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**INFORMATION SOCIETY MEASUREMENTS:
THE CASE OF E-BUSINESS**

Background paper by the UNCTAD secretariat

Executive summary

Information society measurements are increasingly gaining attention, given that very little is known about the extent to which ICT are actually used by people, businesses and Governments. Reliable and internationally comparable data on ICT are needed by policy makers for planning, monitoring and evaluating ICT policies and strategies, and by companies for taking the right investment and business decisions. Therefore, a number of initiatives have been launched at the international level focusing on what should be measured, why, how and by whom. Data are particularly scarce in developing countries, where national statistical offices are only starting to address ICT-related measurements. This paper presents the issues involved and sets out a number of areas where UNCTAD could assist developing countries in their efforts to launch information society measurement programmes, for discussion by participants in the Expert Meeting.

1. Introduction

1. With increasing attention being paid to new information and communication technologies (ICT) and the emerging concept of an information society, as illustrated by the debates taking place in the context of the World Summit on the Information Society (WSIS),¹ calls for data on ICT-related indicators have become more frequent. Particularly in the developing countries, reliable and internationally comparable data on ICT usage by businesses, households and Governments are scarce. In most cases, the only source of data is private providers, which use different – often unpublished – methodologies. As a result, data reflect estimates and predictions rather than statistical evidence, and vary considerably from each other.

2. At the same time, many developing countries are preparing policies and strategies for the deployment and adoption of ICT in their societies. They realize that ICT could provide businesses and individuals with powerful tools to combat poverty, improve health, generate new employment opportunities, enhance market access and improve competitiveness. All of this could result in improved economic livelihoods and socio-economic well-being.

3. But designing and implementing ICT policies and strategies without proper knowledge about the state of ICT in the country, their use by companies and individuals, or the main barriers to them, remains a challenging task. While efforts have been made to assess the level of e-readiness or issues of digital divide, based on available indicators,² much information is lacking on issues such as ICT use by businesses or households. Therefore, during the past five years, a number of national statistical offices – mainly from the developed countries – have started to collect data on the deployment and use of ICT and the Internet in their societies (or “information society measurements”). These offices have the advantage of guaranteeing the confidentiality of the collected data, having a more neutral position when it comes to collecting and interpreting the data and being able to use their existing methodologies and infrastructure for data collection, processing and analysis.

4. Some countries are already benefiting from the results:³ they are now in a better position to benchmark their economies with competitors internationally; and they are able to identify the number of qualified people needed to advance their country’s digital economy or to calculate the amount of investments needed to provide businesses with access to the Internet. In short, e-statistics help both policy makers and business people to take well-informed decisions about best public policy measures and private investments in ICT-related sectors.

¹ The first phase of the WSIS will take place in Geneva (10-12 December 2003), and the second phase in Tunis (2005).

² For further details on country e-readiness, see Dutta, Lanvin and Paua (2003), and on digital divide measurement, UNCTAD (2003a).

³ Such as the Nordic countries, the United States, Canada and the United Kingdom. See UNCTAD (2003b) and Statistics Canada (2001).

5. In the developing world, e-measurement efforts are at a very early stage and only a few countries have started to include ICT data in their statistical compilation programmes. Therefore, there is an urgent need to assist countries in these efforts and to inform them about existing information society measurement efforts in other countries. With the increasing use of ICT by businesses and households in many developing countries, it is essential to start preparing ICT measurements now, for two reasons. First, the development and growth of the information society is irreversible. Businesses and individuals all over the world are increasingly using ICT with little factual data on them available. Second, the experience from countries that have started to develop their e-statistics shows that it takes several years to design and implement a good national strategy for measuring the information society. Hence, the earlier countries begin to work on their e-measurement strategy, the more likely it is that they will achieve better results at the time when ICT and e-business spread to most parts of the developing world.

2. The need for measurements

2.1 Information in an information society

6. Information has always been a vital resource. Never in history, though, has it been possible to capture, store, manipulate and transmit information at such speeds as today, made possible by the advancement of ICT. The instantaneous transmission of information, in particular, from anywhere to everywhere has profound implications both for the functioning of our economies and for the evolution of our societies.

7. Our vocabularies today contain terms such as “real time” or “Internet time” as if some delay in the transmission and processing of information makes information unreal, or at least seriously devalues it. While it is true that generally the value of information is a function of its timeliness, there are clearly contexts where its mere existence matters. To the extent that information enters decision-making, what really matters is the right kind of information, at the right time and within the appropriate context.

8. Information can assume many forms. It can be captured through written text and numbers, sound, still images and video. Its conveyance can also happen in writing, orally or visually. There is information that is event-related and therefore can be generated as events unfold. In essence it becomes indistinguishable from the event – the event is the information. The only requirement is the presence of a witness or a recording device. There is also another kind of information that must be painstakingly generated if its existence is valued, with all the opportunity costs that this entails. For instance, quantifying the penetration and use of ICT by businesses, Governments and people over the last few years does not just happen, but instead requires the systematic and methodical *production of information*.

9. The economic and societal implications of the new possibilities for communication are only now starting to be understood. Certainly, though, new markets open up and the functioning of existing markets is made more efficient. Previously disparate activities get connected in ways that would have been discarded until recently.

As a corollary, not only the ease but also the amount of contact, interaction and exchange increases. The consequences of this for growth and development are significant.

2.2 Quantitative information

10. An important and integral component of overall information is quantitative. It represents magnitudes and is expressed in numbers or, more generally, in data. Moreover, it extends to the analytical findings and insights that can be derived through appropriate manipulation and linkages of information sets.

11. Since antiquity, humans have understood the reality of the world in which we live better through numbers. Record-keeping matters and becomes an indispensable ingredient in our need to identify the time, place and numerous other characteristics of our lives. Today, its value has increased enormously, reflecting in a sense our evolution as a species. An essential set of questions to ask is not whether or not to produce, store, analyse and use information but rather *what* type and *how*. For this we need to know *why* and *for whom*.⁴

12. Governing a country without its vital statistics is inconceivable. So is running a business without knowledge of its human or physical resources. Naturally, then, the ushering in of information societies is accompanied by new quantitative information requirements. These matter for policy-making, businesses and general societal knowledge. Informed policies have a greater chance of success, as they can be better designed and targeted. Business decisions based on sound information concerning current and potential demand are more likely to be successful and produce the desirable outcomes.

13. Identifying the need and making the case for such measurements is only the beginning. Information society statistics represent a vast area, as they encompass the supply and demand sides, people, businesses and Governments, microeconomic and macroeconomic magnitudes, and new phenomena such as e-commerce. A number of elements must be taken into account in prioritizing work, such as specific technologies (e.g. registering penetration or saturation), and national and global landscapes. These must be coupled with the realization that huge differences exist among countries at any given point in time and that the situation of every country is subject to evolution over time. In that regard, e-readiness, ICT usage and long-term impacts become important concepts for government policy.

