Room document 1

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National Accounts

Report of the Eurostat Task Force Software Measurement

OECD MEETING OF NATIONAL ACCOUNTS EXPERTS

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Eurostat Task Force
Software Measurement

June 2002
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1. **INTRODUCTION**

SNA93 and ESA95 require expenditure on software to be recorded as gross fixed capital formation: this is one of the biggest changes compared to SNA68 and ESA79. In the last few years, therefore, countries have included estimates for investment in software in their national accounts, adding directly to GDP. However, evidence shows that the methodologies behind the estimates do not necessarily lead to comparable results. At the meetings of the National Accounts Working Party in June 2001 and the GNP Committee in July 2001 it was therefore proposed to organise a Task Force to study this issue and propose recommendations to improve comparability.

The Task Force's objective was to investigate current methods for the measurement of output and GFCF in software, to clarify any conceptual issues where necessary, to analyse the advantages and disadvantages of each method and to propose solutions to bring the results of different methods closer together.

In particular, the following issues were discussed:

- What is software? What are the different types of software? Should all types be included as GFCF? What about large data bases?
- Estimation from the supply side: what sources are available? How then to make the distinction between intermediate consumption and GFCF?
- Estimation from the demand side: what sources are available? How then to make adjustments to company accounts if necessary?
- How to reconcile data from the supply and demand sides?
- How to estimate software produced on own-account?
- Possible sources of price or volume information for software.
- The bundling of software with hardware and the consequences for measurement.
- How to estimate consumption of fixed capital of software? What are appropriate service lives?

The Task Force was comprised of nine EU countries plus Eurostat and the OECD (see annex 6 for a list of participants). The OECD ran a parallel Task Force to which the Eurostat Task Force contributed. The recommendations of this report are fully compatible with the recommendations from the OECD Task Force.

The Eurostat Task Force met three times: 25-26 October 2001 in Luxembourg, 31 January-1 February 2002 in London and 16-17 May 2002 in Luxembourg. In addition, a joint meeting with the OECD was organised in Paris on 22-23 April 2002. A list of documents prepared by the Task Force is included as annex 7.
2. GUIDELINES FROM THE ESA95

Starting point is the definition of gross fixed capital formation (GFCF):

3.102 Gross fixed capital formation (P.51) consists of resident producers’ acquisitions, less disposals, of fixed assets during a given period plus certain additions to the value of non-produced assets realised by the productive activity of producer or institutional units. Fixed assets are tangible or intangible assets produced as outputs from processes of production that are themselves used repeatedly, or continuously, in processes of production for more than one year.

3.105 The following types of gross fixed capital formation may be distinguished:

(a) acquisitions, less disposals, of tangible fixed assets:

(…)

(b) acquisitions, less disposals, of intangible fixed assets:

(1) mineral exploration
(2) computer software
(3) entertainment, literary or artistic originals
(4) other intangible assets

(c) …

(d) …

Thus, computer software is an intangible fixed asset when used in production for more than one year. The asset category "Computer software" (AN1122) is defined as follows (in annex to chapter 7):

Computer programs, program descriptions and supporting materials for both systems and applications software. Included are purchased software and software developed on own account, if the expenditure is large. Large expenditures on the purchase, development or extension of computer databases that are expected to be used for more than one year, whether marketed or not, are also included.

This definition makes clear that also large expenditures on databases are to be included1.

GFCF is valued at purchaser's prices including all transport, installation and other costs of ownership transfer or - in the case of own account production - at estimated basic prices, or at production cost when satisfactory estimates of basic prices cannot be made. This applies to any type of asset - including software. It follows that costs associated with transfer of ownership and installation, manuals and support services that are needed to successfully put a system into operation should be included in GFCF.

1 This is the only reference to databases in the ESA!
It must be noted that for software, the so-called "small tools rule" is also applicable. This is defined in

3.70 e) items not treated as gross capital formation, like:

(1) small tools which are inexpensive and used for relatively simple operations, such as saws, hammers, screwdrivers and other hand tools; small devices, such as pocket calculators. By convention, in the ESA, all expenditure on such durables which does not exceed 500 ECU (in prices of 1995) per item (or, when bought in quantities, for the total amount bought), should be recorded as intermediate consumption;

Thus, only purchases of more than 500 ECU/Euro in 1995 prices are to be included in GFCF.

The production process of software is described in

3.67. The production of books, recordings, films, software, tapes, disks, etc. is a two stage process and measured accordingly:

(1) The output from the production of originals (an intangible fixed asset) is measured by the price paid if sold, or, if not sold, by the basic price paid for similar originals, its production costs or the discounted value of the future receipts expected from using it in production;

(2) The owner of this asset may use it directly or to produce copies in subsequent periods. If the owner has licensed other producers to make use of the original in production, the fees, commissions, royalties, etc. he receives from the licenses are his output of his services. However, the sale of the intangible asset is negative fixed capital formation.

Lastly, ESA95 makes clear that consumption of fixed capital must also be calculated for software:

6.03. Consumption of fixed capital must be calculated for all fixed assets (except animals), including both tangible fixed assets and intangible fixed assets such as mineral exploration costs and software, major improvements to non-produced assets and costs of ownership transfers.

3. COUNTRY PRACTICES

The joint OECD and Eurostat Task Forces on Software launched a questionnaire to investigate current country practices. The results will not be elaborated here, but have been summarised by the OECD in a paper for the meeting in Paris of 22-23 April 2002.

It appears that most countries use the supply approach to measure GFCF of software. From the Eurostat TF countries, France, the Netherlands and the UK also use independent demand side data. However, even among countries that use the same approach the results can be quite different. There are clearly differences in how the countries draw the borderline between intermediate consumption and GFCF. Also, the way own-account software is estimated differs across countries.

Table 1, drawn from the questionnaire, illustrate this.

3
Table 1: Supply/use balances of participating countries in percentages for CPA 72

Source: Task Force Questionnaire (mostly)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic production</td>
<td>91.4</td>
<td>87.2</td>
<td>83.2</td>
<td>88.9</td>
<td>96.5</td>
<td>19.4</td>
<td>87.8</td>
<td>73.2</td>
<td>70.4</td>
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<tr>
<td>Imports</td>
<td>4.1</td>
<td>9.5</td>
<td>8.0</td>
<td>11.0</td>
<td>3.5</td>
<td>78.0</td>
<td>5.1</td>
<td>23.8</td>
<td>29.6</td>
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<tr>
<td>Margins and taxes</td>
<td>4.6</td>
<td>3.3</td>
<td>8.8</td>
<td>0.1</td>
<td>0.1</td>
<td>2.6</td>
<td>7.1</td>
<td>3.0</td>
<td>-</td>
</tr>
<tr>
<td>Total supply</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Intermediate consumption</td>
<td>81.5</td>
<td>43.3</td>
<td>47.5</td>
<td>45.1</td>
<td>71.5</td>
<td>19.9</td>
<td>67.5</td>
<td>19.7</td>
<td>20.5</td>
</tr>
<tr>
<td>Household consumption</td>
<td>0.0</td>
<td>1.2</td>
<td>0.9</td>
<td>1.9</td>
<td>1.9</td>
<td>0.0</td>
<td>0.7</td>
<td>0.3</td>
<td>0.9</td>
</tr>
<tr>
<td>GFCF</td>
<td>11.0</td>
<td>44.9</td>
<td>49.6</td>
<td>41.6</td>
<td>24.1</td>
<td>46.4</td>
<td>30.6</td>
<td>60.4</td>
<td>55.6</td>
</tr>
<tr>
<td>Exports</td>
<td>7.2</td>
<td>9.5</td>
<td>2.1</td>
<td>11.4</td>
<td>2.5</td>
<td>33.7</td>
<td>1.2</td>
<td>19.6</td>
<td>23.0</td>
</tr>
<tr>
<td>Change in inventories</td>
<td>0.2</td>
<td>-0.2</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Residual</td>
<td>0.0</td>
<td>1.4</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total use</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>GFCF in CPA 72 as % of GDP</td>
<td>0.48</td>
<td>2.27</td>
<td>1.61</td>
<td>1.60</td>
<td>0.70</td>
<td>0.38</td>
<td>0.67</td>
<td>0.66</td>
<td>1.40</td>
</tr>
</tbody>
</table>

Table 1 shows for CPA 72 "Computer and related services" the shares in total supply and total use of the different transaction categories, to get an indication of the differences in country practices regarding the split intermediate consumption/GFCF in particular. A few striking things:

- The shares of imports in total supply are rather similar and rather low, except for Greece, and to a lesser extent Spain and Finland. The exact opposite can be said about the share of exports in total use.2

- The Netherlands and France record relatively very little margins on software. (Finland does not have a value here, since the supply/use tables are not yet balanced.)

- The shares of GFCF in total use are also quite similar, with the exceptions of the UK and France, and to a lesser extent, Italy, which are much lower (the opposite can of course be concluded on intermediate consumption). Spain has the highest share of investment.

2 The high figures for Greece can probably partly be explained by a higher allocation of royalties to CPA 72.
Only two countries record changes in inventories.

The shares in total use and supply give an indication of the treatment of software in the accounts; the last row of the table - GFCF in CPA 72 as a percentage of GDP at market prices - illustrates the different levels of investment as estimated in the national accounts. There are clearly large differences here that seem difficult to explain from economic phenomena only. Sweden has a remarkably high investment compared to its GDP, while Greece and the UK are on the low side. For Greece, this can be explained by the fact that no own-account software is yet estimated. For the UK, an explanation can be found in the low ratio GFCF/intermediate consumption.

Some countries were also able to provide a supply/use balance for subcategory CPA 72.2 "Software consultancy and supply services". Their data are compared with the USA data for packaged and custom software in table 2.

**Table 2: Supply/use balances of some countries in percentages for CPA 72.2**

Source: Questionnaire

<table>
<thead>
<tr>
<th>CPA 72.2</th>
<th>Sweden</th>
<th>Denmark</th>
<th>France</th>
<th>Italy</th>
<th>Finland</th>
<th>USA¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic production</td>
<td>83.8</td>
<td>79.7</td>
<td>91.3</td>
<td>80.3</td>
<td>64.4</td>
<td>91.6</td>
</tr>
<tr>
<td>Imports</td>
<td>11.3</td>
<td>11.4</td>
<td>8.6</td>
<td>7.5</td>
<td>35.6</td>
<td>0.5</td>
</tr>
<tr>
<td>Margins and taxes</td>
<td>4.9</td>
<td>8.8</td>
<td>0.0</td>
<td>12.2</td>
<td>-</td>
<td>7.9</td>
</tr>
<tr>
<td>Total supply</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Intermediate consumption</td>
<td>8.7</td>
<td>26.5</td>
<td>33.7</td>
<td>42.6</td>
<td>7.2</td>
<td>0.4</td>
</tr>
<tr>
<td>Household consumption</td>
<td>1.8</td>
<td>1.2</td>
<td>0.5</td>
<td>0.6</td>
<td>0.8</td>
<td>2.8</td>
</tr>
<tr>
<td>GFCF</td>
<td>75.7</td>
<td>69.3</td>
<td>59.5</td>
<td>55.9</td>
<td>65.0</td>
<td>94.3</td>
</tr>
<tr>
<td>Exports</td>
<td>12.1</td>
<td>3.0</td>
<td>6.2</td>
<td>1.0</td>
<td>27.0</td>
<td>2.5</td>
</tr>
<tr>
<td>Change in inventories</td>
<td>-0.4</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Residual</td>
<td>2.2</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total use</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>GFCF in CPA 72.2 as % of GDP</td>
<td>2.27</td>
<td>1.58</td>
<td>0.70</td>
<td>0.67</td>
<td>1.40</td>
<td>1.21</td>
</tr>
</tbody>
</table>

¹USA: balance for packaged and custom software, plus own-account

Since the USA doesn't cover the whole category 72.2, it is natural that their investment ratio is higher than those of the European countries. Among the European countries, the investment shares are not too dissimilar (Sweden being the most different one). The USA has surprisingly low export shares. France doesn’t record any margins.
The balance for the USA is for 1992, this being the latest year for which a benchmark IO table is available. For information, the ratio of GFCF in software to GDP for 1998 is 1.81\%\(^3\).

It must be noted that these data are the current data in the national accounts of these countries. All countries are still developing their methodology for the measurement of software. Thus, it is likely that the numbers will change significantly within the next few years.

4. **INTERPRETATION OF ESA95**

4.1. **Introduction**

The Task Force considered it important to first agree in detail on the interpretation of ESA95 and the theoretically correct treatment of software in the national accounts, before discussing the various ways of measuring it in practice. This section will therefore analyse in detail the various goods and services concerned, and will try to distinguish in which case they are to be treated as investment and in which cases as intermediate consumption. This will be done in section 4.4 using the CPA 1996 classification\(^4\). This classification is used by the EU countries in business statistics, and is fully consistent with NACE, rev.1, the industry classification. In principle, the classification is exhaustive, i.e. all possible products should find a place, which is another reason to structure the discussion on the conceptual treatment of software using a product classification. But before that, some general principles needs to be formulated.

