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ICT USE BY BUSINESSES: REVISED OECD MODEL SURVEY

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FOREWORD

This paper presents a revision of the 2001 OECD model survey on ICT use by businesses ["ICT Usage and Electronic Commerce in Enterprises: Proposal for a Model Questionnaire", DSTI/ICCP/IIS(2001)1/REV1].

This is the first revision of the model survey and includes changes to the name, scope, classifications and content (including new and revised material on e-business, IT security and e-government).

The Working Party on Indicators for the Information Society (WPIIS) agreed, at its April 2005 meeting, to recommend that the ICCP Committee declassify the revised model survey through a written procedure. This was completed on 7 November 2005.

The report was prepared by the OECD Secretariat in consultation with delegates from the OECD Working Party on Indicators for the Information Society (WPIIS). It is published under the responsibility of the Secretary-General of the OECD.

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ICT USE BY BUSINESSES: REVISED OECD MODEL SURVEY

Introduction

This paper presents a revised OECD model survey on information and communication technology (ICT) use by businesses. The current model survey was agreed at the end of 2001.[1]

While a number of aspects of the measurement of ICT use and e-commerce by business have been discussed at WPIIS and Expert Group meetings since 2001, the model survey[2] has not been changed since first approved. The content of the model questionnaire was always intended to be dynamic, with the 2001 proposal stating that "As technology and policy priorities evolve, the model questionnaire will need to be reviewed and adapted over time."

Additionally, the 2001 proposal outlined outstanding methodological issues needing to be addressed "…..to ensure the comparability of the statistics obtained via the proposed model questionnaire." Those issues included weighting of data according to common principles, harmonisation of the concept of income used when measuring the monetary value of electronic transactions and the collection unit used in each country. This paper addresses those outstanding issues.

The 2002 WPIIS meeting discussed a number of enhancements to the model survey and established two expert groups to consider measurement issues for e-business and the finance sector. The 2003 meeting considered reports from the two groups and agreed to continue work on e-business as a priority area. After some discussion, delegates agreed not to pursue work on the finance sector but instead to monitor Eurostat's efforts in this area. That work is proceeding, with a general European survey of the finance sector to be conducted in 2006.

An OECD workshop on the measurement of e-business was held in December 2003 and involved statisticians, analysts, policy makers and businesses. A subsequent Expert Group meeting was held in April 2004 and the topic was followed up at the 2004 WPIIS meeting.

The 2004 WPIIS meeting considered a Secretariat proposal for a revision of the model survey which was intended to ensure that it reflect current policy needs and be reasonably aligned with country survey practices. The proposal suggested including survey methodology and scope in the new model and suggested new topics such as IT security and e-business [internal working document DSTI/ICCP/IIS(2004)4, A detailed proposal including a complete questionnaire was developed by the Secretariat, in consultation with interested member countries, and presented to the 2005 meeting [internal

1. DSTI/ICCP/IIS(2001)1/REV1, "Measuring ICT Usage and Electronic Commerce in Enterprises: Proposal for a Model Questionnaire".

2. A note on terminology: this paper uses the terms "model survey" and "model questionnaire". The latter refers specifically to the questionnaire provided as a model to participating countries. The former refers to the questionnaire plus associated information, such as recommendations on methodology, scope and classificatory variables.

working document DSTI/ICCP/IIS(2005)2]. It was subsequently revised based on comments made at, and following, the meeting.

The revised model survey

Aim of the revised model survey

The model survey is intended to provide guidance for the collection of statistics on business use of ICT, including e-business and e-commerce.

Member countries are encouraged to use the model as a core part of their survey development in this area of ICT statistics.

Development of the revised model

In order to prioritise material to be included in the revised model survey, content was examined from both an output and an input perspective. Regarding output, reference was made to the OECD list of core e-commerce indicators, agreed at the 2000 WPIIS meeting,[3] and data which OECD has been able to collect from member countries. A core list of ICT indicators currently proposed for use by non-OECD member countries (per the WSIS meetings[4]) was also consulted in order to ensure as many options as possible for future benchmarking across a greater number of countries.

Regarding input, survey material from a number of member countries was examined, including the Eurostat questionnaire for 2006.[5] Details of other surveys consulted may be found in the 2004 WPIIS paper [internal working document DSTI/ICCP/IIS(2004)4].

New questions have been considered based on known policy needs and, as far as possible, the experiences of member countries in asking those questions in their surveys. Ultimately, because of the nature of the revisions, some questions were included in the model which are relatively untested by member countries. Parts of the questionnaire are therefore considered somewhat experimental (for more information, see the section below on non-core questions and the footnotes to the questionnaire).

An important criterion applied at each stage was to try to minimise the number and complexity of the questions. This is in recognition of the high cost of collecting these data in terms of expense and respondent load.

3. DSTI/ICCP/IE/IIS(2000)3/REV1.

4. World Summit on the Information Society meetings. OECD contributed to a list of core ICT indicators which could be used by countries following final agreement. The core indicators were agreed to by a WSIS meeting held in Geneva in February 2005.

5. "Model for a Community Survey on ICT Usage and e-Commerce in Enterprises", 2006.

Comments were sought on the 2004 and 2005 proposals from all WPIIS delegates. A number of countries and organisations responded[6] and their suggestions have been incorporated into the model as far as possible.

In addition, some question-testing work by Statistics Canada was completed during this period and the results taken into consideration for the revised model questionnaire.[7] The Statistics Canada test included questions on IT security, interaction with government and deployment of e-business processes in the areas of marketing and customer relations, sales, purchases, logistics, and financial and human resource management. A copy of the report is available from the Canadian WPIIS delegates or the Secretariat.

Use of core and non-core questions

The 2001 model questionnaire did not attempt to differentiate between questions. However, the revised questionnaire includes a number of non-core questions and response categories. The difference is not one of priority but of either:

- How well tested the question/response category is in country surveys. Non-core questions/categories in this category are relatively untested and can therefore be considered to be somewhat experimental; they include new questions and response categories on e-business and IT security.

- How challenging the question is statistically. The non-core questions in this category are question 5 (employees using the Internet), question 17 on dealing with government, and part of question 12 (split of Internet sales by location of customers). These are questions which are generally regarded as important by policy makers but which can be difficult to collect data for (for instance, because of respondents' understanding of concepts or record keeping practices).

Non-core questions, especially those in the first category, may be revised and lose their *non-core* status as experience is gained by member (and other participating) countries. Countries are encouraged to test those questions and share their experiences.

Structure of the revised model questionnaire

The model questionnaire has been restructured as shown in Table 1, which presents a broad level comparison of the 2001 and revised questionnaire structure.

6. Internal working document DSTI/ICCP/IIS(2005)2 gives details of responses to the 2004 proposal and to a revised questionnaire sent out to interested countries and organisations in December 2004. Comments were received at and/or following the 2005 WPIIS meeting from the following countries and organisations: Australia, Canada, the Czech Republic, Denmark, the European Commission, Eurostat, Finland, France, Germany, Hungary, The International Telecommunication Union (ITU), Japan, Korea, Sweden, the United Kingdom and OECD areas with a policy and statistical interest (for instance, e-business and trust).

7. The testing consisted of 26 cognitive interviews with a selection of respondents from the 2004 Statistics Canada *Survey of Electronic Commerce and Technology*. The work was undertaken with the support of WPIIS and one of its aims was to provide input to the work on revising the OECD model survey.

Table 1. **Summary of changes to the model questionnaire**

2001 model questionnaire	**Revised model questionnaire (2005)**
Module A – *General information about ICT systems*. Questions from this module are contained in the new Section A.	Section A – *General information about your business' use of ICT* including: use of computers, the Internet and technologies such as LAN, WAN, intranets and extranets; means of connecting to the Internet; IT security measures in place; and attacks by viruses, worms etc.
Module B – *Use of the Internet.* This module has been split over the new sections A and B.	
Module C – *E-commerce via Internet*. Questions from this module are now in the new Section B.	Section B – *How your business uses ICT in its operations* including: whether the business had a Web site; functions available on the site (including customer relationship functions, privacy and security features, online purchasing and payment facilities); the incidence and/or value of Internet and non-Internet e-commerce (purchasing and selling); the nature of products sold via the Internet and technologies used to sell those products; benefits and barriers associated with Internet selling; use of the Internet for dealing with government organisations; use of the Internet in other areas of the business such as accounting, human resources functions and information sharing; and links between e-commerce and back end systems, customer and supplier systems.
Module D – *E-commerce via EDI or other computer-mediated network (other than Internet)*. Questions from this module are now in the new Section B.	
Module E – *Barriers on the use of Internet and ICT in general*. Questions are included in the new Section B.	
Module X – *Background information*. Questions are included in the new Section C.	Section C – *Other information about your business:* activity, number of employees and annual turnover. This information is used for classification of output (by industry and size) and provides data for enabling the calculation of e-commerce values where percentages are collected.