2.3 Information on e-business

14. Whether motivated by the desire to gain a competitive edge or simply reacting to the general momentum of competitive forces, businesses are being transformed by increasingly adopting new technologies resulting in the modernization and expansion of their information and communication infrastructure. Such investments improve both their

⁴ The question of *when* is closely related to the desired timeliness of the information and only comes into play later, when actual measurement programmes are designed.

internal functioning and the management of their external relationships with suppliers and customers. E-commerce would be one example of such new e-business processes (see definition below).

15. The economic advantages attributed to these “connected” businesses range from increased efficiency and enhanced innovative capacity, through the faster flow and sharing of information and the management of knowledge, to the broadening of their customer bases and their long-term success through access to new markets. These are closely related to the opening up of new markets and issues of competitiveness.

16. The way in which economic production is organized, distribution of goods and delivery of services takes place, how it all relates to industrial organization, investment and trade, and what it means for firm-level performance, including productivity, profitability and even employment arrangements, need to be understood anew in the light of this move towards e-business – which is here to stay.

17. Moreover, Governments that are developing and implementing national e-strategies give particular importance to policies facilitating the adoption of ICT by the business sector. Enabling frameworks are being put in place, the best formulation of which requires collaboration between Governments, business and international bodies. The opportunities afforded by e-commerce, among other e-business processes, and the need to integrate business of developing countries into the global environment have been well identified. Enterprises, whether in more or less developed countries, are increasingly integrated within global trade flows where business-to-business (B2B) e-commerce plays a crucial role. Also, as consumers become increasingly connected and familiar with the new channels, both business-to-consumer (B2C) and Governments online can expand. Furthermore, all these developments are expected to intensify with the deployment of broadband capabilities.

18. None of these transformations can be meaningfully acted on in an informational vacuum (the *why* question). Reliable and internationally comparable statistics are needed in order to inform government e-policies and business strategies, and to assist steering through the complex reality, as well as to shed light on the ultimate impacts of ICT on growth and wealth creation. Measurements are equally needed for benchmarking and for the assessment of comparative performances so that we can learn what works best by establishing cause and effect. They will also help to continue raising awareness about the real opportunities and challenges of the information society.

3. What has been accomplished to date

19. In the 1990s, as ICT started to penetrate every facet of economic and social interaction, the need for measurements that would satisfy the growing thirst for understanding of the underlying transformations became very clear. In a number of developed countries, it was articulated by a vocal demand, both from policy makers and from businesses. Early on, numerous private sector estimates emerged, but unfortunately they tended to produce inconsistent results, rely on non-transparent methodologies and

result in less-than-credible predictions, and were therefore deemed unreliable (UNCTAD, 2001). The need for systematic efforts was clear.

20. Initial work started around the mid-1990s and was concentrated mostly among OECD countries. Considering the scope of what is involved, measuring the information society can be overwhelming. To help navigate through this conceptual labyrinth, the OECD Working Party on Indicators for the Information Society (WPIIS)⁵ adopted a “building blocks” approach, whereby important components are taken on and dealt with at different speeds in a step-by-step, pragmatic way. Then, in close consultation with users, components of interest are added. An all-out approach would be realistically prohibited both by resources and by the practical impossibility of implementation by statistical offices.

3.1 A measurement framework

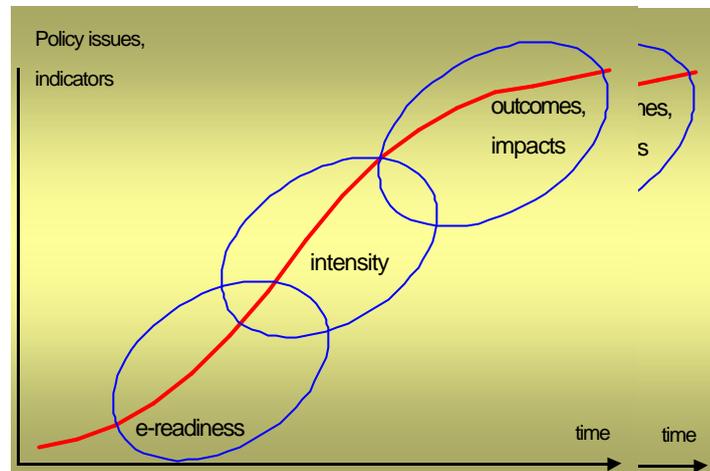
21. In prioritizing measurements, account must also be taken of a country’s ICT evolution over time and of the different stages of ICT development across countries at any given time. The same holds true for the evolution of specific phenomena, such as e-commerce. These are best described by the Scurve, which relates a country’s ICT readiness, intensity and impacts to evolving information requirements (figure 1). This is a useful representation of user needs and has since been adopted by many countries as a good starting place for statistical work. The chart recognizes that a distinction needs to be drawn between various situations where a country might wish to know about:

- The readiness of its people, businesses, infrastructure and its economy generally to undertake ICT-related activities – this is likely to be of interest to countries in the early stages of ICT maturity or activity;
- The intensity with which ICT are utilized within a country and the extent to which ICT-related activities (such as e-business) are undertaken – this is likely to be of interest to countries where ICT are becoming much more prevalent; and
- The impacts of ICT on national economies and business activities being carried out in those countries – this is likely to be of interest in countries where ICT are very well developed (UNCTAD, 2001).

⁵ The OECD WPIIS met first in June 1997, as an ad hoc meeting held under the aegis of the newly created OECD ICCP (Information, Computer and Communications Policy) Statistical Panel. The status of “Working Group” was granted in 1999. WPIIS is composed of representatives from national statistical offices (NSO) of OECD member countries. Information society measurements have also been discussed in other forums, such as the UN Voorburg Group, a group that works on services statistics, or Eurostat. The OECD WPIIS, however, is the group that has advanced most the work on definitions, methods and model surveys and its recommendations are followed by NSO of many countries, including non-OECD members (UNCTAD, 2001, 2003b).

22. Two important implications stem from this:

Figure 1. Maturity of e-markets: The S-curve



Source: Industry Canada (1999).

(a) Information critical at early stages is destined for obscurity later. For example, indicators of Internet penetration are expected to eventually approach saturation, among both people and businesses. Thus, unlike oscillating variables, such measurements may not go on for ever. To all practical intents and purposes, however, penetration indicators are among the core ones needed and the range within which they can be measured (say 5 per cent-95 per cent) can extend over several decades.

