

ICT SATELLITE ACCOUNT

AUSTRALIA

ASNA EXPERIMENTAL ESTIMATES

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I N Q U I R I E S

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ICT SATELLITE ACCOUNT

Information and communication technologies (ICT) play an important role in the way in which we live and do business. There is considerable interest in the role of ICT as a significant driver of socioeconomic development, for example, in the way that ICT has allowed businesses to increase productivity. For official statisticians, the measurement of these technologies provides significant conceptual and measurement challenges. A key part of the ABS response to these challenges has been the development of an ICT satellite account for Australia for 2002–03. This was preceded by the release in 2003 of a 'pilot' ICT satellite account in respect of 1998–99.

The notion of a satellite account was conceived in the System of National Accounts 1993 to expand the core national accounts for selected areas of interest, while using relevant concepts and structures from the core national accounts. An ICT satellite account involves the identification of ICT products and activities within the national accounting framework so that a comprehensive and coherent set of economic data on ICT supply and use can be produced.

There are few international examples of ICT satellite accounts, and the concepts and methods used here are largely based on existing international statistical standards for national accounts. Nevertheless, developments from a number of international fora are also incorporated, in particular, the Organisation for Economic Co-operation and Development (OECD) Working Party on Indicators for the Information Society and the OECD Task Force on Software Measurement in the National Accounts.

This publication represents the first official satellite account on ICT and its direct contribution to the Australian economy. In particular, it contains data on the contribution of ICT to key macro-economic variables such as gross domestic product (GDP), investment, imports and exports. As this satellite account constitutes an integrated set of statistics on ICT products and services within the internationally recognised Australian System of National Accounts, it represents a valuable policy and research tool with a wide range of applications.

This satellite account is the product of development work requiring a number of assumptions and synthetic estimates for some components, and therefore at this stage the estimates should be considered experimental.

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ABBREVIATIONS

ABR	Australian Business Register
ABS	Australian Bureau of Statistics
ACS	Australian Customs Service
ANZSIC	Australian and New Zealand Standard Industrial Classification
ANZSPC	Australian and New Zealand Standard Product Classification
ASCO	Australian Standard Classification of Occupations
ASNA	Australian System of National Accounts
ATO	Australian Taxation Office
BOP	Balance of Payments
EAS	Economic Activity Survey
GDP	gross domestic product
GFCE	government final consumption expenditure
GST	goods and services tax
HES	Household Expenditure Survey
HFCE	household final consumption expenditure
HUIT	Household Use of Information Technology
IAS	Internet Activity Survey
ICT	information and communication technology
ISP	Internet service provider
LFS	Labour Force Survey
OECD	Organisation for Economic Co-operation and Development
SMS	short message service
SNA93	System of National Accounts 1993

INTRODUCTION

BACKGROUND TO THE ICT SATELLITE ACCOUNT

There has been substantial interest in recent years, both in Australia and internationally, in those products and services known as information and communication technology (ICT) products and services (hereafter referred to as ICT products), in the industries that import, produce or distribute those products and in who uses these products. ICT products are closely associated with the phenomenon of the 'new economy' and with other events such as the 'dotcom' boom and the privatisation of telecommunication service providers seen in a number of countries over the past two decades. Much of the demand for economic data on ICT products has been driven by the interest of economists and policy advisors in the uptake of new technologies and in the role ICT may have played in the productivity surge of the 1990s.

Satellite accounts, as articulated in the international *System of National Accounts 1993* (SNA93), allow for an expansion of the national accounts for selected areas of interest while maintaining links to the basic concepts and structures of the core national accounts. The ICT satellite account developed by the ABS uses the national accounts framework to present a picture of the value of transactions in ICT products within the Australian economy. The link with the national accounts enhances the usefulness of the data in analysis because it ensures comparability to, and consistency with, key economic aggregates such as GDP. However, the satellite account does not provide an analysis of the contribution of ICT to productivity growth, nor is it a compendium of all available ICT-related information collected by the ABS or available through other sources.

The ABS provides a variety of ICT-related information from its extensive suite of ICT surveys. These surveys include the Information and Communication Technology Industries Survey (ICTIS), the Business Use of Information Technology Survey (BUIT), the Household Use of Information Technology Survey (HUIT) and the Government Technology Survey (GTS). Appendix 1 describes the framework used by the ICT satellite account in which these and other data are brought together and integrated for the whole economy.

Broadly, ICT products include computer hardware and their peripherals, parts, components and consumables, computer software, telecommunication assets, computer services, telecommunication services and wholesale and retail margins on ICT products. ICT products do not include those ICT goods and services produced and consumed in-house in the process of producing other goods and services. In turn, the 'ICT Industry' is defined with reference to those same products, and includes wholesaling and retailing. Appendix 2 provides a detailed discussion of issues relating to the scope of the ICT satellite account and the classifications used. ICT products in this publication are defined within the ABS Classification of ICT Products and are presented in Appendix 3.

The economic value of ICT products is already included in the Australian System of National Accounts (ASNA) in key economic aggregates such as GDP, industry gross value added, gross fixed capital formation (investment) and household final consumption expenditure (HFCE). However, the classifications and data sources used in the national accounts are generally not designed to systematically isolate ICT products, or the industries producing or distributing those products. Similarly, the national accounts do not systematically isolate the use of ICT products by businesses, government and households, although some important aggregates such as business investment in computer software are already separately available.

BACKGROUND TO THE ICT SATELLITE ACCOUNT *continued*

The basic compilation framework for the ICT satellite account is the national accounts 'supply and use' system. It has been adapted to focus on ICT products and the industries producing or distributing those products. Fundamentally, the system consists of a supply table that tracks the supply of ICT products from imports and from Australian producers, and a use table that tracks the use of those products by industries, government, households and for export. It aims to be comprehensive in its coverage. Many different sources of data of varying quality are used to populate the supply and use tables. Appendix 4 provides a description of the various ABS data sources used. In order to satisfy the identity that the supply and use of products must be equal, discrepancies due to deficiencies in the source data have been identified and resolved. A great strength of the framework is that it facilitates this data confrontation and provides a basis for optimising the quality of the overall estimates in the face of deficiencies and gaps in data coverage.

One role of the satellite account has been to review and, where necessary, make improvements to ICT data series used in the ASNA itself. These improvements were substantially reflected in the 'historical revision' of the national accounts published in *Australian System of National Accounts 2004–05* (cat. no. 5204.0) in November 2005.

Some satellite accounts use a set of recommended classifications and frameworks developed from international research and discussion over a number of years, with international agencies usually taking the lead. For example, when the ABS developed its satellite accounts for tourism and non-profit institutions there were international guidelines available to guide the work. There are no such guidelines available for an ICT satellite account, although there have been international initiatives on some aspects important to this work.

International experience shows that the measurement of ICT transactions is not easy, particularly given the intangible nature of software, the licencing and leasing arrangements involved and the bundling of ICT products. It was therefore inevitable that a range of significant data and other issues required close attention in producing this publication. Appendix 5 provides detail on the substantial number of methodological issues encountered. Inevitably, a number of judgement calls were necessary to integrate the data and to take a stance on issues for which there is as yet no clear international standard. Consequently, the results contained in this publication should be considered experimental. Appendix 6 provides further comment on the quality of the estimates produced and Appendix 7 describes the relationship between these estimates and certain other ICT-related ABS data series.

Because of the large developmental aspect to the ICT satellite account, this publication gives considerable attention to describing the ABS response to the various challenges encountered in producing the published tables. The ABS hopes this will encourage constructive commentary on the issues described and contribute to the development of best practice in statistical measurement internationally.

This publication was preceded by a pilot ICT satellite account in respect of 1998–99, the results of which were published as a feature article '*An Information and Communication Technology Satellite Account*' in the December quarter 2002 issue of *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0). On the basis of knowledge gained from the pilot ICT satellite

INTRODUCTION *continued*

BACKGROUND TO THE ICT
SATELLITE ACCOUNT
continued

account, the ABS undertook to collect a range of additional data from businesses and government to compile the accounts contained in this publication.

ANALYSIS OF RESULTS

KEY RESULTS

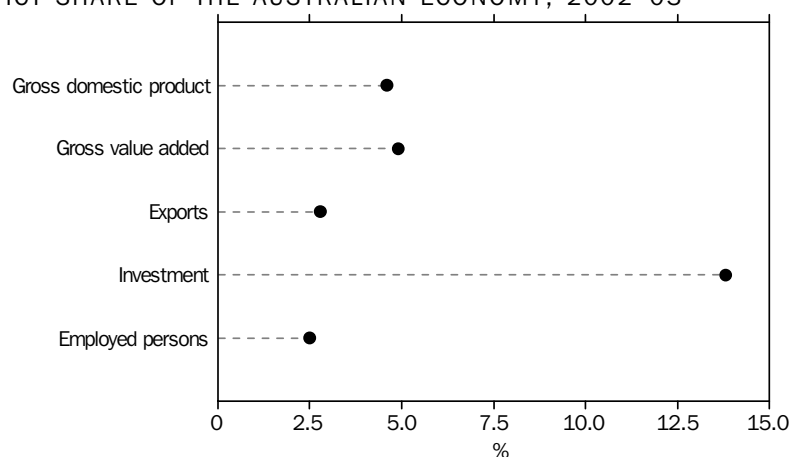
The scope of this satellite account was determined by the range of goods and services considered to be 'ICT'. Essentially, ICT products include computer hardware, computer software, telecommunication assets, computer services and telecommunication services. An ICT satellite account details the supply and use of these products and also measures the direct value that ICT products add to the economy through the key aggregates ICT GDP and ICT gross value added.

ICT GDP represents the total market value of ICT products produced in Australia after deducting the cost of goods and services used up in the process of production. ICT accounted for \$36.2 billion or 4.6% of total GDP in 2002–03.

Industry gross value added is free of the effects of changes in taxes and subsidies on products that can vary between industries and over time and is therefore the preferred national accounts measure of industry contribution to value of production. ICT gross value added was \$34.8 billion (4.9% of total gross value added) in 2002–03.

The ICT share of gross value added exceeds the ICT share of GDP. Since GDP is equivalent to gross value added plus taxes less subsidies on products, this result simply reflects ICT's relative share of taxes less subsidies on products.

ICT SHARE OF THE AUSTRALIAN ECONOMY, 2002–03



ICT GROSS VALUE ADDED

There is no 'ICT industry' in the Australian and New Zealand Standard Industrial Classification (ANZSIC). Instead, producers of ICT products operate in a number of ANZSIC industries. Of the ICT contribution to total gross value added of 4.9%, Telecommunication services contributed 2.2 percentage points, Computer services 1.4 percentage points, ICT wholesale 0.7 percentage points, ICT manufacturing 0.1 percentage points and all other industries 0.5 percentage points.

