18th Meeting of the Voorburg Group on Service Statistics

Tokyo, October 2003

OECD work on standards for measuring electronic business

SESSION: INFORMATION SOCIETY

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Introduction

This paper provides some background information on OECD work on defining and measuring electronic commerce and presents a progress report on more recent work by an OECD Expert Group in looking specifically at measurement of electronic business processes[1]. It also outlines the work done by other areas of the OECD and National Statistical Offices (NSOs) in tackling this measurement issue.

Background: OECD work on defining and measuring electronic commerce

Following a recommendation made by Ministers at the 1998 conference on electronic commerce, the OECD's Working Party on Indicators for the Information Society (WPIIS) established an Expert Group on Defining and Measuring Electronic Commerce. The aim of the Expert group was to "compile definitions of electronic commerce which are policy relevant and statistically feasible".

Subsequent work by the Expert Group resulted in definitions for:

- electronic commerce transactions
- Internet commerce transactions
- electronic commerce business processes
- Internet commerce business processes.

These were presented to the April 2000 WPIIS meeting which agreed to proceed with the two transactions-based definitions and leave the electronic commerce business process definitions for later consideration.

In 2001, a model questionnaire on the use of ICT/E-commerce in the business sector was agreed by WPIIS. Whilst it contained a number of questions on how enterprises were using ICT (especially the Internet), it did not cover the range of an enterprise's possible electronic business processes in a comprehensive fashion. The WPIIS Expert Group on Defining and Measuring Electronic Commerce discussed this omission at its 2002 meeting and recommended that a module on electronic business processes be developed and proposed for inclusion in the model questionnaire. Accordingly, an Expert Group on the measurement of electronic business processes was established at the 2002 WPIIS meeting.

The brief of the Group was to address the following:

- Develop a survey module on business processes in two stages, whereby in the first stage attention should be devoted to transaction-related business processes.

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[1] In this paper, the following terms appear: electronic business, e-business, electronic business processes, electronic commerce business processes. They are taken to mean the same thing, with different terms being used according to the terminology cited in other work.

- Make a distinction between various means of effecting e-commerce (e.g. conventional e-mail, interactive e-mail, and various web-based technologies).
- In a second stage further stratify electronic business processes, more generally, after benefiting from the analysis of preliminary efforts in this area by the US and Japan.

The Expert Group was chaired by Mr. Ivan Bishop of the UK Department of Trade and Industry. It met in March 2003 and reported its work to the May 2003 meeting of the WPIIS (DSTI/ICCP/IIS(2003)3).

Work of the Expert Group

Broad context

In an attempt to explain the different levels of ICT access and use within an enterprise, the Expert Group presented the following nested diagram (based on a Canadian model) to explain the hierarchy of ICT access, ICT use, electronic business and electronic commerce.

Figure 1. Hierarchy of ICT access/use[2]