4.2. **Some general principles for software**

4.2.1. **Definition of software**

The Task Force adopted the following definition of software:

Software consists of computer programs, program descriptions and supporting materials for both systems and applications software. Licenses to use or reproduce software are not separated from the underlying software, and are thus included in this category. Software covers the following sub-categories:

- **Original software**: original software are machines used in the process of production of other products, and as such are considered as investment. Originals can be produced on own-account (they are then called “own account original software”) or can be bought (“purchased original software”). This includes games’ originals. Originals cover two types:

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\(^4\) A preliminary classification on the basis of CPA 2002 is given in annex 1.
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.

- Reproduced software: reproductions of software are copies of original software. They include software giving users the rights, or license, to use, and software that gives the rights, or licenses, to reproduce:

  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 equipment 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 does not include 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.

The original software and its reproductions are separate fixed assets. Thus, the purchase of a copy (or a license to use) is also GFCF, provided the following two general rules are fulfilled:

- The software must be used in production for more than one year
- The value of the purchase should exceed 500 Euro (in prices of 1995).

The development of the original is production for own GFCF. The original software is part of asset category AN11225.

For practical reasons, no distinction is made between purchasing, renting, leasing or licensing software. Although in theory a case could be made for treating rented software differently from purchased software (see annex 2 for a more elaborate discussion), it will be difficult for users to distinguish between payments for "rented" software and payments for "purchased" software. It is assumed that the treatment of some annual or less than annual license fees as purchases of software does not introduce significant errors in GFCF. One consequence of this treatment is that even when payments are labelled "royalties" they can relate to investment expenditure in national accounts terms.

5 This is in contrast with the recommendation of the 1997 Eurostat Task Force on Intangibles
4.2.2. The life of a software system

The service life of a software system, intended for use in production for more than a year, can be seen as:

- A development phase starting when the decision has been made to establish the system and ending when the system has successfully been put into operation. Expenditure during the development phase should be capitalised, whether used for planning, design, programming, installation or testing. Purchased standard programs, programming- and consultancy services should be included as well as documentation and manuals. As for other kinds of investment in fixed capital the value shall include cost of installation and change of ownership.

- The development phase can of course end when a system is abandoned before it becomes operational. For national accounts purposes it can be argued that the expenditure on unsuccessful projects should still count as GFCF\(^6\). In business accounting unsuccessful own-account projects may never reach the stage where the expenditure is capitalised.

- A production phase starting when the system is in normal operation, and no significant changes or extensions are made and ending when the system is abandoned or replaced by a completely new version. Expenditure during this phase should be considered maintenance of the system and should be treated as intermediate consumption.

- If significant extensions or changes to the system are made, e.g. because new facilities are added, parts of the program code is replaced or the system is moved from one platform to another, a new development phase is started. It ends when the modified system is operational. Expenditure in connection with the changes during this phase should be capitalised in national accounts. It may - as for other types of capital goods - be difficult to draw a distinct borderline between improvements/extensions and current maintenance.

Establishment of big software systems will often involve expenditure on hardware, software and consultancy services with respect to both hardware and software. The expenditure can be a combination of purchases in the market and own-account production. It may be difficult to distinguish between expenditure on hard- and software when these are combined in the same services\(^7\).

4.2.3. Embedded and bundled software; subcontracting

Some software is purchased or developed for incorporation in other products. This can be either equipment (for example computers, but also other machinery) or other software. The most prominent example is the bundled sale of software with a PC. PCs are often purchased with software that may or may not be installed prior to the

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\(^6\) Theoretically it can be assumed that with a market equilibrium the invested value should reflect discounted expected future capital services. It can be assumed that investment decisions take into account the risk of failure and that successful projects will “pay” for unsuccessful investment.

\(^7\) Output of hardware- and software consultancy will probably also be difficult to separate.
purchase. Bundled software can be invoiced separately to the customer, in which case the purchase of software can be treated like any other purchase of software. It may however be included in the purchaser's price of the computer. Here the software is either input in the production of "computers with software" or input in wholesale or retail trade, in which case trade margins on computers include the value of the software. The value of total investment is not affected by the difference in treatment.

Licenses purchased by PC manufacturers to make copies of standard software to install on PCs are here labelled "licenses-to-reproduce" and are classified as intermediate consumption. This is to make a clear distinction with "licenses-to-use" which are purchased by the users of the software and are to be treated as GFCF.

Built in processors are used in many types of modern machinery, equipment and consumer durables. The processors are often programmed to perform specific functions, and software will typically be embedded in the design. Often software is permanently burnt into the chips. Development of original software on own-account for such purposes may not easily be separated from research and development in connection with chip design itself. When R&D is excluded from GFCF this original software may disappear from estimates of GFCF based on business accounts. In contrast, estimation of own-account production as the cost connected with the work of the company's own computer staff, can probably result in an (implicit) inclusion of the value of these originals in GFCF.

Computers that may be more or less similar to ordinary general-purpose computers are today widely used to control machinery, equipment and transport equipment. The software used in these computers may share characteristics with ordinary systems and applications software. When producers of machinery record the software as input, their output of machinery will include the value of the software. In this case the software is treated as embedded in the machinery. If such embedded software is (a copy of) standard packaged software, the software will be shown as intermediate consumption in the production of machinery. If however the software is specially developed for this purpose (i.e. custom software) and the machine builder purchases the property rights to this software, this purchase has to be seen as investment expenditure (if used for more than one year and of sufficient value). The machine builder subsequently makes the copies of the software to be installed onto the machines.

Original software for reproduction will often be own-account production and it can be assumed that in most cases the owner of the property rights is also supervising the programming project. However development of parts of the original can be outsourced. It also occurs that original software is bought from other software producers to be built into a more comprehensive software package or to be included as a facility in a new operating system. In relation to the national accounts “subcontracting” can emerge simply as a result of internal division of labour inside big international corporations, where it may not easily be recognised.

In the case where a software producer develops custom software for a client, but the development is wholly or partially outsourced, the value of the services produced on subcontracts must be intermediate consumption of the software-producer. The finished software-product will be GFCF of the client when it fulfils the usual conditions for being investment.
The following table attempts to outline the different situations regarding bundling/embedding and subcontracting.

Table 3: Proposed treatment of embedding/bundling

<table>
<thead>
<tr>
<th>Embedded/bundled in equipment, including computers</th>
<th>Embedded/bundled in other software</th>
</tr>
</thead>
<tbody>
<tr>
<td>For sale</td>
<td>For own-account</td>
</tr>
<tr>
<td>Packaged software</td>
<td></td>
</tr>
<tr>
<td>License-to-reproduce: intermediate consumption</td>
<td>Intermediate consumption</td>
</tr>
<tr>
<td></td>
<td>GFCF⁸</td>
</tr>
<tr>
<td>Custom software</td>
<td></td>
</tr>
<tr>
<td>When used for more than one year: GFCF</td>
<td>Subcontracting:</td>
</tr>
<tr>
<td></td>
<td>Intermediate consumption</td>
</tr>
<tr>
<td></td>
<td>GFCF⁸</td>
</tr>
<tr>
<td>Own-account software</td>
<td></td>
</tr>
<tr>
<td>When used for more than one year: GFCF</td>
<td>Ancillary activity</td>
</tr>
<tr>
<td>When used for less than one year: ancillary activity (probably rare)</td>
<td>(costs are included in intermediate consumption of sold software)</td>
</tr>
<tr>
<td></td>
<td>Ancillary activity</td>
</tr>
<tr>
<td></td>
<td>(costs are included in value of own-account output)</td>
</tr>
</tbody>
</table>

4.2.4. Estimating own-account; which inputs to include?

Software or services purchased to be used for producing own-account software can be recorded in two different ways. The first option is to include them in the intermediate consumption used to develop the own-account software, and thus to include them in the value of the own-account output. By subsequently recording the own-account output as GFCF, these inputs are indirectly capitalised.

The second option is to record the software or services directly as GFCF, in which case of course they should not be counted in the value of own-account output, in order not to double-count them. Both options lead to exactly the same level of GFCF, but the split between purchased software and own-account produced software differs. The amount of information needed to implement one or the other option is in principle exactly the same: it is important to have information on the amount of software or services purchased for the development of own-account output.

⁸ In principle, this could also be treated as intermediate consumption in the development of own-account output (see also the discussion in section 4.2.4). However, the Task Force considered that it would be easier if packaged and custom software were always directly booked as GFCF.
software. Both options are further explained by means of an elaborate example in annex 4.

The Task Force considered that it would be easier in practice to record all packaged and custom software directly as GFCF (except of course when embedded or bundled as in section 4.2.3). For other services (such as consultancy, design, hiring of programmers, etc.) the preferred treatment would probably depend on available sources.

An important issue is which goods and services used for own-account are to be capitalised (directly or indirectly). The Task Force considered that work on own-account software should be capitalised from the point at which technical and commercial feasibility has been proven, and the decision to establish the system is taken, onward. That means that expenditure on e.g. feasibility studies is not capitalised. GFCF in (successful) software should nevertheless include the development costs of software that in the end turns out not to be successful.

### 4.3. Databases

The Task Force has not been able - within the timeframe given - to resolve satisfactorily the question of which databases are to be included in GFCF and which are not. As quoted in section 2, the ESA95 says that "large expenditures on the purchase, development, or extension of computer databases that are expected to be used in production for more than one year, whether marketed or not" are to be included in the asset category "computer software". It is the reference to "large" that has created confusion as to which expenditure are to be capitalised and which not.

The Task Force discussed further criteria to distinguish between databases that qualify as assets and databases that do not, but has not found yet a satisfactory set of criteria. More research and discussion is needed to develop the necessary guidance on this issue.

The Task Force agreed on a number of issues:

- Whenever databases are transferred including their property rights (in other words, transfer of the original database) between companies, the expenditure of the buyer has to be scored as GFCF (and negative GFCF of the seller). It only has an impact on GDP if such transfers take place between a resident and a non-resident company.

- A difference should be made between data and databases. Not every set of data is a database. The following definition of a database is given by http://whatis.techtarget.com:

  A database is a collection of data that is organized so that its contents can easily be accessed, managed, and updated.

  It follows that the purchase of data from a database, for example online subscriptions, is not investment expenditure.

Some members of the Task Force considered it prudent not to record own-account production of databases, in the interest of international comparability. Others
thought that this would disregard important economic assets and would not be a very satisfactory solution on the long run.

Another point of discussion was the treatment of databases held by governments. Prominent examples are the databases of statistical offices and administrative registers such as a population register. Some members of the Task Force thought such databases cannot be seen as economic assets, since they do not fulfil the general definition of economic assets (see ESA95, p. 7.10-7.11) that states that economic benefits should be derived from them. Other members considered however that government databases were also to be included in GFCF.

The Task Force also considered that further investigation is required to find an answer to the question whether Internet sites can be treated as databases as well.

There is also a question on the treatment of originals and copies of databases. There seems to be a difference compared with software in that part-copies of databases can also be purchased. While just buying some data from a database is unlikely to be seen as investment expenditure by enterprises, when the purchase would include a larger set of data or even a full copy of the database (including software), this is no longer obvious.

Although the Task Force did not conclude whether own-account output of databases has to be included or not, the Task Force recognised that some part of this own-account output might be implicitly included when estimating own-account software from the cost side. A large part of the development work of databases will consist of development of software, carried out by software professionals.

4.4. Discussion by product

This section discusses each subcategory of CPA 72, its content and its treatment in the accounts.

CPA 72.1 Hardware consultancy services

These are services that are related to the hardware rather than the software, and thus do not lead to the production of computer programs.

CPA 72.20.1 Recorded data bearing media of a kind used in automatic data processing machines

This category stems from the Harmonised System and is intended to cover the exports and imports of software "goods", i.e. the physical carriers of software such as diskettes and CD-ROMs (see also section 6.7 of this report) as they are registered by customs authorities. These carriers can contain any kind of information, such as data, databases, software, pictures, etc. It is recommended to transfer any items within this category to the appropriate CPA category.

CPA 72.20.2 Programming services of packaged software products

consisting of

72.20.21 Programming services of systems and user tools software
Programming services of application software

The notes to CPA explain that this category includes

- development and marketing (sale, rental, leasing and/or licensing) of packaged systems and user tools software (for 72.20.21), respectively of packaged application software (for 72.20.22)

but excludes

- retailing of packaged software, classified in 52.48.13
- custom design of software or modification of packaged software to meet specific user needs, classified in 72.20.32.

Thus, this category includes the originals (since it includes the development of the systems) and the copies of packaged software, irrespective of whether these systems are sold, rented, leased or licensed (data sources for originals and copies are of course different).

Games software, originals and copies, are also included in this category.\(^9\)

The following breakdown of this category is proposed:

- Original software, purchased or produced on own-account: \(GFCF\)

- Copies of originals:
  - When embedded into computers or other equipment, or software (incl. purchase of right to reproduce software): \(intermediate \ consumption\) (see also section 4.2.3)
  - Other purchased, rented, leased or licensed software: \(GFCF\)

For the latter to qualify as \(GFCF\) the general rules of use for more than one year and costing more than 500 Euro (see above) have to be fulfilled. In practice, this will be the case for practically all purchases of companies.