Viewed differently, the most significant industry contributors to ICT gross value added were Telecommunication services (44.3%), Computer services (28.0%) and ICT wholesale (14.8%).

ANALYSIS OF RESULTS *continued*

ICT GROSS VALUE ADDED

continued

INDUSTRY CONTRIBUTION TO ICT GROSS VALUE ADDED—2002–03

	<i>ICT gross value added</i>	<i>Share of ICT gross value added</i>
	\$m	%
ICT specialist industries		
Manufacturing	709	2.0
Wholesale	5 165	14.8
Telecommunication services	15 397	44.3
Computer services	9 740	28.0
<i>Total ICT specialist industries</i>	<i>31 011</i>	<i>89.1</i>
Other industries	3 781	10.9
Total	34 792	100.0

COMPARISON WITH 'NON-ICT' INDUSTRIES

When compared with the seventeen conventional ANZSIC industry divisions the ICT contribution to total gross value added of 4.9% in 2002–03 ranked ninth. ICT gross value added exceeded that of Agriculture, forestry and fishing (3.3%), Government administration and defence (4.4%), Education (4.8%), and Personal and other services (2.0%). Among the industries with a contribution to total gross value added exceeding that of ICT were Mining (5.0%), Construction (6.4%) and Finance and insurance (7.4%).

INCOME COMPONENTS OF ICT GROSS VALUE ADDED

Gross value added corresponds to the income items compensation of employees, gross operating surplus, gross mixed income and other net taxes on production. In the ICT specialist industries, compensation of employees (\$17.1 billion) and gross operating surplus and gross mixed income (\$13.1 billion) combined comprised 97.5% of gross value added. Among the ICT specialist industries, Computer services contributed most to compensation of employees, and Telecommunication services had the highest gross operating surplus / gross mixed income.

INCOME COMPONENTS OF ICT GROSS VALUED ADDED—2002–03

	<i>Compensation of employees</i>	<i>Gross operating surplus/Gross mixed income</i>	<i>Other net taxes on production</i>	<i>ICT gross value added</i>
	\$m	\$m	\$m	\$m
ICT specialist industries				
Manufacturing	492	188	29	709
Wholesale trade	3 970	1 024	171	5 165
Telecommunication services	4 913	10 220	264	15 397
Computer services	7 740	1 688	312	9 740
<i>Total ICT specialist industries</i>	<i>17 115</i>	<i>13 120</i>	<i>776</i>	<i>31 011</i>
Other industries	na	na	na	3 781
Total	na	na	na	34 792

na not available

ANALYSIS OF RESULTS *continued*

AUSTRALIAN PRODUCTION OF ICT PRODUCTS

The value of Australian production of ICT products was \$65.1 billion in 2002–03. Over 90% of this production took place within ICT specialist industries. The largest single contributor to total Australian production of ICT products was Telecommunication services (\$32.7 billion) followed by Computer services (\$15.5 billion). Retail trade (\$3.6 billion) was the largest contributor among the 'Other industries'.

ICT PRODUCTION, By Industry

	2002–03
	\$m
ICT specialist industries	
Manufacturing	1 813
Wholesale trade	8 861
Telecommunication services	32 650
Computer services	15 528
<i>Total ICT specialist industries</i>	<i>58 852</i>
Other industries	6 227
Total	65 079

INVESTMENT IN ICT

Business and government invested \$26.7 billion in ICT products in 2002–03. Computer hardware made up 40.2% (\$10.7 billion) of this investment and packaged and customised software 30.8% (\$8.2 billion). The Communication services industry (\$5.1 billion) contributed 19.3% to total ICT investment – the largest share of any industry. Other major industry contributors to ICT Investment were Property and business services (14.1%), Finance and insurance (12.1%), Government administration and defence (11.4%) and Manufacturing (8.6%).

INDUSTRY SHARE OF ICT INVESTMENT, 2002–03



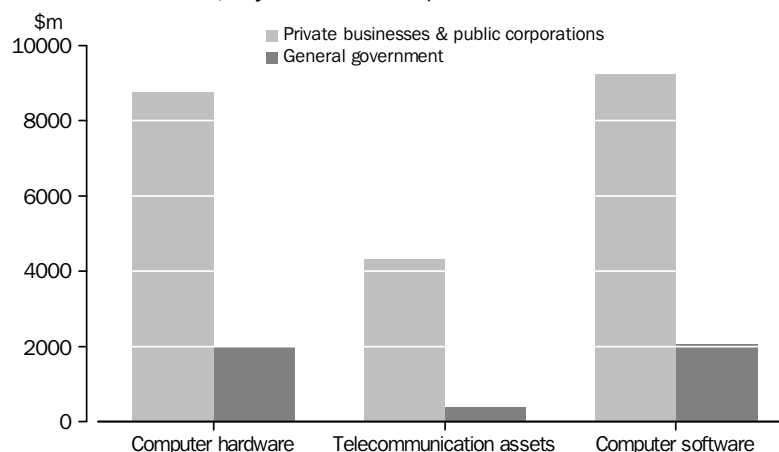
Private businesses and public corporations contributed 83.4% (\$22.3 billion) of total investment in ICT products in 2002–03 while general government contributed 16.6% (\$4.5 billion). The Commonwealth Government accounted for 59.5% of general government sector ICT investment. The largest ICT product investment by any sector was private sector investment in software (\$9.2 billion), followed closely by private sector investment in computer hardware (\$8.8 billion). General government invested \$2.1

ANALYSIS OF RESULTS *continued*

INVESTMENT IN ICT *continued*

billion in software, \$2.0 billion in computer hardware and \$0.4 billion in telecommunication equipment.

ICT INVESTMENT, By sector and product—2002–03



Investment in ICT accounted for 13.8% of total investment in Australia in 2002–03. Some industries invest more intensively in ICT, which is reflected in the marked industry-to-industry variation in the proportion of ICT investment to total investment. The Communication services industry had the largest proportion of ICT investment to total investment at 80.7%. This was followed by Government administration and defence (58.2%), Finance and insurance (48.2%), Wholesale trade (30.3%), and Property and business services (27.1%).

ICT INVESTMENT TO TOTAL INVESTMENT, By selected industries—2002–03

	ICT investment as a proportion of total investment
	%
Wholesale trade	30.3
Communication services	80.7
Finance and Insurance	48.2
Property and business services	27.1
Government administration and defence	58.2
All other industries(a)	11.3
Total	13.8

(a) Excluding ownership of dwellings and ownership transfer costs.

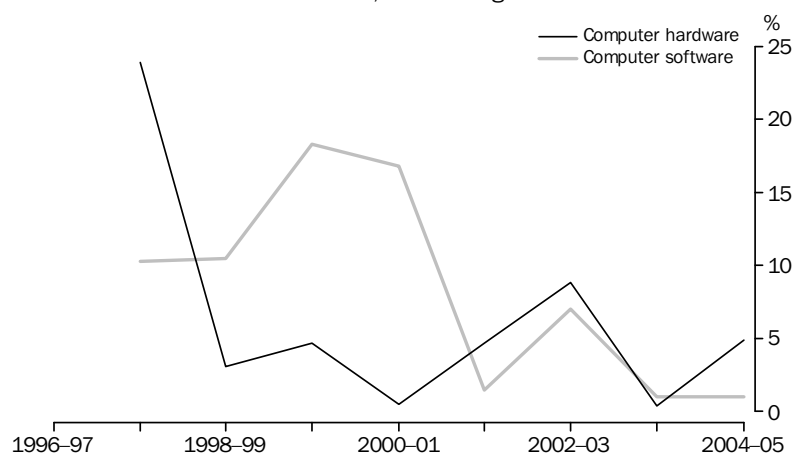
Annual growth in investment for computer hardware and software fluctuated between 1997–98 and 2004–05, though it remained positive throughout this period. The 18.3% peak in growth in software investment between 1998–99 and 1999–2000 reflected Y2K related software spending.

ANALYSIS OF RESULTS *continued*

INVESTMENT IN ICT

continued

INVESTMENT IN COMPUTERS, Annual growth—1997–98 to 2004–05



BUSINESS USE OF SELECTED ICT TECHNOLOGIES

The following table shows recent trends in business use of computers and the Internet, and web presence in businesses. Over the last five years, business use of these technologies has increased substantially, particularly business presence on the web and use of the Internet. In 2002–03, 83% of businesses indicated use of a computer, while 71% used the Internet and 23% had a web presence.

BUSINESS USE OF SELECTED TECHNOLOGIES

	1997–98	1999–00	2000–01	2001–02	2002–03
	%	%	%	%	%
Businesses using a computer	63	76	84	84	83
Businesses using the Internet	29	56	69	72	71
Businesses with a web presence	6	16	22	24	23

Source: *Business Use of Information Technology, 2002–03* (cat. no. 8129.0).

ICT CONSUMPTION

Intermediate consumption is the value of goods and services used up as inputs in the process of production. In business accounting terms, intermediate consumption corresponds to 'business expenses' (as opposed to investment spending). Business and government intermediate consumption of ICT products was valued at \$33.5 billion in 2002–03. The largest item of intermediate consumption of ICT products was telecommunication services valued at \$18.9 billion, followed by other computer services (\$11.0 billion).

Following national accounts conventions, all household spending on ICT products is treated as consumption spending. Households spent \$16.0 billion on ICT products in 2002–03. The largest single component was phone carrier services, which accounted for \$10.8 billion (or 67.0%) of household expenditure on ICT. Households also spent \$1.8 billion (11.4%) on computer hardware, \$1.2 billion (7.5%) on telecommunication equipment and \$1.1 billion (6.8%) on Internet services.

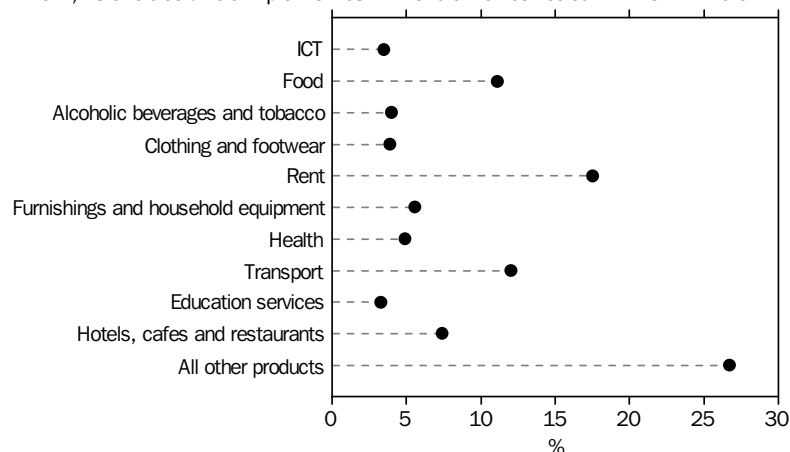
Household spending on ICT products accounted for 3.5% of total household final consumption expenditure (HFCE) in 2002–03. This was similar to the level of household spending on education services, clothing and footwear and alcoholic beverages and tobacco.