This paper covers: name of the model survey; survey methodology; scope and coverage; classificatory variables; particular statistical issues associated with business ICT use measurement; comparison with Eurostat's model survey (see footnote 5) and a model questionnaire (including definitions of terms and metadata notes). The remainder of this paper describes those elements and presents a revised model questionnaire as the Annex.

Name of the model survey

The name of the 2001 model questionnaire, with its emphasis on e-commerce, is no longer appropriate, given the expansion into other areas of e-business. Accordingly, the name has been changed to: **OECD Model Survey of ICT Use by Businesses**. The word "businesses" has been used as it is considered to be a more general term than "enterprises".

Survey methodology

Introduction

The 2001 model did not contain specific methodological recommendations and pointed out the need to do further work in this area. Particular areas cited were weighting methodology and collection units. Other methodological issues have since been raised in Expert Group and Eurostat Task Force meetings, including: sample design and size, validation rules, outlier treatment and non-response treatment. Additional areas falling under the general umbrella of "survey methodology" include: data collection

methods and survey vehicles, population frame, whether collections should be mandatory, data processing (editing, imputation, estimation), survey frequency, reference period and date.

This paper does not attempt to cover all these areas, for two reasons:

- Feedback from delegates indicated that methodological recommendations should be broad because member countries generally have established procedures for conducting business ICT use surveys.

- The publication in late 2005 of a methodological manual[8] for Eurostat's *Community Survey on ICT Usage and E-commerce in Enterprises*. This manual will detail recommendations for countries which undertake the Community Survey and will deal in detail with methodological issues such as sample design, validation rules, non-response treatment, weighting and so on.

Under the heading of "survey methodology", this paper offers general advice on minimising sampling and non-sampling error and more specific suggestions on survey vehicles, collection techniques, statistical unit, survey frequency and reference period/date. In addition, it discusses weighting methodologies used by member countries.

Minimising sampling and non-sampling error

Some general advice is offered as follows on reducing sampling and non-sampling error:

- Use a population frame which accurately reflects the target population (therefore which is up-to-date and representative).

- Use well designed samples which are of sufficient size to produce reliable data (that is having low standard errors for the aggregates suggested in this paper).

- Carefully design and test questions, definitions and question sequences.

- Reduce unit and item non-response rates as far as possible (by, for example, using well designed questionnaires and following up outstanding responses).

- Minimise errors arising from data entry, editing and other data processing (by appropriate staff training and documentation).

Survey vehicles

There is a variety of survey vehicles which could be used to collect data on business ICT use. Most OECD countries conduct dedicated surveys on ICT use, but countries which do not have such a vehicle could add questions to an existing economy-wide survey or to separate industry surveys (where they can collectively cover the industry scope required for ICT use data).

8. Eurostat (2005), *Methodological Manual for Statistics on the Information Society*, Luxembourg.

Collection techniques

Most OECD countries use mail-out/mail-back surveys for collecting data on business use of ICT. However, the information could also be collected by means of personal interview (face-to-face or telephone) or other methods such as drop-off/call-back (or post back). Electronic data capture may be viable for some respondents, though with one or two exceptions, OECD countries are not yet using this technology.

Statistical unit

The following discussion refers to the unit about which data are collected. This may be different from the unit which reports the data (the "reporting unit"). The OECD and Eurostat both specify the "enterprise" as the statistical unit and this is the unit used by most OECD countries. Choice of unit is important as it influences the results obtained. As output from ICT use surveys is mainly proportions data, comparability between countries is more likely to be attained where the unit chosen is the same. As an example, if country A uses the establishment as a unit and country B uses the enterprise, then it is likely that country B will report higher proportions, especially of more sophisticated uses, such as buying and selling over the Internet, or use of an intranet. Another example is that units of a lower order (for instance, establishments) within a larger entity may do more external e-commerce (within the entity) than higher order units such as enterprises.

Unfortunately, there is no single definition of an enterprise that is used in all countries. The two main definitions are those of the ISIC (Rev. 3.1)[9] and the European Union.[10] While they have common characteristics such as the fact that enterprises exercise a certain degree of autonomy in decision-making, the EU concept is narrower and it is suggested that this concept be used where possible.

It is important not to confuse the enterprise unit with the "legal unit" entity. While legal units are independent in a legal sense, they may not necessarily constitute independent economic entities with decision-making autonomy for their productive activities.

Like other business surveys conducted by a country, those measuring business ICT use are national surveys of businesses operating in the country. They therefore include enterprises located in the country but which are part of a multinational group (note that only the domestic part of the multinational should be included).

9. ISIC is the International Standard Industrial Classification of all Economic Activities. For details of ISIC Rev 3.1, see http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=17. According to ISIC, an enterprise has "autonomy in respect of financial and investment decision-making, as well as authority and responsibility for allocating resources for the production of goods and services. It may be engaged in one or many productive activities. The enterprise is the level at which financial and balance sheet accounts are maintained and from which international transactions, and international investment position (when applicable) and the consolidated financial position can be derived."

10. Defined by the European Commission as: "……the smallest combination of legal units that is an organisational unit producing goods or services, which benefits from a certain degree of autonomy in decision-making, especially for the allocation of its current resources. An enterprise carries out one or more activities at one or more locations. An enterprise may be a sole legal unit."

Survey frequency and reference period/date

There is perhaps a greater requirement than for household surveys for the frequency of business surveys to be sensitive to the evolution of ICT and its use. It is probably unrealistic to expect countries to conduct surveys more frequently than annually. For some countries, even an annual collection will not be feasible, in which case it is important that those countries try to align their collection years as far as possible. As much of the information collected is point-in-time data, it would be preferable to also have alignment of reference dates across participating countries.

Weighting methodologies

The subject of weighting of survey estimates was noted as an outstanding issue in the first model survey paper [DSTI/ICCP/IIS(2001)1/REV1] and has been raised at Expert Group meetings as an area to be further explored. In particular, debate has centred on the merits of employment weighted estimation. The main methods employed by member countries are briefly outlined here.

Number-raised weighting (or estimation)

This involves applying a unit weight to each selected business unit according to the total number of units in its stratum. For instance, if there are 100 businesses in a selected unit's stratum and 20 are selected, the selected unit's weight is 5 (that is, 100 divided by 20) which means that the unit represents 5 businesses in the population (itself plus 4 others). Algebraically, the weight is depicted by N_h/n_h, where N_h is the total number of units in stratum h and n_h is the number of sampled units in stratum h.

The technique is applicable to both qualitative (for our purposes, usually "yes/no") and numerical variables (those whose elements are numbers such as a percentage or an absolute value). In the case of numerical variables whose value is a percentage (for instance, the percentage of income earned through selling over the Internet), the value is **first converted to an absolute value** (for this example, the percentage is converted to a fraction (that is, divided by 100) then multiplied by the unit's total income to yield the value of income earned through selling over the Internet). The absolute value is then treated like any other value.

The population estimate is derived by first weighting up unit values in stratum h (that is, multiplying each of them by the stratum weight, N_h/n_h) and then adding all the weighted unit values in the stratum. This is done for each stratum and then stratum totals are aggregated to calculate the population estimate.

Ratio estimation

This technique uses a benchmark (or auxiliary) variable, such as employment or income in addition to the variable of interest. The benchmark variable should be highly correlated with the variable of interest and needs to be known for all units in the population. The ratio estimate is calculated, for each stratum, by weighting each unit's value by a factor equal to the sum of values of the benchmark variable for all units in the stratum divided by the sum of values of the benchmark variable for all selected (sample) units in the stratum. This technique would be suitable for a numerical variable, for instance, estimating e-commerce sales value using total turnover as the benchmark variable.

As before, weighted values of units in stratum h are aggregated across the stratum and stratum totals are added to calculate the population estimate.

Economically weighted estimates

Employment weighting is an example of this type of estimation. In general, it is an estimation technique which gives more weight to larger units. It is typically used for qualitative variables and produces output of the type: businesses with a Web site account for (or represent) x% of total employment. The estimates are calculated for each unit in stratum h, by multiplying the unit's value (0 or 1 for a "yes/no" variable) by its stratum weight (N_h /n_h) and by the value of the auxiliary variable (usually employment or turnover). The resulting values are aggregated across the stratum and then stratum totals are added.

Country practice

Most OECD countries use number-raised weighting for qualitative variables and either number-raised or ratio estimation for numerical variables. Both of these estimation techniques are designed to give population estimates of the type "proportion of businesses using the Internet" or "value of income derived from Internet sales". Theoretically, the techniques should yield fairly similar results.[11]

In addition, some countries present output derived by economically weighted estimation. Estimates resulting from this technique provide valuable **but quite different** information from the other two types of estimation. It is suggested that countries which use economically weighted estimation should make it quite clear to users what such an estimate means. For instance, the difference between a number-raised and economically weighted estimate relating to whether businesses have Web sites can be expected to be significant (in Canada, in 2004, 37% of businesses had a Web site, but they accounted for 85% of total business revenue for Canada).

