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Updated Sector Paper on:

NACE / ISIC 62

Computer Programming, Consultancy And Related Activities

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1. Introduction

The Voorburg Group first studied price indices for computer services in 1990 with a model survey from Canada. During the 1990's, additional studies from the UK, Canada, New Zealand and Czechoslovakia were presented. Additional work was done and reports from the INSEE[1], the UK[2], Sweden[3], Australia[4], and Canada[5] were presented at the 2002 and 2003 Voorburg Group Meetings in Nantes and Tokyo. These reports described each country's experience through a series of mini-presentations for the SPPI and output.

More recent papers were presented at the 2007 and 2008 Voorburg Group Meetings in Seoul and Aguascalientes by France[6], Sweden[7], the Netherlands[8] and the United States[9], including results presented in a Sector Paper on Computer Programming, Consultancy and Related Activities by the BLS[10]. This Sector Paper summarized the methodology and practices in developing output, price statistics and classification.

The present Updated Sector Paper provides an opportunity to review past work and update the conclusions of the Voorburg Group to account for changes in industries, products, methods, and practices. The paper's structure includes the same sections as the previous sector papers but focuses on detailing changes that have occurred since the presentation of the previous sector papers, for example, changes in market conditions, changes in classification, and other efficiencies and improvements in methods and practices. The goal of this Updated Sector Paper is to provide national statistical offices with an up-to-date reference to consult when starting new statistical collections or considering improvements to existing collections. The paper provides

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[1] A price index for computer services The French experiment Benoît Buisson INSEE FRANCE
[2] Challenges in the development of a price index for computer services in the UK, Tim Osmond & Nick Palmer UK Office for National Statistics
[3] Experiences in the development of a price index for computer services in Sweden, Merja Cerda Statistics Sweden
[4] Producer Price Index for Computer Services, Carolyn O'Rourke and Richard McKenzie, Australian Bureau of Statistics, September 2002
[5] Produser price indices for computer systems design, data processing and software publishing, Fred Barzyk Statistics Canada
[6] SPPI for IT Industries in France, Denis Gac, Benjamin Camus, INSEE France
[7] Computer services and related activities in Sweden, Vera Norrman statistic Sweden
[8] Turnover and output measurements for the computer services in Netherland, Mieke Berends-Ballast
[9] Computer programming, consultancy, information services and related activities, turnover measures and practices at the US census bureau, Murphy, John B.
[10] Sector Paper On Computer Programming, Consultancy and Related Activities (ISIC rev. 4 Sector 62) Michael Holdway

some options and notes the implications of the choices that must be made when endeavoring to develop or revise turnover statistics and price deflators for computer services.

In order to facilitate this paper, a survey was conducted among the member states of the Voorburg Group to track their practices in the field of turnover/output and SPPI statistics for computer services. Twenty one countries replied and give all the requested information about the survey, four countries do not have an SPPI yet but plan to start collecting prices and developing an SPPI for this sector in the future.

Throughout this Updated Sector Paper, references to previous work of the Voorburg Group are included. Previous work is presented in combination with new developments, consistently using the framework of the Sector Paper adopted by the Voorburg Group in 2009, with the adoption of the content development framework.

2. Industry Overview

In most countries, the market for computer programming, consultancy and related activities has been growing since 2007. Even in the last recession the market grew; afterwards, it grew rapidly in terms of the number of enterprises, employment, and revenue.

The market is dynamic, providing different service products. Due to the nature of the IT industry (unique, bundled services, subcontracting, offshoring), companies may rapidly change the structure and content of services provided, in order to accommodate to the needs of partners.

In most countries the biggest ISIC group in terms of revenue is 6201 – *Computer programming activities*, and the second largest is 6202 – *Computer consultancy and computer facilities activities*. The group 6209 - *Other information technology services* is the smallest.

It is typical in this industry to engage in subcontracting and providing services for multinational companies. Thus, one of the main challenges of price collection seems to be monitoring subcontractors and collecting transfer prices of transactions between members of multinational corporations.

Secondary activities are common, and bundled services are also provided for clients. Furthermore, companies classified among other industries offer programming, consultancy and related services as well.

3. Classification

3.1 Industry Classification[11]

The *International Standard Classification of All Economic Activities* (ISIC Rev. 4, 2008) Division 62 – *Computer Programming, Consultancy and Related Activities* is an aggregation composed of three industries.

