

ICT Investments in Enterprises

- Nordic Guidelines



Nordic Council of Ministers

Statistics Denmark
Statistics Finland
Statistics Iceland
Statistics Norway
Statistics Sweden

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- Nordic Guidelines**

Printed by
Statistics Denmark
October 2004

Circulation 400

Printed version:
ISBN 87-501-1425-5

Web version:
87-501-1426-3

Preface

Statistics on the Information Society is one of the big challenges for the statistical community, and the statistical institutes are continuously confronted with the need for improving ongoing surveys and to develop methodological work.

This report, including methodological guidelines, is the result of a project set up by the Nordic statistical institutes in 2003. The purpose of this report is to provide guidelines on methodological recommendations and to propose indicators for business surveys of ICT (Information and Communication Technology) investments/expenditures.

The project is co-financed by the Nordic Council of Ministers and has been co-ordinated by Statistics Denmark. The Nordic statistical institutes have in the field of ICT statistics established a strong and efficient teamwork with the Nordic Council of Ministers regarding various projects. Earlier publications such as “Nordic Information Society Statistics 2002” and the model questionnaire for “ICT Usage in the Public Sector” issued in 2003 are both examples of the fruitful results of this cooperation.

Contact persons on this report are:

Henrik Lynge Hansen (Secretary)
Statistics Denmark
Sejrøgade 11
DK-2100 Copenhagen
Denmark
E-mail hlh@dst.dk, telephone +45 3917 3871

Anders Hintze
Statistics Sweden
Karlavägen 100
Box 24 300
104 51 Stockholm
Sweden
E-mail anders.hintze@scb.se, telephone +46 8 506 945 97

Annette Kalvøy
Statistics Norway
Oterveien 23
N-2225 Kongsvinger
Norway
E-mail Annette.Kalvoy@ssb.no, telephone +47 6288 5508

Mervi Niemi
Statistics Finland
FIN – 00022 Statistics Finland
Finland
E-mail mervi.niemi@stat.fi, telephone +358 9 1734 3263

Guðfinna Harðardóttir
Statistics Iceland
Borgartún 21a
150 Reykjavík
Iceland
E-mail gudfinna.hardardottir@hagstofa.is, telephone: +354 528 1263

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1. Summary

- Objective* This report is the result of a project set up by the Nordic statistical institutes in 2003. The Nordic Council of Ministers has co-financed the report. The objective is to provide guidelines on methodological recommendations and to propose indicators for business surveys of ICT investments/expenditures.
- ICT accounts for a large part of total investments* Measurement of ICT investments has created a lot of attention over the last couple of years, not only from business survey experts, but also from National Accountants, who are estimating national levels of ICT investments. Traditionally, ICT investments have been divided into information technology equipment, communications equipment and software. Accurate and reliable estimates of ICT investments are needed since ICT accounts for a large part of total investment in OECD countries. International work in this statistical area has tried to focus on the main components of ICT investments, making attempts to identify possible solutions to measurement problems.
- Work in the OECD and Eurostat* Until recently, there was no internationally agreed definition of ICT products, but in late 2003 the OECD agreed on a definition for ICT goods, which also forms the basis for the Nordic guidelines. Measurement of software has received more attention, especially from National Accountants. Software is considered the most difficult area from a measurement perspective, which is due to the different ways software can be acquired, i.e. purchased or developed in-house (own account software). A couple of years ago, a joint OECD-Eurostat Task Force discussed the issue of measurement problems concerning software and developed recommendations, which are also adopted by this Nordic approach.
- Nordic guidelines concerning ICT goods, purchased software and own account software* One of the main problems when measuring ICT investments is that the national accounting concepts differ from business accounting. The Nordic recommendation is to collect information from enterprises on ICT expenditures, capitalized (investments) and not capitalized (direct costs). The guidelines are centred on investments for ICT goods and purchased software as well as on collecting data that can help estimating own account software, which is also investment.
- Experience limited but plans for future data collection in the Nordic countries* In some of the Nordic countries, attempts have been made to include questions on ICT expenditure in relevant business surveys, i.e. Structural Business Surveys, but the overall experience is still very limited. In most of the Nordic countries, however, there are plans for future data collection in business surveys. Evidence from demand side business surveys is only one important source for the development of better estimates of ICT investments. Supply side information is also important and when comparing supply side with demand side data, it also has to be realized that the latter part cannot solve all the problems that are related to model-based supply side estimates.
- Nordic guidelines based on general recommendations* Choice of survey vehicle is central since existing survey vehicles already include other modules and are thus quite comprehensive. It also has to be borne in mind who is going to answer the questions in the enterprises. These considerations will have to be taken into account when surveying ICT investments. Therefore, the Nordic guidelines at the end of this report are formulated on a general level, trying to take into account that not all countries are using the same survey vehicle and, as such, have a different background for implementing indicators of ICT investments/expenditures.

2. Introduction

<i>Impact on productivity and growth</i>	There is very little doubt that ICT investments have an impact on productivity and growth. ICT spending has grown substantially over the last number of years, not least in the Nordic countries. There are, however, clear signs that statistics on ICT investments from different countries are of low quality and therefore difficult to use. In many areas statistics are also missing and macroeconomic calculations are used instead.
<i>Important with high quality data</i>	In order to assess the impacts of the large scale investments that are made in the Nordic countries, it is crucial that the corresponding statistics are of high quality and comparable across countries. Without such data it will be difficult to identify best practices in the Nordic countries, i.e. to show which investments in ICT that have in an optimal way impact on productivity and growth.
<i>Can improve the foundation for policy decisions</i>	Measurement of ICT investments/expenditures is very important for economic policies. From a political perspective, it is therefore essential to have reliable business information on ICT investments, which can improve the foundation for policy decisions, involving the ICT industries. The Nordic network gives high priority to this important area of ICT statistics.
<i>Statistics on ICT investments very important</i>	Although ICT investment data on the macro level already exist for most countries, the problem is to get reliable information on ICT investments on an industry level. Primary statistics on ICT investments in enterprises are certainly called for as National Accountants, among others, seek more and better information on this.
	Consequently, the objective of this project is to:
	<i>Provide guidelines on methodological recommendations and to propose indicators for business surveys of ICT investments/expenditures.</i>
<i>General purpose of ICT investments</i>	The focus in this publication will be on ICT investments/expenditures for general purposes ICT products. The concept of ICT investment only covers assets that are themselves clearly distinguishable from other goods, but the diffusion of ICT goes beyond this. ICT are embodied in many other capital products, and the value of these ICT components will not be recorded as ICT investment. Thus, the aim of this report is not to fully investigate the benefits of ICT diffusion in the economy at large, but to provide guidelines on ICT investment products.
<i>Expenditures for ICT with asset characteristics</i>	Moreover, the emphasis will be on ICT expenditures, which can usually be capitalized in the financial statements and are, as such, seen as investments. This excludes expenditures for consumables, telecommunication costs and ICT training, which are important expenditure elements in an enterprise, but lack the relevant asset characteristics.
<i>National Accounts recommendations</i>	This report takes its offspring in the need for methodological guidelines for measuring ICT investments in business surveys. These guidelines should be in line with international work already carried out in the OECD and in Eurostat. As some of this work was initially started by National Accounting experts from various National statistical institutes, including representatives from the Nordic countries, this report will closely follow recommendations made by these experts.