(b) As different countries follow different paths, it would be desirable and instructive to conduct comparative analyses that rely on measurements based on harmonized concepts and standardized definitions and methods. This would be particularly apt for countries that will initiate new measurements.

3.2 An overview of measurements

23. In the space of a few years, the OECD WPIIS has carried out a substantial amount of work in a brand new area of investigation. This includes work on the conceptual and definitional fronts, on practical applications and implementations of survey instruments, and on analytical output. All along, user priorities were respected, particularly with regard to e-commerce, which made the headlines in the late 1990s.

24. Household surveys and surveys of individuals are now carried out regularly by the statistical offices of many OECD countries.⁶ Through them, for instance, we know the proportion of people and households that use the Internet, including their socio-economic profile and other characteristics of interest that allow the study of digital divides. Work in

⁶ Such as the EU member countries, Australia and Canada.

this area culminated in a model survey by WPIIS, which is rich in content and covers issues of connectivity, e-commerce and barriers to access and use.

25. Measurements on the ICT sector have also taken place in a way that maximizes international comparability, something that was always in demand from policy makers. The OECD WPIIS definition of the sector represents a vertical integration of both manufacturing and services industries (OECD, 2002).

26. Measurements of the use of ICT by Governments and issues related to government-online initiatives have also been undertaken by WPIIS to shed light on the role of ICT in improving the way Governments deliver services and the way they function for better governance. Such work is ongoing in close consultation with users and extends to both the “back office” and the “front office”. Exports, imports and trade balances of ICT are also measured, facilitated by classifications of ICT commodities. Also, ICT investment and ICT sector R&D are measured to varying degrees. The whole issue of ICT in education is also being investigated, although work is at a rather early stage.

27. The emergence of a wide-ranging amount of data and time-series from a cross-section of countries enables value-added analytical activities that improve our understanding of the evolution of information societies. Popular hype aside, much of our core knowledge derives from these activities (the *what* question).

3.3. Measuring e-business

3.3.1 Use of ICT

28. Early efforts in this area by statistical offices focused primarily on the use of ICT. These measures include computers, cell phones and the Internet, as well as technologies that are internal to the firm and its close associates (intranets, extranets and EDI). They also address employee access to and use of such technologies. Once such basic measures exist, benchmarking by industry and firm size is possible. The use of ICT will always be an important starting component when observing businesses in the information society and will be in the list of a core set of indicators. Progressively, as data accumulate, analytical linkages with other relevant data sets can illuminate business performance.

3.3.2 E-commerce

29. **The context:** E-commerce is one important manifestation of the broader e-business processes. However, because of the extreme policy interest it generated and the attention it received in boardrooms and the press, it was developed as a separate entity of investigation. E-commerce posed substantial challenges to policy makers and businesses alike because of its potential to alter existing economic structures. While its place in the spotlight was new in the late 1990s, it had existed for much longer in the form of EDI. The latter, however, tended to be “hidden” on proprietary networks, and difficult and expensive to implement, and the pace of participation was determined exclusively by

very large firms. The newer form of e-commerce, based on the open Internet platform, emerged from the confluence of various technological innovations and regulatory reforms and commanded much attention because of its potential for widespread reach, including disintermediation and/or re-intermediation and modified consumer behaviour. It could revolutionize markets and would involve serious realignments in cost structures, inventories, the placing of orders, distribution channels and after-sales services.

30. The new reality required a review of traditional government roles and business strategies, including consumer protection and redress, tax collection, trade and competition policies, jurisdictional issues and the like. Informing the policy debate and the drafting of business strategies would benefit from internationally comparable measurements for industries and consumers. Reliable statistics that measure the level, composition and growth of e-commerce were sought by statistical offices.

31. **Dimensions of e-commerce:** To satisfy the information requirements for e-commerce, conceptual and definitional developments were needed. Moreover, the following three key dimensions of e-commerce were of extreme policy interest and had therefore to be taken into account in such work:

- The activities or types of transactions that would be included;
- The technological infrastructure over which such activities are carried out;
- The actors among which transactions occur (B2B, B2C...)

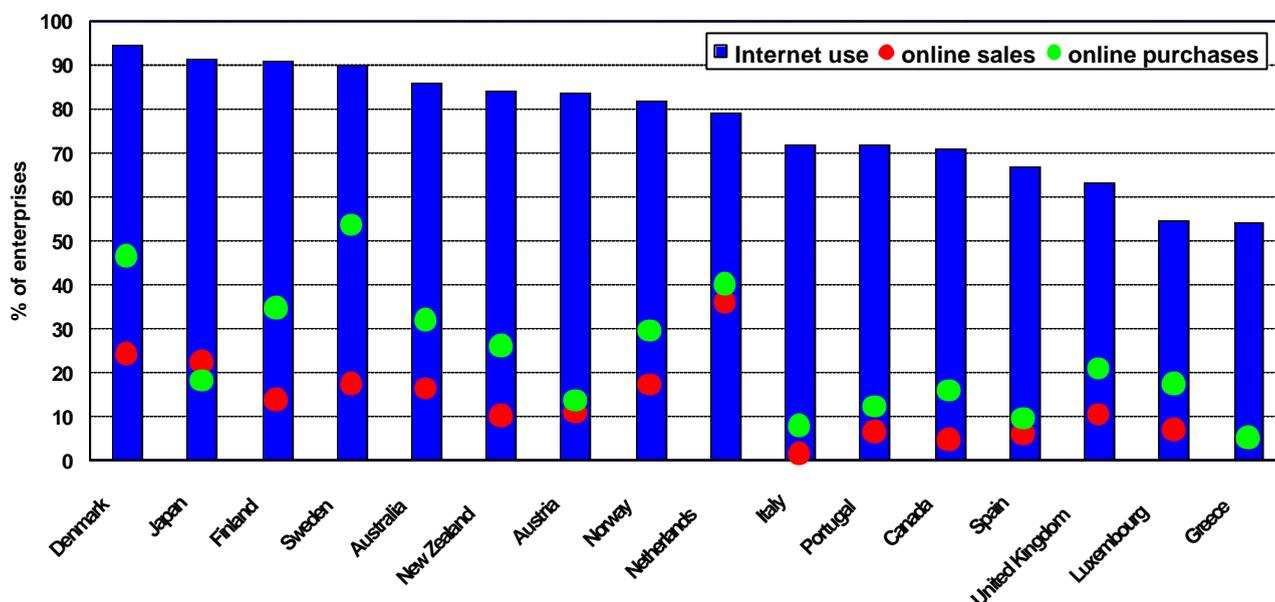
32. **Definitions:** On the measurement front, the first challenge was the lack of a definition that would be applied consistently. There was a plethora of private sector estimates, greatly exaggerating the phenomenon and varying widely. A fair amount of confusion was generated as to the level, growth and potential impact of the new phenomenon.