The *North American Industry Classification System* (NAICS v. 2007) is used by the US, Canada and Mexico. The NAICS industry code 54151 – *Computer System Design and Related Services,* an aggregation composed of four industries, is comparable to ISIC Division 62.

Countries within the European Union use *Nomenclature statistique des activities economiques dans la Communaute Europeenne* (NACE Rev 2.0, 2008) which has similar numeric codes and industry descriptions for *Computer Programming, Consultancy and Related Activities* as ISIC Rev. 4.

Australia and New Zealand use Australian and New Zealand Standard Industrial Classification (ANZSIC 2006, Subdivision 70)

ISIC Division 62 Industries

•6201-Computer Programming Activities

•6202-Computer Consultancy and Computer Facilities Activities

•6209-Other Information Technology Services.

NAICS Group 54151 Industries

•541511-Custom Computer Programming Services

•541512-Computer System Design Services

•541513-Computer Facilities Management Services

•541519-Other Computer Related Services

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[11] The following section is from the *Sector Paper on Computer Programming, Consultancy and Related Activities* (ISIC rev. 4 draft Sector 62), Michael Holdway, U.S. Bureau of Labor Statistics.

NACE v2.0 Division 62.0 Industries

•62.01-Computer Programming Activities

•62.02-Information Technology Consultancy Activities

•62.03-Computer Facilities Management Activities

•62.09-Other Information Technology Service Activities

The industry details listed above show that all three classification systems are similar, but both NACE and NAICS specify *Computer Facilities Management Services* as a separate industry, while ISIC combines this business activity with *Computer Consultancy*.

ISIC 6201 – *Computer Programming* can be thought of as custom software. Computer programmers write, modify, test, maintain and support software to meet the needs of a particular customer. The service provided may also include customizing packaged software to meet a client's specific needs, such as interfacing with other software or business processes. Note that *Software publishing* (aka prepackaged or packaged software which includes licensing the right to use most operating systems, office suites, utilities and games as well as support and software updates) is not part of ISIC Division 62, but instead is included as part of ISIC Division 58 - *Publishing Activities*.

ISIC 6202 - The primary services provided by *Computer Consultancy* can be described as planning, designing, advising or offering expert opinion on computer systems that integrate hardware, software and communication technologies. Computer consultants may provide the hardware and software components for their design or these components may be provided by third parties. Computer consultants may also install the system, train and support users of the system, and they may provide advice and procedures for enhancing systems security.

This industry also includes *Computer Facilities Management* establishments which provide on-site (including remote access) management, operation and support services for clients' computer systems and/or data processing facilities. Note that establishments providing computer data processing services at their own facilities are not included in this industry, but instead are part of ISIC Group 631 - *Data processing, hosting and related activities; web portals*.

ISIC 6209 - *Other Information Technology and Computer Service Activities* include outputs as diverse as computer disaster recovery services, installation (setting-up) of personal computers and software installation.

At this point of the review it is clear that turnover for *Computer Programming, Consultancy and Related Activities* include a wide range of services. Turnover is usually measured in the National Accounts by the value of revenue received by establishments for providing computer services to clients.

3.2 Product Classification

The different Product Classifications are the UN's CPC Version 2.0[12], the CPA 2008[13] used in European countries, and the provisional NAPCS[14] used in the US and Canada.

CPC Version 2.0

831 - Management consulting and management services; information technology services

8313 - Information technology (IT) consulting and support services (correspond to 6202 – *Computer consultancy and computer facilities management activities*)

83131 - IT consulting services

83132 - IT support services

8314 - Information technology (IT) design and development services (correspond to 6201 - *Computer programming activities*)

83141- IT design and development services for applications

83142 - IT design and development services for networks and systems

83143 - Software originals

[12] Central Product Classification, version 2 (2008),
[13] Statistical Classification of Products by Activity in the European Economic Community, version 2008 (CPA),
[14] North American Product Classification System (NAPCS),
latest accessed 25 June 2009: www.census.gov/eos/www/napcs/napcs.htm

8316 - IT infrastructure and network management services

83162 - Computer systems management services

83161 - Network management services

83162 - Computer systems management services

Division 87 - Maintenance, repair and installation (except construction) services

873 - Installation services (other than construction)

8733 - Installation services of office and accounting machinery and computers (correspond to ISIC 6209 - *Other information technology and computer service activities*)

87332 - Installation services of personal computers and peripheral

A comparison between CPC and NAPCS shows that NAPCS is much more detailed, as shown in Table 1 below:

