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NAICS AND THE ICT SECTOR (An Analysis)

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NAICS and the ICT SECTOR

Introduction

1. The North American Industry Classification System (NAICS), developed by the statistical agencies of Canada, Mexico, and the United States, focuses on new and emerging industries, industries engaged in the production of advanced technologies, and service producing industries. These goals were set forth early in the development process and the success of the statistical agencies in meeting these goals can be measured by looking in detail at the structure of NAICS United States.

2. NAICS recognizes an Information sector that brings together industries that create, disseminate, or provide the means to access information and provide data processing services. Included in this sector are publishing, including software publishing; communications and broadcasting; motion picture and sound recording; and information services and data processing services. The NAICS United States manual and the agreement among the three countries that creates this sector fully explain its contents and the rationale for creating the sector.

“For the purpose of developing NAICS, it is the transformation of information into a commodity that is produced and distributed by a number of growing industries that is at issue. The Information sector groups three types of establishments: (1) those engaged in producing and distributing information and cultural products; (2) those that provide the means to transmit or distribute these products as well as data or communications; and (3) those that process data.... Most of the industries in the NAICS Information sector are engaged in producing products protected by copyright law, or in distributing them (other than distribution by traditional wholesale and retail methods). Examples are traditional publishing industries, software and database publishing industries, and film and sound industries. Broadcasting and telecommunications industries and information providers and processors are also included in the Information sector, because their technologies are so closely linked to other industries in the Information sector.”¹

3. NAICS also brings together establishments that manufacture computers, computer peripherals, communications equipment, and similar electronic products and establishments that manufacture components for such products. The justification for creation of this subsector in manufacturing is as follows:

. These industries have been combined “because of the economic significance they have attained,.....and, in addition, their manufacturing processes are fundamentally different from the manufacturing processes of other machinery and equipment. The design and use of integrated circuits and the application of highly specialized miniaturization technologies are common elements in production technologies of the computer and electronic subsector.....The creation of the Computer and Electronic Product Manufacturing subsector will assist in delineating new and emerging industries because the activities that will serve as the probable sources of new industries, such as computer manufacturing and communications equipment manufacturing, or computers and

audio equipment are brought together. As new activities emerge, they are less likely therefore, to cross the subsector boundaries of the classification.”²

ICT Sector

4. In creating these two important sectors/subsectors, NAICS recognized the economic impact of the information age. Many of the industries included in these groupings are growing at more than double the rate of the overall economy, a trend that will probably continue. The recognition of the many important industries within these sectors/subsectors should make it easier for the NAICS countries to monitor the impact of “information and communication technology.”

5. In August of 1997, a paper was prepared as a result of the June 1997 ICCP Statistical Panel ad hoc meeting. This paper “A Draft Definition of the ICT Sector” was presented to the Voorburg Group at its September 1997 meeting. The definition presented in that paper was that the ICT Sector “contains those industries which are associated with the production and distribution of information and communication technologies.” The paper goes on to describe, in detail, the industries to be included as identified in the International Standard Industrial Classification, Revision 3 (ISIC).

6. This paper will examine NAICS as it relates to the ISIC industries proposed for inclusion in the ICT definition and provides data as possible. It should be noted that NAICS-based data in the U.S. will not be available until early 1999 when the first NAICS-based publications from the 1997 Economic Census are published. The information shown in this paper are gleaned from SIC-based surveys conducted by the Census Bureau.

ISIC/NAICS ICT

7. SIC 2213, Publishing of Recorded Media (pt) - correlates to NAICS 51221, Record Production, and NAICS 51222, Integrated Record Production/Distribution. The proposal for the ICT sector includes only CDROM titles and the like whereas NAICS includes publishing of sound recording regardless of media. Separate information on CD ROM titles only will be available in the 1997 Economic Census. We also plan to begin a new information survey and will consider asking for separate information on electronic versus other media although it is our belief that records and tapes are becoming less and less important and therefore, including the complete industry in the ICT definition is acceptable.

8. ISIC 2230, Reproduction of Recorded Media (pt) - correlates to NAICS 334611, Software Reproducing, and NAICS 334612 pt., Pre-recorded Compact Disc (except Software), Tape, and Record Producing. Separate information on production of CDs will be available in the U.S. for the first time in the 1997 Economic Census. Data will be available in early 1999.