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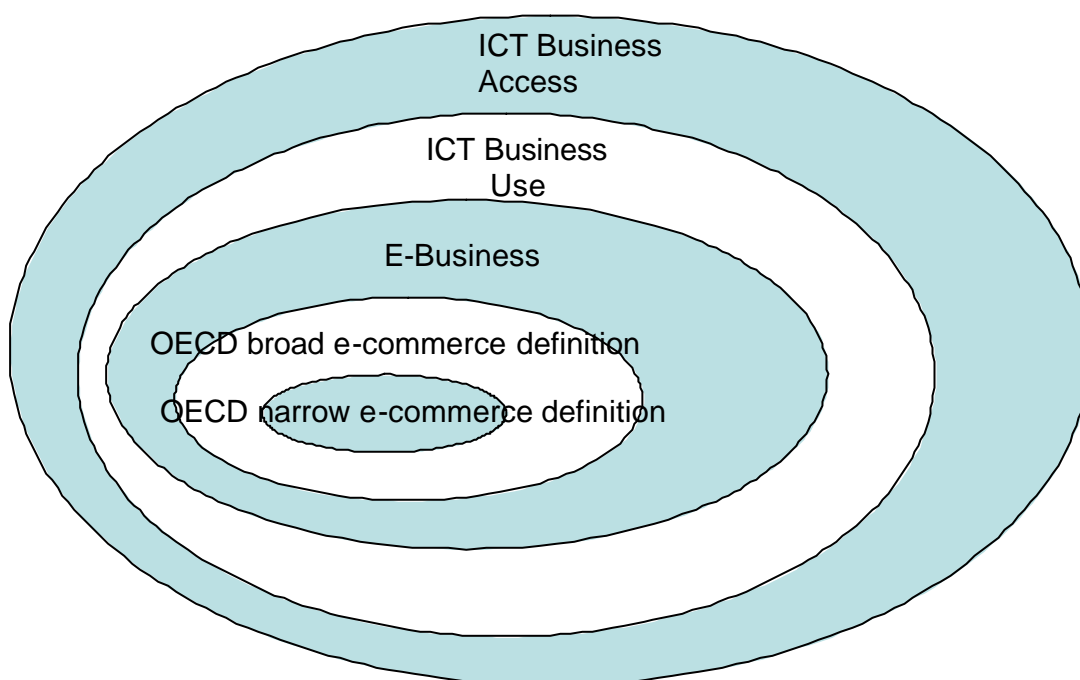
[2] Where elements are defined as follows: ICT business access – having the opportunity to utilise ICTs for the business' activities; ICT use – any use of ICTs by the business, including stand alone, information search, retrieval, processing of ICTs; E-business – automated business activities over computer mediated networks (CMN); E-commerce (broad) – purchasing/selling transactions over CMN; E-commerce (narrow) – purchasing/selling transactions over the Internet.

Definition of electronic business processes

The Expert Group proposed a definition of electronic business processes based on functionality rather than technology. The proposed definition is "(automated) business processes (both intra- and inter- firm) over computer mediated networks". In addition, electronic businesses processes should integrate tasks and extend beyond a stand alone or individual application.

Classification of electronic business processes

A number of broad business functions were identified and described in terms of electronic business processes as shown below.

Customer acquisition and retention
The business processes of acquiring and retaining customers taking place over computer mediated networks. Examples of such processes are marketing applications that use computer mediated networks for activities such as marketing campaign management and planning, campaign execution, customer segmentation, list management, database marketing, direct marketing, telemarketing, marketing encyclopaedia, electronic catalogue, Web activity analysis, Web advertising, and personalisation functions.

Use of the Internet medium to maximise customer calls and requests to handle multiple modes of communication such as fax, email, and Internet in both live agent and automated formats, often integrated with customer databases also belongs to this category. Call centres are a good example of this as they often deploy multiple modes of communicating.

E-commerce
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/or 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. This is equivalent to the OECD broad definition of e-commerce transactions. Invoicing and payments should be excluded since they belong to the process of 'finance, budget and account management'.

Finance, budget and account management
This is the process of managing, planning and evaluating a firm's finance using computer mediated networks. It includes invoicing and payment systems. In addition to this, it covers systems for decision-making and management support, e.g. processes that are conducted via software systems as SAP or SAS.

Human resource management
This is the process of all operations, practices, functions, activities and methods related to the management of people as employees using computer mediated networks. It includes recruitment, training and firing of people. In addition to this it includes all administrative tasks such as time reporting, payment of salaries and pension schemes.

Product design and development
This is the process of designing and developing products via computer mediated networks, e.g. computer aided design (CAD), computer aided manufacturing (CAM) and collaborative design.

Order fulfilment and order tracking
These are the processes directly linked to orders that a firm receives. They include order control, product control, order tracking, data processing that relates to order fulfilment or tracking, sales force automation.

Logistics (inbound & outbound) and inventory control
These are logistic processes, conducted over computer mediated networks that are used in supplying, producing and delivering goods and services. Examples of such processes are supply chain management (SCM), production and inventory control, distribution control, vendor management of inventory, management customers' inventory, transportation and shipping, automated warehouse, e-mail with vendors or customers and systems for managing production or service operations conducted over computer mediated networks.