ANALYSIS OF RESULTS *continued*

ICT CONSUMPTION

continued

HFCE, Selected components—Relative to total HFCE: 2002–03



INTERNATIONAL TRADE IN ICT

Australia experienced a deficit of \$9.7 billion in net trade in ICT products in 2002–03. That is, the level of ICT product imports (\$14.0 billion) was \$9.7 billion greater than ICT product exports (\$4.2 billion). ICT imports accounted for 8.4% of all imports while ICT exports accounted for 2.8% of exports. Re-exports made up \$1.2 billion of total ICT imports and exports. Re-exports are imports which are exported in the same condition or after undergoing only minor transformation which leaves them essentially unchanged. Computer hardware and telecommunication equipment together made up 73.5% of ICT imports. The largest ICT export items were computer hardware at \$1.3 billion and telecommunication services at \$1.1 billion. In combination, these two items comprised 55.2% of total ICT exports in 2002–03.

IMPORTS AND EXPORTS OF ICT PRODUCTS

2002–03	
\$m	
Exports of ICT products	(a) 4 230
Imports of ICT products	(a) 13 965
Net ICT trade	–9 735
Total exports	149 691
Total imports	167 170

(a) of which \$1,216 million are re-exports.

Source: ABS Balance of Payments and International Trade.

ICT EMPLOYMENT

For analytical purposes ICT employment is defined to include 'computing professionals and technicians' working in both ICT and non-ICT related industries. ICT employment excludes persons employed in ICT related industries in such activities as data entry, call centre and general management and administration.

Computing professionals and technicians accounted for 2.5% (or 234,700 persons) of total employed persons in 2002–03. Computing professionals dominated this category, accounting for 74% or 174,800 persons. 'Computing professionals' covers system managers, designers, programmers and auditors, software designers, and applications and analyst programmers.

ANALYSIS OF RESULTS *continued*

ICT EMPLOYMENT *continued*

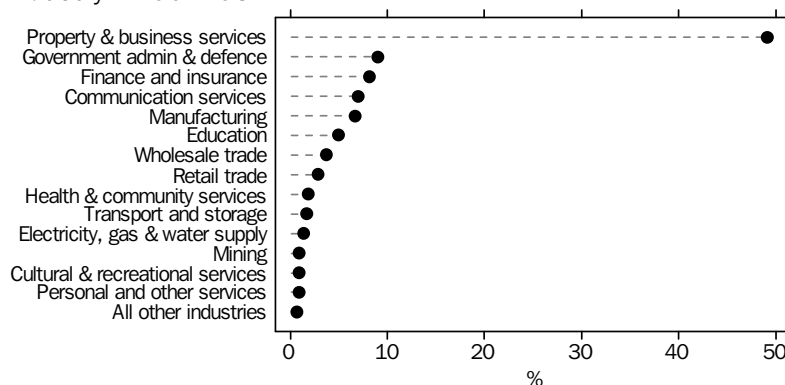
EMPLOYED PERSONS, Computing professionals and technicians

	2002-03
	'000
Information technology managers	30.2
Computing professionals	174.8
Computing support technicians	29.7
Total	234.7
Total employed persons	9 377.5
Proportion of total employed that are computing professionals and technicians (%)	2.5

Source: ABS Labour Force Survey, as published in January 2005 edition of *Australian Labour Market Statistics* (cat. no. 6105.0).

The Property and business services industry employed 49.1% of all computing professionals and technicians in 2002-03. The second largest industry employer of computing professionals and technicians was Government administration and defence (9.0% or 21,100 persons) followed by Finance and insurance (8.1% or 19,100 persons).

EMPLOYED PERSONS, Computing professionals and technicians—By industry—2002-03



Source: ABS Labour Force Survey, as published in January 2005 edition of *Australian Labour Market Statistics* (cat. no. 6105.0).

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ICT SHARE OF GDP (a)—2002–03

	<i>ICT related output</i>	<i>ICT gross value added</i>	<i>Share of total gross value added</i>	<i>ICT GDP</i>	<i>Share of GDP</i>
	\$m	\$m	% pts	\$m	% pts
ICT related activity					
Manufacturing	1 813	709	0.1	709	0.1
Wholesale trade	8 861	5 165	0.7	5 189	0.7
Telecommunication services	32 650	15 397	2.2	16 523	2.1
Computer services	15 528	9 740	1.4	9 774	1.2
Other industries	6 227	3 781	0.5	4 042	0.5
Total	65 079	34 792	4.9	36 237	4.6

(a) Data in this table are considered experimental in nature.

DOMESTIC OUTPUT OF ICT PRODUCTS(a), By industry

2002-03

\$m

.....
ICT specialist industries

Manufacturing	1 813
Wholesale trade	8 861
Telecommunication services	32 650
Computer services(b)	15 528
<i>Total ICT specialist industries</i>	<i>58 852</i>

Other industries

Agriculture, forestry and fishing	4
Mining	37
Other Manufacturing	495
Electricity, gas and water supply	59
Construction	19
Other Wholesale trade	20
Retail trade	3 717
Accommodation, cafes and restaurants	6
Transport and storage	69
Finance and insurance	454
Other Property and business services	261
Government administration and defence	640
Education	267
Health and community services	77
Cultural and recreational services	39
Personal and other services	63
<i>Total other industries</i>	<i>6 227</i>

Total	65 079
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- (a) Data in this table are considered experimental in nature.
- (b) Part of the Property and business services industry.

DOMESTIC OUTPUT OF ICT PRODUCTS(a), By producing industry—2002–03

	<i>Manufacturing</i>	<i>Wholesale trade</i>	<i>Telecommunication services</i>	<i>Computer services</i>	<i>All other industries</i>	<i>Total</i>
	\$m	\$m	\$m	\$m	\$m	\$m
ICT products						
Computer hardware	772	139	—	357	—	1 268
Telecommunication assets	995	117	3 308	—	—	4 420
Computer Software						
Packaged	—	71	—	—	238	309
Customised	20	—	—	5 639	—	5 659
Own account	16	130	165	367	2 392	3 070
<i>Total</i>	36	201	165	6 006	2 630	9 038
Other computer services	—	2 538	125	8 740	—	11 403
Phone carrier services	—	450	26 596	97	—	27 143
Provision of Internet services	—	—	2 183	—	—	2 183
Wholesale and retail margins	10	5 416	273	328	3 597	9 624
Total	1 813	8 861	32 650	15 528	6 227	65 079

— nil or rounded to zero (including null cells)

(a) Data in this table are considered experimental in nature.

DOMESTIC OUTPUT OF ICT PRODUCTS(a), By selected ICT producing industries

2002-03

\$m

.....
Computer services industry

Computer hardware 357

Computer software

Customised 5 639

Own account 367

Total computer software 6 006

Other computer services

Software maintenance services 1 764

Other computer consultancy 3 523

Data processing services 1 191

Other computer services 1 714

Information storage and retrieval 191

Hardware installation, repair and

maintenance 357

Total other computer services 8 740

Phone carrier services 97

Margins 328

Total computer services output 15 528.....
Telecommunication industry

Telecommunication assets 3 308

Computer software-own account 165

Other computer services 125

Phone Carrier services

Basic telephony services 10 946

Short messaging services 818

Other mobile and paging services 7 336

Data and text services 2 655

Intercarrier charges, leased lines and other

infrastructure and sales of capacity to

other telecommunication operators 1 828

Satellite services 397

Other telecommunication services 2 616

Total phone carrier services 26 596

Provision of Internet services 2 183

Margins 273

Total telecommunication industry output 32 650.....
(a) Data in this table are considered experimental in nature.

INCOME COMPONENTS OF ICT GROSS VALUE ADDED(a), By industry—2002–03

	Compensation of employees	Gross operating surplus/Gross mixed income	Other net taxes on production	ICT gross value added
	\$m	\$m	\$m	\$m
ICT specialist industries				
Manufacturing	492	188	29	709
Wholesale trade	3 970	1 024	171	5 165
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Other industries	na	na	na	3 781
Total	na	na	na	34 792

na not available

(a) Data in this table are considered experimental in nature.

IMPORTS AND EXPORTS OF ICT PRODUCTS, By type of product

2002–03

Imports of ICT products	
Computer hardware (\$m)	6 710
Telecommunication equipment (\$m)	3 558
Software packaged (\$m)	1 361
Software customised (\$m)	673
Other computer services (\$m)	256
Telecommunication services (\$m)	1 407
<i>Total (\$m)</i>	<i>13 965</i>
<i>ICT imports as a proportion of total imports (%)</i>	<i>8.4</i>
Exports of ICT products	
Computer hardware (\$m)	1 252
Telecommunication equipment (\$m)	652
Software packaged (\$m)	172
Software customised (\$m)	747
Other computer services (\$m)	324
Telecommunication services (\$m)	1 083
<i>Total (\$m)</i>	<i>4 230</i>
<i>ICT exports as a proportion of total exports (%)</i>	<i>2.8</i>
ICT trade surplus/deficit (\$m)	–9 735
Re-exports of ICT products	
Computer hardware (\$m)	1 001
Communication equipment (\$m)	210
Software packaged (\$m)	5
<i>Total (\$m)</i>	<i>1 216</i>

SUPPLY AND USE OF ICT PRODUCTS(a)—2002–03

	Computer hardware	Communication assets	Computer software	Other computer services	Phone carrier services	Provision of Internet services	Margins	Total
	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m
ICT SUPPLY								
Domestic output	1 268	4 420	9 038	11 403	27 143	2 183	9 624	65 079
Imports	6 710	3 558	2 034	256	1 337	70	—	13 965
Margins	5 807	1 962	1 855	—	—	—	–9 624	—
Net taxes on products	166	127	70	35	978	100	—	1 476
Total supply	13 951	10 067	12 997	11 694	29 458	2 353	—	80 520
ICT USE								
Intermediate consumption	125	3 530	—	10 983	17 678	1 204	. .	33 520
Household final consumption expenditure	1 836	1 195	771	387	10 751	1 095	. .	16 035
Investment	10 738	4 690	11 307	—	—	—	. .	26 735
Exports	1 252	652	919	324	1 029	54	. .	4 230
Total use	13 951	10 067	12 997	11 694	29 458	2 353	. .	80 520

. . not applicable

(a) Data in this table are considered experimental in nature.