9. ISIC 3000, Manufacture of Office, Accounting and Computing Machinery (pt) - correlates to NAICS 33411, Computer and Peripheral Equipment Manufacturing. We assume that only the manufacturing of computers and peripheral equipment from ISIC 3000 would be in the ICT definition. The U.S. has annual information (both industry and product) on these industries.

10. ISIC 3130, Manufacture of Insulated Wire and Cable (pt) - correlates to NAICS 335921, Fiber Optic Cable Manufacturing and NAICS 335929, Other Communication and Energy Wire Manufacturing.

11. ISIC 3210, Manufacture of Electronic Valves and Tubes and Other Electronic Components (pt) - correlates to NAICS 33441, Semiconductor and Other Electronic Component Manufacturing. We assume that the entire NAICS industry, which includes eight U.S. industries, is included in the ICT definition. This includes NAICS 334416, Electronic Coil, Transformer, and other Inductor Manufacturing. This

NAICS industry is part of ISIC 3110, Manufacture of Electric Motors, Generators, and Transformers. We believe that NAICS industry 334416 should be part of the ICT definition. Annual data will be available on this NAICS industry. A great deal of detail is published for these U.S. industries so if there are parts to be included from the ICT definition, that probably could be accommodated.

12. ISIC 3220, Manufacture of Television and Radio Transmitters and Apparatus for Line Telephony and Line Telegraphy - correlates to NAICS 33421 pt., Telephone Apparatus Manufacturing (NAICS includes answering machines included in ISIC 3230 and telephone and telegraph transformers, included in ISIC 3110); NAICS 33422 pt., Radio and Television Broadcasting and Wireless Telecommunications Equipment Manufacturing (NAICS includes pagers, included in ISIC 3230; satellites included in ISIC 3530; and remote control transmissions included in ISIC 3312); and NAICS 33429 pt., Other Communications Equipment Manufacturing (intercommunication systems). While there seem to be a number of exceptions to the correlation, there is available, in the U.S., detailed product data on some of these items, allowing them to be subtracted from the NAICS categories, if necessary. However, we would argue that most of these products should be part of an ICT definition.

13. ISIC 3230, Manufacture of Television and Radio Receivers, Sound or Video Recording or Reproducing Apparatus, and Associated Goods - correlates to NAICS 33431, Audio and Video Equipment Manufacturing; NAICS 33421pt, Telephone Apparatus Manufacturing (answering machines); NAICS 33422 pt., Radio and Television Broadcasting and Wireless Telecommunications Equipment (pagers and antennas); and NAICS 333315 pt., Photographic and Photocopying Equipment Manufacturing (sound recording and reproducing equipment for motion pictures). It is hard to know which parts of the ISIC industries are included in an ICT definition, but the U.S. probably collects sufficient product detail to provide the needed information.

14. ISIC 5150, Wholesale of Machinery, Equipment and Supplies - correlates to NAICS 42143, Computer and Computer Peripheral Equipment and Software Wholesalers. Information on this industry is available annually. We assume that only the computer and software components of ISIC 5150 are included in the ICT definition. NAICS recognizes a separate industry for these wholesalers.

15. ISIC 5233, Retail Sale of Household Appliances, Articles and Equipment - We believe ISIC industry 5239, Other Retail Sale in Specialized Stores, which is where computer stores are classified, also should be included in the definition. ISIC 5233 correlates to NAICS 443112, Radio, Television, and Other Electronic Stores. ISIC 5239 (pt) corresponds to NAICS 44312, Computer and Software Stores. Information on these industries are available annually. We assume that only the computer and software stores of ISIC 5239 should be included in the ICT definition.

16. ISIC 6420, Telecommunications - correlates to NAICS 5132, Cable Networks and Program Distribution, and 5133, Telecommunications. Detailed 6-digit industry data will be available annually.

17. ISIC 7123, Renting of Office Machinery and Equipment (including computers) - correlates to NAICS 53242, Office Machinery and Equipment Rental and Leasing. It should be noted that this is not a direct correlation because ISIC 7123 excludes financial leasing whereas NAICS 53242 includes that activity. The 1987 U.S. SIC had a separate industry for computer rental and leasing, but it was combined with other office machinery rental and leasing because of its size and importance to the NAICS countries. The U.S. will not have separate information for computer rental and leasing unless separate product information is collected.

18. ISIC 7210, Hardware consultancy - correlates to NAICS 541512, Computer Systems Design Services. This is a new NAICS industry for which information will be available annually.