Own-account produced software of this category mainly relates to production of software companies (i.e. the recording of the original as \(GFCF\)).

Games software is mostly household final consumption, except perhaps for some investment by game arcades or casinos.

**CPA 72.20.31 Systems and technical consulting services**

This includes provision of advice and assistance on technical matters related to computer systems. This includes among other things the conducting of feasibility studies. These services will in most cases be treated as intermediate consumption, except when:

\(^9\) This is in fact based on an interpretation derived from CPA 2002.
• They are used in the development of own-account software, and

• They are purchased after the point at which feasibility of the to be developed software is proven, i.e. thus excluding feasibility studies.

If those conditions are fulfilled, the services can be capitalised directly or indirectly. If there are no data available to identify the potentially capitalisable services, it is most prudent to treat all services as intermediate consumption.

CPA 72.20.32 Custom software development services

The explanatory notes to CPA say this includes
- development (analysis, design and programming) of software for, and to meet the requirements of, a specific client
- modification of packaged software

but excludes
- provision of systems analysis and programming services, classified in 72.20.33.

This category includes all custom-made software. No distinction between originals and copies, as was made for 72.20.2, applies here since custom software by definition is not produced for subsequent reproductions.

It is clear that all custom software is to be treated as GFCF unless:

• Its value is less than 500 Euro or the software is used for less than one year; this is probably a negligible case

• When purchased to be included in other software (subcontracting, see section 4.2.3).

CPA 72.20.33 Systems analysis and programming services

The CPA explanatory notes state that this category includes provision of systems analysts' and/or programmers' services on a per diem basis to participate in one of the phases of the development of a system. The client supervises and retains the right to their work. However, it excludes delivery of software commissioned by the client where the developer supervises and is involved in all phases (analysis, design and programming) of the development project, classified in 72.20.32.

The treatment, and argumentation, is similar to that of 72.20.31. If programmers are hired for the development of own-account software, these costs are to be directly or indirectly capitalised. If they are hired for the development of software for sale, they are to be treated as intermediate consumption.

CPA 72.20.34 Systems maintenance services

CPA explanatory notes say that this category includes provision of assistance to keep computer systems (software) in good working condition. The maintenance may be corrective or preventive and includes services such as:

. testing to detect, locate and rectify faults
. improving existing programs
. providing up-to-date user manuals
. providing advice on the proper use of a system.

This category contains services that are clearly of an intermediate nature (such as providing advice) as well as services that would seem to qualify as investment (improving existing programs). Maintenance of software is different to maintenance of other equipment (e.g. cars or machines), since it can be argued that each correction to a program is an improvement to that program. It is not obvious where to draw the distinction between maintenance and improvements in the case of software.

It is probably true that most of these services are carried out in-house, rather than being purchased. It can relate to the maintenance of an original piece of packaged software (e.g. Microsoft maintaining the source code of Windows) as well as the maintenance of own-account produced software. Most companies will view such costs as running costs rather than investment. The recommendation is therefore to treat this category in the main as intermediate consumption. If data are available to identify improvement activities, they could be treated as GFCF.

CPA 72.20.35 Other professional computer-related services

This category consists in the main of intermediate services. The treatment is similar to 72.20.31 and 72.20.33.

CPA 72.3 Data processing services

Consisting of
72.30.1 Computer facilities management services
72.30.2 Computer processing services
72.30.21 Data processing and tabulation services
72.30.22 Data entry services
72.30.23 Other computer processing services.

These services are all to be treated as intermediate consumption, except when used to build databases on own-account, in which case they could be directly or indirectly capitalised.

CPA 72.4 Database services

The CPA explanatory notes state that these include
- services related to database activities
- technical support such as:
  . database development services: assembly of data from one or more sources
  . data storage services: preparation of a computer record for such information in a predetermined format
database availability: provision of data in certain order or sequence, by on-line data retrieval or accessibility (computerised management) to everybody or to limited users, sorted on demand

but exclude

- provision of telecommunication network services (leased networks, public data networks or gateways) necessary to access databases, classified in 64.20.1.

- services involving documentary searches, classified in 92.51.1.

As with packaged software, this category includes both the original databases as well as the sales of data from these databases. See section 0 for a discussion on the treatment of databases.

CPA categories 72.5 Maintenance and repair services of office, accounting and computing machinery does not relate to software. Category 72.6 Other computer related services is a rest category and should be treated similar to 72.20.31.

The following "concordance" table summarises the above.
<table>
<thead>
<tr>
<th>CPA 72.1 Hardware consultancy services</th>
<th>Not software</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPA 72.20.1 Recorded data bearing media of a kind used in automatic data processing machines</td>
<td>Transfer contents to appropriate CPA categories (software, databases, etc.)</td>
</tr>
</tbody>
</table>
| CPA 72.20.2 Programming services of packaged software products | • Original software, purchased or produced on own-account: GFCF  
• Copies of originals:  
  – When embedded into computers or other equipment, or software (incl. purchase of right to reproduce software): intermediate consumption  
  – Other purchased, rented, leased or licensed software: GFCF |
| CPA 72.20.31 Systems and technical consulting services | Intermediate consumption, except when:  
• used in the development of own-account software, and  
• purchased after the point at which feasibility of the to be developed software is proven, i.e. thus excluding feasibility studies.  
If those conditions are fulfilled: directly or indirectly GFCF |
| CPA 72.20.32 Custom software development services | GFCF, unless purchased to be included in other software (subcontracting). |
| CPA 72.20.33 Systems analysis and programming services | See 72.20.31 |
| CPA 72.20.34 Systems maintenance services | Intermediate consumption, except for improvement activities |
| CPA 72.20.35 Other professional computer-related services | See 72.20.31 |
| CPA 72.3 Data processing services | Intermediate consumption, except when used to build databases on own-account, then directly or indirectly GFCF |
| CPA 72.4 Database services | See section 4.3 |
| 72.5 Maintenance and repair services of office, accounting and computing machinery | Not software |
| 72.6 Other computer related services | See 72.20.31 |
5. **BUSINESS ACCOUNTING FOR SOFTWARE**

Until only a few years ago there was a clear lack of guidance on the treatment of software in business accounting. This resulted in individual businesses treating software very differently in their accounts. The introduction of standard guidelines has done much to improve the reporting and the disclosure of computer software within the business accounts of a company.

In "Accounting for Software" John Rieger from the OECD describes the accounting standards currently in place. Here, briefly, only those standards are mentioned that were developed in the USA as these have been around the longest and seem to be more widely referred to:

**FASB Statement No. 86, Accounting for the costs of computer software to be sold, leased, or otherwise marketed.** This says that:

Costs incurred internally in creating a software product should be expensed as research and development until technical feasibility of the product has been established. Technical feasibility is established upon completion of a detailed program design or, in its absence, a working model. After technical feasibility is established all costs should be capitalised on the basis of unamortised costs or net realisable value, whichever is the lower.

**SOP 98-1, Accounting for the costs of computer software developed or obtained for internal use.** This says that:

Certain internal use software should be capitalised. Internal use software is software for which a company has no substantive plans to market externally. Maintenance costs associated with internal use software should be expensed as incurred. Certain internal upgrade costs should be capitalised. When costs can not be separated between upgrade and maintenance the costs may be expensed. For internal software that is purchased where the purchase price includes elements other than the software (training, maintenance, data conversion etc) the value of these additional elements must be separated using objective evidence of fair value and then expensed.

**FASB Emerging issues task force issue No. 00-2, Accounting for website development costs.** This says that:

Certain costs incurred in planning and developing a website should be accounted for under SOP 98-1. However, if a marketing plan is in place or under development the costs should be accounted for under FASB Statement 86.

Thus, the accounting rules (at least in the US) are not far off from what the national accounts rules are. However, there remains much discretion in the interpretation of these guidelines, as was shown by an investigation of a small sample of business accounts (see annex 3 for details). Whilst there is clearly some application of the standards by most companies considered in this sample the application of the accounting standards is far from clear. Examples of apparent deviations from the standard are Microsoft and Sun Microsystems who appear not to apply FASB 86 for software produced for sale. This is because of the interpretation of the technological
feasibility argument which was expressed also by the Software Publishers Association in their 1996 letter to the FASB\textsuperscript{10} which argued:

As a result of the dynamic nature of today's software industry and continual generation of high risk development issues, an increasing number of software companies believe that technological feasibility is not reached until very late in the development cycle. Subsequent costs are inherently immaterial so most companies charge all software development costs to research and development expense.

The consequence is that national accountants should be extremely careful when using business accounts as a basis for measuring investment in software. This applies equally to purchased software and software produced on own-account. Relying fully on business accounts will, first of all, probably underestimate total investment in national accounts terms, and, secondly, produce incomparable results across countries.

The Task Force considered that for correct measurement of investment in software it will be indispensable to conduct surveys on software production and expenditure that ask questions that are independent of business capitalisation practices. Such questions may be incorporated into general business surveys, or be included in special-purpose surveys. The next section will discuss this in more detail.

6. **THE MEASUREMENT OF SOFTWARE**

6.1. **Balancing supply and demand for software**

Investment in software - as any other type of investment - can be estimated in basically two ways:

- From the "demand" side, i.e. by surveying the expenditures on software by enterprises and government, either through business accounts or through direct surveys.

- From the "supply" side, i.e. by estimating GFCF as the residual of output plus imports minus intermediate consumption, household consumption and exports. This can also be seen as an application of the "commodity flow" method.

Ideally, one would have reliable direct data on all components of the supply/use balance, so supply and demand figures can directly be compared to obtain the best possible estimates. Preferably, supply and demand are balanced at a reasonably detailed product level, for example separately identifying packaged software, custom software and software services.

In practice, direct data from the demand side are - at least at the moment - rather scarce, or underestimate GFCF considerably. In the short run, therefore, most countries will have to rely on the supply approach. It is however important to notice that the quality of estimates based on the supply method depends on good information on domestic supply, exports and imports by product. Lack of reliable

\textsuperscript{10} Letter from Ken Wasch, president, Software Publishers Association to Dennis Beresford, chairman, Financial Accounting Standards Board, 14 March 1996.
information on production or foreign trade by products may lead to very unreliable results, and the apparent comparability between “supply side” GFCF-estimates can be an illusion, when estimates of domestic supply depend on more or less arbitrary assumptions.

In the following section, the practical estimation of each of the components of the supply/use balance will be reviewed.

6.2. Output, including own-account

6.2.1. Output of marketed computer software

Section 5 concluded that for software investment calculations, business accounts are unreliable. This implies that, on the short run, improved methods for measuring investment in software from the supply side are essential. The Task Force concluded that in order to properly estimate gross fixed capital formation in software from the supply side, it is necessary – for the output component - to have product breakdowns of turnover of software companies in which at least the production of packaged and custom software could be identified separately. Total turnover is not sufficient.

The problem is the current lack of information in this field. This lack of information is partly due to the fact that software production mainly falls under the service sector and is, therefore, not covered by industrial production surveys. Furthermore, the computer services sector differs from other service sectors regarding the heterogeneity of the activities included and for the high degree of secondary production. In these last years the NSIs have been developing new surveys which try to improve the statistical information in this area. At the moment, however, the structure and the frequency of the surveys vary across countries. For this reason there is an urgent need of harmonization of the surveys in the future in order to achieve comparability of the estimates. An effort in this sense is represented by a pilot inquiry prepared by Eurostat in the context of the Structural Business Statistics to which several EU Member States participate. The pilot was first launched for the reporting year 2000 and now with an extended participation also for 2001.

A production survey for the computer services industry should, at least, provide comparable information such as turnover broken down by product and by customer category. This enables the allocation of the output value to the different product groups used in the national accounts, provided that the product categories in the survey are consistent with the classifications used in the national accounts. This, in turn, would enable a more proper estimation of GFCF or intermediate consumption in computer software from the supply side.

Clearly, different levels of breakdown of total turnover can be proposed. A first could be the one consistent with the proposed definition of software and the proposed theoretical treatment of CPA 72 6-digit categories, as defined in section 4. A second could be a minimum level of detail that simply allows for identification of the production of packaged software (CPA 72.20.2) and the production of custom software (CPA 72.20.32). A question regarding costs of subcontracting could be included, as well as a question regarding sales to hardware manufacturers, so that the investment values are not overestimated.
An example can be found in the next table, which shows total turnover broken down by product. To each of these products a CPA 6-digit classification can be attached. This table is drawn from the Eurostat pilot survey on computer services for 2001.