3. Background

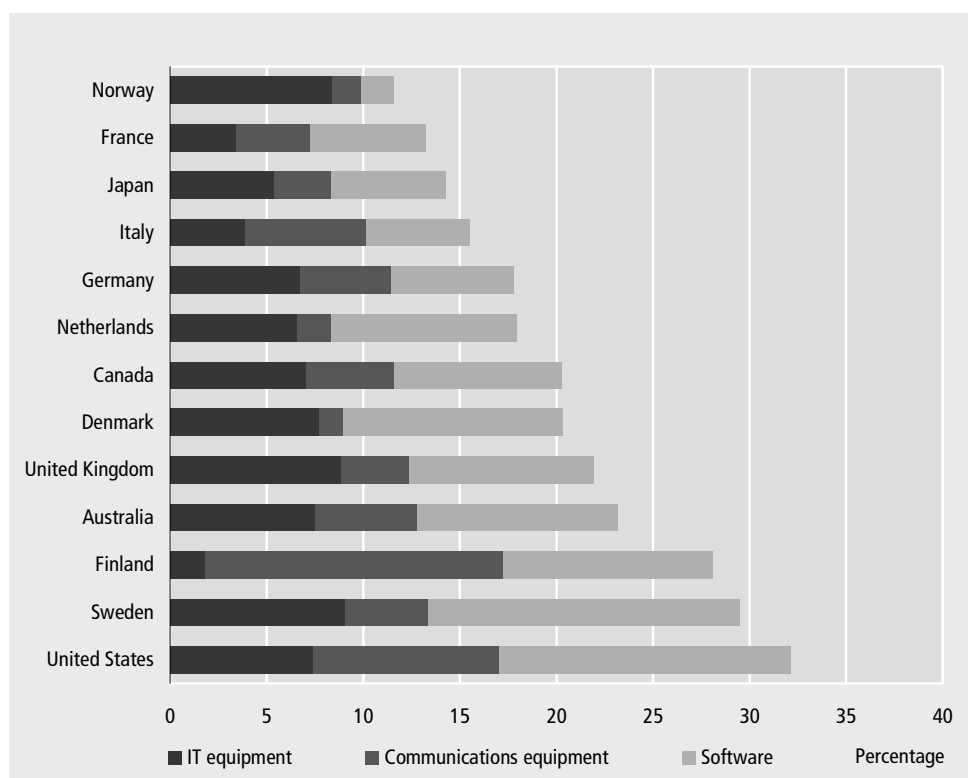
Introduction Measurement of ICT investments has created a lot of attention over the last couple of years not only from National Accountants, but also from business survey experts, who try to implement this important area in adequate surveys. This chapter will describe what is meant by ICT investment and the international work already carried out in this area. Furthermore, focus will be on identifying the main areas to be covered in business surveys, and in what survey vehicles questions on ICT investment are implemented - or are likely to be implemented - in the Nordic countries.

3.1 The importance of measuring ICT investments

Three components of ICT investments In practice, ICT investments have traditionally been divided into three components, i.e. IT (Information Technology) equipment, communications equipment and software. These components of ICT investment only represent a subset of ICT products, but these aggregated groups constitute products, which are normally capitalized in enterprises and are, as such, seen as investments. Therefore, analyses made by, e.g. National Accountants have traditionally put emphasis on these aggregated levels of ICT investments.

ICT investments account for a large part of total investment Accurate and reliable estimates of ICT investments are needed since ICT accounts for a large part of total investment in OECD countries. The figure below shows that approximately 32 pct. of non-residential investment (GFCF in National Accounts concepts) in the United States concerned ICT investment in 2001. For the Nordic countries Denmark, Finland and Sweden, the ratio of ICT investment in 2001 was approximately 20 pct., 28 pct. and 30 pct., respectively.

Figure: ICT investments as a percentage of total non-residential Gross Fixed Capital Formation (GFCF). 2001



Note: ICT equipment is defined as computer, office equipment and communication equipment. Software includes both purchased and own account software.

Source: OECD, Database on Capital Services except data from Norway: Statistics Norway.

For Norway the ratio of ICT investment was approx. 12 pct in 2001.¹ Finland has the highest investment ratio in communication equipment among the illustrated countries (approx. 15 pct.), while Sweden has the highest ratio for software (approx. 16 pct.). Sweden also has the highest ratio for IT equipment with approx. 9 pct.

3.2 International work in the area of measuring ICT investments

Work in the OECD and Eurostat

International work in this statistical area has tried to focus on the main components described above, trying to identify measurement problems and to identify possible solutions. International work and harmonization of measurement issues are primarily conducted in the OECD and in Eurostat.

3.2.1 The OECD product classification

Important definition for ICT goods

A main problem concerning the measurement of IT equipment and communications equipment is the difficulty in separating the two, especially in a world where new products are quickly introduced, products converge and often disappear after a short period. Until recently, there was no internationally agreed definition of ICT products, but in late 2003 the OECD agreed on a definition for ICT goods, which should improve international comparability². As such, this definition forms a natural framework for the Nordic guidelines on the measurement of investments in ICT goods. Measurement of software has received even more attention, especially in the work of National Accountants, which also have great impact on the work of business survey experts.

3.2.2 OECD-Eurostat Task Force on software measurement in the National Accounts

Software difficult to measure

Software is often considered to be the most difficult area from the perspective of measurement. This is due to the different ways software can be purchased/acquired, e.g. via rental and licenses. Moreover, software can also be developed on own account (in-house), which is also considered as investment.