33. The OECD WPIIS kick-started international work in a way that could quickly address the issue as it was unfolding, and aimed at compiling definitions which are policy-relevant while at the same time statistically feasible. Among other things, the response burden, the availability of the information from respondents and its desired timeliness had to be factored in. The following nested definitions were endorsed by OECD member States:

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-private organizations, conducted over computer-mediated networks . The goods and services are ordered over those networks, but the payment and ultimate delivery of the good or service may be conducted on or offline.	Include : orders received or placed on any online application used in transactions such as Internet applications, EDI, Minitel or interactive telephone
NARROW definition	An Internet transaction is the sale or purchase of goods or services, whether between businesses, households, individuals, Governments and other public-private organizations, conducted over the Internet . 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 offline.	Include : orders received or placed on any Internet application used in transactions such as Web pages, Extranets and other applications that run over the Internet, such as EDI over the Internet, or over any other Web-enabled application regardless of how the Web is accessed (e.g. through a mobile or TV set). Exclude orders received or placed by telephone, facsimile or conventional e-mail

34. **Implementation and findings:** Many countries applied these definitions in recent years. The results proved quite illuminating, acted as a reality check and had a major impact on policies and business strategies. Based on national efforts, the compilation of internationally comparable statistics has also been made possible. A small sample from a recent example by the OECD (2002) is shown below (figure 2).

Figure 2. Business e-commerce, 2001



Source: OECD (2002).

3.3.3 Model questionnaire

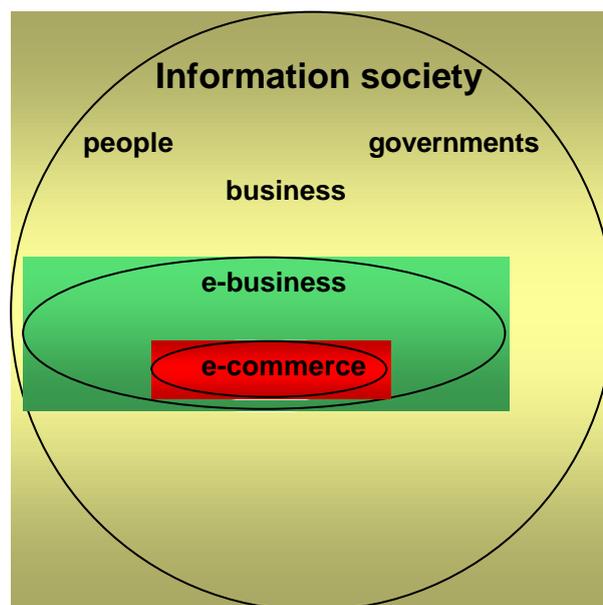
35. Measurements on the use of ICT and e-commerce culminated in a model questionnaire for businesses, intended to provide guidance for the development of such indicators among both current practitioners and newcomers to this area (annex 1). The approach is modular, designed to deal with key aspects of e-readiness and e-intensity. Existing modules cover: (a) **General information about ICT systems**, with questions related to the type of computer-mediated devices, applications or networks that are used by the enterprise, as well as the extent to which employees have access to and use of PCs, the Internet and e-mail in their daily work; (b) **Use of the Internet**, focusing on the type of connection used, its speed (bandwidth) and Internet-enabled business processes with a distinction between purchases of goods and services (the enterprise as customer) and sales of goods and services (the enterprise as supplier); (c) and (d) **E-commerce**, measuring both Internet sales and purchases. Questions related to the money value of such transactions and their breakdown by customer type and geographical destination are expressed in percentage terms of total sales or purchases; module (d) aims at a better monitoring of the development of new forms of sales by separating sales over the Internet from other computer-mediated networks, as well as assessing the pace of migration to open platforms and the substitution that takes place; and (d) **Barriers**, assessing impediments to the use of the Internet to sell goods and services and barriers to the use of the Internet and ICT in general.

36. While the use of core modules makes possible the measurement on an internationally comparable basis, additional indicators within individual modules can be added to respond to individual country needs. The model is designed to be administered to enterprises in an economy-wide survey, as are the phenomena to be measured, but modules can be adapted and inserted in surveys covering specific industry sectors as well.

3.3.4 E-business processes

37. While measurement work on e-commerce has been very useful and continues, it is now expanding to offer a fuller perspective of the underlying transformations brought about by ICT. These cover a wide range of e-business processes. In that setting, e-commerce becomes but one important manifestation of such processes, all of which jointly affect business performance (figure 3). Such processes can be numerous and diverse, including internal re-organization of firms to better suit the new reality of doing business, as well as the entire supply and customer chains – that is, before production of goods and services and after their sales.

Figure 3. E-commerce as an e-business process



38. It would be useful to recognize explicitly the hierarchical nature of ICT, that is stratify them from simple to more complex and start to differentiate between outcomes associated with specific ICT or specific combinations of ICT. A common thread among countries that measure some business processes is an emphasis on identifying whether or not these processes are inter- or intra-firm. The following e-business processes have been identified so far as being of common interest:

- Customer acquisition and retention;
- E-commerce;
- Finance, budget and account management;
- Human resource management;
- Product design and development;
- Order fulfilment and order tracking;
- Logistics (inbound and outbound) and inventory control;
- Product service and support.

3.3.5 E-delivery

39. According to the OECD definition of e-commerce, it is the method by which the order is placed and/or received that determines whether a transaction falls under e-commerce, and not the channel of delivery or the method of payment that was used for the completion of the transaction. Of particular interest, now and in the future, is the issue of e-delivery. For example, an order could be placed in a conventional manner (i.e. offline) but delivered online. This would not be captured under the current e-commerce definition.

40. Together with e-commerce, e-delivery will be very pertinent in the context of developing countries too. Edelivery is particularly relevant to the whole issue of trade and trade negotiations, especially regarding services. For example, an increasing number of companies from developing countries are receiving outsourcing contracts from companies located in developed countries. Since outsourced services, and IT-enabled services more generally, are delivered electronically, e-delivery is becoming an increasingly important e-measurement issue to consider.

41. While e-commerce refers to ordering online, regardless of the means of delivery, it is interesting to study the implications that ICT hold in store for products that can be delivered electronically in their entirety. This could include products that exist in digital form, whether or not they can also exist in physical media (i.e. books, tapes etc.) (UNCTAD, 2002).