— nil or rounded to zero (including null cells)

INVESTMENT IN ICT PRODUCTS, By sector—2002–03

		GENERAL GOVERNMENT			
	Private business and public corporations	Commonwealth	State and local	Total	Total investment in ICT products
<hr/>					
ICT investment					
Computer hardware (\$m)	8 750	1 279	709	1 988	10 738
Telecommunication assets (\$m)	4 297	212	181	393	4 690
Software					
Packaged and customised (\$m)	7 039	na	na	1 198	8 237
Own account (\$m)	2 198	na	na	872	3 070
Total software (\$m)	9 237	1 159	911	2 070	11 307
Total (\$m)	22 284	2 650	1 801	4 451	26 735
Proportion of total investment in ICT products (%)					
	83.4	9.9	6.7	16.6	100.0

na not available

INVESTMENT IN ICT PRODUCTS (a), By industry—2002–03

	SOFTWARE					ICT investment as a proportion of total investment	
	Computer hardware	Communication assets	Packaged and customised	Own account	Total ICT investment	Total investment	Industry share of total ICT investment
	\$m	\$m	\$m	\$m	\$m	\$m	%
Agriculture, forestry and fishing	81	10	68	4	163	6 826	0.6
Mining	314	48	329	37	728	15 818	2.7
Manufacturing	1 293	58	682	273	2 306	16 605	8.6
Electricity, gas and water supply	424	41	306	59	830	8 217	3.1
Construction	239	21	211	19	490	3 705	1.8
Wholesale trade	601	36	448	150	1 235	4 074	4.6
Retail trade	756	30	492	120	1 398	5 872	5.2
Accommodation, cafes and restaurants	91	15	46	6	158	3 140	0.6
Transport and storage	556	45	448	69	1 118	15 522	4.2
Communication services	630	3 547	807	165	5 149	6 378	19.3
Finance and insurance	1 358	52	1 381	454	3 245	6 735	12.1
Property and business services	1 766	106	1 279	628	3 779	13 947	14.1
Government administration and defence	1 248	219	933	640	3 040	5 228	11.4
Education	592	105	221	267	1 185	5 211	4.4
Health and community services	358	97	225	77	757	4 795	2.8
Cultural and recreational services	230	206	198	39	673	3 265	2.5
Personal and other services	201	53	161	65	480	2 320	2.0
Ownership of dwellings	..	..	..	..	..	52 125	..
Ownership transfer costs	..	..	..	..	..	14 006	..
Total	10 738	4 690	8 237	3 070	26 735	193 788	100.0

.. not applicable

(a) Data in this table are considered experimental in nature.

HOUSEHOLD FINAL CONSUMPTION EXPENDITURE ON ICT PRODUCTS (a)

2002–03

ICT products

Computer hardware (\$m)	1 836
Telecommunication equipment (\$m)	1 195
Computer Software (\$m)	771
Other computer services (\$m)	387
Phone carrier services (\$m)	10 751
Provision of Internet services (\$m)	1 095
Total (\$m)	16 035

Total HFCE (\$m) 462 095

ICT as a proportion of total HFCE (%) 3.5

(a) Data in this table are considered experimental in nature.

INTERMEDIATE CONSUMPTION OF SELECTED ICT PRODUCTS (a), By industry—2002–03

	Computer hardware parts	Telecommunication equipment	Other computer services	Telecommunication services	Total	Industry share
	\$m	\$m	\$m	\$m	\$m	%
Agriculture, forestry and fishing	—	15	160	308	482	1.4
Mining	—	8	94	169	271	0.8
Manufacturing	125	82	904	1 733	2 845	8.5
Electricity, gas and water supply	—	11	523	231	765	2.3
Construction	—	34	217	725	976	2.9
Wholesale trade	—	44	697	934	1 676	5.0
Retail trade	—	41	521	860	1 421	4.2
Accommodation, cafes and restaurants	—	11	164	224	399	1.2
Transport and storage	—	42	607	892	1 542	4.6
Communication services	—	2 952	961	6 713	10 626	31.7
Finance and insurance	—	44	1 356	921	2 320	6.9
Property and business services	—	111	2 307	2 332	4 750	14.2
Government administration and defence	—	43	976	902	1 922	5.7
Education	—	22	533	458	1 013	3.0
Health and community services	—	25	438	527	990	3.0
Cultural and recreational services	—	25	253	528	806	2.4
Personal and other services	—	20	273	424	717	2.1
Total	125	3 530	10 983	18 882	33 520	100.0

— nil or rounded to zero (including null cells)

(a) Data in this table are considered experimental in nature.

	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05
	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m
COMPUTER HARDWARE									
Agriculture, forestry and fishing	65	88	87	94	78	97	81	88	91
Mining	74	145	112	114	175	244	314	337	303
Manufacturing	937	1 325	1 266	1 250	1 186	1 262	1 293	1 266	1 202
Electricity, gas and water supply	359	235	388	439	408	388	424	431	337
Construction	244	278	268	243	223	257	239	222	274
Wholesale trade	310	467	501	470	450	494	601	629	776
Retail trade	459	638	597	594	561	566	756	798	928
Accommodation, cafes and restaurants	132	167	178	166	129	107	91	104	97
Transport and storage	438	386	358	549	547	562	556	545	483
Communication services	250	337	385	469	524	541	630	420	479
Finance and insurance	912	935	1 066	1 035	1 236	1 306	1 358	1 399	1 723
Property and business services	1 213	1 641	1 614	1 610	1 665	1 660	1 766	1 895	2 113
Government administration and defence	820	1 004	1 042	1 207	1 088	1 148	1 248	1 264	1 068
Education	326	409	415	457	443	497	592	604	584
Health and community services	228	293	316	314	334	342	358	378	445
Cultural and recreational services	158	181	197	195	221	224	230	212	208
Personal and other services	92	162	171	179	161	176	201	192	202
Total	7 017	8 691	8 961	9 385	9 429	9 871	10 738	10 784	11 313
COMPUTER SOFTWARE									
Agriculture, forestry and fishing	83	95	87	112	104	113	72	73	78
Mining	62	87	142	234	222	299	366	397	406
Manufacturing	726	795	853	882	920	1 035	955	980	992
Electricity, gas and water supply	272	213	271	353	412	394	365	418	465
Construction	179	217	219	226	247	266	230	199	205
Wholesale trade	264	295	328	382	438	467	598	626	637
Retail trade	377	429	435	482	541	554	612	625	637
Accommodation, cafes and restaurants	28	31	35	41	48	49	52	53	54
Transport and storage	443	435	444	522	481	502	517	541	590
Communication services	431	380	526	749	944	887	972	834	732
Finance and insurance	879	1 078	1 183	1 460	1 705	1 724	1 835	1 844	1 862
Property and business services	949	1 137	1 136	1 276	1 599	1 563	1 907	1 978	2 016
Government administration and defence	768	828	942	1 188	1 418	1 424	1 573	1 620	1 604
Education	246	271	310	380	483	451	488	483	455
Health and community services	221	265	277	277	367	367	302	320	358
Cultural and recreational services	142	120	142	153	255	249	237	212	216
Personal and other services	106	137	201	194	226	221	226	219	231
Total	6 176	6 813	7 531	8 911	10 410	10 565	11 307	11 422	11 538

	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05
	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m

CURRENT PRICES

Computer hardware

Investment	7 017	8 691	8 961	9 385	9 429	9 871	10 738	10 784	11 313
Net capital stock	11 396	13 481	14 173	16 339	17 975	17 996	17 404	17 830	18 993
Consumption of fixed capital	3 675	4 267	4 820	4 869	6 061	6 516	6 425	5 975	6 495

Computer software

Investment	6 176	6 813	7 531	8 911	10 410	10 565	11 307	11 422	11 538
Net capital stock	16 472	18 169	20 289	23 287	26 678	28 502	29 916	31 250	32 339
Consumption of fixed capital	4 292	4 636	5 149	5 765	6 616	7 319	7 677	7 984	8 428

CHAIN VOLUME MEASURES

Computer hardware

Investment	1 697	2 511	3 155	4 466	4 694	5 642	7 753	10 784	13 505
Net capital stock	3 001	4 279	5 737	7 887	9 565	11 483	14 595	19 405	25 156
Consumption of fixed capital	889	1 233	1 698	2 318	3 017	3 724	4 640	5 975	7 754

Computer software

Investment	5 011	5 784	6 440	7 731	9 071	9 418	10 665	11 423	12 062
Net capital stock	13 064	14 828	16 785	19 406	22 572	25 358	28 714	32 169	35 485
Consumption of fixed capital	3 303	3 727	4 193	4 749	5 443	6 207	7 041	7 984	8 979

NUMBER OF HOME COMPUTERS

	NUMBER OF HOUSEHOLDS WITH ACCESS TO A HOME COMPUTER			NUMBER OF HOUSEHOLDS WITH HOME INTERNET ACCESS		
	2001	2002	2003	2001	2002	2003
NUMBER ('000)						
Households						
Without children under 15	2 636	2 842	3 179	1 936	2 153	2 537
With children under 15	1 675	1 714	1 860	1 178	1 292	1 502
State or territory						
New South Wales	1 435	1 528	1 653	1 088	1 196	1 365
Victoria	1 108	1 144	1 278	780	852	1 019
Queensland	776	822	957	563	602	757
South Australia	346	355	390	229	261	300
Western Australia	427	479	512	300	366	406
Tasmania	96	98	111	59	67	78
Northern Territory	28	34	na	21	26	na
Australian Capital Territory	94	96	99	73	74	82
Region						
Capital city	2 928	3 091	3 349	2 206	2 398	2 737
Balance of state	1 383	1 465	1 689	908	1 047	1 303
Total	4 311	4 556	5 038	3 114	3 445	4 039

PROPORTION (%)						
Households						
Without children under 15	51	53	58	37	40	47
With children under 15	77	79	85	54	59	68
State or territory						
New South Wales	59	61	65	45	48	54
Victoria	61	62	68	43	46	54
Queensland	55	57	65	40	42	52
South Australia	56	58	62	37	43	48
Western Australia	58	63	67	41	48	53
Tasmania	50	51	57	31	35	41
Northern Territory	52	62	na	38	48	na
Australian Capital Territory	77	78	80	60	60	66
Region						
Capital city	62	65	69	47	50	56
Balance of state	52	54	61	34	39	47
Total	58	61	66	42	46	53

na not available

Source: ABS Household Use of Information Technology (cat. no. 8146.0).