OECD-Eurostat Task Force

In the latest System of the National Accounts (SNA 93) a change was made concerning capitalization of software. In the SNA 93 it is for the first time stated that any purchase of software (and any own-account production) shall be capitalized³. This revision of the System of National Accounts formed the basis for a joint OECD and Eurostat Task Force that was set up in October 2001. The purpose of this Task Force was to address measurement issues and improve international comparability.

Development of recommendations

The joint Task Force developed recommendations concerning the capitalization of the different components of software in the context of the National Accounts and as such, the focus was not on implementing measures for business surveys. The Task Force did, however, consider surveys currently in use, which the Task Force concluded could serve as an instructive example of what could be achieved, including a considerable commentary on the Australian Capital Expenditure Survey.

Data from both the supply side and demand side is important

The work of this Task Force has not only provided key insights into the measurement of software from a National Account perspective, but also provided business survey experts the foundation for implementing questions on ICT investments in relevant

¹ Data on Norway is from another source (from Statistics Norway) than the OECD database on Capital Services. Therefore, one has to be very careful when comparing Norway with the other countries in the figure. No data on ICT investment is available for Iceland.

² DSTI/ICCP/HS(2003)1/REV2, OECD, Paris.

³ That is, if the acquisition satisfies conventional asset requirements, i.e. the software is used in production for more than a year and satisfies small tools' rule. See STD/DOC(2003)1, OECD, Paris. p. 12.

business surveys. It is generally recognized that information on ICT investments has to rely on both supply side and demand side data.

National Accounts presently rely on supply side estimates

Up until now, the problem has been that information from the demand side does not provide accurate estimates, and as long as this is the case, the National Accounts have to rely on supply side estimates. This is also what the Nordic countries have experienced, but as demand side data is crucial for optimal measurement of ICT investment, this has resulted in a huge challenge for statisticians, measuring the information economy at the enterprise level.

3.3 Business surveys for measuring ICT investments

National accounting versus business accounting

One of the main problems when measuring ICT investments is that the national accounting concepts differ from business accounting. One example is the National Account concept of Gross Fixed Capital Formation (GFCF), which differs from the concept of investment in business accounting by including disposal of assets. Another example is that some things that are treated as expenses in business accounting are considered as investments in the system of National Accounts.

Information on investments and direct costs

The OECD-Eurostat Task Force recommendation is to collect information in business surveys of total purchases of software capitalized (investment) and not capitalized (direct costs). In this way, the expensed software can be added to the capitalized software to obtain figures for investment that are more reasonable according to National Accounts concepts. This recommendation is adopted by the Nordic approach, both on software and ICT goods.

Focus on main areas

Measurement of ICT investments in business surveys have to take into consideration that software can be 1) purchased and 2) developed on own account. Taking into account the newly developed OECD list of ICT goods, the basics for describing ICT investments in the remainder of the publication will therefore mainly be on the following areas:

1. ICT goods
2. Purchased software
3. Own account software

This is also in line with what is generally seen as central for implementing measures in business surveys.

3.4 Survey vehicles

The different survey vehicles applied by the Nordic countries

Business surveys have difficulties in acquiring accurate and comprehensive measures of ICT investment. The choice of survey vehicle is important since it determines, to a large degree, what part or parts of an organisation should be requested to supply information on ICT expenditures. Advantages and disadvantages by measuring ICT investment through different survey vehicles will be discussed in chapter 5. Different countries have chosen different solutions:

- Structural Business Survey
- ICT Usage Survey
(Use of Information and Communication Technology in enterprises)
- Investment Survey
- Stand-alone Survey

3.4.1 Structural Business Survey

Mainly deals with information found in annual reports

The Structural Business Survey (SBS) measures the structure, activity, competitiveness and performance of businesses in the community. The statistics are compiled in accordance with the EU regulation on structural business statistics. The population for the survey covers all industries in sections C to K, and parts of section O (NACE 90, 92.1, 92.2, 92.4 and 93)⁴. Enterprises and local kind of activity units⁵ within the public service sectors 110, 510 and 550 are excluded. The survey is mandatory. The questions in the SBS mainly deal with characteristics that can be found in the organisations annual reports and financial statements, such as employment, turnover and investment. Norway is measuring ICT expenditure through the SBS.

3.4.2 ICT Usage Survey

Usage in focus

The purpose of the ICT usage survey is to chart the use of ICT and electronic commerce in enterprises. Produced statistics are, among other things, used as indicators in EU's eEurope Action Plan. The population for the survey covers all industries in sections C to K, except mining of coal and lignite (NACE 10) and parts of section O (NACE 92 and 93). The survey is voluntary and dominated by questions that you can answer with a simple yes or no (tick-boxes).

3.4.3 Investment Survey

Applied in Sweden

The Swedish Investment Survey is carried out through three times a year, in February, May and October. The collected data concerns realized investments and investments planned. On every occasion, data is collected for quarter one to four, the whole year and a forecast for the next year. Only data relating to investments made are statutory.

Sector-specific information

By using different questionnaires when conducting the survey, it is possible to collect sector-specific information. The questionnaires also differ related to when the survey is carried out during the year. The survey covers NACE sections C, D, E, F, G, I, J, K. Different cut-off limits are used in different sectors.

Generally related to acquisition of tangible assets

In general, the survey collects information relating to acquisition of tangible assets with a lifespan of at least one year, including reconstruction and improvements that produce a substantial improvement in capacity, standard or lifespan. Investments are accounted for gross yield, excluding VAT. Acquisitions with an economic life of more than one year should be treated as investment even if it has been expensed by the enterprise. Investments that are conducted by using own personnel should in addition to material also include salaries and related expenses.

3.4.4 Stand-alone Survey

New survey in Denmark focuses entirely on ICT expenditures/investments

The Danish Stand-alone Survey is a new initiative, which will be launched in late October 2004. This survey is expected to be carried out annually and will be mandatory. Data collection will be concentrated on expenditures and investments for ICT goods, purchased software, ICT services and man-years spent on own account software production. A question on expenses for ICT training will also be included. The survey covers the same NACE sectors as the ICT usage survey in enterprises, except NACE section C and E.

⁴ The respective NACE sections: C Mining and quarrying, D Manufacturing, E Electricity, gas and water supply, F Construction, G Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods, H Hotels and restaurants, I Transport, storage and communication, J Financial intermediation, K Real estate, renting and business activities and O Other community, social and personal service activities.