Table 1: Comparison of CPC Ver.2 and NAPCS Product Detail[15]

CPC Code and Subclass Title	NAPCS Code and Title
83131 IT technical consulting services	35000 IT technical consulting services
83132 IT technical support services	35501 Software related technical support services 35502 Hardware related technical support services 35503 Combined hardware and software support services 35504 Auditing and assessing computer operations 35505 Data recovery services 35506 Disaster recovery services, business continuity services 35507 Other IT support services

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[15] *Sector Paper On Computer Programming, Consultancy and Related Activities* (ISIC rev. 4 draft Sector 62), Michael Holdway, U.S. Bureau of Labor Statistics

83141 IT design and development services for applications	35050 Custom computer application design and development services
	35051 Web site design and development services
	35052 Database design and development services
	35053 Customization and integration of cross-industry application software
	35054 Customization and integration of vertical market application software
	35056 Other custom application design and development services
83142 IT design and development for networks and systems	35101 Computer network security design and development services
	35102 Computer network design and

CPA 2008

The following table shows the CPA 2008 classification and its correspondence with ISIC REV 4.

Table 2: Comparison of CPA 2008 and ISIC Rev. 4

ISIC Rev. 4	CPA 2008	Computer Programming, Consultancy and related Services	
6201	62.01	Computer Programming Services	62.01.11 IT design and development for application
			62.01.12 IT design and development for network
			62.01.21 Computer game's software original
			62.01.29 Other software original
6202	62.02		
		Computer Consultancy Services	62.02.10 Hardware consultancy services
			62.02.20 System and software consultancy services

	62.03	Computer facilities management services	62.02.30 IT technical support services 62.03.11 Network management services 62.03.12 Computer systems management services

6209	62.09	Other information technology and computer services	62.09.10 Installation services of computer
			    and peripheral equipment
			62.09.20 Other information technology
			    and computer services n.e.c

Computer services practices vary across countries. However, to the extent allowed by market conditions, it is recommended that product classifications be developed that will accord to the generally accepted breakdowns included above. This will increase international comparability, and yet separate products and product groups based on different measurement variables and practices as well.

4. Turnover Statistics

4.1 Data availability

In terms of turnover, structural business statistics (SBS) provide more detailed data on the industry level than short-term business statistics (STS). In SBS, data are available on the product level.

Most OECD countries use NACE Rev. 2 for industry classification and CPA 2008 for product classification.

Depending on the sample, turnover data are collected annually in the Structural Business Survey (SBS), and monthly or quarterly in the Short Term Statistics Survey (STS).

Most countries use a survey to collect turnover data for the computer services industry or a combination of survey and administrative data. Usually the survey is used for the big companies, above a certain limit, and the administrative data is used for the rest. A few countries use census.

In Germany, STS data is a combination of survey data and administrative data (a survey is used for companies with a least 15 million Euro annual turnover and/or 250 persons employed and administrative data is used for all other enterprises). STS provides turnover data on 3-digit-level (NACE Rev. 2). Structural business statistics (SBS) is based on surveys and on provided data on the 4-digit-level (NACE Rev. 2). Data is also available on the 5-digit-level. (The German economic activity classification "WZ 2008" has an additional 5th level to the NACE Rev. 2). SBS according to the CPA is also available.

In Slovakia, monthly and quarterly STS data are based on a combination of a census for enterprises with 20 and more employees and a sample for enterprises with less than 20 employees. Data are not given for sub-divisions. In addition, SBS data at the 4-digit level is produced for the Eurostat.

In Slovenia, industry turnover on a monthly basis based on a combination of survey and administrative data is for computer programming only, with no detail for sub-divisions of computer programming.

In Croatia, turnover information for computer programming is based on a quarterly STS Survey for the industry at the 2-digit level.

The Czech Republic provides monthly and quarterly turnover at the industry level and an annual turnover at the industry and product level, based on surveys.

Canada produces turnover for both industry and products according to NAPCS (North American Product Classification System). The publication is provided annually, based on a combination of survey and administrative data.

In Japan, turnover data are provided at the industry level only for the 2-digit-level of computer programming. The Monthly Survey on Service Industries in Japan covers not only *Computer programming, consultancy and related activities* but also other service industries. An economic census for business activity is conducted every five years.