BUSINESS USE OF SELECTED ICT TECHNOLOGIES, By selected industries

	PROPORTION OF BUSINESSES WITH INTERNET ACCESS			PROPORTION OF BUSINESSES WITH WEB SITE OR HOME PAGE		
	1997-98	1999-00	2002-03	1997-98	1999-00	2002-03
	%	%	%	%	%	%
Mining	46	70	78	19	30	31
Manufacturing	31	60	73	8	23	29
Electricity, gas and water supply	np	79	79	np	56	35
Construction	17	46	61	4	6	11
Wholesale trade	38	62	49	10	22	33
Retail trade	17	42	60	2	15	19
Accommodation, cafes and restaurants	14	40	58	5	19	29
Transport and storage	20	46	67	5	14	20
Communication services	45	42	63	13	17	22
Finance and insurance	39	71	77	12	19	26
Property and business services	44	76	89	8	19	28
Health and community services	33	57	72	5	9	16
Cultural and recreational services	33	63	81	13	26	37
Personal and other services	20	39	58	9	19	25
Total	29	56	71	6	16	23

np not available for publication but included in totals where applicable, unless otherwise indicated

Source: ABS *Business Use of Information Technology* (cat. no. 8129.0).

EXPENDITURE ON RESEARCH AND DEVELOPMENT, By ICT research field—2002-03

	Business	Higher education	Government	Private non-profit	Total
ICT research fields					
Information systems and technologies (\$m)	711	96	67	3	877
Computer hardware (\$m)	22	2	1	—	25
Computer software (\$m)	720	25	78	na	na
Communication technologies (\$m)	462	35	23	na	na
Other information, computer and communication technologies (\$m)	342	23	37	na	na
Total ICT fields (\$m)	2 257	181	206	5	2 649
Other fields (\$m)	4 314	3 249	2 276	355	10 194
Total (\$m)	6 571	3 430	2 482	360	12 843
<i>ICT fields as a proportion of total (%)</i>	34.3	5.3	8.3	1.4	20.6

— nil or rounded to zero (including null cells)

na not available

Source: Various ABS surveys of research and experimental development 2002-03. Data available on request.

	Computing professionals and technicians	Total employed persons	ICT employment as a proportion of total employment
	'000	'000	%
Agriculture, forestry and fishing	0.3	377.4	0.1
Mining	2.2	88.2	2.4
Manufacturing	15.7	1 114.1	1.4
Electricity, gas and water supply	3.4	72.5	4.7
Construction	1.1	718.2	0.1
Wholesale trade	8.6	443.7	1.9
Retail trade	6.9	1 439.2	0.5
Accommodation, cafes and restaurants	0.3	452.9	0.1
Transport and storage	3.9	408.0	1.0
Communication services	16.5	171.2	9.6
Finance and insurance	19.1	348.0	5.5
Property and business services	115.2	1 085.5	10.6
Government administration and defence	21.1	431.0	4.9
Education	11.6	668.2	1.7
Health and community services	4.4	938.2	0.5
Cultural and recreational services	2.1	240.6	0.9
Personal and other services	2.1	380.7	0.6
Total	234.7	9 377.5	2.5

(a) 'ICT employment' : Computing Professionals and Technicians is comprised of the following ASCO codes: 1224 Information technology managers; 2231 Computing professionals; and 3294 Computing support technicians.

Source: ABS Labour Force Survey, as published in the January 2005 edition of *Australian Labour Market Statistics* (cat. no. 6105.0).

APPENDIX 1 FRAMEWORK AND CONCEPTS

FRAMEWORK FOR THE ICT SATELLITE ACCOUNT

The supply and use tables, which are the cornerstone of the annual and quarterly national accounts, provide the data framework for the development of an ICT satellite account. The supply table records the total supply of products within the economy and the use table records the total use of each product within the economy and for export. In an ICT satellite account the relevant products are those defined to be ICT products.

Supply of each product (valued at purchasers' prices) is composed of:

- Domestic production by industry (valued at basic prices)
- Imports
- Transport, retail and wholesale trade margins
- Taxes less subsidies on products.

Use of each product (valued at purchasers' prices) is composed of:

- Intermediate use by industries (products that are consumed by industries in the process of producing other products).
- Final use by type of expenditure. Final use includes consumption by households and government, products that have been capitalised because they will be used in future production, changes in inventories and goods and services that are exported.

A complete use table also includes for each industry the primary inputs to production, namely compensation of employees, gross operating surplus, gross mixed income (GMI) and other taxes less subsidies on production. For the economy as a whole, the supply and use tables provide the annual estimates of GDP and components.

The supply and use methodology is based on the fundamental economic identity that supply of products equals use. A feature of the supply and use system is that the supply and demand of each product are, as far as possible, independently calculated. A formal and systematic process of data confrontation is used to resolve discrepancies between supply and use. This generally involves making choices about which components are based on the most suitable and reliable data.

The following tables illustrate the basic structure of supply and use tables. In an ICT satellite account the products highlighted are ICT products, but not exclusively so, as industries producing ICT products require non-ICT products for their production process. This is an essential element for deriving ICT GDP. Likewise, the industries highlighted are ICT specialist industries, but as virtually all industries produce some ICT products, a complete list of Australian and New Zealand Standard Industrial Classification (ANZSIC) industries is included, albeit at a more aggregated level (ANZSIC Division).

SUPPLY OF PRODUCTS

	Output of industries at basic prices (1)			Imports (2)	Total supply at basic prices (3) = 1 + 2	Trade and transport margins (4)	Taxes less subsidies on products (5)	Total supply at purchasers' prices (6) = 3+4+5
	Industry A	Industry B	Industry ..					
ICT product A								
ICT product B								
ICT product C								
ICT product ..								
Non-ICT product S								
Total supply								

USE OF PRODUCTS

	Intermediate use by Industries			Total intermediate use	Final consumption expenditure	Gross capital formation	Exports	Total use at purchasers' prices
	Industry A	Industry B	Industry ..					
ICT product A								
ICT product B								
ICT product C								
ICT product ..								
Non-ICT products								
Total use at purchasers' prices								
Compensation of employees								
Gross operating surplus / GMI								
Other taxes less subsidies on production								
Industry output at basic prices								

FRAMEWORK FOR THE ICT
SATELLITE ACCOUNT *continued*

The supply and use tables are used to assemble and integrate all data required to produce estimates of economic aggregates related to ICT, including ICT gross value added and ICT GDP.

The use table above had to be abbreviated for reasons of space. The column marked 'Final consumption expenditure' is further decomposed into HFCE and government final consumption expenditure (GFCE). The column marked 'Gross capital formation' represents a combination of gross fixed capital formation (investment) and change in inventories. The use table does not record industry or sector details relating to gross fixed capital formation. These are compiled in subsidiary tables.

Broadly, the production of the 2002–03 ICT satellite account involved the following steps:

- establishing an ICT product classification. An ICT product classification is a classification that identifies products that are ICT in nature. (The current list of ICT commodity items used in surveys in Australia is shown in Appendix 3.)
- expanding the number of industries in the core supply and use tables to include more detail for the industries of particular interest from an ICT perspective
- compiling a table of gross fixed capital formation by industry using the same ICT product and industry classifications as in the supply and use tables.

CONCEPTS FOR THE ICT

SATELLITE ACCOUNT

ICT Output

Output is defined as the value of total sales or other uses of goods and services (including capital work done on own account), plus the value of change in inventories of goods produced as outputs. The value of ICT output therefore is the market value of ICT goods and services produced within Australia. ICT output may be produced by units in any industry, though in practice the great majority of ICT output is produced by a small number of industries.

Capital goods produced on own account for own use are valued according to their estimated market value, or if this is not possible, on the basis of production costs, i.e. the value of labour and non-labour costs, and consumption of fixed capital used to produce the capital good. There are two significant ICT-related items of capital work produced on own account – own account computer software and own account production of telecommunication assets. The latter item relates wholly to telecommunication service providers and comprises the physical infrastructure required to put various telecommunication equipment in place (e.g. construction of mobile phone towers). All industries engage in producing computer software on own account.

ICT gross value added and ICT GDP

ICT gross value added and ICT GDP are two key economic aggregates derived in the satellite account.

Gross value added shows the 'value' which a producer adds to the goods and services it purchases in the process of producing its own output. ICT gross value added is measured as the value of output of ICT goods and services less the value of intermediate consumption inputs used in producing these ICT products. ICT gross value added is comparable with estimates of the gross value added of 'conventional' industries such as mining and manufacturing as presented in the ASNA.

Output and value added are measured at 'basic prices', that is before any taxes on products are added (or any subsidies on ICT products are deducted). In practice, taxes on ICT products are almost entirely comprised of GST.

SNA93 states that basic price measures are to be used for comparisons between industries and sectors and across countries because they are free of the effects of taxes and subsidies on products that can vary between industries (and countries) and over time. The tax and subsidy component of a product's sale price does not represent value added by the industry producing that product.

ICT GDP, on the other hand, measures the gross value added of the ICT industry at purchasers' prices. It therefore includes taxes (less subsidies) on ICT related products since these are reflected in prices actually paid by the purchaser. ICT GDP has a higher value than ICT gross value added. ICT GDP is a construct to allow comparison with the most widely recognised national accounting aggregate, GDP. While it is useful in this context, the ICT gross value added measure should be used in comparisons with other industries and between countries. There is no generally accepted way to allocate deductible taxes such as GST to industry, and substantially different results can be obtained for industry GDP depending on the method chosen. This is a further reason for gross value added to be the preferred measure for industry comparisons.

ICT Investment

ICT investment is gross fixed capital formation plus changes in inventories relating to ICT products. Gross fixed capital formation is the value of acquisitions less disposals of new or existing fixed assets. Assets consist of tangible or intangible assets that have come into existence from processes of production, and that are themselves used repeatedly or continuously in other processes of production over periods of time exceeding one year.

ICT Government final consumption expenditure

Government final consumption expenditure is current expenditure by general government bodies on services to the community such as defence, public order and safety. Because these are provided free of charge or at prices which cover only a small proportion of costs, the government is considered to be the consumer of its own output.

ICT Government final
consumption expenditure
continued

This output has no directly observable market value, and so is valued in the national accounts at its cost of production. In 2002–03, general government bodies in Australia did not produce any market output that could be considered ICT in nature and therefore government final consumption expenditure on ICT products was estimated as zero.

Current expenditure by general government bodies on such things as telecommunication services and computer services has been treated as intermediate consumption by these units.