⁵ A local kind of activity unit is an organisationally defined part of an enterprise unit, which is located at one single address, and which produces one or mainly one type of goods or services.

4. Best practice

Current estimation primarily based on supply side information

In this chapter, best practice in the Nordic countries concerning estimation of investments in ICT is described, focusing on the different ways of collecting data on the subject. In all the Nordic countries, estimates of ICT investments in the National Accounts are primarily based on information from the supply side. This is due to the fact that getting the required information from the demand side has proven to be difficult, e.g. the lack of robust definitions of ICT goods and software.

Experience still very limited

In some of the Nordic countries attempts have been made to include questions on ICT expenditure in relevant business surveys, i.e. the SBS, but overall the experience is still very limited and the quality of the collected data is either questionable or still need to be fully analysed. In the following, best practice is described with focus on the main areas defined previously ending the chapter with plans for future data collection in the Nordic countries.

4.1 ICT goods

Currently no direct source of information in Denmark

Statistics Denmark does not collect any specific data on expenditure or investments on ICT goods. Attempts were made in the Danish survey of ICT use in enterprises in 1998, but due to poor quality of the results they were never published. The only survey, which collects any information that relates to ICT goods, is the Accounts Statistics survey, which is the responsibility of the Business Structure Division. The problem is that ICT goods are grouped, together with other items under general headings, which makes this survey unsuitable for information on ICT goods.

Finland collects data through SBS but information grouped under general headings

In Finland, an attempt to collect data on ICT expenditure in the context of the survey of ICT use in enterprises was made in 1999, but the results were not very good and they were never published. Today, Statistics Finland collects data through their SBS, but only indirectly via general headings, such as expenditure on programming etc. or investments in machinery and equipment. ICT goods cannot be separated from these headings, which also include other items. Thus, Statistics Finland is not able to provide comprehensive estimates from demand side surveys and has, as such, to rely on supply side information.

No specific data collection in Iceland either

Currently, Statistics Iceland does not collect any specific data on expenditure or investments on ICT goods. Information on investments is obtained through the standardized annual accounts delivered by the enterprises to the Tax authorities, where investments on ICT goods are grouped together with other items under general headings. As for now, estimates in the National Accounts on ICT investments and expenditures are based on information collected by Statistics Iceland in a survey conducted in 2003. This survey was directed to enterprises on the supply side and had a reference time in the years 2001 and 2002.

Norway obtains specific data through SBS

Statistics Norway currently collects information on ICT goods in their SBS and contrary to the other Nordic countries, data is obtained via direct questions on goods items. Since 2002, the following question on ICT goods has been included in the SBS:

ICT goods

Include all kind of ICT goods (hardware and system software, tools and applications). Include packages as well as customized software.

Respondents are asked to provide figures on total expenditure and capitalized expenditure, respectively. The National Accounts in Norway apply this figure as a cheque concerning the level of the investment product. The figure can not be used directly because this product covers more than hardware. The data collection is however problematic. The problems identified mainly arise through uncertainty concerning the definition, i.e. what should be included, and problems with

respondents skipping the question. Revision is difficult since the expenditures are grouped together under general headings such as “operating costs” in the enterprises financial statements.

No data collected in Sweden

Statistics Sweden included questions on hardware investments in their investment survey a few years ago. This is not the case anymore, due to an unacceptable item non-response rate leaving estimations based on supply side information to the National Accounts system, which is in line with the practice of the other Nordic countries.

4.2 Purchased software

Information from Product statistics used in Denmark

Statistics Denmark has only once tried to collect specific information on expenses for software, and that was in the earlier mentioned ICT usage survey of enterprises in 1998. Again, quality was poor and results were dropped. Currently, Statistics Denmark obtains data on intangible assets via Accounts Statistics, and software makes up some of this category. Information on purchased software, though, cannot be separated from this aggregate, which is a general heading in the accounting system. Instead, the National Accounts estimate investments in software by using the Danish Product Statistics to estimate total production from the software industry as an indicator.

Supply side information used in Finland

Statistics Finland obtains data on software through SBS. These data on software investments are utilised in the Finnish National Accounts as a first estimate. The estimate is corrected by using the commodity flow method. As with ICT goods, the earlier mentioned pilot study conducted in 1999 also covered purchased software, but the results had a poor quality and were never published or used for any estimates.

Iceland information based on supply side survey

Statistics Iceland does not collect any specific data on expenditure or investments on purchased software. It is also impossible to obtain such information from the enterprises' standardized annual accounts, because similar to investments on ICT goods, they are grouped together with other items under general headings. Therefore, estimates in National Accounts on expenditures and investments on purchased software are based on the above-mentioned survey carried out in 2003.

Data collection in Norway but not without problems

Statistics Norway collects information on purchased software in their SBS. Since 2001, the following question on purchased software has been included:

Purchased software

Total expenses (investment and direct costs exclusive depreciation) purchased standard software and customized software. Include license fees and services directly connected to the purchase (installation, testing and maintenance). Also include software purchased in combination with hardware if this is not included in ICT goods. If exact figures are not available please provide careful estimates.

As in the case of ICT goods, respondents are asked to provide figures on total expenditure and capitalized expenditure, respectively. Again, the same problems have been encountered: There are difficulties connected to defining software and revision is difficult due to the fact that enterprises group software together with other items in the financial statements. The National Accounts for 2002 used this figure in the calculations of investments.

Investment survey obtains data in Sweden..... but bias in figures

Statistics Sweden collects data on expenditures for the sum of purchased and own account software in the Swedish Investment Survey. The survey does not cover all industries and not small enterprises. Due to a bias in the figures from the Swedish Investment Survey compared to supply side data, the former are only used as reference material. This is unfortunate since international guidelines state that purchased software should be measured using a demand side approach. It is therefore

vital to shed light on why there are differences in the data produced by a demand and a supply side approach.

4.3 Own account software

No business survey experience in Denmark and Iceland but little in Finland

The national statistical institutes of Denmark and Iceland do not have any experience with questions for measurement of own account production in business surveys. In Finland, information on 1) IT staff expenditure and 2) the share of IT staff expenditure, which is directed to the development of software for own use, was collected in the pilot study in 1999 - but again, the results were never utilised because of their poor quality. So, these three countries rely completely on the system of National Accounts to provide macro-estimates on own account production, where employment information is used to estimate the number of persons engaged in software production and their average compensation.