42. Indeed, most of the new legal debates during recent years concern such products, particularly music and pirated software, as the new modes of distribution upset and/or unsettle existing, long-standing arrangements. Such e-delivery of products is expanding, with the growth of online entertainment and all kinds of conventional services, such as banking and insurance.

4. The case of developing countries

4.1 ICT for development

43. As the link between ICT and economic development becomes more and more evident, the area is no longer the domain of a handful of countries, but of almost every country on the planet. The belief that “Creating digital opportunities is not something that happens after addressing the ‘core’ development challenges; it is a key component of

addressing those challenges in the 21st century”⁷ is epitomized by the forthcoming World Summit on the Information Society (WSIS). This linkage is significant in that it recognizes that our societies are at a critical junction and that the “digital divide” can accentuate already huge gaps between haves and have-nots.

44. The task at hand is far from trivial and long-term in nature. As all stakeholders try to identify and choose among ways to cope with what amounts to a very complex reality, they too realize the need for measurements. This is particularly the case with respect to less developed countries, as the obstacles posed by the dearth of information make even the basic identification of tasks, the establishment of priorities and the monitoring of progress more difficult. As many developing countries are now developing their national ICT policies and strategies, the need for data on ICT deployment and usage becomes apparent.

4.2 Regional measurement initiatives

45. At the level of national policy, several attempts are underway to address the issue of measurements. To highlight the need for cooperation in this area, interesting and telling regional efforts are undertaken. Regional collaboration networks are an effective way to exchange information on the development of indicators and other metrics, as well as to ensure the international comparability needed. Such efforts also help avoid unnecessary duplication of work.

46. On the basis of information available, the following gives a brief overview of recent initiatives taken at the regional level in the area of e-measurements.

4.2.1 Asia

47. The Asia-Pacific Statisticians on IT&T Statistics network started in 2001 with participation by Australia, Hong Kong (China), the Republic of Korea, New Zealand, Singapore and the Philippines to enable statisticians and users of information society statistics to share experiences and methods, and exchange views on further developments in the area of measurements.

48. E-ASEAN’s⁸ measurement initiative (with links to the previous network) was launched in 2002. It aims to forge collaboration among countries in the region, identify best practices and leverage collective competence. Initiatives involve the development of a common reference framework for data collection and methodologies on measurements of ICT and e-commerce, and participation in relevant forums to strengthen the region’s institutional capacity, both organizational and technical. To ensure comparability across

⁷ “Digital Opportunities for All: Meeting the Challenge”, report of the Digital Opportunity Task Force (DOT Force), G-8, 2001.

⁸ It comprises Brunei Darussalam, Cambodia, Indonesia, the Lao People’s Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Viet Nam.

the region and internationally, the group maintains an ongoing dialogue with the OECD and other international bodies on ICT-related measurements.⁹

4.2.2 Europe

49. eEurope+ represents another initiative that mirrors the priority objectives and targets of the eEurope Action Plan launched in 2000, but provides for actions that target the specific situation of acceding members and candidate countries.¹⁰ The overall aim is to exploit the opportunities offered by ICT in knowledge-based societies, particularly the Internet, as a strategic resource. Considering the data needs for monitoring and benchmarking eEurope, candidate countries have agreed to use the same list of indicators selected by the EU-15. Their relevant institutions, mainly the NSO, will work closely with EU member States to develop common methodologies in the collection and presentation of relevant benchmarks. Participating countries have also been invited to participate in Eurostat's surveys and additional surveys run by the European Commission.

50. In addition, the Northern eDimension Action Plan (NeDAP), launched in 2001, aims to further enhance the development of ICT in the northern region of Europe, consistent with the decision by the Council of Baltic Sea States to create action plans and national and regional initiatives in tandem with the European Commission.¹¹ NeDAP stresses the need for comparable data necessary for benchmarking in conjunction with a set of core indicators to be used across all countries. In addition, it aims to harmonize methods and concepts used, as developed by international organizations.

4.2.3 Latin America and the Caribbean

51. Several initiatives are springing up in Latin America and the Caribbean too. The Conference of Ibero-American Authorities on Informatics (CAIBI) is an autonomous organization set up by countries in the Americas and extended to Portugal and Spain. Its main objectives are to promote knowledge and application of ICT and to foster social and economic development and modernization of public administrations. It is working also on a common set of indicators on ICT and e-commerce, including macroeconomic statistics (OECD, 2003a). In this context, a first meeting was held in June 2001 in Portugal.

52. In parallel, other initiatives are being contemplated and are at varying stages of development. The Ibero-American Network on Science and Technology (RICYT) started to look into the coordinated development of information society indicators as part of its main efforts that focus on knowledge-based societies. In February 2003, RICYT organized a workshop on information society indicators in Portugal.

⁹ Proceedings of the ASEAN Workshop on Measurement of Digital Economy, Bangkok, Thailand, 19-20 September 2002, National Electronics and Computer Technology Center (NECTEC).

¹⁰ These comprise Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia, Cyprus, Malta and Turkey.

¹¹ The countries involved are Denmark, Estonia, Finland, Germany, Iceland, Latvia, Lithuania, Norway, Poland, the Russian Federation and Sweden.

53. ECLAC has been active in the stock-taking of information holdings and the identification of gaps in the region (ECLAC, 2003), while the new Institute of Connectivity for the Americas also plans to assume an active role in the area of information society measurements. In parallel, additional stimulus is expected to be provided by an EU programme, @lis, which specifically targets the development of information societies in Latin America, and which includes a measurement component.

54. To underscore the growing demand for measurements, yet another effort focusing on a system of indicators for the information society is underway. It is led by the Peruvian statistical office, in collaboration with ECLAC and with the participation of the statistical offices of Mexico, Brazil, Canada and Spain, as well as RICYT and independent experts. With all this interest, one can feel cautiously optimistic about the near-term prospects of producing much needed information. Obstacles, however, remain and will be addressed in the next section.

4.3 Challenges and opportunities

55. The widespread interest in information society statistics represents a decidedly positive element but should not be construed as equivalent to outputs. Unfortunately, attempts can at times be ill-fated or they may not come to the expected fruition. The good will must be actively supported in order to overcome several obstacles on the way. The overview of measurements presented above is still only the domain of a few countries and even there significant gap areas exist. Early in the 21st century, on a global scale, there is still a dearth of quality statistical information for the information society, and particularly the information economy. This seriously hampers efforts to understand ongoing transformations, allocate resources and monitor progress, something that is becoming particularly noticeable as the demand for new strategic investments expands. As a result, more myth than reality prevails and a surplus of hearsay culminating in guess-research likely to lead to distorted assessments of what are widely believed to be historic developments. The following discusses some of the challenges in the area of measurements and identifies opportunities for action.