Survey scope and coverage

Introduction

In practice, survey scope varies between countries, with differences in both industry and size scope. The scope of business surveys is commonly defined by type of organisation, industry (activity), size and geography. The scope of the 2001 OECD model survey is not specified but it is described as an economy-wide survey of business enterprises. However, some guidance on scope is offered for this revision of the model. It derives from the practical experience of OECD in data collection from member countries and from Eurostat in its specifications for its model survey. Details are outlined below.

11. Analyses done by Statistics Finland and Statistics Netherlands on the impact of different weighting methodologies have found that ratio estimation by turnover resulted in a higher figure for e-commerce value than number raised estimation. However, the difference is not significant in statistical terms.

Type of organisation

Whilst not currently specified in the OECD model, this will usually be businesses from the private and public sectors[12] which are operating in the country conducting the survey. General government organisations[13] are excluded. Most OECD countries also exclude non-employers.

Industry (activity) scope

It is important for comparability purposes to have a reasonably consistent industry scope, as some industries are less ICT intensive than others. Most OECD member countries collect business ICT use data from businesses in the following industries: Manufacturing (ISIC D), Construction (ISIC F), Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods (ISIC G), Hotels and restaurants (ISIC H), Transport, storage and communications (ISIC I) and Real estate, renting and business activities (ISIC K).

Eurostat specifies a scope of NACE[14] sections D, F, G, H (55.1 and 55.2 only),[15] I, K and O (92.1 and 92.2 only).[16] Industries which Eurostat states as optional are: E, 55.3-55.5, 92.3-92.7 and 93.

In respect of Financial intermediation (ISIC J),[17] Eurostat is trialling a separate survey which, for 2006, includes NACE classes 65.12, 65.22, 66.01 and 66.03.

Based on industries included in member country surveys, the following minimum scope is feasible for most countries: ISIC sections D, F, G, H, I and K. In addition, Section J has been included in scope but as a non-core sector, pending further results from Eurostat work. ISIC Division 92 (recreational, cultural and sporting activities) has also been added as a non-core sector because of interest in this area. This leads us to an industry scope as follows:

- Manufacturing (ISIC D).
- Construction (ISIC F).

12. These are financial and non-financial corporations following the concepts of the SNA 1993. Such corporations are "institutional units which are principally engaged in the production of market goods and non-financial services" and include corporations "subject to control by Governments".

13. According to the SNA 1993 "The general government sector consists of the totality of institutional units which, in addition to fulfilling their political responsibilities and their role of economic regulation, produce principally non-market services (possibly goods) for individual or collective consumption and redistribute income and wealth."

14. NACE is the Statistical Classification of Economic Activities in the European Community, Rev. 1.1 (2002).

15. In respect of Section H, Hotels and restaurants, about half the countries which do the Eurostat survey collect data for the remaining NACE categories 55.3 to 55.5 (restaurants, bars *etc.*).

16. Not all countries which do the Eurostat survey collect data for all classes of Section O (Other community, social and personal service activities). For collection purposes, divisions 92 and 93 are most relevant.

17. Eurostat developed a specific module of the enterprise survey for a pilot study of this sector in 2004. In 2005, the Eurostat model questionnaire was revised but limited to general ICT variables. For 2006, the model questionnaire was improved and includes questions on e-commerce.

- Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods (ISIC G).
- Hotels and restaurants (ISIC H).
- Transport, storage and communications (ISIC I).
- Financial intermediation (ISIC J) **(non-core).**
- Real estate, renting and business activities (ISIC K).
- Recreational, cultural and sporting activities (ISIC Division 92) **(non-core)**.

Size scope

Most OECD countries specify that in-scope businesses are employers and they define size scope in terms of number of employees. Eurostat specifies a size cut-off of 10 or more employees. For comparability, OECD does likewise when collecting data even though there is a range of cut-offs used among OECD (including European) countries, with at least two member countries including enterprises with a single employee. It is suggested that the size scope recommendation for the model survey be 10+ employees consistent with Eurostat. However, it is recognised that there are important policy issues pertaining to businesses which are smaller than this. Member countries are therefore encouraged to extend the scope to include smaller businesses where they have a policy need and resources permit.[18]

Geographic scope

The 2001 OECD model did not specify a geographic scope, while Eurostat specifies that the whole country is in scope. It is presumed that this scope applies generally to member countries so it has been explicitly adopted for the OECD model. The geographic scope therefore encompasses businesses operating anywhere in the reporting country.

Coverage

Coverage refers to departures from scope and describes the situation where in-scope businesses are not liable to selection in the survey. There are various reasons why this could occur and they include inaccessibility of part of the population in a physical sense (geographic undercoverage) or undercoverage arising from an incomplete population frame. Where undercoverage exists, it is useful if countries advise of any significant impact on survey estimates.

Classificatory variables

The 2001 and revised OECD model questionnaires recommend collection of information on business industry and size (number of employees). While different industry classifications are used by OECD

18. Countries should note that the broader the scope, the larger the sample size generally required to obtain adequate aggregate estimates. Extending the scope to employing businesses with fewer than 10 employees might increase the sample size by a factor of two or more.

countries, in practice the results are reasonably concordable at the broad level at which the OECD publishes them.

Some classificatory data may be collected as part of the survey in cases where the information is not available from other sources (such as the population frame or another survey). Three questions have been included for this purpose in Section C of the model questionnaire. A minimal set of classificatory variables and categories based on practices of OECD countries is suggested below. This is consistent both with advice offered by Eurostat for collection of business use of ICT data and the scope recommendations presented above.

Member countries may use extra classificatory variables and/or additional categories. In particular, countries where a rural/urban divide exists may wish to add a geographic classification, though none has been specified for the OECD model. In practice, classifying units to regions within a country can be difficult as multi-unit businesses do not usually split their operations evenly between regions. For instance, head office operations will tend to be in major cities, but represent national activities.

The following classificatory variables are recommended for the model survey.

Industry (activity)

A broad industry output classification consistent with the suggested industry scope is: Manufacturing (ISIC D); Construction (ISIC F); Wholesale trade (ISIC 51); Retail trade (ISIC 52); Hotels and restaurants (ISIC H); Transport, storage and communications (ISIC I); Financial intermediation (ISIC J) (non-core); Real estate, renting and business activities (ISIC K); and Recreational, cultural and sporting activities (ISIC Division 92) (non-core).

Size (number of employees)

The recommended size categories align with those of Eurostat and OECD data collection categories. They are as follows:

- 10-49 employees.
- 50-249 employees.
- 250 employees or more.

Countries are encouraged to further disaggregate the top category when producing output. Use of some ICTs (in particular relating to e-business) is likely to be more prevalent in very large businesses.

Particular statistical issues associated with business ICT use measurement

E-commerce

The 2001 model survey paper suggested that more work be done on income concepts relating to electronic transactions. Since then, a number of conceptual issues relating to e-commerce and electronic finance have been discussed but not necessarily resolved. This paper outlines those issues and recommends a solution to many of them. The model questionnaire in the Annex incorporates definitions and instructions consistent with those recommendations.

Because of the great policy interest in e-commerce, WPIIS has devoted a lot of effort to its measurement. In 2000, OECD member countries endorsed two definitions of electronic transactions based on narrower and broader definitions of the communications infrastructure. According to the OECD definitions, it is the method by which the order is placed or received, not the payment nor channel of delivery, which determines whether the transaction is an e-commerce transaction. The narrow definition of e-commerce transactions refers to those conducted over the Internet, while the broad definition refers to all computer-mediated networks.

In April 2001, OECD proposed operational guidelines for the interpretation of the two e-commerce definitions. The definitions and guidelines are shown in Figure 1 below.[19]

Figure 1. The OECD definitions of e-commerce transactions and interpretation guidelines

E-commerce transactions	OECD definitions	Guidelines for the Interpretation of the Definitions (WPIIS proposal April 2001)
BROAD definition	An **electronic transaction** is the sale or purchase of goods or services, whether between businesses, households, individuals, governments, and other public or private organisations, conducted over **computer-mediated networks**. The goods and services are ordered over those networks, but the payment and the ultimate delivery of the good or service may be conducted on or off-line.	**Include**: orders received or placed on any online application used in automated transactions such as Internet applications, EDI, Minitel or interactive telephone systems.
NARROW definition	An **Internet transaction** is the sale or purchase of goods or services, whether between businesses, households, individuals, governments, and other public or private organisations, conducted over the **Internet**. The goods and services are ordered over the Internet, but the payment and the ultimate delivery of the good or service may be conducted on or off-line.	**Include**:orders received or placed on any Internet application used in automated transactions such as Web pages, Extranets and other applications that run over the Internet, such as EDI over the Internet, Minitel over the Internet, or over any other Web enabled application regardless of how the Web is accessed (e.g. through a mobile or a TV set, etc.) **Exclude**: orders received or placed by telephone, facsimile, or conventional e-mail.