**Figure 1: SBS Pilot Survey: questions on turnover**

<table>
<thead>
<tr>
<th>4. Breakdown of total net turnover by products</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Hardware consultancy services</td>
<td>___</td>
</tr>
<tr>
<td>(value in national currency)</td>
<td>___</td>
</tr>
<tr>
<td>ii) Software and other computer consultancy services</td>
<td>___</td>
</tr>
<tr>
<td>(value in national currency)</td>
<td>___</td>
</tr>
<tr>
<td>(a) Development and sale of packaged software</td>
<td>___ %</td>
</tr>
<tr>
<td>(b) Development and sale of customised software (incl. modifications of packaged software)</td>
<td>___ %</td>
</tr>
<tr>
<td>(c) Other software and computer consultancy services</td>
<td>___ %</td>
</tr>
<tr>
<td>(d) Total &quot;Software and other computer consultancy services&quot;</td>
<td>100 %</td>
</tr>
<tr>
<td>iii) Other computer related services</td>
<td>___</td>
</tr>
<tr>
<td>(value in national currency)</td>
<td>___</td>
</tr>
<tr>
<td>(a) Computer facilities management and data processing services</td>
<td>___ %</td>
</tr>
<tr>
<td>(b) Database services</td>
<td>___ %</td>
</tr>
<tr>
<td>(incl. on-line information provision)</td>
<td>___ %</td>
</tr>
<tr>
<td>(c) Systems maintenance services</td>
<td>___ %</td>
</tr>
<tr>
<td>(d) Computer hardware servicing, repair and maintenance of computing machinery and equipment</td>
<td>___ %</td>
</tr>
<tr>
<td>(e) Total &quot;Other computer related services&quot;</td>
<td>100 %</td>
</tr>
<tr>
<td>iv) Network and telecommunication services</td>
<td>___</td>
</tr>
<tr>
<td>(value in national currency)</td>
<td>___</td>
</tr>
<tr>
<td>v) IT-related training</td>
<td>___</td>
</tr>
<tr>
<td>(only if provided separately from other computer services)</td>
<td>___</td>
</tr>
<tr>
<td>vi) Leasing or rental services of computing machinery without operator</td>
<td>___</td>
</tr>
<tr>
<td>(value in national currency)</td>
<td>___</td>
</tr>
<tr>
<td>vii) Retail (wholesale and retail)</td>
<td>___</td>
</tr>
<tr>
<td>(a) Software (not own developed)</td>
<td>___ %</td>
</tr>
<tr>
<td>(b) Hardware and equipment</td>
<td>___ %</td>
</tr>
<tr>
<td>(c) Other resale</td>
<td>___ %</td>
</tr>
<tr>
<td>(d) Total resale</td>
<td>100 %</td>
</tr>
<tr>
<td>viii) Other additional products n.e.c.</td>
<td>___</td>
</tr>
<tr>
<td>Please enter details of the sales (net turnover) of all other types of products that you provide (not covered by the previous product categories, for example business and management consultancy, manufacturing etc.)</td>
<td>___</td>
</tr>
<tr>
<td>Total Net Turnover (sum of items 4, ii...viii)</td>
<td>___</td>
</tr>
<tr>
<td>(national currency)</td>
<td>___</td>
</tr>
</tbody>
</table>

It can be difficult for the respondents to identify exact values for the production of different products, which is why the above table asks to estimate shares of production instead of values.
The Task Force considered that for the particular purpose of estimating GFCF in software, the breakdown of the categories ii) and iii) is vital. It is also recommended that a product description is included with the survey in order to facilitate the filling in of the survey. This should somewhat simplify the recognition of different products by the respondent. The following is an abstract of the explanations added to the pilot survey questionnaire.

Figure 2: SBS Pilot Survey: Explanatory notes

<table>
<thead>
<tr>
<th>Development and sale of packaged software:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sale, rental, leasing and/or licensing of own developed packaged software. The category should also include sales of licenses (for packaged software). On the other hand, software bought for resale must be excluded.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Development and sale of customised software:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Development (analysis, design and programming) of customised software</td>
</tr>
<tr>
<td>2. Adaptation of existing software</td>
</tr>
<tr>
<td>This category should include internet programming and web design, software related to network services and application software. The category should also include sales of licenses (for customised software). On the other hand, software bought for resale must be excluded.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other software and computer consultancy services:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Provision of advice and assistance on matters related to computer software:</td>
</tr>
<tr>
<td>- conducting feasibility studies on the implementation of a system</td>
</tr>
<tr>
<td>- providing specifications for a database design</td>
</tr>
<tr>
<td>- providing technical expertise for the integration of hardware and software</td>
</tr>
<tr>
<td>- providing guidance and assistance during the start-up phase of a new system</td>
</tr>
<tr>
<td>- providing specifications to secure a database and so on</td>
</tr>
<tr>
<td>- providing advice on proprietary software</td>
</tr>
<tr>
<td>2. Provision of computer-related professional services not elsewhere classified:</td>
</tr>
<tr>
<td>- development of service-level agreements services</td>
</tr>
<tr>
<td>- disaster recovery services (software)</td>
</tr>
<tr>
<td>- implementation planning services</td>
</tr>
<tr>
<td>- quality assurance planning and review services</td>
</tr>
<tr>
<td>- system implementation support services</td>
</tr>
<tr>
<td>- system quality assurance services</td>
</tr>
<tr>
<td>- system integration services</td>
</tr>
</tbody>
</table>

A problem is the secondary production of software by non-software industries. To identify this production it is necessary to include one or more specific questions regarding software production in the industrial production surveys. These questions should be phrased in a wording consistent with the wording used in the production survey to the computer services industry. For reasons of resources and response burden, some branches that are known to have significant software sales could be prioritised.

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11 The SBS pilot survey follows the CPA classification very closely. However, the Task Force noted that the important category 72.20.33 Systems analysis and programming services is neither explicitly nor implicitly recognised.
In order to facilitate proper estimation of GFCF or intermediate consumption of software, a production survey to the computer services sector should include turnover broken down by product/customer category. The following table shows total net turnover by customer category only.

**Figure 3: SBS Pilot Survey: Breakdowns of turnover**

<table>
<thead>
<tr>
<th>1. Total net turnover</th>
<th>(value in national currency)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Total net turnover by client</td>
<td></td>
</tr>
<tr>
<td>(a) Enterprises</td>
<td></td>
</tr>
<tr>
<td>including: public owned enterprises, sole proprietorships and companies with limited liability</td>
<td></td>
</tr>
<tr>
<td>(b) Public sector</td>
<td></td>
</tr>
<tr>
<td>including: public administration, health and education</td>
<td></td>
</tr>
<tr>
<td>excluding: public owned enterprises</td>
<td></td>
</tr>
<tr>
<td>(c) Households and non-profit institutions</td>
<td></td>
</tr>
<tr>
<td>(d) Total</td>
<td></td>
</tr>
</tbody>
</table>

The Task Force thought that in particular the split between resident clients and non-resident clients is an important one. The outcomes should be compared with the data from foreign trade and balance of payments statistics.

The Task Force considers it essential to develop at national level surveys on the computer service sector aimed to identify the production of the different products/services. The SBS pilot surveys should become compulsory (preferably annual) for all Member States. This type of survey is aimed at measuring turnover. It cannot be used therefore to measure own-account output. The Task Force did not consider it useful to include questions on own-account output in such surveys.

A common structure of the production surveys in the NACE 72 industry for all the European countries would improve comparability. This should be a priority and could require a breakdown of products not too detailed. The structure of the product breakdowns also need to be comparable over time. The computer services sector is evolving very fast, with a new range of products every year. It might be better to have a minimum breakdown of turnover for each year, than to have a very detailed breakdown for only one year.

**6.2.2. Output for own fixed capital formation**

The valuation of output of software for own fixed capital formation should respect ESA95 rules:
3.113 Gross fixed capital formation is valued at purchasers’ prices including installation charges and other costs of ownership transfer. When produced on own-account it is valued at the basic prices of similar assets (which implies a mark-up for net operating surplus or mixed income) or at the costs of production if such prices are not available.

To use basic prices of similar assets for such assets is not easy, because of the unique feature of these assets. This is why the Task Force recommends to estimate the value of own-account produced software from the cost side.

Present experience (see section 5) seems to show that interpretation of businesses own estimates of the value of production of own-account software is not clear. It may be concluded that until good business estimates based on common practices may eventually become available, estimation based on compensation of the employees working on own-account production and a mark-up factor should be preferred. It follows that questionnaires should avoid asking questions on the value of capitalised software including own-account software. At a minimum, questions on the value of the two types of software should be asked separately. For own-account software information on the number of employees working on own-account software, the time spent on this production and/or the wages connected with this production may be more useful than information on the capitalised value. This level of detailed information can be more useful, especially at present when we have concerns over the consistency of how businesses record such expenditure in their accounts and the observed differences between countries.

For a harmonised approach to measurement of own-account output from the cost side, it is necessary to have harmonised data on labor inputs and non-labor inputs. So we have to define:

- people who do the actual design or programming of computer software;
- the time they spend on developing software;
- the non-labor inputs and the way to estimate them.

The preferred approach would be to ask companies on their number of staff involved in developing software, or alternatively, on the wages paid to software staff. A good existing example of this approach is the "Automation Survey" of Statistics Netherlands (see Annex 5 for more details). It seems easier for companies to answer a question on software staff than to make an estimate of the value of their own-account output. Thus, the reliability of the answers to such a question can be expected to be higher.

As an alternative, the ISCO classification seems to be an appropriate source for harmonised data on labor inputs. ISCO category 213 “computing professionals” seems to be the relevant class of occupations. However, when ISCO data are used, adjustments have to be made for the time the “computing professionals” spend on other activities than producing own-account software? Indeed, they have several other activities, such as training, maintenance of software, software consultancy, operating of systems, etc. The time spent on such activities should not be counted in GFCF.
The Task Force proposes that an adjustment factor of 50% could be used as a preliminary solution to estimate the time spent on software development. The value of 50% has been chosen to emphasise the arbitrariness of the choice. The USA uses this proportion at the moment. Until real information becomes available on time spent or costs made, this adjustment factor is seen as an acceptable solution.

Statistics Netherlands conducted an analysis of the difference between the two approaches outlined above. They compared the results of their direct question in the Automation Survey with ISCO data in labour statistics. See Annex 5 for the results. The main conclusion is that the 50% ratio is - if anything - on the high side. At the moment the information on the subject is scarce, and a more widespread use of surveys may provide a less uncertain basis for a percentage.

An estimate of total labour costs is then derived by multiplying staff numbers by the average wages. For this, the average wage of staff in NACE 72 could be a proxy.

A different approach is required for NACE 72. Taking all computing professionals of this branch as basis for the estimates of own-account output would overstate the true value since part of the staff is working on custom software to be sold, which should not be counted. In fact, only

(1) the time spent on the development of originals of packaged software, and

(2) the time spent on the development of software to be used only by the company itself ("real" own-account)

should be included. Special data or calculations will be required to estimate (1) and (2). In the absence of actual data, item (1) could be proxied by using the share of turnover from the sales of copies in total turnover as proxy for the share of staff working on originals. It is however difficult to say how good or bad this proxy is. Item (2) is not covered by turnover, but will probably be relatively small. Given the rough nature of the proxy for (1), it could be assumed to cover (2) as well.

Finally, we need to estimate the non-labor part of the costs. We have to value:

- a) intermediate consumption (see the discussion in section 4.2.4 on which inputs to include);
- b) consumption of fixed capital;
- c) a mark-up factor for net operating surplus.

Elements b) and c) can also be combined into gross operating surplus. To estimate the non-labor costs, the cost structure of NACE 72 industries can be used as a proxy. Preferably, if available, the cost structure of custom software producers is used. Then the non-labor costs ratio (intermediate consumption, consumption of fixed capital and net operating surplus) per employee can be applied to the total number of computing professionals.
6.3. Intermediate consumption

Section 4 described the borderline between intermediate consumption and gross fixed capital formation. Briefly summarised, intermediate consumption of software contains:

- Packaged software embedded in equipment (such as computers) or software for sale
- Custom software integrated in other software for sale (subcontracting)
- Services not used in the development of own-account software or databases

Services used in the development of own-account software or databases can also be treated as intermediate consumption, but they will have to count in the value of the own-account output, and are thus indirectly capitalised.

Also, purchases of software to be used in production for less than one year or costing less than 500 Euro should in principle be included in intermediate consumption.

It is important to obtain estimates of the above categories in order not to overestimate GFCF when calculated from the supply approach.

In principle, as usual, real data on these phenomena should be collected from businesses. Data on the level of subcontracting, for example, can best be estimated from information from the companies that outsource the work rather than from companies that take on the subcontract (because they might not always be aware of the use of their service as an element of a final product).

In the absence of actual data from businesses, estimates could be made by using fixed proportions to total sales. For example, the input of software into PCs could be estimated as a percentage of total sales of PCs.

6.4. Gross fixed capital formation

Special surveys on expenditure on software are preferred as the method to establish estimates of software investment, without referring to the peculiarities of business accounting practices. The ideal solution seems to be to collect information on total purchases of software, capitalised and not capitalised, if possible by subcategories that are useful for national accounts purposes, and at the same time to gather information on how these purchases are treated in business accounts.

One way of doing this is to collect information via two questions that could for example be formulated as follows:\(^\text{12}\):

- How much expenditure on software did you capitalise?

\(^{12}\) This approach is currently practiced in Belgium and Australia.
How much expenditure on software did you expense?

The expensed software can then be added to the capitalised software to obtain more reasonable figures for software investment according to national accounts concepts. However, that can only be done if the numbers for expensed software do not include e.g. software consultancy services that are not to be treated as GFCF.