4.3.1 Demand and users

56. A key challenge concerns the demand side. A look at successful developments points to the presence of strong demand (the *for whom* question). Interested policy makers and Governments at all levels are big users of e-statistics, and their informational requirements must be taken seriously into account when developing new measures. In this way, not only will the statistical robustness and the quality of the data be there, but also their relevance will be ensured.

57. Businesses are also important users of such information. More than ever, in a period of widespread technological evolution, benchmarking is important as a means of assessing comparative performance, strategies and tactics. This is true both at the level of industrial activity and at the firm-size level. It also matters for trade markets. E-business information in particular has a range related to the hierarchical sophistication of

technological platforms and applications. Just as an example, businesses of all kinds were important consumers of early information on e-commerce, as they were uncertain about their strategy or its desired speed. Speculative motives aside, both supply- and demand-side measurements are needed in order to tailor and time the introduction of new applications.

58. International organizations and donors are now in the midst of numerous initiatives for the information society and therefore form an integral part of the demand side. In addition to making possible the assessment of needs and the prioritization of investments, measurements can shed light on relative progress in the spirit of accountability, which is growing in importance today.

4.3.2 Empirical considerations

59. Other problems are many and they include the state and capacity of statistical infrastructures, cultural attitudes towards information, and downright budgetary constraints and trade-offs (the *how* question).

60. **Concepts:** It is frequently argued that the reality of developing countries is different, and that therefore adaptations must be introduced to existing conceptual frameworks and bodies of knowledge prior to implementation. Just one issue, for instance, concerns the appropriateness of the household as a unit of observation. In the context of developing countries, the notion of a household may not be the same, considering the housing situation, the more communal attitudes of people and the generally larger family size. This leads to community-oriented indicators. Certainly, there will be areas where differences will necessitate adaptations, both for national needs and for international relevance. While such issues can be dealt with, practically it would be beneficial to have structures through which developing countries can be part of future conceptual developments. Such a forum would address peculiarities specific to the interests and idiosyncrasies of individual countries, while maintaining all along the desired properties of relevance, timeliness, accuracy, interpretability and coherence in order to ensure the reliability and comparability of information. Close international collaboration will be indispensable, especially among those with responsibility for collection.

61. While the need for adaptation may be true, there are no compelling reasons why the main body of recent conceptual and definitional advancements cannot be equally applicable to all countries, including the definition of the ICT sector, the definition of e-commerce or the definitions of ICT commodities. Among other benefits, this would immediately increase the value of the produced output.

62. **Structures:** It must be recognized that the new measurements need to be integrated within existing structures. In measuring ICT we do not start from scratch, since information systems of various degrees of sophistication are already in place. These matter enormously, as the new area should not be dealt with outside those but within them. Essentially, the following needs to be done:

- Produce new information;
- Modify/extend/adapt/ recast existing information;
- Intelligently interpret and analyse new and existing information.

63. As a consequence, the focus should be on outputs, not instruments of measurement. In that context, country-specific know-how is necessary. None of the many information requirements of the information society have necessarily a one-to-one correspondence with statistical instruments. Broad knowledge of organizational workings is necessary in order to identify, negotiate and effect options (e.g. speedy and cost-effective piggy-back surveys as opposed to stand-alone ones), as well as access to diverse methodologies, ranging from business and households to the macroeconomic level. The issue of the timeliness that much of the sought-after information requires is also challenging. What matters is comparability of outputs, not of processes.

64. **Statistical methods:** An empirical problem is that administrative sources for information society statistics are at best scarce. To compound the problem, this is a very rapidly changing area – probably the most rapidly changing that statisticians have encountered. When one adds the breadth of the demand for information and the diverse statistical operations involved, the danger of pitfalls becomes clear. For this, more demanding and dynamic juggling is required, particularly when it comes to content. Space in questionnaires, for instance, cannot swell endlessly. Again, subject-matter knowledge is necessary in order to differentiate between core content (mostly of a time-series nature) and a one-off or periodic line of questioning.

65. A particular problem facing many developing countries in trying to implement e-business measurements would arise from the absence of national business registers. While not immediately obvious to the non-initiated, this could seriously hamper efforts, delay the process and even compromise the credibility of outputs. Here, reliable alternatives need to be sought on a case-by-case basis.¹² Furthermore, detailed problems surrounding specific areas of measurements are numerous: the appropriateness of units of observation, such as enterprises versus establishments, in measuring e-commerce, individuals or households in measuring access to or use of ICT, the effects of proxy responses, the use of revenue- or employment-based weights, size cut-offs, age cut-offs, the recall period for the value of e-commerce transactions, industry part-classes in the ICT sector, boundaries of ICT commodity classifications and many others combine for lengthy, detailed discussions.

4.3.3 Areas of promise

66. Such challenges are not devoid of significant opportunities. In helping to effect e-measurements, international organizations and donors are well placed to occupy a sizeable fraction of the demand. This will certainly provide a welcomed boost to the whole effort, increase its profile and help stop treating statistics as a poor relative.

¹² Thailand, for example, has carried out a number of Internet surveys based on website presence of Thai companies.

67. An additional opening is offered to exploit more fully work already underway in several countries, including insightful analytical work that can then be used to showcase examples. Ideally, efforts in this area could be combined with overall efforts relating to capacity building. Thus, information society statistics can serve as a trigger to improve areas where desired advances have not been possible so far.

68. Another opportunity relates to the transfer of competence by leveraging newly created knowledge. Both products and forums can be envisaged. Appropriately packaged, all that has been developed by the OECD WPIIS over the last few years, for example, can be of help to many others. Closely related to this is the issue of the more detailed know-how needed for the administration of specific survey programmes, where the amount of methodological details that matter cannot be underestimated. This leads to the issue of training for information society statistics and analysis.

69. With these opportunities present, and considering the positive climate envisioned over the next few years with respect to e-measurements, the ground is fertile for initiatives to succeed. Action could now be catalytic for long-term progress. The UNCTAD Expert Meeting on e-measurement therefore comes at a timely moment, focusing on what needs to be done in particular at the international level.

5. Action to be taken at the international level

70. Not only do information society measurements need to be addressed at the national level, but also action at the international level is needed to advance e-measurement developments in areas such as definitions, indicators and methodologies. The objective of this section is to pose questions regarding actions for consideration and brainstorming by experts. The following are but a few suggestions for how to advance information society measurements in developing countries, and possible UNCTAD involvement. Experts are invited to contribute further ideas during the Expert Meeting.