APPENDIX 2 CLASSIFICATIONS AND SCOPE

INTRODUCTION

The classifications used in the supply and use tables of the ASNA are consistent with the standard classifications used throughout ABS publications – ANZSIC for industries, and the Australian and New Zealand Standard Product Classification (ANZSPC) for products. These are not entirely appropriate for an ICT satellite account and, in particular, the 1993 version of the ANZSIC (used in the satellite account) was developed when there was less focus on 'new economy' activities than there is today. Consequently, there is no grouping for ICT activities, and some new products and industries have emerged that did not exist or were relatively unimportant when this version of ANZSIC was developed. ANZSIC was recently reviewed and an updated version was released on 28 February 2006.

For ABS business collections relating to ICT statistics, the relevant ANZSIC industry classes are combined into an 'alternative industry view' for ICT industries. The satellite account incorporates and extends this concept of an alternative industry view.

ICT PRODUCTS

The scope of the ICT satellite account is effectively determined by the range of products (goods and services) defined as 'ICT'. The Working Party on Indicators for the Information Society convened by the OECD has produced a draft 'Classification of ICT Goods' and is working on a classification of ICT services. The ABS had significant input into this work and the classification used by the ABS in ICTIS is broadly consistent with, but not identical to the OECD classification as far as it relates to goods. The OECD definition included a broader range of goods than the Australian definition. The Australian definition only includes ICT goods if they are able to be networked or are components of goods that can be networked. It also excludes a range of medical, scientific and audio visual equipment.

A challenging aspect for any statistical classification is to preserve continuity and still remain contemporary. This is especially so for ICT where new goods and services emerge rapidly. The ABS undertakes a complete review of its ICT product definition every two years to ensure it remains up-to-date. Australia also continues to work with the international statistical community (through the OECD) toward international consensus on ICT product classification issues.

The products in-scope of the satellite account are shown in Appendix 3 and, with some exceptions, is consistent with the definition of ICT products in-scope of ICTIS 2002–03. The satellite account aims to be even more comprehensive, so some additional products were added (primarily computer software produced on own account, construction of telecommunication facilities on own-account and margins relating to the retailing of ICT goods).

The list of ICT products shown in Appendix 3 essentially covers computers, communication equipment, and the services that facilitate the use of such equipment. However, process control computers and other equipment, such as robots and scientific and health equipment, are excluded since the presence of microprocessors is predominantly for the control or setting of functions. Simple calculating devices are also excluded, along with television and radio receivers.

One area of conjecture is the treatment of construction activity undertaken by or on behalf of telecommunication service providers. A substantial proportion of telecommunications equipment is purchased to be integrated within telecommunication structures such as transmission towers and telecommunication networks. The satellite account treats spending on construction activities which are integral to the operation of telecommunication equipment as part of ICT output, value added and gross fixed capital formation. In practice, this means that the following are included:

- mobile phone, radio, television, microwave and radar transmission towers, telephone lines and underground cables, coaxial cables

APPENDIX 2 CLASSIFICATIONS AND SCOPE *continued*

ICT PRODUCTS *continued*

- the full value of work done on the design and construction of telecommunication networks, including the purchase of equipment which is installed as an integral part of the network.

An alternative would have been to include only the ICT equipment and to treat the construction activity as a building and construction product outside the scope of ICT output, value added and gross fixed capital formation. This would be more in keeping with the common conception of the nature of ICT products. It can be difficult to draw the boundary and in this case the deciding factor is that the construction activity creates a structure that typically can only be used for telecommunication purposes. In the ASNA, the value of this activity is included with the communication services industry.

While the list of ICT products in Appendix 3 represents the scope of the ICT satellite account, it has not been possible to collect or present data at this level of detail. In general, the main categories of ICT products used in the satellite account are:

- Computer hardware
- Telecommunication assets
- Computer software – packaged
- Computer software – customised
- Computer software – own account
- Computer services
- Telecommunication services
- Wholesale and retail trade margins

VALUATION OF PRODUCTS – TREATMENT OF DISTRIBUTION MARGINS

Wholesale and retail margins on ICT products are subject to a special treatment in supply and use methodology. While the margins are listed as service products in their own right, they also form part of the value of the underlying good as far as the purchaser of the good is concerned. Supply and use tables distinguish between the 'basic price' and the 'purchasers' price' of products. The basic price is relevant to the producer or the importer of the ICT good and represents the factory gate or landed value of an ICT product such as a computer. Trade and transport margins and taxes on products (such as GST) must be added to get to the value paid by the purchaser.

Satellite account tables relating to the production, gross value added and import of ICT products are expressed at basic prices and distribution margins are treated as separate products. However, tables relating to investment or consumption of ICT products are expressed at purchasers' prices, so the distribution margins become incorporated (along with product taxes) in the overall value of the underlying product.

ICT INDUSTRIES

The scope of 'ICT industries' relates closely to the set of ICT products previously defined. ANZSIC, the industry classification used in the ASNA, is a 'statistical units' based classification. Individual entities (interpreted widely to include government departments and non-profit institutions) are assigned an appropriate industry category on the basis of their predominant activity. For example, a business providing predominantly communication services would be classified to the communication services industry. It may also produce secondary products other than communication services and these would also be included in the output of the communication services industry. Equally, some businesses may produce communication services as a secondary activity that would be reflected in the output of the industry to which its primary activity is classified. Although industry data based on a units approach has some analytical disadvantages, its major advantage is that it accords with real world businesses and the data they can provide to statistical agencies.

APPENDIX 2 CLASSIFICATIONS AND SCOPE *continued*

ICTIS INDUSTRIES

ICTIS 2002–03 is a major data source for the satellite account and covers the main industries involved in the production and distribution of ICT goods in Australia. It is a units based view as described above and its scope is broadly consistent but not identical with the OECD ICT Sector definition. As described in the section on ICT products, the Australian definition only includes ICT products if they are able to be networked or are components of products that can be networked. Units that manufacture or distribute products such as industrial process equipment are included in the OECD classification but excluded from the ABS classification. The ABS classification takes Australian circumstances into consideration and has been agreed to by major policy and industry organisations in Australia for use in the regular ICT surveys.

The list below describes the ANZSIC classes in scope of the ICTIS collection.

ABS Classification of ICT Industries (by ANZSIC Class) – as used in ICTIS

Class 2841 Computer and business machine manufacturing

Class 2842 Telecommunication, broadcasting and transceiving equipment manufacturing

Class 2849 Electronic equipment manufacturing n.e.c.

Class 2852 Electric cable and wire manufacturing

Class 4613 Computer wholesaling

Class 4614 Business machine wholesaling n.e.c.

Class 4615 Electrical and electronic equipment wholesaling n.e.c.

Class 7120 Telecommunication services

Class 7831 Data processing services

Class 7832 Information storage and retrieval services

Class 7833 Computer maintenance services

Class 7834 Computer consultancy services.

The recorded media manufacturing and publishing industry (ANZSIC 2430) has been excluded from the classification of ICT industries as used by ICTIS because it primarily engages in the reproduction of content, rather than carrying out functions of information processing and/or telecommunication. Nevertheless, it does have significant income relating to the production of packaged software and data are therefore collected in ICTIS, but shown separately from the ICT industries. In the satellite account it is included in the economy-wide ICT industry (explained below).

ICT SPECIALISTS AND NON-SPECIALISTS

Within these 'ICTIS industries', businesses are further classified as either ICT specialists or non-specialists. This affects some businesses in industries in the ICT Manufacturing and Wholesale trade industry groupings only. Businesses in these industries are defined as ICT specialists if more than 50 percent of their income is derived from production of ICT outputs. Businesses in the other ANZSIC classes mentioned above are defined as ICT specialists regardless of the source of their income.

ECONOMY-WIDE ICT INDUSTRY

An alternative view is to group all similar activities together as an 'industry', regardless of whether the ICT products are produced as primary activities of businesses that are commonly thought of ICT producers, or as secondary activities of businesses that are not regarded as ICT producers. For example, ICT products such as software produced as a secondary activity by businesses (and government organisations) outside the ICT industries would be included. Likewise, non-ICT products produced by ICT specialist industries would be excluded. This leads to a wider definition of the 'ICT industry'. The disadvantage of this view is that estimates of ICT gross value added on this basis require use of assumptions because it is not possible to collect all the required information on the costs of producing ICT products or the value of output.

APPENDIX 2 CLASSIFICATIONS AND SCOPE *continued*

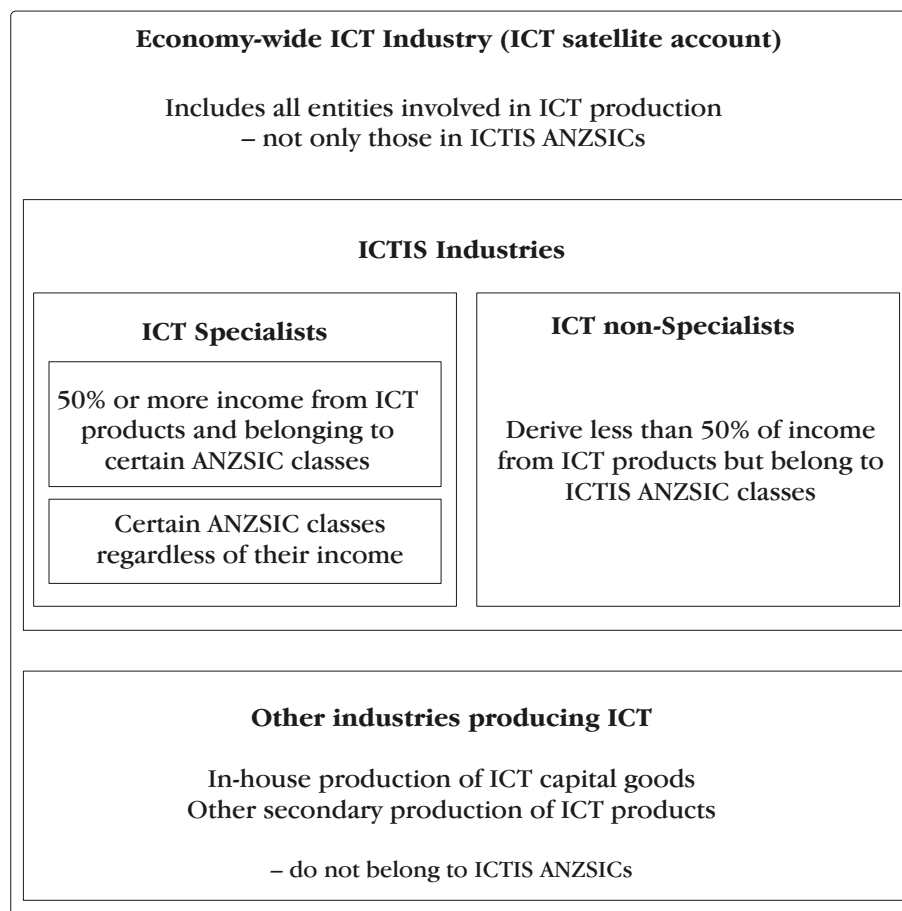
ECONOMY-WIDE ICT INDUSTRY *continued*

This wider activity concept of an ICT 'industry' is clearer in practice where it involves actual sales of ICT products. Defining the boundary becomes more complicated where ICT goods and services are produced in-house for own use. For example, a bank (classified to the financial services industry) may use its own employees to provide help desk services, data processing, system maintenance and software development, etc., or it may purchase these services from other businesses. Where these services are purchased, and regardless of the source of the purchase, they become part of the economy-wide ICT industry for inclusion in the satellite account. In the national accounts, goods and services produced for own use are not regarded as part of output where they are consumed as part of the process of producing other goods and services. In that case their value is reflected in the other outputs of the business, in this example financial services. However, where the in-house ICT products are in the nature of gross fixed capital formation, for example software development, they are included as products in their own right in the national accounts.