Of the issues raised since the definition of e-commerce transactions was agreed in 2000, those described below are considered to be significant in either conceptual terms or in terms of the feasibility of data collection. Where possible, they have been addressed in questions and definitions associated with relevant questions in the model questionnaire.

Technological convergence

Technological convergence is making it more difficult to distinguish Internet e-commerce from other e-commerce. For instance, different technologies may be used simultaneously, and integrated to the extent

19. This Figure comes from the Summary Record of the 2001 meeting [DSTI/ICCP/IIS(2001)M] which also contains a report of the discussion.

that it can be very difficult for the respondent to calculate the value of sales they should include for each technology. This issue was discussed (but not resolved) at an April 2004 Expert Group meeting in response to a Nordic proposal[20] to consider other approaches to defining e-commerce (and, in particular, Internet commerce). The model questionnaire in the Annex attempts to better define the types of e-commerce and includes a non-core question on the split between Internet sales according to whether they occurred over a business' Web site, a third party Web site and/or EDI over the Internet. Additionally, a definition of EDI is now included in the questionnaire with the aim of clarifying the difference between Internet and non-Internet EDI.

Commitment and timing issues

There are several issues here and they include:

- The expensive items question (*e.g.* sales/purchases of automobiles and real estate) where a contract is usually not completed over the Internet.

- Pre-existing arrangements which could have occurred over any medium but where the order is received (or activated) over the Internet.

- Renewal of subscriptions or memberships. Where the initial commitment to join was not made over the Internet then ongoing payments made via the Internet do not constitute Internet commerce. However, if the member **chooses** to renew the subscription or membership and pays the renewal over the Internet, it could be argued that the commitment to join is being renewed and the Internet transaction could therefore be interpreted as Internet commerce.

- Difficulty in reporting ongoing payments (whether via the Internet or not) resulting from orders initially received via the Internet, but in a previous reporting period; such payments should be regarded as Internet commerce transactions but it is unlikely that businesses would have this information available.

At least two OECD countries (Australia and Canada) have attempted to clarify the commitment issues by referring to on order as a "commitment to purchase goods or services". The question on inclusion or exclusion of certain sales then becomes one of whether the commitment was made via the Internet or by another mode. The "commitment" concept has been adopted in the revised model questionnaire.

Reporting period issues (the last dot point above) may cause difficulty from a collection point of view as a business is unlikely to retain records of whether the first order occurred via the Internet.

Conventional e-mail transactions

The question of whether transactions conducted by conventional e-mail are Internet commerce has proved to be quite controversial. While the proposal presented to the April 2001 meeting (and shown in Figure 1 above) excluded conventional e-mails, it did not resolve the issue. The topic was debated further at the 2002 WPIIS meeting where there was agreement that conventional e-mail would be excluded subject to reconsideration in the light of future work on measuring e-business processes. In the context of consultations for this revision, the issue was raised again and most countries preferred to exclude conventional e-mail transactions. They have therefore been excluded in the relevant questions. However,

20. "Defining e-commerce. Towards a 'technology-free' definition."

for comparability purposes, it is suggested that countries which do include conventional e-mail transactions separately estimate their value. It is likely that this will be a diminishing problem; it is assumed that transactions by conventional e-mail will become less prevalent with the growth in Web sites and the increasing availability of relatively inexpensive e-commerce solutions.

Selling by agents

The issue here is how Internet sales made by agents should be treated. For example, should businesses which are acting as agents report the value of Internet sales **or** the value of commissions earned on those sales? The advice offered in this paper (and incorporated in the model questionnaire) is that agents should report the value of commissions or fees earned on the Internet transaction and that their clients should report the value of the Internet sale. This enables the allocation of Internet revenue to the correct industry and is consistent with other concepts for reporting income. Regarding collection feasibility, it is possible that businesses will not always know the value of Internet transactions undertaken on their behalf by agents.

The finance sector

A related issue is reporting of the value of e-commerce transactions in the finance sector. A WPIIS Expert Group presented some ideas to the 2003 meeting on the principles to be followed. After some discussion, it was decided to monitor the work of Eurostat in this area given that they have a strong policy impetus to develop a survey of ICT use by businesses in the finance sector. That work is still proceeding, with a general European survey of the sector to be conducted in 2006. The revised model questionnaire attempts to define Internet income relating to financial transactions as follows: "For financial services, **include** only commissions, fees and premiums earned in respect of services offered over the Internet and, in respect of Internet-only accounts, net interest income." It is possible that this definition will change with more experience by member countries, especially those conducting the 2006 Eurostat survey of the finance sector. Note that the finance sector (ISIC J) has been included as non-core for the purposes of scope.

Reliability of splits of the value of Internet commerce transactions

The model questionnaire, like its predecessor and like the current Eurostat model asks for several percentage splits of the value of Internet commerce. Reliability of one of those splits has been questioned, namely the value of Internet commerce transactions by location of customer (international versus domestic). Anecdotal evidence indicates that businesses have trouble reporting these splits as they firstly will not necessarily know the destination of their sales, and secondly, even if they did, would not necessarily record this information in a way which is readily retrievable.

The revised model questionnaire has four splits (including new splits on the types of products sold and how orders were received). All these splits have been marked as non-core (either because of known reporting problems or the experimental nature of the question).

Online purchases data

The reliability of the reported value of online purchases has long been a concern to statisticians. There is significant anecdotal evidence to suggest that businesses will often not have this information available as purchasing tends to be a diverse and decentralised activity. For these reasons, the questions have been removed from the model. Especially for Internet purchasing, it has been argued that a value question is

important as an intensity measure. A new question on linkages between purchasing over computer networks and other systems has been included in the model questionnaire and it is hoped that it will provide useful and more reliable intensity information.

Data collection issues

These include the small volume of e-commerce activity in the economy and consequent measurement issues such as: high standard errors and the reliability of disaggregated data; confidentiality issues at industry level; the general quality of reported data; and dealing with statistical outliers (typically small units with a large weight reporting high e-commerce values).

E-business

Measurement of e-business is of particular interest to policy makers because of the potential productivity impacts of ICT use on business functions. However, the ongoing challenges in this measurement field are significant and include problems associated with measuring a subject which is both complex and changing rapidly. These difficulties are exacerbated by limitations imposed by the statistical vehicles used to collect ICT use data (usually, economy-wide, mail-based survey vehicles for which simple "yes/no" questions work best).

History of WPIIS work on measuring e-business

In 1999, the WPIIS established an *Expert Group on Defining and Measuring E-Commerce* to "compile definitions of e-commerce which are policy relevant and statistically feasible". By 2000, work of the Group had resulted in definitions for e-commerce transactions but not e-business processes. In 2001, the first model questionnaire on the use of ICT/E-commerce in the business sector was agreed by the WPIIS but it did not comprehensively cover the range of an enterprise's possible e-business processes. In 2002, it was agreed that a module on e-business processes be developed and the *Expert Group on the Measurement of E-Business Processes* was established.

At the 2003 WPIIS meeting, the Expert Group proposed a definition of e-business processes based on functionality rather than technology: "(automated) business processes (both intra- and inter-firm) over computer mediated networks". In addition, the Group proposed that e-businesses processes should integrate tasks and extend beyond a stand-alone or individual application. Nine broad business functions were identified and described in terms of e-business processes, *e.g.* customer acquisition and retention; e-commerce; finance, budget and account management; logistics (inbound & outbound); and inventory control.

An expert meeting on measuring e-business was hosted by the OECD in December 2003.[21] The meeting involved delegates from national statistical offices, government policy organisations, the private sector (including computer services firms) and academia. The discussion was useful and wide-ranging but the outcome was not conclusive. The major issues raised and discussed were:

- Definition of e-business. There were diverse views expressed and the question of whether a definition was necessary was raised.

21. Details can be found in the Summary Record of the meeting: internal working document DSTI/ICCP/IE/IIS/M(2003)1.

- Framework for describing and classifying e-business processes. Is a classification possible given the integrating and evolving nature of e-business processes? Is it necessary?

- Which broad business functions are important and measurable? Are they generalisable across industries, firm size and countries?

- Networks. What kind of networks (Internet Protocol or all computer-mediated networks) are we interested in measuring? The focus seems to be on IP networks.

Conceptual model for measuring e-business

Ideally, we would establish a conceptual model for e-business before attempting to frame questions to measure it. Indeed, this was one of the goals of the December 2003 meeting, which looked at issues such as broad frameworks, classifications and definitions. While a conceptual model for e-business did not emerge from that work, some components of one are available from more general models of business processes (for instance, the Porter value chain model). A classification of e-business processes (as distinct from business processes) is considered problematic, partly because of the integrating nature of e-business.