5.1 Creation and maintenance of a database

71. A number of countries are now measuring various aspects of the information society. Measurements cover diverse areas, such as households and individuals, businesses (including e-commerce) and Governments. The OECD maintains a database for information society statistics for its member States, complete with important metadata information. There are, however, non-OECD member countries that have statistics and several more are on their way to getting there. The presence of a centralized repository of such information, particularly for developing countries, where users can have easy and reliable access to what is available, would be very useful. Such a database could be created in collaboration with the OECD, to build on the results of work already accomplished. One approach could be to focus on a core set of indicators that could be collected from as many countries as possible, now and in the future. The identification of such a list of indicators is not automatic, but it would constitute a separate activity by itself. In addition to the core, individual countries will almost certainly have more data –

some of which may well be common across several countries. In order to help policy makers better target their future e-policies, the collection of additional data could also be contemplated.

5.2 Establishment of a forum

72. Many of the measurements that have taken place over the last few years would not have been possible without the conceptual and definitional breakthroughs developed by practitioners at the OECD WPIIS. That forum now plans to consolidate the new knowledge in the form of a framework document, complete with guidelines for measurements, something that would make it conducive to diffusion among developing countries interested in information society measurements (OECD, 2003b). As discussed earlier, certain adaptations may be necessary in order to fit better the reality of developing countries. Also, many additional developments will undoubtedly take place and it would be desirable for developing countries to be involved. How will either the diffusion of what exists or the new developments happen? There is no analogous forum for interested participants. While bilateral contacts and regional networks are steps in the right direction, an international forum for the exchange of experiences and ideas, for new developmental work and the diffusion of standards and guidelines could be a subject for discussion.

5.3 Real demonstration projects

73. Despite the enormous attention that the issue of e-measurement is attracting, it is not realistically feasible to expect that comprehensive measurements will appear soon across a large number of countries. Creating successes and making examples of them offers a good approach. Countries that are ready to start collecting ICT use statistics could be actively helped at every step of the way to conduct e-business surveys where none existed. This could be done, for example, through the creation of partnerships with NSO from experienced countries. Such an endeavour would require the buy-in of all stakeholders. Certain preconditions that countries may have to meet could include the commitment of the Government or NSO, the existence of a satisfactory business register or similar data source and the potential to influence others.

5.4 Information society training

74. Cutting across all the above is the issue of training. The body of knowledge that has been developed around the information society is substantial. With specific reference to the empirical applications of statistical measurements, it is also quite technical. Moreover, it is continuously evolving. Even if the will to initiate measurement programmes is there, the learning curve can be steep and overwhelming. Much energy is currently directed to numerous bilateral and other consultations for the transfer of know-how. While these are useful, they do not necessarily benefit from the full breadth of experiences available and they tend to be of a tacit nature without any requirement for at least basic codification. The creation of formal training courses for the information society that would be administered on demand is now needed. These can include modules

that link policy context, measurements and analysis. This would represent a major and worthwhile undertaking that will put into practice the widespread notions concerning “capacity building”.

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ANNEX I

**OECD MODEL QUESTIONNAIRE ON ICT USAGE AND ELECTRONIC
COMMERCE IN ENTERPRISES**

Explanatory notes

Column variables

The following column variables are applied to the majority of the questions:

Column variable	Categories	Application
Starting year	t-1 or earlier, t (reference year), Planned for t+1 If the survey is carried out every year, t-1 might only be used the first time.	ICT and Internet use
Evaluation	No importance, Some importance, Much importance	Barriers and motivations

A general residual category is used throughout the questionnaire 'Do not know/not relevant now' (can optionally be broken down into two separate categories).

Use of column variables

The column variables are used to sort the enterprises that actually use e.g. Internet from those who have plans. Example: Starting year in connection with Internet filter

B1. Does the enterprise use or plan to use Internet? (Filter question)

	Year t	Plans for year t+1	Do not know/ not relevant now
Does the enterprise use or plan to use Internet?	?	?	? Go to question ..→

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Module A: General information about ICT systems

	Year t-1 or earlier	Year t	Year t+1	Do not know/ not relevant now
A1. Does the enterprise use or plan to use personal computers, workstations or terminals? (Filter question)	? → Go to question A4	? → Go to question A4	? → Go to question A2	? → Go to question A2

	Year t-1 or earlier	Year t	Year t+1	Do not know/ not relevant now
A2. Does the enterprise use or plan to use Internet? ¹³	?	?	? Go to question E1	? Go to question E1

A3. Type of equipment used to access the Internet in year t? (Tick all that applies)	
Mobile phone	? → Go to E1
Other equipment (please specify)	? → Go to E1

A4. Does the enterprise use or plan to use the following: ¹⁴ (One entry in each row)	Year t-1 or earlier	Year t	Year t+1	Do not know/ not relevant now
E-mail	?	?	?	?
Intranet ¹⁵	?	?	?	?
Extranet ¹⁶	?	?	?	?
Computer-mediated networks other than Internet (e.g. EDI, Minitel, interactive telephone systems)	?	?	?	?

¹³. Questions A2 and A3 are addressed to those enterprises that do not use personal computers, workstations or terminals but might use the Internet by accessing it by other means. Those two questions are not to be considered core, therefore they can be eliminated if there is no interest in measuring Internet use through devices other than personal computers, workstations or terminals.

¹⁴. The ICT-indicators such as Internet and EDI should not be asked if they are used as filter-questions in other modules.

¹⁵. An internal company communications network using the same protocol as the Internet allowing communications within an organisation.

¹⁶. A secure extension of an intranet that allows external users to access some parts of an organisation's Intranet.

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A5. The share of the total no. of employees using in normal work routine:	
Personal computer, workstation or terminal	%
Personal computer connected to the Internet/www	%

Module B: Use of Internet

	Year t-1 or earlier	Year t	Year t+1	Do not know/ not relevant now
B1. Does the enterprise use or plan to use Internet? (Filter question)	?	?	? → Go to D1	? → Go to D1

B2. Type of external connection to the Internet in year t? (Tick all that applies)	
Analog modem (Standard phone line)	?
ISDN	?
xDSL (ADSL, SDSL etc.) or other fixed connection < 2Mbps	?
Other fixed connection >= 2Mbps (Frame relay or other broadband network service)	?
Wireless connection (satellite, mobile phones etc.)	?
Do not know	?