In principle, the scope of the ICT satellite account could conceivably be defined to include all ICT activity including in-house activity. Using the above example of a bank, help desk activities could be separately valued and included as part of ICT output and value added. The services would be deemed as being both 'sold' and then 'purchased' by the bank for input to the production of financial services. However, this quickly becomes an artificial construct. Businesses make different decisions about which functions to outsource and which to provide in-house across a whole range of activities, including accounting, payroll, transport, storage, recruitment and so on. In practice, it is not possible to collect the information required or to satisfactorily value such activities provided in-house.

An 'economy-wide' scope is adopted in the satellite account. However, ICT products produced in-house for own use are excluded from the output and use of ICT products, apart from in-house production of ICT capital goods (software and telecommunication assets). A schematic presentation is shown below.

SCHEDULE OF ICT-PRODUCING INDUSTRIES



ECONOMY-WIDE ICT
INDUSTRY *continued*

This diagram shows a hierarchy of ICT-producing industries relevant to ABS surveys. The 'Economy-wide ICT Industry' view used in the satellite account includes all entities involved in ICT production. However, only production of ICT products is in scope of the satellite account and production of non-ICT products is excluded.

EMPLOYMENT

The satellite account uses employment data from two sources: ICTIS and the ABS Labour Force Survey (LFS). LFS data include those used in a feature article '*Employment in Information and Communication Technology (ICT)*' as published in the January 2005 edition of *Australian Labour Market Statistics* (cat. no. 6105.0). LFS is a household-based survey. While LFS is the preferred source of employment data, the model used to estimate production of own account software requires an estimate of workers engaged in production of customised software and ICTIS is the data source best able to satisfy this need. Consequently, the satellite account has used both LFS and ICTIS employment data.

Both LFS and ICTIS data relate to 'employment numbers' which equates to 'employed persons'. Employed persons include both employees and the self-employed – the latter is made up of employers, own account workers and contributing family workers.

ABS collections use *Australian Standard Classification of Occupations (ASCO) Second Edition* (cat. no. 1220.0) to classify occupations according to skill level and skill specialisation.

The LFS-based numbers for 'ICT employment' relate to the following ASCO classes:

- 1224 Information technology managers
- 2231 Computing Professionals
- 3294 Computing support technicians

EMPLOYMENT *continued*

ASCO class 2231 includes the following types of workers:

- Systems managers
- Systems designers
- Software designers
- Applications and analyst programmers
- Systems programmers
- Computer systems auditors
- Computing professionals nec (e.g., computer analyst, database analyst, LAN controller)

ICTIS 2002–03 collected 'ICT employment', which includes the following types of workers but excludes data entry and call centre staff:

- Information technology managers
- Electronics engineers
- Systems managers and administrators
- Systems analysts, designers and programmers
- Applications and analyst programmers
- Computer and communications technicians
- Help desk staff

Overall, a broadly similar concept of 'ICT employment' applies in ICTIS and LFS data.

APPENDIX 3 ABS CLASSIFICATION OF ICT PRODUCTS

COMPUTER HARDWARE

Multiple-user computers:

Mainframe, mini- and super-computers

Computer file servers and other multiple-user computer hardware

Personal computers:

Laptops, notebooks, personal digital assistants (palm tops/hand-held electronic organisers) and similar portable computers

PCs and similar desktop computers

Other personal computers

Computer peripherals and consumables:

Laser and other printing/plotting systems

Other peripherals (including monitors, keyboards, computer mice, joysticks and other pointing devices, scanners, bar-code readers, web cameras, computer speakers and microphones, drives, burners)

Consumables (including removable storage media)

Other computer parts and accessories

TELECOMMUNICATION EQUIPMENT

Telephone and telegraphic equipment (including electrical line, electronic switchboards, communication servers, modem equipment, telephones, teleprinters and telephone facsimile machines):

Carrier telephone and telegraph equipment

Main exchange switching equipment

Electronic switchboards:

Processor or micro processor

Other electronic switchboards n.e.c.

Data modem equipment/multiplexors

Telephones (exclude radio-telephony such as mobile, cellular and car phones)

Mobile, cellular and car phones

Teleprinters and telephone facsimile machines

Other telephone and telegraph equipment (exclude parts)

CB and other mobile radio transceiving equipment

Radio reception apparatus and other fixed premises radio transceiving equipment

Relays and relay sets for radio, telephone and telegraphic equipment

Satellite equipment

Other communication equipment and parts

COMMUNICATION CABLE AND WIRE

Insulated wire, cable and optical fibre for computers/communication purposes:

Coaxial cable

Twisted pair cable

Optical fibre cable

Other wire/cable

RECORDED MEDIA

CD-ROMs

Other prerecorded computer tapes or disks

COMPUTER SOFTWARE AND OTHER COMPUTER SERVICES

Packaged software

Customised software services and solutions

Web site design

Other Internet applications

Other customised software services

Software maintenance services

Other computer consultancy services

Hardware installation, repair and maintenance services

APPENDIX 3 ABS CLASSIFICATION OF ICT PRODUCTS *continued*

COMPUTER SOFTWARE AND OTHER COMPUTER SERVICES *continued*

Data processing services
Information storage and retrieval services
Other computer services
Whole ICT business functions (bundled services)

TELECOMMUNICATION SERVICES

Basic telephony services
Mobile and paging services
 Short messaging services (SMS)
 Other mobile and paging services
Data and text services
Other telecommunication services
 Intercarrier charges
 Satellite services
Other

INTERNET PROVIDER SERVICES

Internet services
 Broadband Internet services
 Other Internet services

ADDITIONAL ICT PRODUCTS IN SCOPE OF ICT SATELLITE ACCOUNT

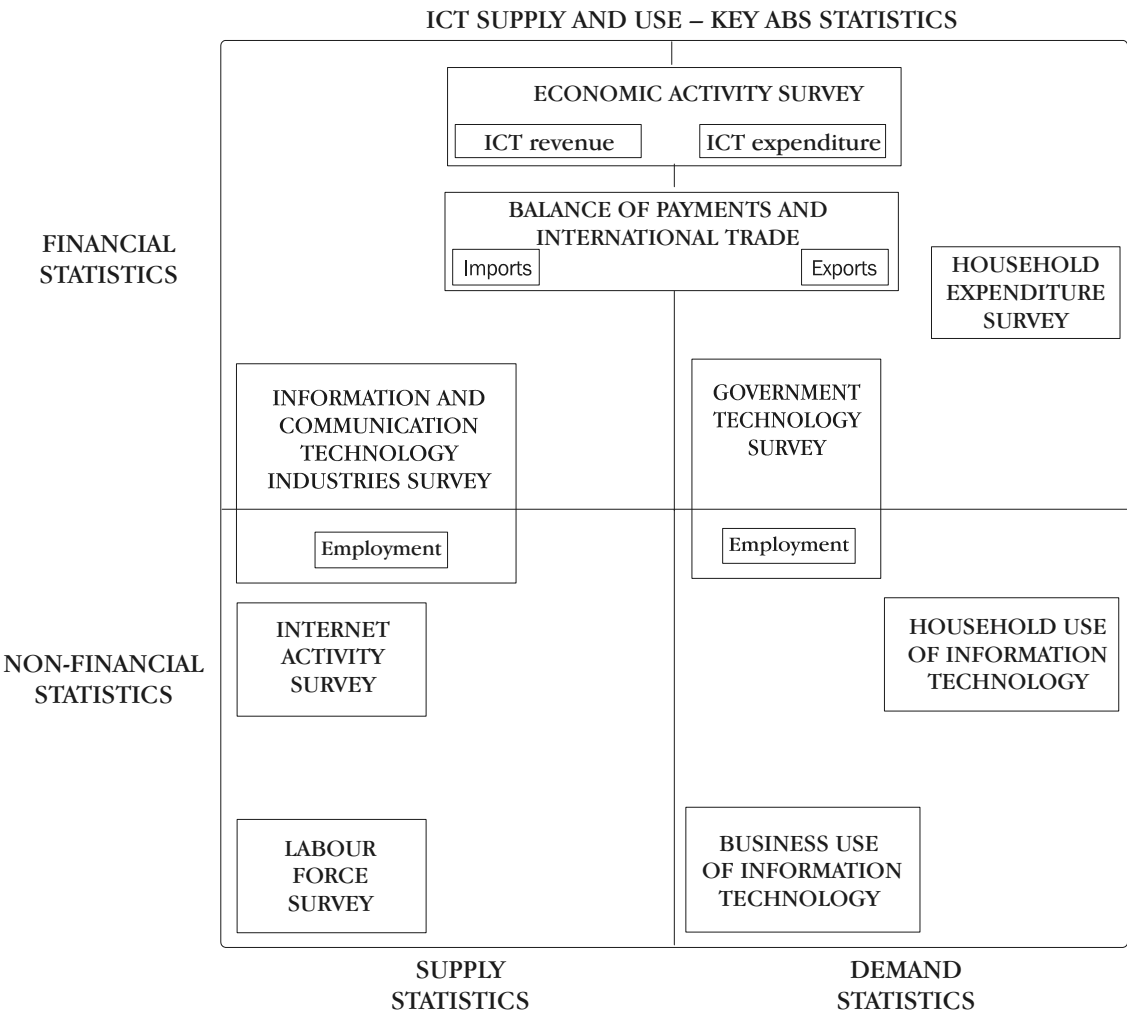
Margins relating to wholesaling and retailing of ICT goods
 Computer hardware, parts, components and consumables
 Communication hardware, parts, components and consumables
 Sales and licensing of packaged software
Own account computer software
 Software produced on own-account for own use
Telecommunication assets
 Structures integral to the functioning of telecommunication equipment e.g. towers
 and other structures supporting mobile phone and other telecommunications.