Model questions for measuring e-business

The December 2003 meeting debated the definition of e-business and eventually concluded that, for questionnaire purposes, a definition may be less useful than targeting processes of particular interest for which feasible questions could be included on an economy-wide survey vehicle. This has therefore been the approach taken and, as a result, e-business questions are asked in the most appropriate way in the model questionnaire. For instance, customer relation functions have been included in a question on Web site features (question 16) and questions 23 and 24 ask businesses which purchased or sold over computer networks about linkages with other systems.

A set of questions on e-business for inclusion in the revised OECD model questionnaire on ICT usage in enterprises was first drafted following the December 2003 meeting and subsequently revised following the 2004 and 2005 WPIIS meetings. In all versions, the term "e-business" was not used on questionnaires (because it is a term which does not have a firm definition and is likely to be interpreted differently by different respondents). A few comments on the questions in the revised model questionnaire appear below.

It is assumed that the benefits of e-business will be realised where there is a greater degree of integration between functions. The model questionnaire has questions on linkages associated with e-commerce, that is, whether systems used to receive/place orders over computer networks are linked with internal systems, customers' systems and/or suppliers' systems. There is an emphasis on e-commerce linkages because of the continuing significant interest in e-commerce and the potential productivity gains from automatically linking electronic transactions with downstream processes such as inventory ordering, delivery, accounting functions etc. In addition, questions such as these are fairly well-defined in a statistical sense and have been used (though not necessarily in the exact form as on the model questionnaire) reasonably successfully by at least two member countries (the United Kingdom and Australia).

Regarding other e-business questions, there are specific questions on use of the Internet in business processes in question 16 (Web site functions) and question 18 (use of Internet in finance, HRM (recruitment and training) and sharing and distribution of information (within the business and with other businesses)).

More work needs to be done on so-called "integrated e-business processes", in particular to probe areas of integration which are often referred to using terms such as "supply chain management", "enterprise resource planning" and "customer relationship management". Delegates have generally preferred not to use such terms in questionnaires as such technical terms present a problem in a mail-based survey where they cannot be explained. This is exacerbated by the fact that these terms may not be understood in the same way by all businesses and that the meanings themselves may change over time as applications become more sophisticated.

Unfortunately, there are very few statistical models available on which to base integration questions and WPIIS delegates felt that the inclusion of very experimental questions (such as those included in draft versions of the model questionnaire) should be avoided at this stage. The European Commission and Eurostat are interested in collecting data on e-business from 2008. It is therefore suggested that this topic be discussed at the 2006 WPIIS meeting and that work continue amongst interested countries, including Canada and a number of European countries.

There are several possible approaches which could be considered in measuring the use of integrated e-business processes. They include:

- Directly ask the business whether it uses applications such as SCM (supply chain management), ERP (enterprise resource planning) or CRM (customer relationship management). Following the arguments presented above, the best statistical approach is probably to describe those processes rather than to use the precise terms and expect that respondents will understand them in the same way. Denmark used a descriptive approach in its 2005 survey to ask about use of ERP and CRM applications. However, it is considering changing that approach to ask about processes rather than systems. This is because it is thought that respondents might not uniformly understand terms which describe specific systems (as ICT systems could integrate several processes).

- Follow the Statistics Canada approach for asking about integrated business processes. The questions tested by Canada (see footnote 7) were: whether a browser-based system is used to manage functions associated with online sales, online purchases, customer relations and logistics. Supplementary questions asked about automatic linkages with backend systems, customers' systems and suppliers' systems.

- Ask about sales and purchases transactions generally and whether those transactions generate an automatic update in other systems such as backend systems, customers' systems and suppliers' systems. This approach has the advantage that it covers all sales and purchase transactions not just those which constitute e-commerce. It also focuses on functions which are common to most businesses (that is, purchasing and selling goods or services).

- Consider Denmark's approach (used in its 2005 survey) for obtaining information on external integration. Denmark asks about the electronic exchange of data between the business' systems and other entities' systems. It specifies that these exchanges use structured messages and agreed message standards. More information is provided in the form of a classification of the types of documents and transactions for which data are exchanged (they include salary transactions, electronic invoicing, product descriptions, transport documents, data for public authorities and financial transactions).

All these approaches present a problem which also occurs in other areas of ICT use measurement and that is "how can the significance of the activity be ascertained"? It would almost certainly be problematic to ask businesses about the number of "linked transactions", their value or other measures of intensity. Therefore the data obtained from approaches such as those described above are a series of "yes/no"

responses. This means that if a business is using particular e-business processes for a minor part of its business or in respect of a small number of transactions, its reply has the same significance as a business which has used ICT to completely transform the way it does all its business.

Trust in the online environment

A number of questions (and parts of questions) in the revised model questionnaire deal with the important topic of trust in the online environment. The questions concern IT security (questions 7 and 8), privacy and security features of a business' Web site (question 16) and security and privacy as barriers or limitations to selling over the Internet (question 14).

Feedback from WPIIS delegates both confirmed the importance of this topic and the survey difficulties it presented. In general, the questions are relatively technical which can present problems, especially for small businesses.

At the 2005 meeting, WPIIS comments were sought on the feasibility of relatively untested response categories on IT security measures in place: anti-spyware software, regular back up of data critical to your business operations, and employee training programmes in IT security. The question was changed slightly as a result of feedback. The category *Employee training programmes in IT security* was removed following feedback that the category was very broad and therefore difficult to interpret. There were suggestions from delegates that the category on anti-spyware could be technically difficult. The definition has been changed slightly to indicate that such software might be integrated into other packages. The anti-spyware and data backup categories remain non-core until they are better tested in member country surveys. As a result of comment, an item was added to the question on Spam filters (which are relevant for security given that Spam can contain malware and cause denial-of-service). The concept of a Spam filter was understood by respondents in recent question testing by Statistics Canada (see footnote 7) and is successfully used by Statistics Denmark in its business ICT use questionnaire.

Delegates were also asked for their views on the statistical feasibility of the following types of questions, and to offer any experience in testing or asking such questions.

- Whether the business has conducted a risk assessment on the security of its computer system and, if so, what type of assessment that was (for instance, internal, by an external party, by a certifying organisation/authority etc.).

- Whether businesses which use anti-virus software download virus definitions and, if so, whether automatically, daily, weekly etc.

- Whether the business applies patches to, or updates, software which is critical to the security of its computer systems, and if so, whether automatically, daily, weekly etc.

Feedback suggested that there are problems asking about updating of software and virus definitions, partly because these processes can happen automatically and therefore the person completing the questionnaire would not necessarily be aware of them. On the topic of risk assessment, question testing by Statistics Canada (see footnote 7) found that the term was not uniformly interpreted and attracted a high "yes" response. As a result, no questions on these topics have been added to the model.

There were other issues raised by member countries, the main one being that questions about security incidents encountered are problematic. There is significant anecdotal evidence that businesses will either not answer such questions or will understate the extent of any problems. Reflecting this concern, the

question on IT security incidents (question 8) has been reduced to attacks by viruses etc. and made non-core.

An earlier draft question on whether the business' Web site had a security policy statement etc. has been incorporated into a larger question (16) thus enabling useful cross-classification against other responses on the question (for instance, whether the site is set up for online ordering, online payment and whether it collects customer information).

Digitised products

The Internet sales distribution question (part of question 12) includes a percentage breakdown of Internet sales by product type. Of particular interest are "digitised products", those products which are able to be digitally delivered via the Internet. They are challenging statistically as they are difficult to describe in a way which is technically correct yet understandable to respondents. However, the United Kingdom has found that respondents seem to be able to provide the information in question 12 using a very similar definition to that in the question.

Comparison with Eurostat's model survey

European Union countries now comprise nearly two thirds of OECD countries. Additionally, some OECD countries which are not EU members use the Eurostat model survey (see footnote 5) It is therefore important to try to align the OECD and Eurostat model questionnaires (and associated standards) as far as possible, while taking into account the interests of the eight OECD countries which do not carry out Eurostat's model survey. The revised model questionnaire is reasonably consistent with Eurostat's 2006 Enterprise questionnaire – where they overlap. However, Eurostat asks questions about several topics which are not on the OECD model questionnaire and *vice versa*, in particular, in the area of e-business. Other differences include instances where the questionnaires differ because response categories are split in one questionnaire and not in the other. The OECD model tends to have more response categories in equivalent questions.

In respect of scope and classificatory variables, the revised OECD and current Eurostat models are very similar.

Model questionnaire

The revised model questionnaire, including definitions of terms and associated metadata notes, is shown in the Annex.

The size of the revised model questionnaire

Delegates should note that, in terms of the number of questions, the revised questionnaire is smaller than the 2001 version (27 versus 34 questions). However, the questions are not strictly comparable. For instance, the revised version combines two questions in the previous model into one (and adds two extra components to it) and the previous model had more dimensions for some questions, asking about planned as well as actual use of ICT.

