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MEASURING THE USE OF INFORMATION TECHNOLOGY AND TELECOMMUNICATIONS (IT&T)

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MEASURING THE USE OF INFORMATION TECHNOLOGY AND TELECOMMUNICATIONS (IT&T)

Introduction

1. This paper outlines recent Australian Bureau of Statistics (ABS) work on demand side surveys. It summarises the current ABS survey program, particularly noting the areas in which more attention has been placed in recent surveys. Separately for household and other surveys, the paper then summarises the key uses to which the outputs will be put, notes some particular areas where the existing strategy is deficient and lists the data items and classifications used in the survey output.

2. The ABS realises that its current strategy is mainly aimed at medium to long term statistics. Over the next year, it intends to move into the derivation of short term indicators of computer and telecommunication uptake and similar statistics.

Summary of the 1998 Program

3. The ABS first surveyed IT&T use by households, private businesses and government organisations in 1994. The Household Use surveys were updated and run again in 1996 and have been further upgraded for conduct in respect of the four quarters of 1998. The ABS has just finalised the development of its 1997-98 surveys on the Business and Government Use of IT&T. In future the ABS expects to conduct detailed surveys of the Use of IT&T every second year. In the alternate years surveys on the production of IT&T goods and services will be conducted.

4. A major enhancement in all the ABS surveys since 1994 has been the change of focus to measure Internet usage. In respect of the Internet, the focus is mainly on issues such as the barriers to the use of the Internet and the ways in which the Internet is being used.

Household Surveys

5. These interviewer based surveys have been put onto a quarterly basis (for the months of February, May, August and November) to increase the sample size. The four quarterly surveys, each with a sample of 3,000 households can be combined into a set of 12,000 which enables the ABS to release much more detailed data at the end of the cycle.

6. A randomly selected adult will be asked questions about the household, about their own individual activities, and will provide responses on behalf of up to 5 other persons in the household. This enables the ABS to output data about the personal characteristics of users of PCs including some basic information on the uses to which PCs are put.

7. In addition, a comprehensive set of questions has been added to measure Internet use as one of the uses of PCs. More data is also being collected about a range of communications devices like mobile phones, facsimiles, and other devices. Information is also being collected on the frequency of computer use.

8. The survey has also been extended to include questions about the use of computers and the Internet outside the home, in addition to its use inside.

Business and Government Surveys

9. In September 1998 a stratified random sample of business enterprises and general government organisations will receive a mailout form and will be asked to report data in respect of the financial year just completed and, in some cases, for the point in time of 30 June.

10. The focus of the surveys has switched to measuring Internet use (including some information on electronic commerce via the Internet) and service delivery. The financial and hardware questions have been significantly reduced without sacrificing the ABS' ability to produce time-series data. The surveys will collect data about the information technology and telecommunications infrastructure in the organisation as at 30 June and, for measures of the performance of the organisation, over the last completed financial year.

11. An important feature of the survey will be the collection of data not only about the uses of the Internet but also about the benefits, barriers and intentions with respect to the Internet.

12. The government sector now includes 'local government' and it is hoped to develop a better coverage of statistics about hospitals and schools.

PART A: HOUSEHOLD SURVEYS

User demand for household IT&T statistics

13. There are many uses to which data on the use of IT and the Internet in households and by householders can be put. For example, Australian governments need these statistics to develop economic and social policies which have the following aims:

to promote computer literacy and use, the argument being that people with these skills are employable. Government agencies therefore want to know:

- What is the incidence of computers in households?
- What is the age, sex and occupation of computer users?
- What do they use them for (study/games/work)?
- How long is spent on each activity?
- How widespread is teleworking? What is the age, sex and occupation of teleworkers? Are they self-employed or employees?
- What is the computer and Internet usage in potentially disadvantaged groups eg low income households, non English speaking, rural and remote areas etc?

to reduce the cost of government services and make them more accessible by putting them all 'on-line' as soon as possible:

- Who currently uses government services 'on-line', and for what purpose (information/form lodgement)?

- How many people with reduced mobility or in lower income groups (e.g. solo parents and older people) access government services on-line?

- Where do they access these services - from home computers, from public access computers (e.g. in libraries) or from information kiosks?

- Would people access on-line services if they were available and if they (the respondents) had a computer?

- Where do they use the computer and the Internet? both at work and at home, or only the former?

to address the special needs of rural and remote Australia; governments may want to offer these communities health, information and education services on-line but will the communities be able to access them

- How computerised and 'on-line' are households in rural and remote Australia?