Figures have improved in Norway

Statistics Norway collects information on own account software via the SBS:

Own account software/software developed for own use

Total expenses, investment and direct costs inclusive labour costs but exclusive depreciation, for own developed software for internal use, not for sale. Purchased software and developed software for customers should not be included.

The key problem has been to describe, what own account really is. Statistics Norway asks for total expenses including labour costs; this can be misleading since these expenses probably consist of labour costs only. The basic experience is that the question has to be more precise. The figures were used in the National Accounts calculations in 2002.

Supply side information used in Sweden

Statistics Sweden also compiles investments in own account software by using a supply side approach. Specific educational codes within the area of programming and systems engineering are selected. The educational register is then co-ordinated with the employment register for these codes, which results in industry allocated wages for those who work with own-account programming. A "value of production to wages" ratio is calculated for the NACE 72 industry. By applying the value of production to wages ratio, to the industry allocated wages, a value of production for those who work with own-account programming can be calculated for every industry. And, value of production of own-account software equals the GFCF in own-account software.

However, two new possibilities have emerged in Sweden:

Question implemented in the ICT usage survey

The first one is to use data from the Swedish survey on ICT use in enterprises. For the past two years this survey has been collecting data on man-years spent on developing software by own personnel. In a next step, the enterprises are asked to divide these man-years into shares spent on own account software, software for resale and maintenance etc. The data on man-years spent on own account software has not yet been compiled, but there is high hope that this new data source will produce more accurate estimates.

Newly developed occupational register

The second possibility is to use the newly developed occupational register. Deploying the recommendations from the joint OECD and Eurostat Expert Group, regarding which occupations should be classified as ICT specialist, will probably produce better estimates than using the earlier mentioned educational register.

4.4 Overview: Current data collection

Matrix on current data collection

Information on current data collection from the demand side can be summarized in the following matrix:

Table: Business surveys on ICT expenditure/investments

	Type of business survey		
	Business structure	Investment	ICT usage survey
ICT goods	<p>Denmark, Finland: No specific data is collected; information is grouped together with other items under general headings in the questionnaires.</p> <p>Norway: Implemented question in survey since 2002. Quality of data questionable.</p>	No data collected	No data collected
Purchased software	<p>Denmark, Finland: For expenditure: No specific data is collected; information is grouped together with other items under general headings in the questionnaires. In Finland, expenditure on ICT services are asked, investments in software are asked as a separate item.</p> <p>Norway: Implemented question in survey since 2001. Quality of data questionable.</p>	<p>Sweden: Data on expenditures for the sum of purchased and own account software are collected, but only used as reference material due to bias in figures.</p>	No data collected
Own account software	<p>Norway: Implemented question in survey since 2001. Quality of data questionable.</p>	<p>Sweden: Data on expenditures for the sum of purchased and own account software are collected, but only used as reference material due to bias in figures.</p>	<p>Sweden: Question on man-years spent on developing software by own personnel implemented in the 2003 questionnaire. Data is not yet compiled.</p>

As can be seen from the matrix, the information on ICT expenditure/investment is primarily obtained through SBS.

4.5 Future data collection on ICT expenditures/investments

<i>Results from new survey in Denmark ready in the first half of 2005</i>	As mentioned earlier, Statistics Denmark will conduct a stand-alone survey this autumn. In preparation for the survey, national experience from the Danish Accounts Statistics and Nordic recommendations have been taken into consideration, also with focus on requests from the National Accounts, which rely heavily on better figures for ICT expenditures and investments. Results from the survey are expected to be ready in the first half of 2005.
<i>Data collection in Finland in the near future</i>	Statistics Finland aims at starting to collect data on ICT investments from the demand side already in the near future. The preparation of data collection will be started in 2004/2005, and the first data collection concerning the statistical year 2005 will be realized in 2006. The data collection will be carried out in the context of the SBS.
<i>No plans in Statistics Iceland</i>	As for now, Statistics Iceland does not intend to carry out any survey of ICT expenditure and investments. If data on ICT investments/expenditures from the demand side was to be collected, it is most likely that the ICT usage survey would be chosen as a vehicle for that.
<i>Data collection will continue in Norway</i>	Statistics Norway will continue their data collection through SBS. More precise questions and more resources directed to the revision of the collected data are likely to produce better data quality. To collect information on own account software via the ICT usage survey is under consideration. It will then be asked for estimated man-years developing own-account software and not for total labor costs as in the SBS.
<i>Evaluation in Sweden</i>	As stated earlier, Statistics Sweden does not collect data on ICT goods in demand side surveys. It would, therefore, be recommended that either the Investment Survey or some other survey started collecting such information. Until reconciliation between the supply side estimates and Investments Survey figures on purchased software can be made, the supply side method will be used. Evaluation of the two new possibilities of estimating own account software expenditures using occupational data and own personnel man-years spent on developing own account software will be carried out in the near future.
<i>Swedish plans on data collection in 2006 or 2007</i>	According to Statistics Sweden's development plan for economic statistics a developed data collection of ICT expenditures/investments is supposed to be carried through either 2006 or 2007. Which survey vehicle that is supposed to be used has not yet been decided.

5. Common frame of reference for measuring ICT investments

Introduction In the following, the Nordic guidelines will take their form beginning with recommendations for ICT goods, purchased software and ICT services. The difficult issue of own account software will also be addressed before going into general discussions on supply versus demand approaches and the important issue of what the choice of business survey vehicle means for the collection of data.

5.1 ICT goods

OECD classification as a starting point A reasonable approach regarding the measurement of ICT goods is to take the available international product classifications as a starting point. This is of great significance because such classifications facilitate the work of developing internationally comparable indicators for ICT investment. Because of the rapidly changing character of ICT goods, it is not very easy to make such a classification, but the earlier mentioned OECD classification of ICT goods will hopefully pave the way for more harmonised methods.

Based on the Harmonised System The OECD classification is based on the Harmonised System (HS), which is the only commodity classification system used on a sufficiently wide basis to support international data comparison. Many countries use the HS to classify their exports and imports of goods and to categorise domestic output. This ensures that the ICT goods classification is ready for immediate use and also stands as a guideline for what goods that should currently be regarded as ICT. It is expected though that the current OECD list will evolve over time as experience of member countries, which use this classification, can give new knowledge.