In Singapore, annual and quarter turnover data are available. Annual turnover data are provided based on the *Singapore Standard Industrial Classification* (SSIC) up to the 5-digit-level. Turnover data at the commodity/product level are not available

In Estonia, turnover data is provided according to the SBS Regulation at 3- and 4-digit level for NACE Rev.2 activity, and for the commodity/product level at the 4-digit level of

CPA for NACE Rev.2 Division 62. An annual sample survey is combined with the use of administrative information for editing and imputation in case of non-response.

In Austria, SBS data are available 18 months after the end of the reference year. Turnover indicators for short term statistics are available two months after the end of the quarter of reference. Quarterly short term statistics based on administrative data from turnover advance returns are provided at the 2-digit industry level. Industry turnover at the 4-digit level and products by CPA are provided on an annual basis based on a combination of administrative data and surveys.

In Finland, annual industry turnover at the 2-digit level is based on a combination of census and survey.

Hungary produces turnover data at the industry level based on a combination of survey and administrative data, on a quarterly and annual basis. Turnover by product is provided for enterprises with more than 19 employees. The classifications used are NACE Rev. 2 for industry and CPA 2008 for products.

Ireland provides monthly industry turnover and annual industry and product turnover based on surveys.

The Netherlands makes use of quarterly turnover for industry and annual turnover for industry and products at the aggregate level.

In Norway, quarterly industry turnover is based on the Value Added Tax Register and annual industry turnover is based on a combination of trading statements and surveys. Turnover information is detailed for sub-divisions of computer programming at the 4-digit level.

Spain provides a monthly survey at the 2-digit level of industry turnover and an annual survey at the 2-digit level of industry turnover and the 4-digit level of products. In the product survey, a breakdown of turnover by the different services at the 4-digit level, product turnover, is available for the enterprises whose main activity is Division 62.

Sweden produces turnover data for industry on a monthly basis at the 4-digit level and annual turnover data for industry and products at the 4-digit level.

In Korea, turnover statistics are based on associations' statistics.

4.2 Data Issues

For most countries the survey frame is the Business Register. The selection of companies for turnover statistics depends on the usage of survey or administrative data or combination of the two. In the case of using a combination of survey and administrative data, large companies are chosen for the survey, according to their revenue and/or number of employees. Companies are selected by the stratified sampling method. Usually small and medium size companies are sampled and large companies are entirely included. The selection is according to turnover size or number of employees, or a combination of the two.

In the Czech Republic, enterprises with 50 or more employees or having a turnover of CZK 200 million or more are included, and others are sampled.

In Canada, a sample survey with a cross-sectional design is used. The data have two different sources: a sample of all businesses with revenue above or equal to a certain threshold (the threshold may vary among industries and provinces), for which either survey or administrative data may be used; and administrative data, which is used only for businesses with revenue below the specified threshold. Only financial information is available from businesses below the threshold: for example, revenue, and expenses such as depreciation, salaries and benefits. Detailed characteristics are collected only for surveyed establishments. Prior to the selection of a random sample, establishments are classified into homogeneous groups (i.e., groups with the same NAICS codes and same geography). Quality requirements are targeted, and then each group is divided into sub-groups called strata: take-all, must-take, and take-some. The take-all stratum represents the largest firms in terms of performance (based on revenue) in an industry. The must-take stratum is comprised of units selected based on complex structural characteristics (multi-establishment, multi-legal, multi-NAICS, or multi-province enterprises). All take-all and must-take firms are selected for the sample. Units in the take-some strata are subject to simple random sampling.

In Japan the sample unit is an establishment. The sampling frame of the survey uses the 2006 Establishment and Enterprise Census. Establishments with less than 10 persons are selected based on "industry" and "region", establishments with 10 or more persons are selected using "industry" and "establishment size", based on stratified sampling methods. In principle, the subject establishments are surveyed for two years while half of

the subjects were replaced by new ones every January. A group of establishments referred to as the "census survey group" will not be replaced.

In Singapore, all establishments in the sampling frame were first stratified by activity. Within each activity, establishments were stratified by operating receipts into three size strata (large, medium and small). All establishments in the large size stratum were selected with certainty, whereas the firms in the medium and small size strata were selected using simple random sampling without replacement.

In Croatia, companies are selected from the Statistical Business Register. All medium sized and large units (those with 50 or more employees) are included. Small units are selected by a stratified sample, based on main activity and size (number of employees).

In Austria, a cut-off survey for enterprises above a certain threshold and a model based estimation for enterprises below these threshold values are used, as well as a complementary use of administrative sources.