19. ISIC 7220, Software Consultancy and Supply - correlates to NAICS 541511, Custom Computer Programming Services and 51121, Software Publishers. Data on these industries will be available annually.
20. ISIC 7240, Data Base Activities - correlates to NAICS 51114, Database and Directory Publishers and 514191, On-line Information Services. Data on these industries will be available annually.
21. ISIC 7250, Maintenance and Repair of Office, Accounting, and Computing Machinery - correlates to NAICS 811212, Computer and Office Machine Repair and Maintenance. Separate information on repair of computers will not be available.
22. ISIC 7290, Other Computer Related Activities - correlates to NAICS 541519, Other Computer Related Services. Annual data will be available on this industry.
23. ISIC 73, Research and Development pt. - correlates to NAICS 54171 pt., Research and Development in the Physical, Engineering, and Life Sciences. Separate data on computer research will not be available. We believe that most of this research is not carried out in separate establishments that would be classified in this industry.
24. ISIC 9213, Radio and Television Activities pt. - correlates to NAICS 5131, Radio and Television Broadcasting. Detailed annual data will be available.
25. Using data available within the United States, Table 1 in Attachment 1 presents U.S. sales/ shipments/ receipts for 1996 of the proposed Information and Communications Technology sector:
26. It is extremely difficult to split industries as suggested by the proposed ICT definition. To provide data on split industries requires that detailed product information be collected for these industries. While that might be possible, it is highly unlikely that employment data can be provided for those pieces of industries to be included. We would, rather, suggest that the entire industry either be included or excluded. Therefore, for the NAICS industries above that are listed as parts we would propose the following:
- ☞ 333315, Photographic and Photocopying Equipment Manufacturing - Exclude this industry from the ICT definition
 - ☞ 33421, Telephone Apparatus Manufacturing - Include all of industry
 - ☞ 33422, Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing - Include all of industry
 - ☞ 334612, Prerecorded Compact Disc (except Software), Tape, and Record Producing - Include all of industry
 - ☞ 54171, Research and Development in the Physical, Engineering, and Life Sciences - Exclude all of industry
27. To ensure that large “chunks” of ICT activity are not missed by excluding entire NAICS industries, we plan to review carefully the 1997 Economic Census data for these industries and their products. At

that time, we can determine whether or not it is feasible or desirable to attempt to collect detailed product data to provide data on the ICT sector as currently proposed.

AN ALTERNATIVE PROPOSAL

28. In April 1998, the U.S. Department of Commerce issued a report titled "The Emerging Digital Economy," which includes a definition of information technology industries in the United States. Following is an excerpt from that report outlining the U.S. NAICS industries to be included in such a definition.

29. "The first task in analyzing the IT sector was to choose a set of industries upon which to base the analysis. In this definition, IT industries produce, process, or transmit information goods and services as either intermediate demand (inputs to production to other industries) or as final products to consumption, investment, government purchases, or exports.³ Other industries were considered to be IT industries since they provide the necessary infrastructure (communications) for the Internet to operate.

30. IT industries are classified (and defined according to the 1987 SIC manual, published by the Office of Management and Budget (**note: the SIC industries have been converted to NAICS industries by this author**)). IT industries are further separated into categories of Hardware, Software and Services, and Communications.

31. Hardware industries include computers and equipment, including their wholesale and retail sales, office machines, semiconductors, some other electronic component industries, and industries that produce measurement and laboratory analytical instruments. Wholesale sales of computers and equipment was included to capture the sales by manufacturers through their branch offices, accounted for by the Census as a wholesale sale. These sales were considered to be closely aligned with a manufacturer's sale; excluding their sale would result in a serious undercount. Retail sales were included to capture all other sales of computers.

32. Software and services industries include those that provide prepackaged software and services associated with computers. There is some concern that direct sales of software are underestimated because government data *often* (often - added by this author) only detail the sales of prepackaged software for microcomputers. The cost of software loaded onto a mainframe computer for business or government use, therefore, may not be captured. A much greater problem exist with respect to international trade of software. In this case, the software cost reported to the Customs Bureau as an import might include only the cost of the cassette or CD-ROM. In the U.S. the software could be copied and resold any number of times. The same might be true for a U.S. manufacturer with foreign affiliates. In this case, the software could be developed in the U.S. and a single copy sent to their foreign affiliate and copied overseas to be used in their computer production. Accounting for these transactions is difficult to do, if not impossible.