Logic of the revised model questionnaire

The questionnaire logic incorporates the following main assumptions:

- If a business **does not have a computer**, it is assumed that it could still use the Internet.
- Businesses which **do not use any networks** (internal or external) are filtered out of the questionnaire very early.
- Businesses **without the Internet** (but with another network) are filtered out of most of the questionnaire and are not asked questions about IT security or questions about use of the Internet for business processes. This logic means that businesses without the Internet but on whose behalf orders are placed or received over the Internet are excluded from relevant questions. The general view of WPIIS delegates was that this exclusion would not cause a problem.

Core and non-core questions (and response categories)

Questions and response categories denoted "non-core" are considered to be **either** difficult to collect **or** relatively untested (and therefore experimental to some degree). The term "non-core" is **not** used to indicate a lower priority. In the model questionnaire, a *non-core* question or response category is indicated by **NC** beside it.

Definitions of terms

The 2004 WPIIS paper proposed an expansion of survey material to include a glossary of terms. This has been included in the form of definitions of terms associated with each question in the revised model questionnaire.

Adaptation of the model questionnaire

It is not expected that the structure, question wording or definitions which comprise the model questionnaire would be used unchanged (or literally translated) in national surveys. However, it is important for comparability purposes that:

- Where questions are used, their meanings are preserved.
- The logic is preserved to the extent that the same (or very similar) populations of businesses are asked each question. For instance, non-computer users should be asked whether they used the Internet.[22]

Concluding remarks

Like the 2001 model survey paper [DSTI/ICCP/IIS(2001)1/REV1], this paper ends on a slightly uncertain note. While the outstanding methodological issues in the 2001 paper have been addressed, new

22. Even though the incidence of Internet access by devices other than computers is currently low, it may increase with improvements in mobile phone technology (such as 3G).

issues have been raised. Reflecting increasing sophistication of ICT tools, users are seeking answers to more complex questions such as:

- Use of e-business solutions which integrate processes within a business and externally with business partners.
- Impacts of those e-business solutions.
- Use of outsourcing to increase efficiency and effectiveness.

In relation to e-business questions, as discussed above, the nature of the topic creates conceptual and practical problems for statisticians.

Regarding impacts, there is more than one possible approach but none are straightforward. The model questionnaire has a question on benefits of selling over the Internet. Such a question, while subjective, has been successfully used by member countries, with its success probably attributable to the fact that it asks about the benefits of something quite specific – selling products over the Internet. It is considered that asking subjective impact questions about something more general than this, such as e-business or use of ICT generally, is unlikely to be successful because the subject of the question is very broad and not uniformly understood by respondents. An objective approach to impacts of ICT use is becoming more widespread among member countries and often involves linking ICT use survey data with other data (such as labour productivity information). This could also be done using data on e-business, though achieving international comparability of such analyses tends to be more difficult. In this context, note also the issue of measuring intensity of activity raised in the discussion above on measuring e-business.

Following a discussion on revision strategy at the 2005 meeting, where it was agreed that incremental revision is preferred to occasional major updates, it is expected that new or revised questions on e-business or other topics could be incorporated into the model survey fairly easily. Incremental revision would also allow the inclusion of important emerging topics in the area of business use of ICT. They include areas such as outsourcing[23] and the use of potentially transforming technologies such as:

- Voice over IP (VOIP) which could enable better integration of voice communication with other business uses of the Internet.
- Radio frequency identification (RFID), a technology with significance for supply chain management and logistics.
- Use of open source software.[24]

Despite the fact that work still needs to be done in the area of business ICT use measurement, the WPIIS has now declassified the second version of the model questionnaire. The revision better reflects current policy interests than the 2001 version and is more aligned with the current statistical practices of member countries in this field.

23. An earlier draft of the questionnaire included an instruction to the effect that where a business outsources management or operation of ICT functions, the business should respond to relevant questions as if it managed/operated them. However, several delegates preferred to further discuss such a change before including it in the model survey.

24. A question on this topic has been successfully tested by Statistics Canada.

The adoption of this model survey will continue to improve the comparability of ICT statistics within the OECD area. Additionally, as the model is adopted by non-member countries, a greater range of comparable statistics will become available globally.

ANNEX. OECD MODEL QUESTIONNAIRE FOR ICT USE BY BUSINESSES (2005)

Section A: General information about your business' use of ICT		Logic[1]	Definitions and notes
1 Did your business use computer/s during <period>?	☐ **No** ☐ **Yes**		A computer includes: a desktop, portable or handheld computer (*e.g.* a personal digital assistant), minicomputer and mainframe. A computer does not include computer controlled machinery or electronic tills.
2 Did your business use the Internet or any other computer network during <period>?[2]	☐ **No** ☐ **Yes**	**Go to 25**	The Internet refers to Internet Protocol (IP) based networks: WWW, extranets, intranets, Internet EDI, Internet access by mobile phone and Internet e-mail. Other computer networks include internal networks (*e.g.* a LAN), proprietary external networks which are not IP-based (for instance, the networks originally set up for EDI), and automated telephone systems. EDI is electronic data exchange with other organisations via the Internet or other networks. The exchange is in a computer readable specified form based on agreed standards *e.g.* EDIFACT, RosettaNet.
3 Which of the following information technologies, if any, did your business have at <reference date>?			
	Tick all which apply		
Intranet within your business	☐		A network using the same protocol as the Internet and allowing communication within an organisation. It is typically set up behind a firewall to control access.
Extranet between your business and other organisations (including related businesses)	☐		A private, secure extension of the intranet running on Internet protocol that allows selected external users to access some parts of an organisation's intranet.
Local area network (LAN)	☐		A network connecting computers and associated devices within a localised area such as a single building, department or site; it may be wireless.
Wide area network (WAN)	☐		A network that connects computers and associated devices within a wide geographic area, such as a region or country.
None of the above information technologies	☐		

Section A: General information about your business' use of ICT			Logic	Definitions and notes
4	**Did your business use the Internet during <period>?**	☐ **No**	**Go to 19**	The Internet is defined in Question 2. Use of the Internet may be on your business premises or elsewhere.
		☐ **Yes**		
5	**What proportion of persons employed in your business routinely used the Internet at work during <period>?**[3]	**NC** ☐ **%**		This question refers to all persons employed by the business, not only those working in clerical jobs. It includes working proprietors, partners and employees. The Internet is defined in Question 2.
6	**How did your business connect to the Internet during <period>?**[4]			This question refers to the business as the subscriber rather than individual employees.
		Tick all which apply		
	Analog modem (dial-up via standard phone line)	☐		An analog modem converts a digital signal into analog for transmission by traditional (copper) telephone lines. It also converts analog transmissions back to digital.
	ISDN (Integrated Services Digital Network)	☐		ISDN is a telecommunication service that turns a traditional (copper) telephone line into a higher speed digital link. It should be regarded as narrowband.
	Other narrowband[5]	☐		Including most mobile phone access (*e.g.* WAP, i-mode) and other forms of access with an advertised download speed of less than 256 kbps (kilobits per second).
	DSL (ADSL, SDSL, VDSL etc.)	☐		Digital subscriber line; it is a high-bandwidth, local loop technology carrying data at high speeds over traditional (copper) telephone lines.
	Cable modem	☐		A modem which uses cable TV lines for connection to the Internet.
	Other broadband[5]	☐		Including optic fibre cable, some mobile phone access (*e.g.* UMTS, EDGE), powerline, satellite, fixed wireless, with an advertised download speed of greater than or equal to 256 kbps.

Section A: General information about your business' use of ICT	Logic	Definitions and notes
7 Did your business have any of the following IT security measures in place at <reference date>?		
Tick all which apply		
Virus checking or protection software which is regularly updated ☐		Software which detects and responds to malicious programs such as viruses, Trojan horses and worms. Regular update refers to automatic or manual downloading of virus definitions.
Anti-spyware software which is regularly updated[6] **NC** ☐		Software which detects and removes spyware from a computer system (spyware gathers user information through an Internet connection without the user's knowledge). May be standalone or included in security software packages or operating systems.
Firewall ☐		Software or hardware that controls access into and out of a network or computer.
Spam filter ☐		Software that diverts incoming spam (junk e-mail). Spam filters trap messages using various criteria such as e-mail addresses or specific words (or word patterns) in the e-mail.
Secured communication between clients and servers (*e.g.* via SSL, SHTTP) ☐		SSL is an encryption protocol which creates a secure connection between a client and a server. SHTTP supports the secure transmission of individual messages over the WWW.
Authentication software or hardware for internal users ☐		Authentication software or hardware verifies the identity of an internal or external user, user device, or other entity. Forms of credentials include passwords, tokens, PIN codes and digital signatures.
Authentication software or hardware for external users (*e.g.* customers) ☐		
Intrusion detection system ☐		Any system which attempts to detect intrusion into a computer or network by observation of actions, security logs or audit data.
Regular back up of data critical to your business operations[6] **NC** ☐		
Off site data backup ☐		Backup copies of computer files stored at a different site to your main data store. Includes both automated and non-automated backups.
No IT security measures in place ☐		
8 Did your business experience an attack by a virus or similar (for example, a Trojan horse or worm) which has resulted in loss of data or time, or damage to software during <period>?[7] **NC** ☐ **No**		A *virus* is a self-replicating, malicious program which attaches itself to a host program. A *Trojan horse* is a program that performs like a real program a user may wish to run, but also performs unauthorised actions. A *worm* is a malicious program that self-replicates across networks.
☐ **Yes**		
Excluding: *attacks which were successfully prevented by security measures in place.*		