Thus, it must be clarified to respondents what "expenditure on software" means. Ideally, one would breakdown the above questions in product categories, such as packaged software, custom software and other software services. Then, it would be easy for national accountants to make the correct allocation of purchases to intermediate consumption and GFCF.

In addition, information is required on the purchases of software services that are used for the development of own-account software, since these purchases are directly or indirectly to be capitalised (see section 4.2.4).

Altogether, the response burden created by this number of questions (and their complexity) might be a stumbling block for the future emergence of independent demand side estimates for software investment. Simpler alternatives have to be sought.

An alternative could be to collect only aggregate information from each company (for example, total expenditures on software), complemented by more detailed information from subsamples. The UK followed this approach in 1998, when the capital expenditure inquiry was complemented by a telephone inquiry to selected businesses, to obtain information on the treatment of software in the business accounts 13. Even if such a survey has to be limited to a relatively small sample of businesses, it may provide information of the type that is needed to perform the transition from the concepts used in business accounting to national accounts definitions.

It should be noted that when business accounts data are replaced by other estimates of capital expenditure, other parts of the business data - total output, intermediate consumption, value added, etc. - will have to be adjusted as well. That's why it is important to have information on business accounting practices (at least if the national accounts are heavily reliant on business accounts).

Own-account software cannot be expected to be fully capitalised in business accounts. In fact, as was discussed in section 6.2.2, the Task Force considered it to be more appropriate to ask for staff working on software development than for values of capitalised own-account software.

6.5. Household final consumption

Household final consumption expenditure on computer software is small compared to the remaining components of demand (intermediate consumption, gross fixed capital formation). This is shown by the data in tables 1 and 2 of section 3 of this

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report. This is partly due to the fact that households often buy software in combination with hardware, so that the expenditure on software is hidden in the data on hardware. In surveys designed to estimate household final consumption, sometimes software is not separated from hardware.

Games software should be included in household expenditure on software, and is probably one of the larger expenditure items of households. It cannot be excluded that households also purchase other software services than packaged software and games (for example databases).

For the estimation of household final consumption the main sources of data are Household Budget Surveys and Retail Trade Statistics.

The most common source for the estimation of final consumption is the Household Budget Survey. In some countries, this survey includes in the same question the expenditures on hardware and software, according to the COICOP category 9.1.3 Information processing equipment. The Task Force considered that it would be recommendable to separate software from hardware in the Household Budget Survey. If that is not feasible, at least one question for packaged software purchased separately should be introduced in the survey.

Another source for estimating household final consumption is the Retail Trade Statistics, provided the household expenses can be separated from business and government expenses.

The relevant category for games software in CPA is 72.20.2, that includes the programming services of packaged software products. Thus, for games, the distinction between the original and the copies have to be made in the same way as for packaged software. The original should be considered as GFCF while the copy could be household final consumption, intermediate consumption or GFCF (when the expenditure is made by the recreational and entertainment activities) or exports.

However, the main survey used to estimate household expenditure (the household budget survey) uses the COICOP classification. This classification explicitly includes software games as entertainment goods in the category 9.3.1. It may be difficult to identify household purchases of games software within this category.

### 6.6. Changes in inventories

Inventories of software can appear in two ways:

- Inventories of packaged software at producers and retailers
- Work-in-progress on custom software.

Inventories of packaged software at retailers would in principle be captured by the normal retail trade surveys. Inventories of packaged software at producers however are unlikely to be surveyed in business surveys to the computer services industry. They might not be very significant though.
Work-in-progress can be scored if information is available. However, for the level of GDP it is not important whether the output is recorded as work-in-progress or as GFCF directly.

Technically, the ESA95 does not allow to score work-in-progress for own-account software, since own-account output will have to be recorded as GFCF directly.

6.7. Exports and imports

The treatment of exports and imports of software is complicated due to the special nature of some part of the products, i.e. the packaged software. Although classified as a product of a service industry in NACE, there is in fact a tangible output that can be bought "off-the-shelf". This led to international standards and classification making a distinction between trade in software "goods" and software services. The packaged software is included in international merchandise trade statistics, while the services are included in the trade in services statistics of the balance of payments.

6.7.1. Trade in goods

The "International Merchandise Trade Statistics - Concepts and Definitions" (UN, series M, no. 52, rev.2) gives the following guidance as far as software is concerned (underlining added):

27. Goods used as carriers of information and software. (HS heading 85.24) This category includes, for example, (a) packaged sets containing diskettes or CD-ROMs with stored computer software and/or data developed for general or commercial use (not to order), with or without a users’ manual, and (b) audio- and videotapes recorded for general or commercial purposes (see para. 123 below for recommendation on valuation). However, (i) diskettes or CD-ROMs with stored computer software and/or data, developed to order, (ii) audio- and videotapes containing original recordings, and (iii) customized blueprints etc. are to be excluded from international merchandise trade statistics (see para. 48 below).

123. There are international transactions which present special difficulties or questions regarding valuation of the goods involved. Some of the difficulties are due to the complexity of the transaction or the peculiarity of the goods. (...) The valuation of all goods should be made in accordance with the WTO Agreement on Valuation and the recommendations contained in the present publication (see paras. 116 and 121 above). In addition, it is recommended that:

(a) (...)

(b) Goods used as carriers of information and software, such as packaged sets containing diskettes or CD-ROMs with stored computer software and/or data developed for general or commercial use (not to order), be valued at the their full transaction value (not at the value of the empty diskettes or CD-ROMs, paper or other materials (see para. 27 above))

Thus, custom software is treated as a service and therefore excluded here, and the packaged software is to be valued at full value rather than the value of the carrier only (which has been practice in the past).

There exist various practical problems in correctly recording international flows of packaged software. To name a few:
• The HS and CN classifications do not make a distinction between packaged software and custom software: they only classify by carrier (CD-ROM, diskette, tape, etc.) Thus, when custom software is exported on a CD-ROM, this will be included in the goods statistics, despite the guidance given by the UN manual. This software may at the same time be recorded in the Balance of Payments (see below), so that a risk of double counting exists. (This is not an issue within the Intrastat system.)

• More and more software is sold on-line: thus, no physical flow exists and no registration takes place;

• Since in the past CD-ROMs etc. that crossed the border were valued at the "empty" value (since the software it contained was seen to be a service), it is probable that in many cases this valuation is still used.

• There is an incentive for producers to classify their products as custom software, if for packaged software import duties are to be paid.

• The codes of the HS and CN used for software (8524 and its sub-categories) may also contain non-software products. The interpretation of the HS may not be the same in all countries.

6.7.2. Trade in Services

Software appears in two codes of the Balance of Payments (BOP) system.

• 263 Computer Services.

The draft Manual on Statistics of International Trade in Services (see http://esa.un.org/unsd/tradeserv/docs/msits_unedited010906.pdf) gives the following definition of computer services (underlining added):

3.117. **Computer services** consists of hardware and software related services and data processing services. Included are hardware and software consultancy and implementation services; maintenance and repair of computers and peripheral equipment; disaster recovery services, provision of advice, and assistance on matters related to the management of computer resources; analysis, design and programming of systems ready to use (including web page development and design), and technical consultancy related to software; development, production, supply and documentation of customised software, including operating systems made on order for specific users; systems maintenance and other support services such as training provided as part of consultancy; data processing services such as data entry, tabulation, and processing on a timesharing basis; web page hosting services (i.e., the provision of server space on the internet to host clients’ web pages); and computer facilities management.

3.118. Excluded from computer services are the provision of packaged (non-customised) software (classified as goods and therefore not included in EBOPS57) and non-specific computer training courses (included in other personal, cultural, and recreational services).

3.119. **News agency** services include (…)

3.120. **Other information provision services** includes database services—database conception, data storage, and the dissemination of data and databases
Thus, all types of services of CPA 72 are included here, with only database services separated from computer services. In particular, custom software is not separated. This yields a problem in the supply approach to estimating GFCF.

- 266 Royalties and license fees

The above draft Manual defines this as follows (underlining added):

3.121. This *Manual* recommends a disaggregation of the BPM5 component into franchises and similar rights and other royalties and license fees. Franchises and similar rights comprise international payments and receipts of franchising fees and the royalties paid for the use of registered trademarks. Other royalties and license fees includes international payments and receipts for the authorised use of intangible, non-produced, non-financial assets and proprietary rights (such as patents, copyrights, and industrial processes and designs) and with the use, through licensing agreements, of produced originals or prototypes (such as manuscripts, computer programs, and cinematographic works and sound recordings). Payments and receipts for the outright purchase or sale of these assets and rights are excluded (following BPM5, these are recorded as capital account transactions, not as services). Excluded also are distributive rights for audiovisual products for a limited period or a limited area; these are included in audiovisual and related services.

Thus, royalties relate to payments for the use of the original software. This is not a very clear concept. Payments for the right to produce copies, for example to install software onto hardware, will usually be classified as royalties (and are intermediate consumption). However, the purchaser of these rights will unlikely receive the original code for making the copies (if such a thing exists at all). Also, payments from, say, Microsoft/Ireland to Microsoft/USA for the right to sell copies of MS software in Europe are royalties, although MS/Ireland will receive only a copy of the software themselves. (But this is not very different from the use of original movies or original manuscripts.)

Payments for the purchase of copies of software (which logically can only relate to packaged software) should be in trade in goods. However, it could be that a significant share of packaged software is purchased without a physical flow of the product. For example, an enterprise may buy additional licenses for a product already in use. Such license payments, which should be seen as investment expenditure, will likely be recorded under royalties.

Royalties should not relate to custom software either, since that should be included in computer services. However, it is not excluded that in practice some royalties in fact relate to purchase of custom software and are thus wrongly recorded.

Royalties should also not relate to the outright purchase of an original (of a packaged software product). Such payments are included in the capital account of the BOP (although the draft Manual only mentions trade in non-produced assets). They should in principle be treated as negative GFCF of the selling country and positive GFCF of the buying country. In many cases, however, software originals are purchased by purchasing the company that owns them, and thus shown as foreign
direct investment flows. The exports and imports of the originals are then not recorded explicitly. This may lead to a situation where - according to the national accounts - one country owns the original and another country produces the copies.

The main problem with the above is of course that royalties related to software are not separately identified. Thus, statistical offices have to make assumptions as to the amounts of software royalties. Breakdowns of the royalties by importing/exporting enterprises might help identifying this. Identifying software royalties would not only be for the benefit of national accountants, but would also help ICT analytical work and trade analysis generally.

The following table gives Balance of Payments data for the year 2000, in millions of Euro, for the two categories (source NewCronos).

**Table 5: Exports and imports of computer services and royalties and license fees**

<table>
<thead>
<tr>
<th>Declaring country</th>
<th>263 Computer services</th>
<th>266 Royalties and license fees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exports</td>
<td>Imports</td>
</tr>
<tr>
<td>European Union (15 countries)</td>
<td>7184</td>
<td>5473</td>
</tr>
<tr>
<td>Belgium+Luxembourg</td>
<td>1748</td>
<td>1366</td>
</tr>
<tr>
<td>Denmark</td>
<td>:</td>
<td>:</td>
</tr>
<tr>
<td>Germany</td>
<td>4025</td>
<td>4833</td>
</tr>
<tr>
<td>Greece</td>
<td>65</td>
<td>123</td>
</tr>
<tr>
<td>Spain</td>
<td>489</td>
<td>703</td>
</tr>
<tr>
<td>France</td>
<td>726</td>
<td>652</td>
</tr>
<tr>
<td>Ireland</td>
<td>5965</td>
<td>300</td>
</tr>
<tr>
<td>Italy</td>
<td>459</td>
<td>965</td>
</tr>
<tr>
<td>Netherlands</td>
<td>736</td>
<td>860</td>
</tr>
<tr>
<td>Austria</td>
<td>:</td>
<td>:</td>
</tr>
<tr>
<td>Portugal</td>
<td>5</td>
<td>22</td>
</tr>
<tr>
<td>Finland</td>
<td>191</td>
<td>286</td>
</tr>
<tr>
<td>Sweden</td>
<td>1147</td>
<td>947</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>3431</td>
<td>1099</td>
</tr>
<tr>
<td>Norway</td>
<td>:</td>
<td>:</td>
</tr>
<tr>
<td>United States</td>
<td>2673</td>
<td>908</td>
</tr>
<tr>
<td>Japan</td>
<td>:</td>
<td>:</td>
</tr>
</tbody>
</table>

The data for the EU are net figures, i.e. excluding intra-EU flows.

The first thing one notes is the very low figures for exports and imports of services in the USA. Royalties received seem very large, but this also includes royalties received for films and music and can also include various fees for use of patents, manufacture of drugs and machinery under license; the USA questionnaire indeed confirms that software royalties have only a minor share. The low figures for services could perhaps be explained by the fact that a lot of exports and imports of services take place through foreign direct investment and subsequent intra-firm trade with foreign affiliates.

Ireland is an interesting case. Large exports of services (which should not be Microsoft software) are offset with large payments of royalties (in particular to the USA). This could indicate that the above example of royalties paid by Microsoft/Ireland to Microsoft/USA are in fact correctly recorded (but only from the Irish side).
Net exporters of software services are the EU, Belgium/Luxembourg, France, Ireland, Sweden, the UK and the USA. All other countries are net importers of services.