In Hungary there is a cut-off for "big" companies completed by a probability sample for smaller companies

In Ireland, a census is used for enterprises with 20+ employees and a random stratified sample is used for enterprises with less than 20 employees for the annual survey. Monthly turnover data is collected from enterprises with 100+ employees or an annual turnover of €20 million or more.

Spain uses a probability sample, but all enterprises with 200 or more employees are always selected in the monthly survey, and all enterprises with 50 or more employees are always selected in the annual survey.

To assure that companies classified as computer programming companies really offer those services and do not belong to another industry, the survey questionnaire contains a question about the main activity of the enterprise. When utilizing administrative data, information from the Business Register is used to verify the classification code, whenever available. The classification code is determined from other statistical surveys.

The surveyed national statistical offices (NSO) identified the following major challenges in developing turnover statistics. Most countries indicated that the change in classification was the main challenge. Other challenges stem from the dynamic nature of

the industry, which includes mergers and acquisitions, and new products and services. Below are some of the challenges indicated by NSOs:

- Finding the predominate activity of businesses according to the new *Statistical Classification of Economic Activities in the European Community*, NACE Rev. 2.

- Classification of companies and services thereof and maintaining an updated sample.

- Confidentiality issues for a small number of very large multinational companies.

- The main challenge in developing the turnover statistics for computer services is that enterprises that are classified under computer programming (*Computer Systems Design* – NAICS 541510) purchase companies that are classified under *Software Publishing* (NAICS 511211) or *Data Processing* (NAICS 518210) and may change activities within computer services from one year to the next (Canada).

- Outsourcing and specifying services are the major challenge for the industry (Sweden).

- The major challenge can be said to be due to the new classification. This is because the old NACE/ISIC included only one division – Division 72 – for IT services, while the new classification includes two divisions – 62 and 63 – resulting in difficulties in determining the primary activity of companies. *Software publishing activities* classified now under division "58" were previously included in Division 72 (Hungary).

- The formation of the sample is quite difficult because the larger companies have many secondary activities (The Netherlands).

4.3 Recommended Approach

A major problem with the use of administrative data is that it was not designed to obtain statistical economic indicators. Data from the tax authorities has the following flaws:

- The definition of "turnover" is different: For example, the tax authority includes sales of assets which are not included in the desired measurements of turnover statistics.

- Large corporate groups with many small subsidiaries are treated as one company by the tax authority; hence, turnover gained by sales between those

subsidiaries is not counted – which is incompatible for turnover as an economic indicator.

- Turnover for which no tax is paid is quoted, but often the quality of the report is in doubt.

When using only administrative data, NSOs must be aware of weaknesses such as these and find appropriate remedies.

NSOs may follow the approaches listed in the table below for developing turnover statistics. Which option is chosen depends largely on the purpose of the statistics (e.g., economic indicator or input of National Accounts), on the resources and political conditions.

Table 3: Options for Developing Turnover Statistics – security and investigation activities[16]

Category	Data Source	Level of Detail Collected	Frequency	Disadvantages	Advantages
Best	Survey/Census (one or more surveys with different frequencies may include economic census)	Industry turnover detailed according to ISIC or NACE or NAICS or ANZSIC and product turnover detail CPC, CPA, NAPCS	Annual and Sub-annual collection (monthly or quarterly)	- Most expensive - Largest response burden	- Provides detailed information for the national accounts on a timely manner
Good	Survey/Census or combination	Industry detail only	Sub-annual	- Expensive - Industry detail may not be sufficient	- less response burden
Minimum	Administrative (tax data, industry association data etc.,)	Industry detail only	Annual	- Least expensive - Little or no respondent burden	- definitions can differ adding imprecision to estimates - Least timely

5. SPPI Statistics

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[16] The table is based on Murphy (2008); turnover statistics seem to be quite similar for most of the service sectors.

5.1 Data Availability

The recommended development options presented here are based on papers presented at Voorburg Group meetings and a survey that was conducted among the member states of the Voorburg Group in advance of the 2012 meeting in Warsaw, Poland.

Responses were received from 20 countries, 15 countries already developed SPPI for the industry under consideration and five countries do not yet have SPPI.

According to the classifications used by Voorburg Group participants, computer services include three main classes: 6201 – *Computer Programming Activities*; 6202 – *Computer Consultancy and Computer Facilities Activities* and 6209 – *Other Information Technology Services*.