Section B: How your business uses ICT in its operations	Logic	Definitions and notes
Purchasing and selling goods or services via the Internet		
9 Did your business place orders (make purchases) for goods or services via the Internet during <period>? ***Including:*** *via Web sites, specialised Internet market places, extranets, EDI over the Internet, Internet-enabled mobile phones but* ***excluding*** *orders submitted via conventional e-mail*	☐ **No** ☐ **Yes**	An order is a commitment by the business to purchase goods or services, where the commitment was made via the Internet. The order may be with or without online payment and excludes orders which were cancelled or not completed. EDI is defined in Question 2. Purchases include all capital and current purchases (raw materials, components, office items, equipment, maintenance and repair items, services etc.).
10 Did your business receive orders (make sales) for goods or services via the Internet during <period>? ***Including:*** *via Web sites, specialised Internet market places, extranets, EDI over the Internet, Internet-enabled mobile phones but* ***excluding*** *orders submitted via conventional e-mail* ***Including:*** *orders received on behalf of other organisations and orders received by other organisations on behalf of your business*	☐ **No** **Go to 14** ☐ **Yes**	An order is a commitment to purchase goods or services from the business, where the commitment was made via the Internet. The order may be with or without online payment and excludes orders that were cancelled or not completed. EDI is defined in Question 2.
11 What proportion of your business' total turnover during <period> (excluding value added taxes) did those Internet orders (sales) represent?[8] ***Note:*** *In respect of Internet orders received on behalf of other organisations,* ***include*** *only fees or commissions earned.* ***Include*** *the value of Internet sales orders received by other organisations on your behalf. For financial services,* ***include*** *only commissions, fees and premiums earned in respect of services offered over the Internet and, in respect of Internet-only accounts, net interest income.* ***Note:*** *Careful estimates are acceptable.*	☐ **%**	The Internet and Internet orders are defined in Question 10.

Section B: How your business uses ICT in its operations		Logic	Definitions and notes
12 Please provide percentage breakdowns of the value of those Internet orders (sales), by:[9] *Note: Careful estimates are acceptable.*		**NC**	
Types of products your business sold			Via the Internet
Physical products (ordered on line and delivered offline)	%		For instance, raw materials, components, stationery, equipment, hardware, books.
Digitised products (downloaded or accessed on line)	%		Products which are delivered over the Internet in digitised form, replacing physical products, *e.g.* reports, software; and new kinds of Web products which are accessed on line (*e.g.* online financial and information services).
Services which are ordered on line but delivered offline	%		These include services which are ordered on line but are delivered, or substantially delivered, offline (*e.g.* accommodation, air travel).
	=100 %		
How orders were received			Via the Internet.
Via an online ordering facility on your Web site	%		For instance, a shopping cart facility. Excludes conventional e-mail linked from a Web site.
Through another Web site (*e.g.* specialised Internet marketplace or an agent's site)	%		
Via EDI over the Internet	%		For example XML/EDI. EDI is defined in Question 2.
Via other Internet technologies (please specify)……..……..	%		
	=100 %		
Types of customers your business sold to			Via the Internet.
Other businesses	%		Including related businesses.
Individual consumers	%		
Government and other non-business organisations	%		Including non-profit organisations.
	=100 %		

Section B: How your business uses ICT in its operations		Logic	Definitions and notes
12 Please provide percentage breakdowns of the value of those Internet orders (sales), by:[9] (continued)	**NC**		
The location of customers your business sold to			Via the Internet.
Customers within your country	☐ %		
Customers outside your country	☐ %		
	=100 %		
13 Which of the following benefits, if any, did your business realise through Internet selling during <period>?[10]			Internet selling (that is receiving orders for goods or services over the Internet) is defined in Question 10.
	Tick all which apply		
Reduced transaction time	☐		
Increased quality of customer service	☐		
Lower business costs	☐		Including transaction and other costs.
Increased sales volume and/or number of customers	☐		
Keeping pace with competitors	☐		
Able to better target customers individually	☐		
Other (please specify)…….……	☐		
No benefits realised	☐		

Section B: How your business uses ICT in its operations		Logic	Definitions and notes
14 Which of the following factors, if any, limited or prevented Internet selling by your business during <period>?[11]	Tick all which apply		Internet selling (that is receiving orders for goods or services over the Internet) is defined in Question 10.
Products of your business are not well suited to sale via the Internet	☐		
Security concerns	☐		Includes concerns the business has and the perceived concerns of customers (*e.g.* on providing credit card details over the Internet).
Privacy concerns	☐		Includes concerns the business has and the perceived concerns of customers (*e.g.* about providing personal information over the Internet).
Prefer to maintain current business model, *e.g.* face to face interaction	☐		
Customers' or suppliers' computer systems are incompatible with yours[12]	☐	**NC**	Refers to interoperability issues which could also be described as the inability of systems to exchange information.
Insufficient level of customer demand for purchasing via the Internet	☐		
Uncertainty concerning legal/regulatory framework for selling over the Internet	☐		
Cost of development and/or maintenance is too high	☐		
Lack of skilled employees to develop, maintain or use the technology required	☐		
No limitations to selling over the Internet[13]	☐		
Not relevant – as selling over the Internet is currently under development or planned for the near future[14]	☐		
Other (please specify)…….……	☐		

Section B: How your business uses ICT in its operations			Logic	Definitions and notes
Use of the Internet for other business processes within your business				
15 **Did your business have a Web site at <reference date>?** ***Including:*** *Web site, home page or presence on a third party's site where your business has substantial control over the content of the page/s but* ***excluding*** *inclusion in an online directory and advertising on a third party's site.*		☐ **No** ☐ **Yes**	**Go to 17**	Includes the business' Web site/home page or a presence on a third party's site (including a related business) where the business has substantial control over the content of the site/page. It excludes a listing in an online directory, advertising on a third party's site, or other Web pages where the business does not have substantial control over content.
16 **As at <reference date> did your business' Web site have any of the following features?**[15]		Tick all which apply		
Product catalogues or price lists		☐		
Customised Web page or information provided for repeat clients		☐		
Facility for collecting customer information on line		☐		
A privacy policy statement[6]	**NC**	☐		May be called privacy guidelines, notice or guarantee. It explains the privacy practices of the business regarding handling and using personal information.
A privacy seal or certification[6]	**NC**	☐		Refers to third party privacy certification. May also be called a trustmark.
An online ordering facility for your business' products		☐		Ranges from a simple order form which is completed on line to a *shopping cart* system. May involve an intermediary, for example, a transaction processor. Products include goods and services.
Facility for online payment		☐		
Provision of online after sales support		☐		For example, online queries, customer feedback, customer services organised on line, FAQ facility.
Order tracking available on line		☐		
A security policy statement[6]	**NC**	☐		A security policy statement explains the business' practices on security of customer information (transmission and/or storage) or financial transactions.
A security seal or certification[6]	**NC**	☐		Refers to third party security certification. May also be called a trustmark.