- What is the demographic profile of computer and Internet users in rural and remote Australia?

- How available, expensive and reliable is Internet access in rural and remote Australia?

14. The ABS household surveys aim to provide answers to these questions and therefore inform government policy makers and analysts. At the same time, welfare groups, health providers, consumer advocacy groups and researchers will find the data equally informative and useful.

Difficulties in meeting user requirements.

a) The demand for sub-State, sub-annual data.

15. Australia is a federation of six States and two Territories, so it is reasonable that with the increasing up-take of IT&T in households users should increasingly demand more complex State data, and data at the regional, metropolitan and local levels. The initial household survey in 1994 was originally designed as essentially a national survey and provided only limited data at the State and sub-State levels. To meet the demand for cross classified and regional data the survey has been transformed into a set of quarterly surveys to boost the survey population to 12,000 households; this has enabled the ABS to release 'metropolitan' and 'non-metropolitan' data for each State.

16. Three problems have emerged with this approach:

a) It only partially meets the demand for complex cross-tabulated data

b) It does not provide data for particular regions within Australia

c) The sample size for each of the quarterly surveys is small, thus limiting the reliability of the quarterly estimates and any estimates of change between quarters. By running four surveys (February, May, August, November), each with 3000 households, and publishing an average of the aggregated quarterly data, the ABS can produce an 'annual' figure, which is good for supplying detailed cross-classified data, but, because of poor timeliness, is not so useful for measuring the level of a rapidly changing variable such as the rate of uptake of the Internet.

17. One solution to these problems is to include household IT questions in larger surveys, e.g. the Monthly Labour Force Survey and the annual Agricultural Commodity Survey. The Monthly Labour Force Survey (MLFS) goes to 30,000 households and would be an ideal vehicle for collecting household IT statistics. However output from such surveys tends to be fairly late in being released and so would not improve timeliness even though sufficient observations could be collected in the one survey to support most analysis. It is also extremely difficult to obtain sufficient interviewing time in such a survey to answer the myriad of questions that are relevant to the issues about the use of information technology. The ABS has therefore decided not to go down this route.

18. The Agricultural Commodity Survey, is an annual survey going to about 65,000 agricultural enterprises, i.e. half the agricultural enterprises in Australia. It is therefore an ideal vehicle for surveying IT use and take-up in rural Australia. This survey has therefore been used as the vehicle to help answer the questions on the use of information technology in the agricultural sector and indeed in specific rural and remote areas.

d) The rate of change in the emergence of new technologies

19. New technologies are coming on line at a faster rate than they can be included in surveys. Anticipation of the demand for data about such technologies, including the type of data required, is extremely difficult. In addition, in sample surveys, the measurement of the use of such technologies in their infancy is difficult as not many households , or people, will in fact have access to them. Some examples of the problems to be faced are:

- New information technologies are emerging at an ever faster rate, as is new or improved equipment (e.g. Digital Versatile Disc Drives, faster modems)?
- The useful working life of IT equipment, especially computers, is decreasing?
- The take-up rate of new information technologies (e.g. the Internet) and new IT equipment by consumers is very rapid?
- New technologies can have important socio-economic implications (e.g. the networking of computers has made 'teleworking' possible)?

Data Items Being Collected in the 1998 Survey

20. The household questions on Internet use being asked in 1998 are:

- Does this household have access to the Internet from home?
- Does this (Internet access) include; A. Internet email? B. Any other Internet services?
- Who pays for the Internet service costs incurred by this household?

- In the last 12 months how much has this household paid for Internet services?
- In the last 12 months how much has the home-based business paid for Internet services?
- Why hasn't the household paid any Internet service costs?
- What is the main reason for not having Internet access?
- Does this household intend to get access to the Internet in the 12 months?

21. The population' questions on the Internet are:

- In the last 12 months have you used the Internet at any of these places? (10 sites identified ranging from work, school, tertiary institution to cafe, etc)?
- Is the availability of the Internet elsewhere a satisfactory alternative to having it at home??
- In the last 12 months, which of these activities have you done at work using the Internet? (4 activities identified)?
- In the last 12 months, which of these activities have you done at home using the Internet? (4 activities identified)?
- In the last 12 months have your purchased or ordered goods or services for your own private use via the Internet?
- Where were you when you purchased or ordered goods or services via the Internet for your own private use? (options: home, work other)?
- Did you purchase or order goods or services from Australia or overseas?
- Did you pay electronically for the goods or services via the Internet?
- How much you paid for goods and services via the Internet in the last 12 months?
- In the last 3 months, have you used the Internet to pay any bills or transfer funds?
- Are you aware that your Internet usage patterns can be monitored?
- Does it worry you that your Internet usage patterns can be monitored?
- Does (would) Internet monitoring affect your usage (of the Internet)? the introduction in 1998 of two questions on 'teleworking': the introduction in 1998 of respondent options for new technologies on the home market, viz., Digital Versatile Disc drives (DVDs) and Pentium II computers?