Most of the countries – nine countries out of 15 – cover all three groups and six countries cover only Group 6201 and Group 6202.

Most countries use the common industrial classification NACE Rev. 2 of the European Union, and the CPA 2008 (the EU's classification of goods and services) for product classification. Canada uses the North American Industry Classification System (NAICS) for industry classification; Japan uses the Japan Standard Industrial Classification (JSIC) for industry, which mainly corresponds to the International Standard Industrial Classification (ISIC), and the CPC for products. Korea uses KSIC based on ISIC, with changes to reflect Korea's economy.

The Business Register is used as a sample frame in all countries and the sample is selected at the class level. The variations are in the methods of sampling. Most countries use stratified sampling that has a limit criteria above which all units are included in the sample and another limit below which no units are included. Between the limits companies are selected with various methods, such as PPS sampling (probability proportional for size), random sampling or judgmental selection. In some cases only cut-off sampling is used, in which only companies above a certain limit are included in the sample and below that threshold they are not included. A significant share of turnover is achieved by including the largest companies.

The criterion for selection of companies is either turnover or number of employees or a mixture of both.

In Slovakia, the sample includes the largest companies, which cover up to 40% – 70% of the total revenue of the industry. In Slovenia, as many large enterprises as possible are included, and quite a few medium, small and micro-sized enterprises as well, to reach the target share of the total turnover (60%). In Austria, cut-off sampling is used in which all companies above a certain turnover threshold are chosen for the sample. The goal is to achieve turnover coverage of 75% in the respective classes.

5.2 Sources of SPPI Data

In most countries prices are collected directly from sampled firms, usually by visiting the companies at the initial data collection stage and then by mail, telephone or fax. A major improvement in data collection practices has been the advent of electronic data collection, i.e., Internet questionnaires over the internet, in addition to paper questionnaires or instead of them. Germany, Slovakia, Sweden, Finland and Norway use on-line questionnaires. Hungary will be collecting prices only by Internet as of 2013, and Spain is preparing an on-line questionnaire for 2013. Other countries use email in addition to the traditional fax, telephone and post.

Prices are collected on a quarterly basis and published quarterly as formal statistics or as experimental data. A few countries do not publish the index but use it only for National Accounts and for the Eurostat. The Czech Republic, Japan and Korea collect prices monthly and in Canada the index is annual.

5.3 Pricing Method

The main pricing method is charge-out rates according to professions, the staff's skill level, experience and other definitions of the service such as the type of software and project. Sometimes the type of clients is added as well. Countries use part or all of the above specifications. However, countries that use only service specifications plan to add staff specifications as well, and to expand the definition of the service. The types of services include: Software analysis, software programming, software installation, and software consultancy.

The staff's skill level and description of services include: Senior database programmer for design and development of the database, senior system engineer for hardware consultancy, and senior PC technician for installation services of computers and peripherals.

In Canada, prices collected for the IPSPI represent the input costs of labor and the realized profit for the firm. The labor cost is calculated as the weighted average of the firm's contract fees and wage rates for the year, while the profit portion reported is used to derive the realized net multiplier. Both of these inputs are multiplied to arrive at a total price index.

All countries use a time based method for *Computer Programming Activities*. For the other groups — *Computer Consultancy and Computer Facilities Activities* and *Other Information Technology Services*, which have more regularly provided services, such as data processing or the operation of hardware systems — other pricing methods are used. These include: contract pricing, direct use of prices of repeated services, and in some cases unit values and fee percentages, e.g. percentage fees of software licenses.

Austria uses hourly charge-out rates by level of staff and type of service, for example: Chief programmer for analysis, senior consultant for consultancy, junior consultant for planning and chief programmer for training.

Spain uses a time based method (hourly rate). In *Computer Programming Activities*, a distinction is made between different skills and in terms of the staff's experience, for example: Junior programmer (less than 2 years of experience), semi-senior programmer (between 2 and 5 years of experience) or senior programmer (more than 5 years of experience), a junior analyst, semi-senior or senior analyst, a junior systems engineer, semi-senior or senior engineer. In *Computer Consultancy and Computer Facilities Activities*, a distinction is made between the different services: hardware consultancy and software consultancy. Starting in 2013, a distinction will be made in terms of the staff's experience and skill level in these services too.

Only two countries use model pricing, Korea and The Netherlands, and only for small companies. Canada is investigating the possibility of using model pricing instead of the current labor/profit pricing method.