Net receivers of royalties are France, Finland, Sweden, the UK and the USA. The rest is net payer. As said, this includes all kinds of royalties, not only software.

National accountants, foreign trade statisticians and balance of payments compilers should all co-operate in order to improve the recording of international flows of software. For the estimation of GFCF in software, the following points are important in particular:

- A thorough analysis should be made of the software content of the HS/CN groups. It should be verified whether the correct valuation is applied.

- Estimates for software sold on-line should be developed, for example through e-commerce surveys.

- An attempt should be made to identify the custom software component of trade in services, in order to improve the estimates of GFCF from the supply approach.

- Royalties and license fees should only relate to licenses-to-reproduce, and not to licenses-to-use, which are to be treated as purchases of software.

- An attempt should be made to identify the software component of royalties and license fees relating to licenses-to-reproduce. These royalties are to be treated as intermediate consumption.

- It should be verified whether the royalties erroneously contain payments for custom software or packaged software (i.e. licenses-to-use). In that case, they should be transferred to computer services or trade in goods, since they should be included in GFCF.

- It should be verified if any sales or purchases of originals took place. If so, estimates for this should be added.

6.8. Consumption of fixed capital

Countries use the perpetual inventory method (PIM) for their capital stock calculations whenever direct information on the stock of fixed assets is missing. Consumption of fixed capital is usually calculated using the ‘straight line’ method - where the original value of a fixed asset is written off at a constant rate over the whole lifetime of the good -, or using geometric depreciation - where a constant share of the remaining fixed asset is written off each year. The average service life for software should probably be between 3 to 5 years.

GDP is the result of the domestic economic production from which the decline in the value of the fixed assets used in creating this production has not been deducted. In the short run economic growth could be achieved without renewing the capital stock. However, in the long run it is necessary to replenish the capital stock with new investments. Hence, many researchers prefer using net domestic product (which is GDP less consumption of fixed capital) instead of gross domestic product,
because it is seen to better indicate the development of economic well-being. This is becoming more and more apparent since many countries capital stocks are undergoing a compositional shift towards assets with shorter service lives, with an increasing rate of depreciation being the result.

7. **Deflation of Software**

Price indices used by countries to deflate computer software differ significantly. This reflects largely the situation that for many countries no indices are available, and ad hoc solutions have had to be made.

The Eurostat Handbook on Price and Volume Measures in National Accounts discusses the deflation of software in detail in chapter 4.10.4. Various methods are discussed and classified into good (A), alternative (B) and bad (C) methods. One of the main principles of the Handbook is that methods based on inputs or costs are C methods, and should no longer be used. The A or B methods differ according to the product concerned.

The Handbook also stresses the importance of using a supply/use framework for constant price estimates. This ensures that solutions used for deflation are internally consistent. This is particularly important since many countries import a significant share of their software. If prices and volumes on the use side are consistent with imports, errors will not be very significant at the GDP level.

The discussion below focuses on the three main types of software: packaged, custom and own-account software.

7.1. **Deflation of packaged software**

Packaged software is the only type of software for which prices are clearly observable. However, the difficulty lies in capturing the rapid changes in the market. There are two main alternatives in building such an index, the hedonic and the matched model approaches. The problem with the hedonic method is to define the appropriate characteristics that determine the quality of software. The problem with the traditional matched model approach is that the sample quickly becomes out-of-date. A possible way around this is to apply the matched model approach on a monthly basis using large, possibly complete, samples. This can be done for example using scanner data (for the consumer price index).

The Eurostat Handbook on Price and Volume Measures in National Accounts states that deflation with price indices that have an appropriate quality adjustment procedure is the A method. Using less appropriate quality adjustments will be B methods. Also, using the US index for packaged software, adjusted for exchange rate effects or different general price changes, will be a B method. Care should be taken to use appropriate indices and methods.

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14 See the results of the Task Force questionnaire.

15 An example can be found in Marc Prud'Homme (Statistics Canada) *A price index for computer software using scanner data*, presented at the ZEW conference "Price Indices and the Measurement of Quality Change", 25-26 April 2002, Mannheim, Germany.
taken, however, to reflect the different timings of releases of new software in the US and in Europe.

In the short run, it seems appropriate to use the US price index for packaged software, since US software has a dominating share in the market. On the long run, developing price indices within the EU is essential.

7.2. Custom software

Different approaches to develop price indices for custom software exist (see also the discussion in the Eurostat Handbook), for example model pricing, representative pricing (that is producing companies are asked to select some of their products that are representative for their total output) or to follow the price development of contracts. These are costly methods and not easy to implement in practice.

Alternatively, one could follow hourly fees paid to programmers.

Price indices for custom software is estimated in the US and Canada as a weighted average of the packaged software index and the own-account software index (which is based on a deflation of cost components). Weights of the two indices are arbitrarily defined, for packaged software 25 and own-account software 75. Such solutions are acceptable short-term solutions.

7.3. Own-account software

The volume of own-account software is estimated in the US and Canada by total costs using an average of wage and salary indices and price indices of intermediate consumption. The Eurostat Handbook states that the result of the model pricing of custom software approach could be used as a proxy (B method), if it can be shown that the own-account software could also have been produced by an external company.
8. **Final remarks**

Several of the participants to the Task Force stated that the recommendations formulated in this report will lead to significant changes (usually upward) to the software investment estimates in their national accounts. There can be different reasons for that, varying from changes to the measurement of own-account output, changes in the ratio intermediate consumption/GFCF, the inclusion of originals, adjustments to exports/imports data, etc. Many such changes can already be made before new sources become available.

Nevertheless, the Task Force would like to stress the importance of better and more extensive data sources on computer services. Extending turnover surveys and including questions on expenditures on software in business surveys are essential in the long run. Further improvement of the data on exports and imports of software should also be a priority, as well as the development of genuine price indices.

The need for better data sources comes largely from the difficulties in using business accounting data for estimating investment in intangible assets such as software. Perhaps, in the long run, business accounts may become more usable, if accounting standards converge internationally and are increasingly adhered to.

The Task Force did not resolve satisfactorily the issue of databases. The Task Force does believe however that the issue is important enough for continued research and discussion.
| CPA 72.1 Hardware consultancy services                                                                 | Not software                                                                                                                                                                                                 |
| CPA 72.21.1 Packaged software products                                                                 | - Original software, purchased or produced on own-account: *GFCF*  
- Copies of originals:  
  - When embedded into computers or other equipment, or software (incl. purchase of right to reproduce software): *intermediate consumption*  
  - Other purchased, rented, leased or licensed software: *GFCF*                                                                                                                                 |
| CPA 72.21.2 Recorded data bearing media of a kind used in automatic data processing machines          | Transfer contents to appropriate CPA categories (software, databases, etc.)                                                                                                                                 |
| CPA 72.22.11 Systems and technical consulting services                                                 | Intermediate consumption, except when:  
  - used in the development of own-account software, *and*  
  - purchased after the point at which feasibility of the to be developed software is proven, i.e. thus excluding feasibility studies.  
  If those conditions are fulfilled: directly or indirectly *GFCF*                                                                                                                                 |
| CPA 72.22.12 Custom software development services                                                     | *GFCF*, unless purchased to be included in other software (subcontracting).                                                                                                                                |
| CPA 72.22.13 Systems analysis and programming services                                                 | See 72.22.11                                                                                                                                                                                                |
| CPA 72.22.14 Systems maintenance services                                                              | Intermediate consumption, except for improvement activities                                                                                                                                                 |
| CPA 72.22.15 Other professional computer-related services                                              | See 72.22.11                                                                                                                                                                                                |
| CPA 72.3 Data processing services                                                                      | Intermediate consumption, except when used to build databases on own-account, then directly or indirectly *GFCF*                                                                                          |
| CPA 72.4 Database services                                                                             | See section 4.3                                                                                                                                            |
| CPA 72.5 Maintenance and repair services of office, accounting and computing machinery                 | Not software                                                                                                                                                                                                 |
| CPA 72.6 Other computer related services                                                                | See 72.22.11                                                                                                                                                                                                |
ANNEX 2: THE ANNUAL LICENSE PAYMENT PROBLEM

Software copies are rarely sold without some conditions attached. Commonly, these definitions specify that ownership resides with the original owner. In practice copies may however be made available to users in different kinds of arrangements:

1) A simple purchase. When a copy is purchased with a single up-front payment the arrangement is clearly similar to any other purchase of an investment good.

2) A sequence of annual purchases. In many cases the acquisition of copies is paid by a combination of an up-front payment and a payment of fees for a smaller "maintenance license" during subsequent years. The maintenance license gives the user right to free updates and will usually not cover any other services from the owner of the original. This should not be mistaken for leasing arrangement because the annual payments can be considered to equal the value of software purchases in the same period. One should not be confused by the use of the word "maintenance" when used to cover improvements that should be included in GFCF. In this case the arrangement should be seen as a purchase of (copies of) software in the first year and purchases of updates (improvements to the first version) in subsequent years.

3) A license that lasts less than one year: Licenses or rentals for software that is intended for use for less than one year should in principle be treated as intermediate consumption. The value of such licenses may be insignificant for the moment, but may eventually become important if for instance software is made available through the internet on a "pay per use" basis.

4) A license with annual or less than annual payments. Other software licensing arrangements may or may not share characteristics with financial leasing. The analogy with "financial leasing" seems most appropriate if a licensing arrangement is actually binding for a period covering all or most of the normal lifetime of the software and all the risks and rewards of ownership is de facto transferred from the legal owner to the user. In this case the conversion can clearly be seen as reflecting the economic reality.

The arrangement seems more like "operational leasing" if it can be re-negotiated/cancelled at any time, the right of use can be extended/reduced or the provider of the program supplies maintenance, support or other services regularly as part of the arrangement.

Tangible fixed assets under financial leases are treated as GFCF of the user. There is no mention of a similar treatment of intangible fixed assets in the SNA. In the ESA the borderline between operational and financial leasing is described in detail in Annex II. Here financial leasing seems to be restricted to "durable goods".

Treatment as a financial lease will require a consistent treatment of financial assets and liabilities. A loan equal to the capitalised value of future rentals for new leasing arrangements is imputed and the rentals are split into interest and repayment of the loan. The user make an imputed investment equal to the size of the loan and the annual payment of rentals is removed from the users intermediate consumption. The
value of the software original should now (ideally) at any time reflect the discounted value of future expected "imputed sales" of copies instead of the discounted value of future expected license fees. Conversion from license fees to sale of copies will probably require adjustments to import and export figures as shown in the balance of payments if the value of converted license payments to/from the rest of the world is significant. The imputed changes of ownership can be seen as a production of purchased copies, in which case the service life of the original should be reduced and the depreciation profile adjusted. (As a less probable alternative it might be seen as a partial sale of the original).

**Should repeated license payments for a piece of software be converted into GFCF?**

A strict interpretation of SNA/ESA seems to rule out the conversion of annual or less than annual license fees into GFCF unless they can be seen as a sequence of purchases. It can also been argued that for national accounts purposes there is no need to activate a stream of expected future rentals - a solution that would not be proposed for other kinds of rentals that can be assumed to last for an undecided period of more than one year e.g. housing services. To avoid unrealistic or manipulated values for intermediate consumption of software licenses, estimates of annual license payments could be based on market shares for the types of software products that are usually licensed in this way and/or turnover of the firms that use this type of licensing.

It can be argued that only licenses for some specialised packages and mainframe software cannot be interpreted as separate purchases of software copies and updates. Today these types of software make up a relatively small share of total supply. In the absence of data, inclusion of these license fees in investment may not seriously affect GFCF.
ANNEX 3: BUSINESS ACCOUNTING: SOME EXAMPLES

For this review only information from published company reports has been used. Companies are generally free to provide whatever information they see fit in these reports. This limits the amount of information provided on the accounting practice adopted by the company and also leads to a lack of consistent reporting on the level of detail provide by the individual companies. However, despite this, it is interesting to compare and contrast the individual practices in place even when accounting standards are available.

An extract from the company report for each of the companies reviewed follows. The companies have been grouped together into two distinct types, companies that produce software for sale and those that only use software in production.

**Software producing companies**

Software producers are also generally software users. As such they have to account not only for the software they produce for sale, but also for the software they use within the process of production - whether produced on own account or bought in.

**Microsoft**\(^{16}\)

*Software for sale*

Research and development costs are expensed as incurred. Statement of Financial Accounting Standards 86, Accounting for the Costs of Computer Software to Be Sold, Leased, or Otherwise Marketed, does not materially affect the Company.

This leads to the conclusion that all expenditure by Microsoft to develop software for sale is treated as current expenditure.

*Software for internal use*

Computer software developed or obtained for internal use is depreciated using the straight-line method over the shorter of the estimated life of the software or three years.

This implies that some software for internal use is capitalised, but gives no clue as to the conditions under which this occurs. However, an earlier annual report\(^{17}\) clearly states 'As required by SOP 98-1, Accounting for Costs of Computer Software Developed or Obtained for Internal Use, Microsoft began capitalising certain computer software developed or obtained for internal use in fiscal 2000.'.