22. Other (non-Internet) questions include:

Home based business presence:

- Does any member of the household run a home based business?

Communications technologies:

- Does any member of this household use any of these at home?

  fixed phone
  cordless phone
  mobile phone, digital
  mobile phone , analogue
  car phone
  answering machine
  facsimile machine
  pager
  voice mail or voice message
  pay TV

Games machines:

- Does any member of this household use a dedicated games machine at home (eg playstation)?

Computer access at home:

- Does any member of this household have access to a computer at home regardless of whether it is used?.

- How many of the following types of computers does this household have?

access to at home:

  .. laptop, notebook or other portable computers
  .. desktop personal computers
  .. other computers

Computer ownership:

- Who owns the computer that is used in this household (or how many are owned by each of the following)?

  .. a member of the household
  .. a registered home based business
  .. a commercial rental business
  .. a relative or friend living elsewhere
  .. an employer
  .. other

Frequency of computer upgrades:

- When did this household last purchase or lease a new or relatively new computer?

- Does any member of the household intend to purchase or upgrade a computer in the next 12 months?

Computer capacity:

- Which best describes the capacity of the most powerful computer owned or payed for (286, 386, 486 pentium etc)?

- What is the memory capacity of the most powerful computer used (eg 16 meg, etc)?

Frequency of use:

- How often is a computer used at home?

- Why isn't the computer used more frequently (or at all, if this applies)?

Peripheral equipment:

- Which of the following pieces of equipment are used in the household?

.. printers
.. character or image readers/scanners
.. CD ROM equipment
.. modems
.. DVD

Household expenditure:

- How much has the household spent on computing equipment or software in the last 12 months?

- Excluding Internet costs, how much has the household spent on computer related services such as training or repairs in the last 12 months?

Barriers to computer use:

- What is the main reason for this household not having computing facilities (cost, interest etc)?

Personal Questions (non-Internet):

Frequency of use:

- Do you use a computer at home?

- How often do you use a computer at home (daily, twice a week once a week etc)?

Activities undertaken:

- For which of these activities do you use a computer?

.. playing computer games
.. learning/study activities
.. work related activities
.. keeping personal or family records/correspondence
.. Internet based activities
.. accessing other online services/databases/bulletin boards
.. other

Time spent:

- On which activities do you spend the most time (enter number of activity)?

- How many hours per week on average would you spend playing computer games at home (exclude games machine use)?

- Excluding playing computer games, how many hours per week would you use a computer at home?

Barriers to use:

- What is the main reason you do not use a computer at home?

.. not interested
.. no time
.. not permitted
.. have access elsewhere
.. lack of confidence/skill
.. other

Access outside home:

- In the last 12 months have you used a computer at any of these places?

.. work
.. school
.. TAFE/ tertiary institution
.. public library
.. shops/stores/cafes
.. community or voluntary organisation
.. Neighbours or friends house
.. Other

- How often do you use a computer outside the home (daily, weekly etc)?

Experience with computers:

- For approximately how many years have you been regularly using computers?

- Have you ever received computer training from any of these?

.. equipment supplier
.. an employer
.. a commercial organisation
.. primary or secondary school
.. TAFE
.. University
.. Adult community education course
.. other

- In general, how would you assess your level of skill with computers?

.. basic
.. adequate
.. competent or better
.. don't know

Attitudes to selected online services:

- Ignoring costs, would you consider using a computer or other home technology?

.. to shop from home
.. to bank from home
.. to gamble from home
.. to participate in online education services
.. to access government information or online form lodgement

Classifications:

23. The data items above can be classified by the following characteristics:

Household characteristics

Number of persons aged 18 years and over in household
Age of eldest dependent
Household family classification
Dwelling structure
Nature of Occupancy
State
Metropolitan/ex-metropolitan

Personal Characteristics

Age
Sex

Marital status
Birthplace
Highest education level received
Income (Usual gross income received)
Labour force status
Occupation (1 digit ASCO)
Major activity for those persons not in the labour force

PART B: THE BUSINESS AND GOVERNMENT SURVEYS

User demand for business and government IT&T statistics

24. Australian governments and industry associations want these statistics for policy related purposes in the following areas:

- in promoting the development of the IT&T industries in Australia with due regard for the adverse balance of payments on this range of goods and services

- in promoting the take-up and use of IT&T by Australian companies: the adoption and use of IT&T is considered to be a fundamental characteristic of companies which compete successfully in both domestic and global markets.