In the case of time-based methods it is necessary to divide the staff into different categories according to the type of staff, level of experience and skills. Different methods are used for different sub-groups.

Table 4: Examples of Different Pricing Methods

Pricing method	Example	Sub-group
Time-based	Hourly charge-out rates for chief programmer for analysis	6201
Time-based	Hourly charge-out rate for senior database programmer for design and development of the database	6201
Direct use of prices for repeated services	Security services for network	6209
Percentage fees	Percentage of software licenses	6202

5.4 Main issues in price measurement

One of the issues of last years Voorburg presentation and discussion is that of subcontracting or outsourcing parts of a computer services job, especially when the subcontractor is an off-shore establishment. The aim of off-shoring is the reduction in costs made possible by substituting labor paid at high salaries for labor paid at low salaries but at the same level of qualification. One of the concerns is that the charge out rates might provide poor estimates of real price change when part of the job outsourced. If the charge out rates collected from the respondent is a list price with no correction/adjustments to shifts from in-house to contracted services than it becomes a problem to use it. The solution is to take in account the off-shoring effect and convince the surveyed companies to correct the charge out rates to reflect the change in labor composition, in order to be an appropriate deflator.

Company-internal prices/is another issue. Some big enterprises set up companies that offer IT-services in-house. One difficulty is to separate services in order to get market prices from these enterprises. Company-internal prices are in general difficult to handle for index calculation reasons because the price development isn't always comparable to the development of market prices.

Changes in the time-based prices generally include not only pure price changes but also changes in the labor productivity. The latter changes are to be excluded from the price developments.

5.5 Recommended Approaches

Table 5: Choices for Developing SPPI Statistics

Category	Pricing Method	Data Type in the Survey and Frequency	Advantage	Disadvantages
Best	Transaction prices, prices for repeated services	Real transaction prices	The information is available, specification allows comparison over time	Not possible for unique services such as custom-built software
	Time-based methods	The price for the time spent on the service is used as a proxy for the real price	Response burden is moderate	May not reflect productivity changes, specification must be defined to keep constant quality
Good	Model pricing	Price based on expert estimates by using a fictitious service or a real service as a model	Holding constant quality	High response burden, needs to be updated frequently
	Contract pricing			The contract must specify the service and must be updated frequently
Minimum	Unit value	Revenue and amount sold or time spent; services must be sufficiently homogeneous	Least expensive, lowest response burden	Price changes can be highly volatile if quality and/or quantity of services differ among periods

5.6 Quality Change

When using time based prices it is necessary to specify all the relevant characteristics: Level of staff, kind of service, kind of software, project, kind of client (manufacture) and the time (hour, day). The issue of quality in these services is very challenging for National Statistical Offices. Close contact with respondents is needed to identify changes in the quality of services.

For countries publishing computer consulting indices it appears that the most common quality change valuations are based on overlap or estimating the initial pure price change implicitly by price changes of similar services. Hedonic techniques do not appear to be a practical option at this point. The overlap method is applicable to cases in which the two services coexist simultaneously. If there is no price observed for the previous month for the new service then imputation is accrued according to price change of similar services. Spain, Germany and Sweden use the overlap method for quality change. Spain also uses expert estimation.

6. Summary and Further Suggestions

Much progress has been done in the last years, since the last Sector Paper on Computer Services, in 2008 both in SPPI and Turnover data in the area of Computer Services. More countries already developed and published SPPI for NACE / ISIC 62 computer programming, consultancy and related activities, other plan to start developing SPPI in the near future. All the countries in the survey calculate and publish turnover data. Countries usually collect turnover data at the product level but publish at the industry level. All counties moved to the new industry classification and for product turnover use the CPA 2008 or the CPC. The classifications used are similar in the area. Most countries use survey for collecting turnover data as recommended. The frame is the Business Register and the method for selection of companies is stratified sampling according to size of turnover or number of employee or combination. Some use combination of survey and administrative data, few countries use census. regarding SPPI The most dominant pricing method is charge out rates according to workers qualification such as: professions, skill level and experience and or according to the type of service. It is recommended that charge out rates will be based on detailed specification that identifies both the workers qualifications and the service definition. Constant quality SPPI present a challenge for computer services. Future improvements

include effort to improve company's cooperation, using model pricing in some cases when charge out rates is not reflecting the real price change and relying more on expert estimation.

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