Section B: How your business uses ICT in its operations	Logic	Definitions and notes
17 Did your business use the Internet for dealing with government organisations during <period>?[16]	**NC**	Government organisations are defined by the SNA93 as entities which "assume responsibility for the provision of goods and services to the community or to individual households and to finance their provision out of taxation or other incomes; to redistribute income and wealth by means of transfers; and to engage in non-market production." They include government organisations at local, regional and national level.
	Tick all which apply	
For obtaining information from government organisations (*e.g.* from Web sites or via e-mail) ☐		
For downloading or requesting government forms ☐		Includes downloading from Web sites or e-mailing requests for forms; includes taxation forms, claims, applications for permits etc.
Completing forms on line or sending completed forms ☐		Includes online completion and submission of forms (*e.g.* Web forms) and sending completed forms, for instance, by e-mail; includes taxation forms, applications for permits and tender documents.
For making online payments to government organisations ☐		Includes payment of fees, payments for purchases, taxation remittances etc. Online payments to government organisations may be made via an intermediary, for instance, a bank's Web site.
Other dealings with government (please specify)…….…… ☐		
Did not use the Internet for dealing with government organisations ☐		
18 Did your business use the Internet in any of the following areas of your business during <period>?[17] ***Including:*** *the WWW, extranets, intranets, EDI over the Internet but* ***excluding*** *conventional e-mail*	**NC**	
	Tick all which apply	
Finance ☐		Includes invoicing and making payments via the Internet, online banking.
Internal or external recruitment ☐		For instance, including details of vacant positions on an intranet or Web site.
Staff training ☐		Includes e-learning applications available on an intranet or from the WWW.
Sharing or distribution of information within your business ☐		Includes via an intranet or knowledge management software.
Sharing or distribution of information with other organisations ☐		For instance, collaboration with business partners.
Did not use the Internet for any of the above business activities ☐		

Section B: How your business uses ICT in its operations	Logic	Definitions and notes
Purchasing and selling goods or services via computer networks other than the Internet		
19 Did your business place orders (make purchases) for goods or services via computer networks other than the Internet during <period>? ***For instance:*** *non-Internet based EDI, automated telephone systems.* ☐ **No** ☐ **Yes**		An order is a commitment by the business to purchase goods or services, where the commitment was made via a computer network (other than the Internet). The order may be with or without online payment and excludes orders which were cancelled or not completed. EDI is defined in Question 2. Purchases include all capital and current purchases (raw materials, components, office items, equipment, maintenance and repair items, services etc.).
20 Did your business receive orders (make sales) for goods or services via computer networks other than the Internet during <period>? ***For instance:*** *non-Internet based EDI, automated telephone systems.* ***Including:*** *orders received on behalf of other organisations and orders received by other organisations on behalf of your business.* ☐ **No**	**Go to 22**	An order is a commitment to purchase goods or services from the business, where the commitment was made via a computer network (other than the Internet). The order may be with or without online payment and excludes orders which were cancelled or not completed. EDI is defined in Question 2.
☐ **Yes**		
21 What proportion of your business' total turnover during <period> (excluding value added taxes) did those orders (sales) represent?[8] ***Note:*** *In respect of orders received on behalf of other organisations,* ***include*** *only fees or commissions earned.* ***Include*** *the value of sales orders received by other organisations on your behalf. For financial services,* ***include*** *only commissions, fees and premiums earned in respect of services offered over computer networks other than the Internet.* ***Note:*** *Careful estimates are acceptable.* ☐ **%**		Orders are defined in Question 20.
Integration of your business' processes[18]		
22 Did your business place or receive orders for goods or services via any computer networks during <period>?[19] ***Including:*** *the Internet and other computer networks (e.g. non-Internet based EDI) but* ***excluding*** *orders submitted via conventional e-mail.* ☐ **No**	**Go to 25**	An order is defined in questions 9, 10, 19 and 20.
☐ **Yes**		

Section B: How your business uses ICT in its operations	Logic	Definitions and notes
23 Did your systems for placing orders via computer networks link <u>automatically</u> with any of the following internal or external systems as at <date>?[20]		An automatic link exists if information captured in one system triggers an update in another system or is available in real time in other systems.
Tick all which apply		
Your suppliers' computer system/s ☐		
Your purchasing partners' computer system/s ☐		
Your business' computer system/s		
For ordering or inventory control ☐		
For accounting functions ☐		For instance, paying suppliers.
For production or service operations ☐		
Other internal or external computer system/s (please specify)…..…… ☐		
Your system/s for placing orders via computer networks were not linked automatically to any of the above ☐		

Section B: How your business uses ICT in its operations	*Logic*	*Definitions and notes*
24 Did your business' computer systems for receiving orders via computer networks link <u>automatically</u> with any of the following internal or external systems as at <date>?[20]		An automatic link exists if information captured in one system triggers an update in another system or is available in real time in other systems.
Tick all which apply		
Your customers' computer system/s ☐		
Your suppliers' computer system/s ☐		
Your business' computer system/s		
For ordering or inventory control ☐		
For accounting functions ☐		For instance, invoicing customers.
For delivery of products ☐		Including electronic delivery.
For production or service operations ☐		
For marketing or customer relations management ☐		
Other internal or external computer system/s (please specify)…..…… ☐		
Your system/s for receiving orders via computer networks were not linked automatically to any of the above ☐		

Section C: Other information about your business		
25 **Main activity of the business** Please describe……		
26 **Number of employed persons at <date>**[21]		
27 **Total turnover during <period>** *In national currency, excluding value added taxes*		

Notes to the questions

1 Where there is no "Go to" direction, the skip is to the next question.

2 This is a filter question only. Its purpose is to allow businesses which do not use networks to go to the last section of the questionnaire.

3 There is contradictory evidence from EC countries regarding the usefulness of this question for policy purposes and its statistical reliability. At least some European countries find that respondents have difficulty with the question. It has therefore been presented as non-core in the model questionnaire.

4 The main aim of this question is to enable estimation of the proportion of businesses with broadband access. Possible country variations are: rename categories where local terms differ (for instance, the term "DSL" is not used much in some countries); remove categories where items are not feasible; add or split categories according to technologies available and country data requirements. Care should be taken when adding or splitting categories that statistical bias is not introduced. This could occur if the provision of alternative categories affects response thereby leading to loss of comparability with other countries' data. Note also the comments against the categories "Other narrowband" and "Other broadband". An earlier draft included a split of the broadband categories based on maximum contractual download speed (equivalent to advertised speed). That split was removed because of concerns about respondent knowledge and because it is considered that any cut-off chosen will be obsolete in a relatively short time. Individual countries may wish to include such a split, with a possible model being based on questions included by Eurostat on its 2006 model questionnaire.

5 This "other" item would not appear on questionnaires – countries should add appropriate category/ies based on services available. In particular, there is anecdotal evidence that the term "broadband" may not be well understood in all countries.

6 This response category is non-core because it is relatively untested in member country official surveys.

7 This question is non-core because it is relatively untested in member country official surveys.

8 Countries can also ask the question as ranges or absolute values as long as an estimated total value can be calculated for each business.

9 This question is non-core because three of its components are either relatively untested in member countries (types of products and how orders were received) or are believed to be difficult statistically (location of customers). Countries may prefer to ask each component of the question as a separate question. Other issues relevant to this question include the statistical reliability of disaggregated data. An alternative to percentage splits is to ask for absolute values. The component "type of customers" is known to be fairly stable so could be asked every second year rather than annually.

10 Categories and order are based on analysis of responses from Australia, Canada and Eurostat. Possible country variations are to add or split categories according to country data requirements. Note that responses to barriers and benefits questions tend to be fairly stable over time therefore they may be rotated in and out of an annual collection.

11 Categories have been revised and ordered based on data from Canada (Internet commerce), Australia (Internet selling) and Eurostat (Internet selling - both sellers and non-sellers). Note that this question is asked of both sellers and non-sellers though countries may prefer to ask the question separately of sellers (as a limitations question) and non-sellers (as a barriers question). Possible country variations are to add or split categories according to country data requirements. It is possible to ask barriers questions in a variety of ways. They include asking for all reasons, asking respondents to rate the importance of each reason or asking for the main plus a secondary reason, or the main reason only. The approach taken here is probably one of the least burdensome presentations. Where countries use a different approach to the collection of these data, for the purposes of international comparability, data should be tabulated to show the main reason most commonly reported or the reason most commonly selected as the most important reason. Note that responses to barriers and benefits questions tend to be fairly stable therefore they can be rotated in and out of an annual collection.

12 This is a new item designed to capture interoperability as a barrier. It is non-core because it is untested.

13 This would be a valid response for businesses which are already selling over the Internet.

14 This would be a valid response for businesses which are not currently selling over the Internet but are planning to do so.

15 This question offers the potential to cross-classify categories and produce useful information on e-business and trust functions on a business' Web site. For instance, cross classifying whether a site collects information against privacy characteristics or cross-classifying an online order facility against security characteristics. Possible country variations are to add or split categories according to country data requirements.

16 Questions relating to government units in demand surveys are complicated because respondents do not have a common idea of what constitutes a government organisation (this is exacerbated when results are compared across countries). The question has been made non-core because of these statistical difficulties. WPIIS delegates have generally supported use of the SNA definition of government units so that has been specified in this question. The SNA93 definition includes government organisations at local, regional and national level and may be found here: http://unstats.un.org/unsd/sna1993/glossform.asp?getitem=219. Countries should tailor this question to best convey the SNA concept of a government organisation.

17 This question is experimental and has not been asked in this form by NSOs. It is therefore non-core. It is partly based on a question tested by Statistics Canada but additional response categories have been added.

18 This section is currently limited to links between e-commerce and other systems. In the future, it could include questions about links between other business systems such as other (non e-commerce) purchases and sales, logistics etc.

19 A business should respond positively if it answered yes to any of the e-commerce purchasing or selling questions (9, 10, 19 or 20).

20 Interested countries can ask the linkages questions separately for Internet and non-Internet purchasing and selling.

21 The date would usually be the end of the reference period. To simplify the question, the date used could be that of the last pay date in the reference period.