- in ensuring that regulatory policies in the fields of copyright, confidentiality and competition protect all parties without hindering the take-up and use of IT&T.

- to benchmark government and business usage and expenditure on IT&T against international best practice.

- to assess the potential for increased on-line delivery of government services - especially health and education. This is an important issue in a large, but sparsely populated country where Federal, State, and local governments are committed to ensuring that all Australians, regardless of where they live, have equity of access to digital technologies and services.

- to monitor trends in outsourcing (ie contractural arrangements for ongoing external IT&T service provision) in both business and government sectors, with emphasis in this respect on the downsizing of federal government organisations.

- to promote and monitor trends in the uptake of electronic commerce (and particularly Internet commerce). In this context data is required which addresses uses, benefits, barriers and intentions. Data is also required which addresses concerns about the effect on domestic businesses and taxes resulting from Internet purchasing overseas.

25. The ABS business and government surveys of IT&T use therefore ask questions on:

Labour:

. number of IT&T employees
. total employees (IT&T and other)
. number of IT&T contract staff

. wages and salaries of IT&T employees,

Income:

. Income from the provision of IT&T services
. value of orders received on-line (for businesses)
. Total income

Contracted services:

. contracted out/outsourced IT&T services

Technology characteristics:

. number of computer workstations
. number of employees authorised to use computer workstations
. nature and purpose of IT&T networks
. networking intentions
. number of employees authorised to use the Internet
. type of Internet access (Internet e-mail/ web-site access)
. restrictions on web-sites access
. reasons for not using the Internet
. intentions to obtain Internet access
. range of services provided on-line
. benefits and problems to using the Internet for e-commerce and online service provision
. other IT&T technologies used by the organisation in e-commerce and service provision.

Classifications:

26. The data items above can be classified by:

Industry (according to ANZSIC)
Employment size

Difficulties in meeting user requirements

a) The outsourcing/contracting out of IT&T activities

27. One difficulty has been in defining the term 'outsourcing'. Some business consider that all services provided by external providers constitutes outsourcing regardless of the short term or ongoing nature of the service provided. The main issue in separating out short term contract arrangements is that these have very little effect on the functions which a business typically undertakes itself and consequently little effect on IT&T staff numbers. In outsourced arrangements, whole business IT&T functions are hived out to an external provider as an alternative to in-house staffing. In federal government organisations this is currently causing a significant shift in employment.

28. The business and government surveys will therefore ask questions on:

. the value ($A) of outsourced IT&T
. the nature of these services (e.g. 'on-going' versus 'one-off' activities)
. the value ($A) of IT&T to be outsourced in the next financial year.

b) The timing of the surveys

29. The business and government surveys are being undertaken at a time when the full potential of electronic commerce and on-line service delivery has yet to be realised. E-commerce is, as yet, not a wide spread activity. Similarly, use of the Internet by governments for online service delivery is a quite recent initiative. Because of keen interest in these leading edge developments, the ABS business and government surveys will emphasise electronic commerce, on-line service delivery and the enabling role of the Internet.

c) Business networks and connectivity

30. One of the main difficulties in establishing how businesses are connected is in choosing language which will be widely understood. There are a number of ways of describing networks depending on whether you are a provider of services or a user. Providers might describe their services generally as value added network services (VANs, or IVANs if international in nature) or virtual private network services (VPNs), etc. The ITU describes networks used in e-commerce as being either a public network, a proprietary network, a closed usergroup network or a private network. Again it may prove difficult for businesses in general to make these distinctions, particularly if the person completing the questionnaire is non-technical. Some of the difficulty also relates to the degree of understanding which survey development staff may have about the telecommunications environment.

31. The one distinction which we feel cannot be confused is between use of the Internet on the one hand and use of other external data communication networks.

d) Internet related costs

32. A key user interest in the all up Internet cost to businesses and government organisations. This is proving to be difficult to collect because of outsourcing arrangements in particular. Some organisations are substantially or totally outsourced and claim not to have a breakdown of charges which would identify Internet costs in isolation. In addition, in-house costs associated with the Internet may not be identifiable as such (eg software work associated with a site may only be identifiable by purpose).

e) The survey unit

33. ABS will be using the Management Unit (MU) in its business collection in line with normal ABS practice for industry collections. The MU is a dissection of an enterprise group. The use of an MU as a statistical unit will lead to difficulties in ensuring that data is consistently reported between MU s within the one organisation. In respect of some questions, there ought to be similar answers to the same question eg on the barriers to the use of the Internet. In situations where there are financial transactions between MUs within the one enterprise group, it will be necessary to undertake some consolidation of data.