B3. For which of the following purposes has the enterprise used the Internet in year t? (Tick all that applies)	
General activities	
Information search	?
Monitoring the market (e.g. prices)	?
Communication with public authorities	?
Banking and financial services	?
Information about employment opportunities (recruitment and search)	?
Activities related to purchasing goods and services – the enterprise as a purchaser	

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Information search on homepages	?			
Receiving purchased digital products	?			
Receiving free digital products	?			
Obtaining after sales services	?			
B4. Does the enterprise have or plan to have a Web site? (Filter question)	Year t-1 or earlier	Year t	Year t+1	Do not know/ not relevant now
	?	?	? Go to C1	? Go to C1

B5. Homepage facilities – the enterprise as a supplier (Tick all that applies)	
Marketing the enterprise's products	?
Facilitating access to product catalogues, price lists etc. Inquiry/contact facility	?
Customised page for repeat clients (e.g. customised presentation of product preferences)	?
Providing after sales support	?
Capability to provide secure transactions (e.g. firewalls or secure servers)	?
Integration with back end systems	?

Module C: E-commerce via Internet (asking enterprises with Internet access)

Purchases via Internet

C1. Has the enterprise purchased products via the Internet in year t? (Filter question)	Yes ?	No ? →	Do not know ? Go to C5
C2. What percentage of the total purchases (in monetary terms) do the Internet purchases represent?	%	Do not know ?	

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C3. Has the enterprise paid on-line¹⁷ for products purchased on the Internet?	Yes ?	No ?	Do not know/not relevant now ?
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C4. Has the enterprise purchased products via specialised Internet market places¹⁸ in year t?	Yes ?	No ?	Do not know/not relevant now ?
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C5. What significance have the following motives for purchasing via the Internet (Multiple choice)	No importance	Some importance	Much importance	Do not know/not relevant now
To simplify transactions	?	?	?	?
To purchase goods or services at lower costs	?	?	?	?
To increase access to, and awareness of, suppliers	?	?	?	?
To speed up business processes	?	?	?	?

Sales via Internet

C6. Has the enterprise received orders via the Internet in year t? (filter question)	Yes ?	No ? →	Do not know ? Go to D1
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C7. What percentage of the total turnover (in monetary terms) do the Internet sales represent?	% Do not know ?
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C8. Has the enterprise delivered over the Internet in year t any of the digitised products it sells? (e.g. sales of music, packaged software, professional services, etc.)	Yes ?	No ?	Do not know/not relevant now ?
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C9. Has the enterprise received on-line payments for Internet sales in year t?	Yes ?	No ?	Do not know/not relevant now ?
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¹⁷. On-line is defined as an integrated ordering-payment transaction.

¹⁸. More than one enterprise is represented at the Web site. The market sells either certain goods/services or is addressed to limited customer groups.

Model questionnaire on ICT usage and electronic commerce in enterprises

C10. Breakdown of Internet sales

Please break down the Internet sales in year t into the following customer groups/destination of sales (estimate in percentage):

1) Other enterprises 2) Households 3) Others (1+2+3=100 %)	%	%	%	Do not know ?
1) Homemarket (domestic sales) 2) Exports (non domestic sales) (1+2=100 %)	%	%	Do not know ?	

C11. Has the enterprise sold products to other enterprises via a presence on specialised Internet market places in year t?	Yes ?	No ?	Do not know/not relevant now ?
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C12. What significance have the following motives for selling via the Internet (One entry in each row)	No importance	Some importance	Much importance	Do not know/not relevant now
Company image considerations	?	?	?	?
To reduce business costs	?	?	?	?
To speed up business processes	?	?	?	?
To improve quality of services	?	?	?	?
To expand beyond normal business hours	?	?	?	?
To expand the market geographically	?	?	?	?
To launch new products	?	?	?	?
To keep pace with competitors	?	?	?	?

Model questionnaire on ICT usage and electronic commerce in enterprises

Module D: E-commerce via EDI or other computer-mediated network (other than Internet)
(asking enterprises with ICT)

	Year t-1 or earlier	Year t	Year t+1	Do not know/ not relevant now
D1. Does the enterprise use or plan to use EDI or other computer-mediated networks? (Filter question)	?	?	? → Go to E1	? → Go to E1

D2. Has the enterprise in year t used EDI or other computer-mediated networks in relation to: (Tick all that applies)	
Customers	?
Suppliers	?
Banks/Financial institutions	?
Others	?

D3. Purchases via EDI or other computer-mediated networks		
If the enterprise orders products via EDI, what percentage of the total purchases (in monetary terms) does this represent in year t?	%	Do not know ?

D4. Sales via EDI or other computer-mediated networks		
If the enterprise receives orders via EDI, what percentage of the total turnover (in monetary terms) does this represent in year t?	%	Do not know ?

Model questionnaire on ICT usage and electronic commerce in enterprises

Module E: Barriers on the use of Internet and ICT in general

What significance do the following barriers have for the present or future use of ICT and the Internet¹⁹

E1. Barriers to the use of ICT in general	No importance	Some importance	Much importance	Do not know/ not relevant now
ICT expenditure too high	?	?	?	?
New versions of existing software introduced too often	?	?	?	?
Supply of ICT-technology not matching the ICT needs of the enterprise	?	?	?	?
The level of ICT skills is too low among the employed personnel	?	?	?	?
Difficult to recruit qualified ICT personnel	?	?	?	?
Existing personnel reluctant to use ICT	?	?	?	?
Lack of perceived benefits	?	?	?	?

E2. Barriers to use of Internet	No importance	Some importance	Much importance	Do not know/ not relevant now
Security concerns (e.g. hacking, viruses)	?	?	?	?
Technology too complicated	?	?	?	?
Expenses of development and maintenance of Web sites too high	?	?	?	?
Lost working time because of irrelevant surfing	?	?	?	?
Data communication expenses too high	?	?	?	?
Data communication is too slow or unstable	?	?	?	?
Lack of perceived benefits	?	?	?	?

¹⁹. Barriers on Internet sales, use of the Internet and ICT in general are here grouped in one integrated module related to barriers. Another possible option is to place questions E1 and E2 separately after modules B and C respectively.

Model questionnaire on ICT usage and electronic commerce in enterprises

E3. Barriers to Internet sales	No importance	Some importance	Much importance	Do not know/ not relevant now
The products of the enterprise not applicable for Internet sales	?	?	?	?
Customers not ready to use Internet commerce	?	?	?	?
Security problems concerning payments	?	?	?	?
Uncertainty concerning contracts, terms of delivery and guarantees	?	?	?	?
Cost of developing and maintaining an e-commerce system	?	?	?	?
Logistical problems	?	?	?	?
Considerations regarding existing channels of sales	?	?	?	?

Module X: Background information ²⁰	
X1. Name and address of the enterprise	
X2. Activity of the enterprise	
X3. No. of employees end of year t	
X4. Total purchases of goods and services in year t (national currency)	
X5. Total sales in year t (national currency)	

²⁰. The information asked for in this module might be totally or partially available from the Statistical Business Register and/or statistical registers and thus might not need to be included in the questionnaire.