The broad categories of ICT goods Given all the different kinds of ICT goods that exist on the market, the OECD list is long and very detailed but the broad categories are:

1. Telecommunication equipment
2. Computer and related equipment
3. Electronic components
4. Audio and video equipment
5. Other ICT goods

CPA classification also important Generally, the Nordic recommendation is to focus on these broad categories in surveys and provide the respondent with some examples from each category in order to give an idea of what products are covered by the categories. Furthermore, as the National Accounts also need information on expenditures for ICT goods, it is important that the chosen categories are in line with the European Community classification of products (CPA), which lay the foundation for supply and use tables in National Accounts. This gives the National Accounts the possibility to compare supply side information with information from the demand side.

CPA groups of interest The relevant product groups in the CPA classification are some of the products contained in the following CPA groups

- 30 Office machinery and computers
- 31 Electrical machinery and apparatus, not elsewhere classified
- 32 Radio, television and communication equipment and apparatus
- 33 Medical, precision and optical instruments; watches and clocks

Exclusion of electronic components Thus, the idea is to list some products in the surveys under central categories, which are in line with the OECD classification list and the CPA product classification. It can be discussed that some of the categories are less relevant than others for surveying ICT investments in enterprises. Especially, the category electronic components can be

distinguished from the others, by containing products, which are predominantly used as input in production. This is, of course, relevant for a great number of enterprises in some industries, but it might be more appropriate to include these products in other surveys, which, for example, focus on expenditures for raw materials in production.

Categories with examples Below is listed the four of the broad OECD categories with some examples:

<p>1. Computer and related equipment (hardware)</p> <ul style="list-style-type: none"> - Computers no matter what size including servers and larger systems - Computer screens, keyboards, printers and scanners - Network equipment including routers and cabling <p>2. Telecommunications equipment</p> <ul style="list-style-type: none"> - Telecommunications network including cabling - Switchboards, telephones, telephone answering machines and facsimile machines - Aerials - Burglar or fire alarm systems 	<p>3. Audio and video equipment</p> <ul style="list-style-type: none"> - Tv, video, dvd, monitors and projectors - Video cameras and digital cameras - Radio receivers - Loudspeakers and amplifiers <p>4. Other ICT goods</p> <ul style="list-style-type: none"> - Instruments and appliances for medical use - Measuring instruments - Electronic calculating machines
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ICT goods should be allocated correctly

The listed products are just examples and by no means exhaustive, but just to give the enterprises an idea of what expenditures they have to include. Someone might even say that they are not that necessary, because the person who is going to answer the questionnaire should be able to distinguish between the broad categories. It is just to make sure that the relevant expenditures are allocated correctly under ICT goods in the questionnaire. The recommendation is to collect data on investment and direct costs, which is line with National Accounts recommendations described earlier.

How to deal with embedded software

A problem related to investments and expenditures on ICT goods is that there is a vast quantity of software embedded in such products. Presumably, it will almost be impossible for an enterprise to separate the software part from an ICT good. The general international recommendation from the National Accounts is that if software cannot be separated from the hardware, then it shall be included in expenditures for hardware. This line will be followed in the Nordic guidelines. However, it has to be ensured that the embedded software is not double-counted when making National Accounts estimates on ICT expenditures for software.

5.2 Purchased software

Ways of acquiring software

Basically, an enterprise can acquire software in three different ways:

- By purchasing off-the-shelf pre-packaged software, such as MS Excel
- By contracting specially developed software, i.e. customised software or
- By developing software in-house (own-account software)

This paragraph will be centred on purchased software, leaving in-house development of software to paragraph 5.4.

Common definition for software

Before considering a reasonable approach for measuring purchased software, it might be appropriate to define what software really is. The OECD-Eurostat Task Force agreed on the following definition, which is quite comprehensive, but gives a thorough basis for understanding the different kinds of software types, which can be found on the market and how they can be purchased:

Software consists of computer programmes, programme descriptions and supporting materials for both systems and applications software and can be split into 1) original software and 2) reproduced software.

Originals **1) Original software:**

This is a term that can be applied to describe software used as a “machine” in the process of production of other products. An example could be Microsoft producing the software original “MS Excel”, which is then used to produce “MS Excel” reproductions for subsequent sale. Another example is the software original Adobe Photoshop which can be used to edit digital images in a form that can be used in e.g. web pages.

Basically, original software covers two types which are:

- **Originals for reproduction:** original software whose purpose is to be reproduced. They are generally the result of the production of software editing companies.
- **Other originals:** software that can be used in the process of production of other products.

Reproductions **2) Reproduced software:**

The term reproduced software is used to describe copies of original software. Reproduced software includes software that gives a user the right, or license, to use, and software that gives a user the right, or license, to reproduce. Ahmad (2003) describes the distinction between license-to-use and licence-to-reproduce in the following way:

- **Licenses-to-use:** they are mostly marketed, and thus called “packaged software” or “off-the-shelf software”. In general they legally provide a license-to-use the software. This category includes reproduced software for final use and reproduced software for bundling in hardware, other goods or other software. This category also covers “multiple copy” licenses-to-use and software “rented” for use, for which payments often take the form of “royalties”. It excludes licenses that permit copies to be made for sale.
- **Licenses-to-reproduce:** licenses-to-reproduce permit companies to make further software reproductions (licenses-to-use) for subsequent sale. These reproductions can be sold via licenses-to-use or as part of a bundle, whether the bundled software is included separately or embedded directly onto hardware. Often, licenses-to-reproduce are paid for using “royalties”.

Software to be re-sold has to be excluded

As can be seen from the definition, software can be acquired by using several kinds of payment, including simple purchases and other types such as license payments, rentals and royalties. The OECD-Eurostat Task Force recommendation is to include all external costs made on software related services for own final use, including expenditures made on an original software. All expenditures made on software to be re-sold, whether embedded in other software or in hardware should be excluded though⁶.

Pre-packaged software and customised software

The Nordic approach should follow these recommendations and focus on the main areas where the enterprise can provide a reasonable answer on software expenditures. A natural approach would be to centre on the main ways of acquiring software as mentioned earlier and ask the enterprise for all expenditures made on:

1. Pre-packaged software

⁶ That is software which is re-sold without any further amendments.