34. The most significant complications are likely to occur in cases where an enterprise group contains centralised (or ancillary) services within one MU within the enterprise group. In these cases it is expected that the survey takers will have to develop a detailed understanding of the structure of the

enterprise group before obtaining responses to the survey forms. The terminology applicable to single business enterprise groups will not be always appropriate for MUs within the one enterprise group.

35. Within the government collection, there will be considerable difficulties with the delineation of units. Considerable changes take place at all levels of government which may not be reflected on the ABS Business Register as the Business Register is not generally used for statistical collections from these units.

36. In addition, it has been necessary to put in place a number of special arrangements to avoid duplication or overlap in the reporting of data. This is as a result of different ownership, and funding arrangements, occurring in different levels of Government. Thus the larger government organisations have been approached personally to provide information on their IT profile.

f) The scope of the surveys

37. Demand side business surveys really need to be divided into a number of distinctly different parts. These parts relate to sectors which present their own individual difficulties for collection activity and have different information requirements associated with them. Some of the different treatments are shown below.

38. Agriculture: Agricultural enterprises have been excluded from the main business survey. The path we are taking is to add a few questions to the ABS' Agriculture Commodity survey which is a one in two sample of agricultural establishments involving 65,000 selected units).

39. The questions are in the style of household questions given that this is generally the level of sophistication prevailing and also because the environment in which they are used is much the same (ie, mainly in the home).

40. The advantages of such a survey may well be different in Australia to a number of countries, given possible differences in geographic size. One of the main issues we are addressing relates to infrastructure problems for potential Internet users in regional areas. The cost of dialling-up your local ISP, which may in Australia be an STD call, can be prohibitive or not cost effective. Often, those connected to the 'net can experience drop outs etc. Similar difficulties can be experienced with fixed telephone services.

41. A survey of 65,000 provides ABS with an opportunity to get data at fine regional levels (ie below city/country at State level). This will be particularly useful for the statistics about the barriers to Internet and computer use.

42. Churches: Churches will be excluded from the 1998 survey, because their use of IT is negligible.

43. Hospitals: It is intended to obtain consolidated data on hospitals from the various funding agencies in the States of Australia.

44. Education: Some data on this sector is becoming available from the Education Department within the Australian Federal Government. This will be used to provide some approximate measures for this sector.

45. Some of the specific collection problems in the education sector are:

- Government and private schools obtain and fund their IT in a variety of ways; therefore each school (or a sample of them) will have to be surveyed directly.

- In universities and technical colleges IT is generally managed at the faculty level, whereas the ABS forms dispatch system is set up to survey the university/college; i.e. to send only one form to each university/college. This means that an IT survey would have to be coordinated within the universities and colleges, and a sample of faculties selected and surveyed.

46. Local Government: Local government was not surveyed in 1994 because their IT use was thought to be insignificant. Now, as service providers to the public, all local government bodies are under instruction to 'go on-line', as soon as possible. A sample of local government units is proposed for 1998.

47. The multimedia industry: ABS initially thought that an economy wide survey would provide a good opportunity to establish something about the production of multimedia products. Part of the plan was to identify those industries in which multimedia production was concentrated. Users have for a number of years been asking for statistics on the multimedia industry.

48. Analysis of some externally obtained lists of multimedia businesses when checked against our business register suggest that a two stage sample process (as initially envisaged) may not work. There are not a large number of multimedia businesses in total but some of the ANZSIC classes to which they are classified are quite large (eg ANZSIC Class 7834 which has several thousand businesses). This would mean that a high sample fraction would be required in a number of industries to find sufficient multimedia businesses on which to base a result. The cost of doing this was determined in the end to be prohibitive, both in terms of available funding and also provider load.

Conclusion

49. The ABS surveys in these fields are very new and still being developed. As such, while there has been significant progress made to date, there are still many issues which complicate the derivation of reliable statistical indicators. The ABS presents this paper in the hope that its survey work to date will help other countries as they move into this area.

50. The ABS believes that the demands for indicators of this type will grow rapidly and it is a most important area for the development of international statistical standards. It is hoped that the 1998 meeting decides to move towards developing draft standards for demand surveys.