---

\(^{16}\) Microsoft Annual Report 2001 Form 10-K, Notes to Financial Statements.

\(^{17}\) Microsoft Annual Report 2000, Notes to Financial Statements.
IBM\(^\text{18}\)

*Software for sale*

Costs that are related to the conceptual formulation and design of licensed programs are expensed as research and development. Also, for licensed programs, the company capitalises costs that are incurred to produce the finished product after technological feasibility is established. The annual amortisation of the capitalised amounts is the greater of the amount computed based on the estimated revenue distribution over the products' revenue-producing lives, or the straight-line method, and is applied over periods ranging up to three years. The company performs periodic reviews to ensure that unamortised program costs remain recoverable from future revenue. The company charges costs to support or service licensed programs against net income as the costs are incurred.

*Software for internal use*

The company capitalises certain costs that are incurred to purchase or to create and implement internal use computer software, which include software coding, installation, testing and data conversion. Capitalised costs are amortised on a straight-line basis over two years.

The company capitalises costs incurred during certain phases of internal Web site development. Capitalised costs are amortised on a straight-line basis over two years.

Effective January 1, 1999, the company adopted American Institute of Certified Public Accountants (AICPA) Statement of Position (SOP) No. 98-1, "Accounting for the Costs of Computer Software Developed or Obtained for Internal Use."

**Oracle**\(^\text{19}\)

The annual report makes no specific mention about the treatment of software for sale or for internal use. The only reference to software in the annual report is to computer software development costs, net of amortisation which appears as an entry in the consolidated balance sheet.

**Sun Microsystems Inc**\(^\text{20}\)

*Software for sale*

Costs related to the research, design, and development of products are charged to research and development expenses as incurred. Software development costs are capitalised beginning when a product's technological feasibility has been established and ending when a product is available for general release to customers. Generally, the Company's products are released soon after technological feasibility has been established. As a result, costs subsequent to achieving technological feasibility have

\(^{18}\) International Business Machines Corporation and Subsidiary Companies Annual Report 2000

\(^{19}\) Oracle Annual Report 2000

\(^{20}\) Sun Microsystems Inc Annual Report 2000 Form 10-K, Notes to Consolidated Financial Statements
not been significant and all software development costs have been expensed as incurred.

**Software for internal use**

Costs related to internally developed software and software purchased for internal use, which are required to be capitalised pursuant to Statement of Position (SOP) No. 98-1, "Accounting for Costs of Computer Software Developed or Obtained for Internal Use." Are included in property, plant and equipment under machinery and equipment.

**The Sage Group plc**

The annual report makes no specific mention about the treatment of software for sale or for internal use, but makes the general statement that all costs associated with the development of software are written off as incurred.

**Software using companies**

These group of companies have only to account for the software they use within the process of production - whether produced on own account or bought in.

**Gateway computers**

The Company has royalty-bearing license agreements that allow the Company to sell certain hardware and software which is protected by patent, copyright or license. Royalty costs are accrued and included in cost of goods sold when products are shipped or amortised over the period of benefit when the license terms are not specifically related to the units shipped.

The annual report makes no specific mention about the treatment of software for internal use although there is an entry in the balance sheet for internal use software and reference is made to it being depreciated using a straight-line method over 3-5 years.

**Compaq computers**

Intangible assets primarily relate to the value of the installed customer base, proven research and development, and trademarks of companies acquired, as well as capitalised software and goodwill. The cost of capitalised software is amortised on a straight-line basis over the estimated lives of up to three years.

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21 The Sage Group plc Annual Report 2000, Notes to the Accounts
22 Gateway Annual Report 2000
23 Compaq Computer Corporation Annual Report 2000
**BMW group**

Intangible assets comprise mainly capitalised development costs on vehicle and engine projects as well as subsidies for tool costs, licenses, purchased development projects and software.

**Deutsche Bank**

Although Deutsche Bank is a stock corporation organised under the laws of the Federal Republic of Germany it prepares its consolidated financial statements in accordance with accounting principles generally accepted in the USA (US GAAP).

Eligible costs related to software developed or obtained for internal use are capitalised and depreciated using the straight-line method over a period of 3 to 5 years. Eligible costs include external direct costs for materials and services, as well as payroll and payroll related costs for employees directly associated with an internally used software project. Overhead, as well as costs incurred during the planning or after the software is ready to use, are expensed as incurred.

The balance sheet analysis of premises and equipment presented in the annual report separately identifies and quantifies expenditure on purchased software and self-developed software.

**London Stock Exchange**

Third party software costs for the development and implementation of systems which enhance the services provided by the Company are capitalised and amortised over their future useful lives, which is an average of three years.

**Barclays PLC**

Barclays present their accounts on a UK GAAP basis, but also show explicitly the main difference needed to move to a US GAAP presentation. As such figures for internal use software are shown.

Under UK GAAP, all costs of computer software developed or obtained for internal use are expensed in the year of purchase unless the cost of the computer software cannot be separated from the hardware cost.

Under US GAAP, AICPA Statement of Position (SOP) 98-1 requires certain costs incurred in respect of software for internal use to be capitalised and subsequently amortised.

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24 BMW Group Annual Report 2001
27 Barclays PLC Annual Report 2001
**France Telecom**

The annual report makes no specific mention about the treatment of software for internal use although reference is made to computers and software (excluding networks) being depreciated using a straight-line method over 3-5 years.

**Deutsche Telekom**

Deutsche Telekom present their accounts on a German GAAP basis and on a US GAAP basis, because of its listing on the New York Stock Exchange. As such figures for internal use software are shown.

Under US GAAP, Deutsche Telekom has been applying the Statement of Position (SOP) 98-1, Accounting for the Costs of Computer Software Developed or Obtained for Internal Use since the 1999 financial year. In accordance with SOP 98-1, in contrast to German GAAP, certain internal and external expenditures incurred during the internal project development stage of computer software for internal use are to be capitalised and amortised over its expected life.

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29 Deutsche Telekom Annual Report 2000
ANNEX 4: ESTIMATING OWN-ACCOUNT OUTPUT: WHICH INPUTS TO INCLUDE?

Section 4.2.4 discussed two options for the treatment of inputs into own-account development of software. This annex will explain the two proposed treatments by means of an elaborated example.

Four producers of software are considered:

- A producer of packaged software. This producer produces a new package of which the original has to be valued as own-account output. It has also some sales of copies.

- A producer of custom software.

- A producer of programmers' services, i.e. an "programmers agency" hiring out their staff to other companies.

- An accountancy firm producing software on own-account.

Suppose information on sales is known from a business survey. This gives 400 of packaged software, 600 of custom software and 200 of programmers' services.

There is no debate about the treatment of packaged software and custom software: they are to be capitalised directly even when in fact used in the development of own-account software. Thus, in the example it may well be that some of the packaged and custom software is purchased by, say, the accountancy firm, either for direct use or for further "embedding" into own-account software. Only when purchased software is further integrated into other software destined for sale (e.g. in the case of subcontracting), these purchases are to be treated as intermediate consumption. For the sake of simplicity, it is assumed in the example that no subcontracting of custom software takes place, and that for packaged software a PC manufacturer pays the producer 200 for the right to reproduce their software and embed it in their machines.

As for programmers' services, these are in principle intermediate services, since no final output is generated. However, they should be counted as input into the development of own-account software. For this, there are two options. But let's consider the valuation of own-account output first.

In the example, we have also information on the number of software professionals working in each firm. From this, we can calculate the value of own-account software produced by the packaged software producer (the original) and by the accountancy firm. Here, the following assumptions are used:

- the wage per software professional is the same across industries and equal to what is earned in the custom software company

- the ratio of other inputs (including operating surplus) over wages is the same across industries and equal to this ratio in the custom software company.
<table>
<thead>
<tr>
<th></th>
<th>Supply table of software</th>
<th>use table of software</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>packaged software producer</td>
<td>PC manufacturer producer</td>
</tr>
<tr>
<td></td>
<td>Custom Software Producer</td>
<td>Software Mers Agency</td>
</tr>
<tr>
<td>Packaged software (copies)</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>Packaged software (original)</td>
<td>800</td>
<td>800</td>
</tr>
<tr>
<td>Custom software</td>
<td>600</td>
<td>200</td>
</tr>
<tr>
<td>Hiring of programmers</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Other intermediate inputs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating surplus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1200</td>
<td>600</td>
</tr>
<tr>
<td>Marketed output</td>
<td>400</td>
<td>600</td>
</tr>
<tr>
<td>Own-account output</td>
<td>800</td>
<td>200</td>
</tr>
<tr>
<td>No. software professionals</td>
<td>40</td>
<td>30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Supply table of software</th>
<th>use table of software</th>
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<td>Software Mers Agency</td>
</tr>
<tr>
<td>Packaged software (copies)</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>Packaged software (original)</td>
<td>700</td>
<td>700</td>
</tr>
<tr>
<td>Custom software</td>
<td>600</td>
<td>175</td>
</tr>
<tr>
<td>Hiring of programmers</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Other intermediate inputs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating surplus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1100</td>
<td>600</td>
</tr>
<tr>
<td>Marketed output</td>
<td>400</td>
<td>600</td>
</tr>
<tr>
<td>Own-account output</td>
<td>700</td>
<td>175</td>
</tr>
<tr>
<td>No. software professionals</td>
<td>40</td>
<td>30</td>
</tr>
</tbody>
</table>
This method assumes that some information is available on the inputs consumed by the custom software company.

The plausibility of the assumptions is not the point of discussion here. They could easily be replaced by more plausible ones or even by direct information.

The difference between treatment 1 and treatment 2 is that treatment 1 takes programmers' services as part of other inputs while treatment 2 does not (but capitalises these directly).

Using these assumptions, the value of own-account output for the accountancy firm is estimated at 200 in treatment 1 and 175 in treatment 2. The value of the original kept by the packaged software producer is 800 in treatment 1 and 700 in treatment 2. These values feed back into the supply table, which can now be completed. In the use table, the own-account output feeds directly into GFCF.

In treatment 1, all programmers' services are intermediate consumption. In treatment 2, a distinction is made between programmers' services that are destined to be used to develop software for sale and services that are destined to be used to develop own-account software. Thus, only the services purchased by the custom software producer are intermediate consumption, the remainder is all for own-account development.

Total GFCF is the same in both treatments.

<table>
<thead>
<tr>
<th>Calculation of GFCF</th>
<th>Treatment 1</th>
<th>Treatment 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Derived from sales data</td>
<td>Packaged software: 200</td>
<td>Packaged software: 200</td>
</tr>
<tr>
<td></td>
<td>Custom software: 600</td>
<td>Custom software: 600</td>
</tr>
<tr>
<td></td>
<td>Programmers' services: 125</td>
<td>Programmers' services: 125</td>
</tr>
<tr>
<td>Own-account output</td>
<td>Original packaged software: 800</td>
<td>Original packaged software: 700</td>
</tr>
<tr>
<td></td>
<td>Accountancy firm: 200</td>
<td>Accountancy firm: 175</td>
</tr>
<tr>
<td>Total</td>
<td>1800</td>
<td>1800</td>
</tr>
</tbody>
</table>

In either treatment, information or assumptions are required on the share of programmers' services that is used in the development of own-account output.

It is important in treatment 1 that an estimate is made of the use of programmers' services in own-account production. If this is omitted, the level of own-account output and thus GFCF will be too low.

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30 It would not be correct to capitalise all programmers' services directly, since this would double count the services that are used to develop software for sale.
On the other hand, it is important that in treatment 2, the estimate of the mark-up to be added to the labour costs of the own-account production of the accountancy company does not implicitly take into account the costs of the programmers' services that have already been accounted for by capitalising directly these costs.

Thus, the data requirements are exactly the same in both treatments.

The issue is therefore not a conceptual issue but one of implementation. The difficulty, in the supply approach is to co-ordinate, on the one hand, the estimate of purchased software, and, on the other hand, the estimate of own-account software. In treatment 1 one should avoid to underestimate the own-account production of the accountancy firm by using an adequate mark-up to its labour costs. In treatment 2, one should avoid to overestimate the own-account production of the accountancy firm by using a mark-up which would double-count this flow.
1. Introduction

In the Dutch national accounts, the estimation of gross fixed capital formation (GFCF) in software is largely based on the annual ‘Automation Survey’. This survey is specifically directed to the administrative and office oriented application of information technology and includes private companies as well as government units. Smaller companies (size classes 0-2) are not included. A grossing up is made for these smaller companies. At the end of this annex an extract from the survey form is given.

For the estimation of own account GFCF, information is used on Electronic Data Processing (EDP) staff that is collected by the Automation Survey. This information includes a number of function groups such as:

- general EDP management
- development
- user support
- operation/production
- other support and advice

In the Dutch national accounts, the labour costs of own account GFCF only includes EDP development staff.

Also information is collected on the external contracting of EDP specialists. The share of the costs of internal development staff in the total costs of internal EDP staff is used to estimate the labour costs of external software development staff. Regarding external EDP staff, the survey explicitly distinguishes between:

- purchases of tailor-made software including the costs of extraneous EDP specialists and,
- (other) contracting of EDP specialists

Only the second category is used for estimating own account GFCF in software.