2. Specially developed software, i.e. customised software

The first includes all software that requires no or minor adjustments, for instance operating systems, packaged software products and most of the existing development tools software. Customised software is software that is adjusted to the enterprises needs for the enterprises own expenses. The expenditures should be split into capitalized and expensed software, respectively, which is in line with the approach for expenditures on ICT goods and thus takes into account the different nature of the National Accounts and the financial statement of an enterprise.

5.3 ICT services

The importance of ICT services

Another central aspect when measuring ICT investment is the issue of expenditures for ICT services, which is presumed to constitute a very substantial part of an enterprise expenses and therefore it is treated separately in this chapter.

The difficulties related to measurement of ICT services

One can discuss if expenditures for external consultancy should be included under the headings for ICT goods or purchased software depending on the nature of the service, or they should be separated on their own in the questionnaire. The argument for including ICT services such as external consultancy in the measurement of expenditure on ICT goods or purchased software is that software and related consultancy are, in many circumstances, purchased as a package making it very difficult for the enterprises to separate the two. On the other hand, it can be argued that expenditures for ICT services constitute such a heavy burden on budgets that the chief accountant in an enterprise is fully aware of the expenses incurred for external ICT services, even if software and related consultancy are purchased as a package.

ICT services should be included in some way

Regardless of the difficult issue of separating the ICT services from the related products, the recommendation from the OECD-Eurostat Task Force is to include ICT services in some way in the questionnaire. Both from a National Account perspective and for ICT analysts in general, it is interesting and useful to have separated information on ICT services. Especially, information on how much of the ICT service that is capitalized in the enterprises' financial statements can be of great interest.

Related ICT services to be included under ICT goods and purchased software

However, the Nordic recommendation is to keep it voluntary whether or not to separate ICT services from the ICT goods or purchased software. As long as the experience with collecting data on this item is limited, it should be tested if it is possible for the enterprises to give separated information on their expenditures for ICT services. Due to this uncertainty, the Nordic approach will be to include related ICT services under ICT goods and purchased software in the guidelines. Hopefully, future data collection in the Nordic countries will shed light on this issue.

CPA group 72 important

Whether or not to separate ICT services, the recommendation from the National Accounts is to follow the statistical classification of products by activity (the CPA) which is used by the National Accounts in their supply estimates. CPA group 72 constitutes Computer and related services and can be separated into the following sub-categories:

72.1 Hardware consultancy services

72.2 Software consultancy and supply services, includes

- a) Software publishing services
- b) Software consultancy and supply services not elsewhere classified

72.3 Data processing services, includes

- a) Computer facilities management services
- b) Computer processing services such as web hosting services and
- c) Sales of internet advertising space by web hosts

72.4 Database services

72.5 Maintenance and repair services of office, accounting and computing machinery

72.6 Other computer-related services

External consultancy related to hardware and software

Ideally, most of these groupings should be taken into account in questions related to expenditure on ICT services, because of the important nature of each sub-group. For instance, external consultancy services related to hardware or software are presumably substantially more expensive than the product itself and guidelines for measuring ICT investments should ensure that central services are included in the surveys. With CPA 72 as a starting point, ICT services to be included in the guidelines are:

- All external consultancies related to hardware and software

Other ICT services such as outsourcing, facilities management services, web hosting and delivery of data could be included as examples in surveys, which separate the related ICT service from ICT goods and purchased software.

5.4 Own account software**5.4.1 National Accounts Recommendations***All own-account software is investment*

The United Nations recommends in its System for National Accounts (SNA93), Paragraph 512, Article 10.92. that own-account software/ software produced in-house should be treated as Gross Fixed Capital Formation. Furthermore, the OECD-Eurostat Task Force on Software Measurement in the National Accounts, which published its recommendations 2002 in STD/NA(2002)2, concluded in paragraph 1.2 that all own-account software is investment. Another conclusion was that "Work in progress" related to own-account software should also be treated as an investment.

What should be included in own account software

The OECD-Eurostat Task Force recommends that own-account software should include the following costs: compensation of staff and all internal overhead costs incurred in own-account production and all expenditure relating to Functional/Detailed analysis, Programming, Tests and Documentation, excluding any expenditure on assets.

Only costs of associated work conducted in-house

The Task Force also recommends that own-account production should only include the costs of associated work conducted in-house, excluding any assets, but including procured goods and services, used in the production process. Put more explicitly, this means that any purchased software (e.g. reproductions) with "asset" characteristics should be recorded directly as investment; where the purchased software provides capital services to the own-account production process.

Updates of originals

The Task Force finally concluded that own-account software updates should not include the value of the "original" version, but instead only reflect the increased value.

5.4.2 Different approaches in measuring own-account software**The supply side approach***Programming related occupations*

In many countries, information about programming related occupations and wages and salaries is used in order to estimate investments in own-account software on a macro level. This approach has a number of disadvantages. One of these is that it is

difficult to delimit occupations producing own-account software. One dimension of this is that many non-ICT-occupations probably work as programmers, e.g. economists and mathematicians.

It is also difficult to decide what share of their work effort that programmers allocate to own-account programming. National differences in the implementation of occupation nomenclatures might also make country comparisons difficult.

The demand side approach

Uncommon in demand side surveys

It is relatively uncommon to collect data on investment in own-account software via demand side surveys. One reason for this is that few companies trace expenditures and/or investments related to own-account programming. Differences in business accounting and national accounting also make it difficult to collect the desired data. One of the main problems related to this is that an enterprise can, in many cases, choose to treat the development of own-account either as an expense/cost or as an investment. It is therefore difficult to collect consistent and usable data on ICT investments.

Information on full-time equivalents

Another approach, which could be considered either demand or supply side, is to collect data in enterprise surveys on full-time equivalents that work with own-account programming as described in the proposed questions in Chapter 6 Nordic Guidelines. By adding information on salaries and wages for this part of the workforce, it is then possible to compile figures on ICT investments in own-account software. This way of measuring has been implemented in Sweden and the Netherlands.

Better information on working time for programming

The advantage of this method, compared to using data on occupation, is that it is easier to delimit both the group working with own-account software and on what share of their working time that is spent on this task.

Survey vehicle important

The disadvantage of this method is that the variable is measured via surveys that do not cover the whole economy. In Sweden, for example, data is collected from the enterprise sector but not the public sector. It is also necessary to collect the information via a suitable survey vehicle. In the case of Sweden and the Netherlands this data has been gathered via the surveys on ICT usage in enterprises.