Product service and support
This includes all processes that relate to product service and support that are carried out over computer mediated networks. The most common example of this might be websites where part of the website is devoted to support. Such support pages might contain answers to frequently asked questions (FAQ), downloadable manuals and the possibility to post questions online.

Knowledge management
This covers the use of ICTs to effectively share knowledge or expertise within an organisation.

Data items to be collected

The Expert Group discussed what information would be of interest in relation to electronic business processes. They concluded that the processes themselves are of interest as well as whether those processes had been innovated in the previous year by the use of computer-mediated networks. They proposed the following questions:

- Which activities/functions/processes are managed over Computer-mediated networks?
- Which processes have been re-organised/modified/changed/innovated through use of Computer-mediated networks?

Other issues and characteristics

The Expert Group paper raised a number of other measurement issues and characteristics, as follows:

- Industry differences (e.g. services versus manufacturing). The Group recognised that it might be necessary to ask different questions for different sectors, noting that the financial sector had characteristics which distinguished it from other sectors.
- Size differences were seen to constitute less of a measurement issue than industry differences.

- Intra/inter firm and integration of systems. This is no doubt a complex area of measurement. For instance, how do we measure integration between the plethora of systems which most large businesses will have? The Group suggested that a matrix question might enable measurement of systems integration (see figure 3 below).
- Type of network. Many users would be interested in the type of networks being used (Internet/non-Internet and Proprietary/non-Proprietary) though the Group did not attempt to build this distinction into the questions proposed.
- Outsourcing. The complexity of data collection in this area was noted and the Group made no specific recommendation.
- Impacts/effectiveness of ICT use e.g. on linkages of processes, would be additional questions to those suggested. The Group acknowledged the importance of such information but questioned whether impacts data could be collected via a survey (suggesting that micro data analysis is the more usual method).
- Impact on reporting burden. The Group recognised that an e-business process module would increase respondent load and that maintenance of response rates could be made more difficult. They suggested that rotation of modules would assist. In the long term, they thought that the model questionnaire on business ICT use/E-commerce might need to be redrafted to reflect the hierarchical nature of ICT usage, e-business and e-commerce (see figure 1). For instance, it may not be logical to simply add a module on e-business processes, when e-commerce, which is already in the questionnaire, is a subset of the latter.

Information which should be collected

The group suggested two matrix format questions for inclusion in the model questionnaire. They are shown below.

Figure 2. Matrix question on information relating to electronic business processes

Please indicate which apply to the business processes used within your enterprise:

Business process	The business process is managed over a computer mediated network	The business process (ICT) system is integrated with other business process systems within your enterprise	The business process ICT system is integrated with the ICT systems of suppliers		The business process ICT system is integrated with the ICT systems of customers		The business process ICT system is integrated with the ICT systems of other organisations	During the past year the use of computer mediated networks has enabled process modification or change within your enterprise
			Within business group	External to business group	Within business group	External to business group		
Customer acquisition & retention								
E-commerce (OECD broad definition)[3]								
Finance, budget & account management								
Human resource management								
Product design & development								
Order fulfilment & order tracking								
Logistics (in- & outbound), inventory control								
Product service & support								

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[3] In light of recent results from micro-data work in the UK and Japan, it has been suggested that the e-commerce business process be split into two processes - receiving orders and placing orders.

Figure 3. Matrix question to assess extent of integration

For each of the business processes listed down the side of the table, please indicate the business processes shown across the top that they are integrated with over computer mediated networks.

Business processes	Customer acquisition & retention	E-commerce (OECD broad definition)	Finance, budget & account management	Human resource management	Product design & development	Order fulfilment & order tracking	Logistics (in- & outbound), inventory control	Product service & Support
Customer acquisition & retention								
E-commerce (OECD broad definition)								
Finance, budget & account management								
Human resource management								
Product design & development								
Order fulfilment & order tracking								
Logistics (in- & outbound), inventory control								
Product service & Support								

WPIIS reaction to the Expert Group's work

The presenter, Ivan Bishop, spoke to the paper provided to the May 2003 meeting and concluded his talk by posing the questions: 1) Are the principles and definition correct? 2) What are the priorities for the questions? 3) Is the proposed work plan reasonable? A general reaction was that the new questions would need to be carefully tested. In his summary of the discussion, the Chair suggested that WPIIS probably needs more input from the business community on this work. The key question, he suggested, is whether we can arrive at an economy-wide harmonised questionnaire module for electronic business processes. The meeting agreed to continue work on electronic business processes as a priority area.