33. Communications equipment and services industries were selected as IT industries since they provide the "infrastructure" that allows the connections between computers and servers that enable electronic commerce and provide the highways for access and movement.

34. Despite the attempt to cleanly designate the IT sector, there will always be some subjectivity with the data that are used to measure it. As IT goods and services are increasingly incorporated into non-IT goods and services, it is difficult to draw hard-and-fast boundaries. For instance, semiconductors are used in computers, but they are also used in automobiles, home appliances, and a variety of other goods. Because

they provide computing power and intelligence to all of these products, we have included the entire semiconductor industry as IT. Similarly, the majority of revenue by the telecommunications industry is still generated by traditional telephone service. Over time, however virtually all IT investment will be part of interlinked communication systems.”⁴

35. Following is the list of NAICS industries included in the Department of Commerce IT definition and their NAICS codes. Please note that this list was originally developed based on the SIC. This author has converted the SIC codes to NAICS codes and the match was not always direct. Therefore, this list does not completely reflect the original Department of Commerce proposal.

INFORMATION TECHNOLOGY INDUSTRIES¹

Hardware Industries	NAICS
Computers and equipment *	33411
Wholesale trade of computers and equipment *	42143 pt.
Retail trade of computers and equipment *	44312 pt.
Calculating and office machines, nec.	333313
Magnetic and optical recording media	334613
Electron tubes *	334411
Printed circuit boards *	334412
Semiconductors*	334413
Passive electronic components *	334414--9, 33422, 33431
Industrial instruments for measurements	334513
Instruments for measuring electricity	334416 *, 334515
Laboratory analytical instruments	334516
Software/Services Industries	
Custom computer programming services *	541511
Software Publishing *	51121
Software Reproducing *	334611
Wholesale trade of software *	42143 pt.
Retail trade of software *	44312 pt.
Computer systems design services *	541512
Data processing services	51421
On-line information services *	514191
Computer facilities management services	541513
Computer rental and leasing *	53242 pt.
Computer maintenance and repair *	811212 pt.
Computer related services, nec *	541519
Communications Equipment Industries	
Household audio and video equipment *	33431
Telephone and telegraph equipment *	33421, 334416, 334418
Radio and TV and communications equipment *	33422
Communications Services Industries	
Telephone and telegraph communications *	5133
Radio broadcasting *	51311
Television broadcasting *	51312
Cable and other pay tv services *	5132

* Included in OECD proposed ICT definition

¹ The Emerging Digital Economy, Appendices, Table 4, pp. A1-19. U.S. Department of Commerce, April 1998.

36. Those ISIC/NAICS industries are included in the OECD proposed definition but are not included in the U.S. Department of Commerce definition are:

- ISIC 2213, Publishing of Recorded Media (NAICS 51221 and 51222)
- ISIC 2230 pt., Reproduction of Recorded Media (NAICS 334612)
- ISIC 3130, Manufacture of Insulated Wire and Cable (NAICS 335921)
- ISIC 3230 pt., Manufacture of Television and Radio Receivers, Sound or Video Recording or Reproducing Apparatus, and Associated Goods (NAICS 333315 pt., Photographic and Photocopying Equipment Manufacturing - sound recording and reproducing equipment for motion pictures)
- ISIC 7240 pt., Data Base Activities (NAICS 51114, Database and Directory Publishers)
- ISIC 73, Research and Development (NAICS 54171 pt.)

37. Conversely, those industries included in the U.S. Department of Commerce definition that are not included in the OECD definition are:

- NAICS 333313, Office Machinery Manufacturing (ISIC 3000 pt. - we assume that the part of ISIC not included in the ICT definition is office machinery)
- NAICS 334613, Magnetic and Optical Recording Media Manufacturing (ISIC 2429 pt.)
- NAICS 334513, Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables (ISIC 3313 pt.)
- NAICS 334515, Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals (ISIC 3110 pt., 3190 pt., 3312 pt.)
- NAICS 334516, Analytical Laboratory Instrument Manufacturing (ISIC 3312 pt.)
- NAICS 51421, Data Processing Services (ISIC 7230 pt.)
- NAICS 541513, Computer Facilities Management Services (ISIC 7230 pt.)