5.5 Supply versus demand approach in general

Business surveys important but not the only source

However, evidence from business surveys is only one important source for the development of better estimates of ICT investments and expenditure. Good supply side data is still very important, and so is information from the public sector. One also has to be realistic as regards to what can be derived from business surveys: If the required information is not recorded in the enterprises accounts, they will most likely not be able to report it.

More balanced assessment of ICT investments

Primary statistics on the investments for ICT goods and purchased software obtained via demand side surveys will contribute to a more balanced assessment of ICT investments. More specifically, this will give National Accountants a more thorough insight into ICT investments in a broad range of industries.

Interest in capitalized own account production

Regarding own account software it can be discussed which way is the most appropriate to collect such information. Currently, the estimation of own account software production is based on a model (apart from Norway), which has its disadvantages as stated in the previous paragraph. Naturally, the National Accounts are interested in how much of the in-house development the enterprises actually capitalize. This will give them the opportunity to compare demand side investment with the model-based estimates.

In-house development goes through several phases

The recommendation from the OECD-Eurostat Task Force is very detailed concerning what expenditure should be counted for as own account software production. The problem is that neither the supply side/model based estimates currently used nor the demand side surveys are likely to capture all the different phases that the in-house development of software is going through. One can argue though, that the recommendation describes an ideal world and therefore not necessarily should be interpreted too narrowly when developing questions to be implemented in business surveys.

5.6 Choice of survey vehicle

Type of survey matters

When comparing supply side with demand side information, it has to be realized that the latter part cannot necessarily solve all the problems that are related to model-based supply side estimates. Ideally, the National Accounts would like to obtain information on a very detailed level, i.e. split the different sub-categories of ICT goods in the questionnaires aimed at businesses. The problem is not only if an enterprise is able to separate the expenditures/investments for the different sub-categories, but also what type of survey a given country is using to collect the data.

Expenditure questions time-consuming

Apart from a stand-alone survey, all other survey vehicles include other questions to which the enterprise has to respond. This is a problem if the survey vehicle is already comprehensive and thus includes many questions on other items, which are an obstacle to detailed questions on ICT expenditures and investments. Thus, including ICT expenditure questions make the survey more time-consuming and may result in lower response-rate.

Accounting department will answer in most cases

Who is going to answer the questions also has to be borne in mind. For the SBS and Investment Survey and the stand-alone survey, it is most likely the responsible person for the accounting department who has to answer the questionnaire, while the ICT usage survey is, to a greater degree directed at the IT manager.

Investments might be easier to track than direct costs

If organisations track ICT expenditures in their bookkeeping, the accounting department is probably the most suitable to answer questions on ICT investments. This is, however, not always the case. The expenditures are often grouped under general headings in the financial statements, and for this reason not tracked in the bookkeeping. Investments might be easier to track than direct costs, since they are more often specified in the annual reports. Smaller organisations might also be able to reason back to find these expenditures.

IT-manager might be more suited for questions on own account programming

The main problem by using the SBS and the Investment Survey or, for instance, a stand-alone survey is questions concerning expenditures for developing software for own use. The direct costs associated with this are highly unlikely to be specified in the bookkeeping, and for this reason, the IT-manager might be more suited to answer this question. The investment figures for own account software might be doubtful since organisations are using judgement and valuation methods to estimate these investments.

Guidelines formulated on a general level

All these considerations will have to be taken into account when surveying ICT investments, and against this background the proposed guidelines in the next chapter are formulated on a general level, trying to take into account that not all countries use a stand-alone survey and as such will have to adjust to other modules in the business questionnaire. Furthermore, obtaining reliable information on ICT investments on a more general level from business surveys is always a good beginning.

6. Nordic guidelines

Introduction On the basis of a common frame of reference, the guidelines are build on 1) ICT goods 2) purchased software and 3) own account software:

ICT expenditures consist of investments and direct costs (expenses). Depreciation of ICT investments is, however, excluded. Also excluded are expenses for ICT goods and purchased software, which are to be re-sold without further amendments.

If exact figures are not available, please provide careful estimates.

Guidelines, ICT goods

1. ICT goods

ICT goods consist of:			
1. Computer and related equipment	2. Telecommunication equipment	3. Audio and video equipment	4. Other ICT goods
<ul style="list-style-type: none"> - Computers no matter what size including servers and larger systems - Computer screens, keyboards, printers and scanners - Network equipment including routers and cabling 	<ul style="list-style-type: none"> - Telecommunications network including cabling - Switchboards, telephones, telephone answering machines and facsimile machines - Aerials - Burglar or fire alarm systems 	<ul style="list-style-type: none"> - Tv, video, dvd, monitors and projectors - Video cameras and digital cameras - Radio receivers - Loudspeakers and amplifiers 	<ul style="list-style-type: none"> - Instruments and appliances for medical use - Measuring instruments - Electronic calculating machines

How much did your enterprise spend on ICT goods in year x?

Also include related consultancy services (e.g. installation and maintenance). If hardware and software are purchased as a bundle and/or the software cannot be separated from the hardware, the total amount should be accounted for as an ICT good.

As investments _____ (in national currency)

As direct costs _____ (in national currency)

Guidelines, purchased software

2. Purchased software

Purchased software consists of:	
Pre-packaged software	Customised software
Software that demands no or minor adjustments. Examples: <ul style="list-style-type: none"> - Software packages - Operating systems and development tools - Word processing programs, spreadsheets etc. 	Software that is adjusted to the enterprises needs and for the enterprises expenses

How much did your enterprise spend on purchasing software in year x?

Also include related consultancy services (e.g. development, implementation and testing).

As investments _____ (in national currency)

As direct costs _____ (in national currency)

*Guidelines,
own account software*

3. Own account software

How much did your enterprise spend on labour costs for developing own account software for internal use in year x?

(expenses for external consultancy should be included under question 2)

_____ (in national currency)

Or

A. Does your enterprise have in-house staffs (excluding external consultants) who work with software development, e.g. systems analysts and programmers?

Yes No

If Yes

Please estimate the man-years for software development work: _____

A man-year is the work completed by one full-time employee during one year.

B. Distribute the number of man-years in question A as follows:

- | | |
|---|---------|
| a) Software development for your enterprise's own use,
e.g. software for financial management and administration | _____ % |
| b) Software development for external sales
(including software that is a part of your enterprise's product line) | _____ % |
| c) Other, e.g. maintenance, support, repairs etc. of the enterprises
own software | _____ % |
| <hr/> | |
| Total | 100 % |

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