Related work on the measurement of electronic business processes

Other OECD work

Electronic Commerce Business Impact Project

During 2001-2002, the OECD co-ordinated a case study project on the impacts of electronic commerce on business. The study involved nearly 220 firms across 11 countries and a common methodology was used across 14 broad sectors. Of particular relevance to this paper is the taxonomy used to map types of innovation to (electronic) business processes as follows:

- Types of innovation:
  - product innovation (diversification, differentiation, customisation, bundling)
  - process innovation (design, logistics, production lines, co-ordination)
  - relationship innovation (expansion, segmentation, trust, loyalty)

- Business processes, consisting of:
  - transaction preparation (advertising, catalogues and stock lists, information services, negotiation)
  - transaction completion (ordering, billing and payment, finance, delivery)
  - production support functions (information capture, information management, market analysis, market development).

For more information, including results of the cross-country study, see the OECD paper DSTI/ICCP/IE(2002)5/REV1 and sector case studies at http://www.oecd.org/sti/information-economy/.

Firm level studies

OECD has also undertaken a major study on the impact of ICT on firm performance, using official statistics. Results were included in *ICT and Economic Growth: Evidence from OECD Countries, Industries and Firms*, published in August 2003. A finding which is relevant to work on measurement of electronic business processes is that ICT is closely linked to process innovation in firms.

Measurement of electronic commerce in the financial sector

A separate Expert Group of WPIIS examined the measurement problems of ICT use/E-commerce in the financial sector and also reported their findings to the 2003 WPIIS meeting (see DSTI/ICCP/IIS(2003)4). That Group recognised that both e-commerce and e-business measurement issues were likely to be different for the financial sector. However, they did not attempt to define a set of electronic businesses processes for the sector, suggesting that further input and experience was required in order to do that.

NSO work

Several national statistical organisations (NSO) have included selected electronic business process questions in their national surveys of ICT use/e-commerce for some time. Such questions are typically lists where the respondent is asked to "tick all which apply". They include:

- purpose of use of Internet questions (Australia, European Union countries)
- web site functionality/facilities questions (Australia, Canada, European Union countries)
- integration of orders/purchases systems with other IT systems (Australia, some European Union countries)
- information sharing facilitated by ICT, by type of information and recipient (Canada).

Some countries have gone further and have presented a more comprehensive set of electronic business processes. Japan, for instance, in its Survey of ICT Workplaces, has asked technological questions (networks used, outsourcing sites, hardware and software acquisition) about a range of information systems from production to after sales service.

The US, in its Computer Network Use supplement to the annual Survey of Manufactures, asks about use of a range of computer networked business processes in the broad categories: purchasing, selling, production management, logistics, communication and support services.

Next steps

The Expert Group proposed a work plan as follows:

1. Seek country comments on paper.
2. Obtain advice from business community experts.
3. Identify and prioritise sub electronic business processes (recognising that the processes identified in their paper are broad level).
4. Identify appropriate information to collect in respect of particular sub electronic business processes (for instance, inter- or intra-firm).
5. Develop survey questions on sub e-business processes.
6. Present results of the investigation and collect member country comments.
7. Present proposal to the 2004 WPIIS meeting (April 2004).

Following from the work of the Expert Group, the OECD plans to hold a workshop on this topic in December this year. Although details are not finalised yet, it is likely that the workshop will draw together statisticians, analysts, policymakers and businesses to look at identifying and measuring the more important electronic business processes. It is expected that the workshop should address *Next steps* 2 to 5 shown above and bring us closer to an agreed module on electronic business processes.

For discussion – Voorburg views

Views are sought by Voorburg members on:

- the Expert Group's suggested definition of electronic business processes and the two questions presented
- whether you think it possible to capture electronic business process data in an economy wide survey
- measurement of electronic business processes more generally, including country experiences.