2. The use of labour surveys

The Task Force recommends the use of labour surveys to estimate the labour costs of own account GFCF in software. It is suggested to limit the number of software professionals from occupational data to computing professionals (ISCO-88; 213). Another suggestion made by the Task Force was to use a deduction rate of 50% for
time spent by software professionals on other tasks than software development. (See section …)

A comparison of both types of sources e.g. automation survey versus labour survey in the Netherlands may provide a rough indication on how to use a labour survey to estimate the labour costs of own account GFCF in software.

In the Netherlands, the most suitable source to use in such a comparison is the ‘Structure of Earnings Survey’. This is not an independent survey but a micro integration of three independent sources:

- Labour survey
- Employment and wages survey
- The social insurance administration of employees

The Structure of Earnings Survey contains information on wages by level of education and occupation.

3. A comparison of both sources

The table presented below contains a preliminary comparison of both sources. The first three columns (1a-1c) contain, as background information, the compensation of employees as recorded in the Dutch national accounts 1997 by industry (NACE-A17 level). Computer services (72) are separated from ‘Real estate renting and business services’ (K).

The subsequent three columns contain information from the Automation Survey (2a-2c). The estimates in these column include a grossing up for smaller companies. The first column (2a) represents the labour costs of all internal EDP staff. The following column (2b) represents only the costs of EDP development staff which are used in the estimation of own account GFCF in software. The costs of development staff represents approximately one-third share of the total costs of internal EDP staff. Column (2c) shows the costs of contracting external EDP personnel.

Column (3a) resembles the total wage earnings as recorded in the Structure of Earnings Survey. Column (3b) contains wages of Computing Professionals (ISCO-88; 312). In the following columns two additional adjustments are made. Firstly, total wages and salaries in the national accounts exceeds those in the Structure of Earnings Survey by 12.6%. Therefore, for each industry branch the wages of Computing Professionals are adjusted to the national accounts wage level (correction factor 4a). Subsequently, an adjustment (4b) is made for social contributions.

Column (4c) represents the resulting estimates of the compensation of employees of Computing Professional (or EDP) staff by industry branch, based on the Structure of Earnings Survey. In total, this estimate is almost 15% lower than the corresponding total from the Automation Survey (2a). A number of subsequent adjustments are necessary to estimate the actual labour costs of own account GFCF:
• Costs of EDP staff not involved in software programming should be excluded. In the case of the Netherlands, the wages of software developers resemble only 3 billion while the total wage bill of internal EDP staff equals 9 billion guilders. In the Netherlands, no corrections are made to adjust for time spent by programming staff on other activities then programming and vice versa. It is presumably reasonable to assume that time spend on cross-over activities of both development and non-development phase out.

• On the industry level, a supplementary estimate must be made for the software development costs of the external contracting. In the Netherlands, the contracting of all external EDP staff comprises almost 3.4 billion guilders. It is assumed that regarding these costs, a similar share of 33% refers to software developers which corresponds to 1.1 billion guilders. Clearly, this 1.1 billion comprises only a shift in software development costs. Therefore, counterbalancing adjustments must be made in the own account GFCF of those industries (i.e.72) that send software development staff on secondment.

It can be concluded that in the case of the Netherlands, a correction factor of 50%, as provisionally recommended by the Task Force 7(13), may result in a small overestimation of the labour costs of own account GFCF.
**Measuring the labour costs of EDP staff in the Netherlands, 1997: a comparison of the 'Automation Survey' with the 'Structure of Earnings Survey'**

<table>
<thead>
<tr>
<th>NACE-A17</th>
<th>National Accounts</th>
<th>Automation Survey</th>
<th>Wage Structure Survey</th>
<th>Estimation EDP staff costs based on the Structure of Earnings Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Compen-</td>
<td>Wages and Salaries</td>
<td>Costs of internal EDP staff</td>
<td>Wages and salaries, ISCO-88 total (213)</td>
</tr>
<tr>
<td></td>
<td>sation of</td>
<td></td>
<td>Costs of external EDP staff</td>
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</tr>
<tr>
<td></td>
<td>employees</td>
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<td></td>
<td>Wages and</td>
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<tr>
<td></td>
<td>Salaries</td>
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<tr>
<td></td>
<td>tions</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1a</td>
<td>1b+1c</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

= 1b+1c

| A | Agriculture, hunting and forestry | 4 112 | 3 597 | 515 | 6 | - | 3 | 3 147 | - | 1,14 | 1,14 | - |
| B | Fishing | 213 | 195 | 18 | - | - | - | 92 | - | 2,12 | 1,09 | - |
| C | Mining and quarrying | 1 107 | 930 | 177 | 26 | 9 | 6 | 892 | 11 | 1,04 | 1,19 | 14 |
| D | Manufacturing | 67 691 | 59 272 | 8 419 | 882 | 203 | 304 | 50 867 | 836 | 1,17 | 1,14 | 1,113 |
| E | Electricity, gas and water supply | 3 474 | 3 002 | 472 | 85 | 22 | 84 | 2 941 | 33 | 1,02 | 1,16 | 39 |
| F | Construction | 25 700 | 21 523 | 4 177 | 82 | 7 | 36 | 20 477 | 85 | 1,05 | 1,19 | 107 |
| G | Wholesale and retail trade | 51 124 | 45 424 | 5 700 | 849 | 156 | 345 | 38 210 | 575 | 1,19 | 1,13 | 769 |
| H | Hotels and restaurants | 6 504 | 5 863 | 641 | 6 | 1 | 3 | 4 177 | - | 1,40 | 1,11 | - |
| I | Transport, storage and communication | 25 874 | 22 686 | 3 188 | 690 | 200 | 332 | 20 892 | 274 | 1,09 | 1,14 | 339 |
| J | Financial intermediation | 21 269 | 17 937 | 3 332 | 1 857 | 623 | 1 475 | 14 508 | 660 | 1,24 | 1,19 | 968 |
| K | Real estate renting and business services excl. 72 | 46 950 | 41 900 | 5 050 | 1 098 | 193 | 333 | 32 151 | 630 | 1,30 | 1,12 | 920 |
| K72 | Computer and related services (72) | 6 199 | 5 690 | 509 | 2 827 | 1 424 | 219 | 4 916 | 1 917 | 1,16 | 1,09 | 2 417 |
| L | Public administration and defence etc. | 37 549 | 29 283 | 8 266 | 242 | 111 | 65 | 27 713 | 415 | 1,06 | 1,28 | 562 |
| M | Education | 25 415 | 20 616 | 4 799 | 217 | 27 | 24 | 21 725 | 112 | 0,95 | 1,23 | 131 |
| N | Health and social work | 35 118 | 30 367 | 4 751 | 174 | 14 | 79 | 31 276 | 116 | 0,97 | 1,16 | 130 |
| O | Other community social and personal services | 11 949 | 10 407 | 1 542 | 129 | 21 | 43 | 9 205 | 100 | 1,13 | 1,15 | 130 |
| P | Private households | 53 | 48 | 5 | - | - | - | - | - | - | - | - |

370 301 | 318 740 | 51 561 | 8 950 | 3 011 | 3 351 | 283 189 | 5 764 | 1,13 | 1,16 | 7 639 |

Please note that the estimation of own-account software production in NACE 72 is not based on the Automation Survey but instead on the Business Survey.
### 4. EDP investments (VAT excluded)

Investments* 1995 in computers and peripherals, including operating systems (e.g. MS-DOS) Hfl. __________,000.-

Investments* 1995 in network/datacommunication/equipment/software/servers/distributors/cables etc. Hfl. __________,000.-

*In case of rent or lease: investments = 36x monthly (rent/lease) payments

What percentage of the investments for 1995 is for EXPANSION of the automation in your company and NOT for replacing existing computer facilities ________ %

### 5. EDP expenditure (VAT excluded)

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware</td>
<td>Depreciation, yearly costs of maintenance and rent or lease of computer equipment in 1995</td>
<td>Hfl. __________,000.-</td>
</tr>
<tr>
<td>Software</td>
<td>1 Standard software: expenditure, rent/lease yearly costs of maintenance &amp; modifications (incl. new releases), licensing, possible depreciation in 1995</td>
<td>Hfl. __________,000.-</td>
</tr>
<tr>
<td></td>
<td>2 Tailor-made software: expenditure, yearly costs of maintenance &amp; modifications in 1995, incl. costs of extraneous EDP specialists for developing software</td>
<td>Hfl. __________,000.-</td>
</tr>
<tr>
<td></td>
<td>Value of the purchased software (as mentioned above) that has been NEWLY entered on the balance sheet in 1995</td>
<td>Hfl. __________,000.-</td>
</tr>
<tr>
<td>Contracting</td>
<td>Estimated contracting costs for extraneous EDP specialists, excl. contracting costs already counted in the preceding items of this question</td>
<td>Hfl. __________,000.-</td>
</tr>
<tr>
<td>Other</td>
<td>Other EDP costs 1995 (see note, but no labour costs of EDP staff)</td>
<td>Hfl. __________,000.-</td>
</tr>
</tbody>
</table>

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31 PC’s, mini computers, mainframes, printers, modems, tapestreamers etc.

32 Examples: extension of the number of PC’s, purchases for network extension, installation of new software for newly automated parts of the company.

33 All computer equipment as described in question number 1. Please include any telecommunication costs and yearly costs of data communication.

34 STANDARD SOFTWARE: please include any yearly costs or licenses for use of software tools/languages. TAILOR-MADE SOFTWARE: this is software that has been developed especially for your company by others.

35 Including any charges for costs of personnel that is on the pay-roll of allied companies.
6. Employees

Total number of employees in your company _______

7. EDP staff

How large is your company’s EDP staff (such as, programmers, information analysts, system management etc.)

<table>
<thead>
<tr>
<th>none</th>
<th>1 - 5</th>
<th>more than 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>end of the questionnaire</td>
<td>to the shaded area below</td>
<td>to the next lines</td>
</tr>
</tbody>
</table>

NB: do NOT include users

Function groups | Examples | estimated working years (FTE)\(^{38}\) in 1995
---|---|---
General EDP management | EDP Manager at academic or higher vocational level, e.g. director of computer centre, head of EDP department |
Development | Systems designer/analyst, programmer, problem analyst, information analyst and/or project management |
User support | application/system manager, PC assistant, help desk staff, EDP training consultant, informatics trainer |
Operating/production | Specialist system software, network manager, production analyst, computer operator, manager technical infrastructure |
Other support & advice | 1 Controller central computers/system software, database management, adviser internal control and security |
| 2 Adviser organisation/information/automation policy |
Other EDP staff: |

Total working years (FTE) of EDP staff in 1995, _______

Total labour costs\(^{39}\) of EDP staff in 1995, _______

Number of vacancies for EDP staff at the end of 1995 _______

---

\(^{36}\) Costs of supplies, rent of computer time, costs of EDP advice or training charges, and other EDP costs of your company (e.g. costs of EDP housing, printer paper etc.; please do not include labour costs here.

\(^{37}\) Common definition of EDP staff: employees whose main task lies in automation. Users: employees who do not belong to the EDP staff, but who frequently use computers/terminals for their own work.

\(^{38}\) Example: five part-time programmers (20 hours per week) have to be counted as follows: 5x20/40=2.5 working years. FTE: Full Time Equivalents.

\(^{39}\) Gross wage; (basis for social insurance contributions) plus pension premiums, early retirement scheme contributions, employer-paid social insurance premiums, saving premiums, compensation for commuting expenses; minus sick pay compensations, profit-related benefits and benefits paid due to death of employees.
ANNEX 6: LIST OF PARTICIPANTS TO TASK FORCE

Greece: Anastasia Pateraki
UK: Adrian Chesson
Finland: Jukka Jalava
Netherlands: Martin Mellens, Mark de Haan
Sweden: Katarina Andersson
Denmark: Søren Larsen
France: Olivier Frouté, Francis Malherbe
Spain: Ana Luisa Solera
Italy: Ludovico Bracci
OECD: Francois Lequiller, Nadim Ahmad
Eurostat: Paul Konijn (chair), Roger Akers
ANNEX 7: LIST OF TASK FORCE DOCUMENTS

Organisation of the Task Force

TFS/1. Eurostat (2001) Task Force Software Measurement; background, objective and working method


Background papers


TFS/13. Extracts from SNA93 and ESA95
Country papers


**TFS/15.** Norbert Rainer, Statistik Austria (1999) A survey method to measure own-account produced software for Austria (STD/NA(1999)33)


**TFS/22.** Jukka Jalava, Statistics Finland (2001) *Software in Finland*

**TFS/23.** Ana Luisa Solera, INE, Spain (2001) *Current practice in the Spanish National Accounts: Measurement of GFCF on Software*

**TFS/24.** Katarina Andersson, Statistics Sweden (2001) *Estimation of software in the national accounts*

Second meeting

**TFS/25a.** Eurostat (2002) *Agenda for the second meeting of the Eurostat Task Force Software Measurement*


**TFS/26.** OECD/Eurostat (2002) *Proposals for the treatment of different types of software*

**TFS/27.** OECD (2001) *First synthesis of the Questionnaire on software*


Third meeting