CONCLUSION

38. As the U.S. Department of Commerce report states, “Due to the difficulty in isolating IT, no standard definition exists. Different governmental and private sector bodies propose their own definitions, sometimes breaking out IT as a separate sector, sometimes including it as part of a set of industries that they consider to be high-tech.”⁵ There does, however, seem to be a great deal of consistency between the proposed OECD definition and the U.S. Department of Commerce definition. The development of NAICS with its emphasis on high-tech and new and emerging industries will facilitate the U.S.’s ability to more closely monitor the economic activity of the ICT sector, however defined.

NOTES

1. North American Industry Classification System (NAICS), Agreement Number 18, Information.
2. North American Industry Classification System (NAICS), Agreement Number 13, Computer and Electronic Product Manufacturing.
3. In some cases, industries were considered to be included if they incorporated computer or semiconductor technology as an integral part of its inputs. A whole host of industries could have been included in this category; e.g., 333512, Machine Tool (Metal Cutting Type) Manufacturing; 336111, Automobile Manufacturing; 336411, Aircraft Manufacturing; and 334510, Electromedical and Electrotherapeutic Apparatus Manufacturing to name a few. To be conservative, we added a narrow subset of these industries; i.e., industrial instruments for measurement, instruments for measuring electricity, and laboratory analytical instruments.
4. The Emerging Digital Economy, U.S. Department of Commerce, April 1998.
5. Ibid

ATTACHMENT A
Table 1 --ICT SECTOR (1996)

NAICS Code	Description	Value (mil. \$)
333315 pt	Photographic and Photocopying Equipment Manufacturing (sound and video recording or reproducing apparatus for motion pictures)	234 ¹
33411	Computer and Peripheral Equipment Manufacturing	101,434
33421 pt	Telephone Apparatus Manufacturing (except telephone and telegraph transformers)	31,727. ²
33422 pt	Radio and Television Broadcasting and Wireless Telecommunications Equipment Manufacturing (except satellites and remote control transmitters)	32,080
33431	Audio and Video Equipment Manufacturing	8,988
33441	Semiconductor and Other Electronic Component Manufacturing	127,996
334611	Software Reproducing	³
334612 pt	Prerecorded Compact Disc (except Software), Tape, and Record Producing (production of compact discs)	⁴
335921	Fiber Optic Cable Manufacturing	1,946
335929	Other Communication and Energy Wire Manufacturing	14,414
42143	Computer and Computer Peripheral Equipment and Software Wholesalers	18,313 ⁵
443112	Radio, Television, and Other Electronic Stores	51,068 ⁶
44312	Computer and Software Stores	⁶
51114	Database and Directory Publishers	2,228
51121	Software Publishers	39,325 ⁷
51221	Record Production	⁴
51222	Integrated Record Production/Distribution	2, 278 ⁸
5131	Radio and Television Broadcasting	39,182
5132	Cable Networks and Program Distribution	38,488

5133	Telecommunications	244,573
514191	On-line Information Services	6,916
53242	Office Machinery and Equipment Rental and Leasing (computer rental and leasing)	3,295 ⁹
541511	Custom Computer Programming Services	42,163
541512	Computer Systems Design Services	20,202 ¹⁰
541519	Other Computer Related Services	16,504 ¹⁰
54171 pt	Research and Development in the Physical, Engineering, and Life Sciences (research and development related to ICT)	¹¹
811212	Computer and Office Machine Repair and Maintenance (computer repair and maintenance)	12,040 ¹²
TOTAL		NA

- 1 Includes only shipments of sound and video recording apparatus.
- 2 Includes all telephone apparatus manufacturing.
- 3 Included with Software Publishers. Data will be available separately for 1997.
- 4 First data will be available in the 1997 Economic Census
- 5 Includes professional and commercial equipment and supplies. Separate computer and peripheral equipment wholesalers data will be available for the first time in the 1997 Economic Census.
- 6 Includes television, radio, and computer stores. Will be available separately in 1997 Economic Census.
- 7 Includes software reproducing. Data will be available separately for 1997.
- 8 Integrated record production/distribution (NAICS 51222) is mostly captured in manufacturing data within the SIC system. The dollar volume shown is the value for SIC 3651, which also includes phonograph records and prerecorded audio tapes and disks.
- 9 Includes only computer rental and leasing. Excludes finance leasing.
- 10 NAICS 541512 and 541519 are approximations based on U.S. SIC's 7373, computer Integrated Systems Design, and 7379, Computer Related Services.
- 11 Information on research and development related to ICT is not available.
- 12 Includes only computer repair and leasing.