and personal service activities**
119 90 - *Sewage and refuse disposal, sanitation and similar activities*
120 91 - *Activities of membership organizations n.e.c.*
121 92 - *Recreational, cultural and sporting activities*
122 93 - *Other service activities*
123 **P - Private households with employed persons**
124 95 - *Private households with employed persons*
125 **Q - Extra-territorial organizations and bodies**
126 99 - *Extra-territorial organizations and bodies*

[End of Annex II and of document]