APPENDIX 4 DATA SOURCES

INTRODUCTION

The ABS has invested considerable resources in establishing and maintaining a comprehensive, high quality suite of ICT statistics. These statistics provided the basic building blocks of the ICT satellite account. They were supported by ABS Balance of Payments (BOP) and International Trade data, and by the annual Economic Activity Survey (EAS) that collected a range of ICT-related data items for the reference year 2002–03.

The following diagram provides an overview of ABS statistics used in the ICT satellite account. It describes whether the source primarily provided financial or non-financial information, and whether the source supported supply-side or demand-side (or both) estimates of ICT.



The remainder of this section describes the main data sources used in the satellite account, along with details on the specific use made of each source.

INFORMATION AND COMMUNICATION TECHNOLOGY INDUSTRIES SURVEY (ICTIS)

This is a biennial survey collecting data on the production and distribution of ICT goods and services by businesses in Australia. Its scope relates to a set of goods and services considered to be 'ICT' in nature. The scope of these products has been agreed to by major policy and industry organisations within Australia and is described in Appendices 2 and 3. This survey targets specific businesses where it is known that significant ICT production occurs, that is, those businesses recorded on the Australian Business Register (ABR) which are classified to the group of ANZSIC classes as described in Appendix 2.

APPENDIX 4 DATA SOURCES *continued*

INFORMATION AND COMMUNICATION TECHNOLOGY INDUSTRIES SURVEY (ICTIS) *continued*

By targeting these industries (manufacturers of ICT goods, wholesalers of ICT goods, and providers of computer hardware and software-related services and telecommunication services) ICTIS captures information on the most significant producers of ICT products in Australia. However, by restricting the scope to a relatively narrow range of industries, ICTIS does not capture ICT-related activity where such activity is a secondary activity of a business.

ECONOMIC ACTIVITY SURVEY (EAS)

The ABS conducts an economy-wide annual survey (EAS) covering non-general government units. Data directly collected by the ABS are combined with income tax data provided by businesses to the Australian Taxation Office (ATO) to create a comprehensive data source. The survey collects a range of data, including details on business income, expenses and capital formation. Results are produced by ANZSIC industry and are a key input to the core national accounts.

EAS also provided information on business usage of ICT-related products. EAS 2002–03 collected the following ICT-related data items: telecommunication expenses; expenses related to ICT contractors and consultants; computer software purchases expensed; computer software purchases capitalised (including, separately, capitalised own account computer software); and capital expenditure on communications equipment and computer hardware (including computer peripherals).

GOVERNMENT TECHNOLOGY SURVEY (GTS)

Australia is one of the few countries that comprehensively measures the use of ICT by general government units. *Government Technology* (cat. no. 8119.0) presents data on use of ICT by federal, State/territory and local general government organisations. GTS 2002–03 was a significantly enhanced collection in comparison to previous ABS surveys of ICT use by general government and collected a similar range of ICT data to EAS 2002–03. Significantly, the scope of GTS 2002–03 was extended to include general government educational organisations.

The following data items were used in the ICT satellite account: ICT employment; telecommunication expenses; expenses related to ICT contractors and consultants; computer software purchases expensed; computer software purchases capitalised (including, separately, capitalised own account computer software); capital expenditure on communication equipment; and capital expenditure on computer hardware (including computer peripherals).

HOUSEHOLD USE OF IT SURVEY (HUIT)

Household use of Information Technology (cat. no. 8146.0) publications for 2002 and 2003 presented a range of information related to household use of computers, the Internet and other technologies. This information was used to support assumptions made in various modelling exercises conducted in the compilation of the satellite account, and in validating ABS Household Expenditure Survey (HES) estimates of household spending on ICT products. HUIT does not collect data on household spending on ICT and so otherwise had limited use in the satellite account.

BUSINESS USE OF IT SURVEY (BUIIT)

Business Use of Information Technology (cat. no. 8129.0) publications for 1997–98, 1999–2000 and 2002–03 presented a range of information on business use of computers, the Internet and other technologies. BUIIT information was used to show changes in business use of selected technologies, by industry, across a number of years. BUIIT does not collect information on business spending on ICT and so otherwise had limited use in the satellite account.

INTERNET ACTIVITY SURVEY (IAS)

The Internet Activity Survey is a census of Internet Service Providers (ISPs), now conducted annually, that collects details on various aspects of Internet access services. It provides information on the number and characteristics of Internet subscribers and on the volume of data downloaded – by access technology and by subscriber type.

APPENDIX 4 DATA SOURCES *continued*

INTERNET ACTIVITY SURVEY (IAS) <i>continued</i>	IAS does not collect financial information, which limited its use in the ICT satellite account. However, it provided data used in estimating the breakdown of ISP spending between household and non-household units.
BALANCE OF PAYMENTS AND INTERNATIONAL TRADE	The ABS compiles statistics on the import and export of goods using information supplied by exporters and importers (or their agents) to the Australian Customs Service (ACS). Information on the import and export of services is sourced from the ABS Survey of International Trade in Services. For imports and exports of ICT products, the range of goods and services considered to be 'ICT' is consistent across ICTIS, the ICT satellite account and ABS Balance of Payments and International Trade.
SURVEYS OF RESEARCH AND EXPERIMENTAL DEVELOPMENT (R&D)	The ABS collects information on business and government R&D expenditure across major R&D fields. The R&D fields of relevance to the ICT satellite account are: computer software; communication technologies; and other information, computing and communication sciences.
HOUSEHOLD EXPENDITURE SURVEY (HES)	<p><i>Household Expenditure Survey: Detailed Expenditure Items, 2003–04</i> (cat. no. 6535.0.55.001) presents information about the expenditure, income and characteristics of households resident in private dwellings throughout Australia for 2003–04. HES data supported the following estimates of HFCE in the satellite account: computer hardware; telecommunication equipment; packaged computer software; Internet provider services; and other telecommunication services.</p> <p>HES and the satellite account relate to different reference periods, however no adjustment has been made to account for the likely price and volume effects. These effects are difficult to accurately account for and the combined price and volume impact is thought to be relatively small.</p>
LABOUR FORCE SURVEY (LFS)	LFS supplies key data on ICT-related employment. It collects employment data by occupation type and by industry of employment. These data are of interest in their own right and also supported modelling exercises used to generate estimates of own account production of computer software in the satellite account.

APPENDIX 5 METHODOLOGICAL ISSUES

COMPUTER SOFTWARE

The release of SNA93 with its recommendation that statistical agencies treat computer software spending by producers as gross fixed capital formation rather than intermediate consumption expenditure brought into focus the understanding and measurement of computer software. The intangible nature of software, the ways in which it is produced and copied under licence, and deficiencies in business accounting for software have provided significant conceptual and measurement challenges for official statisticians.

There has been considerable work undertaken recently towards developing an understanding of, and consensus on, how software production and distribution should be treated in the national accounts and how some of the practical data difficulties might be overcome. Key international forums advancing this work include the OECD's Task Force on Software Measurement in the National Accounts (hereafter referred to as the OECD software task force) and the Canberra II Group on the Measurement of Non-Financial Assets.

This appendix describes the concepts and methods used to generate estimates of software supply and use for the various types of software included in the satellite account. It describes the notion of a software 'original' within a broader discussion of the production of packaged software. Two areas of interest associated with packaged software are the treatment of computer games, and data collection difficulties caused by the widespread practice of selling computer hardware and software as a 'bundle'. A brief description of relevant issues is provided. Australian production of software relates mainly to customised software and own account software. Measuring the latter presents a considerable challenge to national accountants and detailed attention is provided in this appendix on the estimation methods used in the satellite account. Finally, this appendix describes how gross fixed capital formation on computer software has been derived within the supply and use balancing process, and how industry-based estimates of gross fixed capital formation on computer software were produced.

Software originals

Broadly speaking, software can be divided into original software and reproduced software. Original software can be created for the purpose of reproduction (of so called packaged software), for on-sale, or it can be used for direct input into the creation of goods and services more generally, including other software. As mentioned, software can be readily reproduced at minimal cost and on-sold to others. This characteristic underlies much of the debate about its treatment in the national accounts.

Packaged software: the production process and accounting for licence payments

It is helpful to describe how packaged software is typically produced and how this production process is treated within the framework of the national accounts.

Packaged software generally reaches its buyer through a three stage process. The software production process commences with the creation of an 'original' piece of software which is clearly an asset and is treated as gross fixed capital formation as long as it is used in production for longer than one year. The second stage relates to reproduction of the software 'original'. The vast majority of packaged software purchased in Australia is copied from an overseas-produced original. The reproduced software may be imported in a 'boxed' format (i.e. disk(s), manuals and packaging) though increasingly, a copy of the 'original' is sent over the Internet or provided on disc and reproductions of this 'original' are then made in Australia. In the latter case, licence fees or royalties are paid to facilitate reproductions of the 'original' ('licence to reproduce'). In Australia, reproduction of the 'original' is typically organised by a wholesaler. The third stage in the software production process involves the software user securing use of the reproduced copy through 'licence to use' payments.

In the national accounts and the satellite account, payments relating to licences to reproduce and licences to use receive different treatments. SNA93 recommends that 'licence to reproduce' payments be treated as intermediate consumption by the licensee and as service income by the owner of the original (paragraph 6.146). They represent

Packaged software: the production process and accounting for licence payments continued

payments for capital services rendered by the software original and are not considered to be investment spending.

The more difficult issues surround the treatment of licences to use software. Software can be 'purchased' in many different ways but typically the owner of the original will retain certain rights over the use of the software. Notwithstanding these conditions, software copies can be purchased outright in the form of a once only payment of a licence fee, or of regular licence payments that may or may not include the provision of updates and other services such as help desk. Recent international discussions by an OECD software task force considering the update of SNA93 concluded that the use of software copies by the final user should be treated as investment if this user is a business or government unit who intends to use the software for longer than one year. It should be treated as final consumption expenditure if it is purchased by a household. In all cases, the software copy is regarded as separate to the original.

The value of packaged software to be recorded as gross fixed capital formation is straightforward where a once only payment for the use of the software is made, as the payment can be considered the market value of the asset. However, there are complications in situations where contracts require regular licence payments to be made. The OECD software task force report identified three different scenarios:

- initial payment followed by smaller maintenance updates payments. In this case the up-front payment can be considered the initial acquisition cost and the series of smaller payments are for the rights to updates. Both payments are treated as gross fixed capital formation.
- regular annual payments. Where the contract requires regular payments over the expected lifetime of the asset it has the characteristics of a finance lease and the software is therefore considered to be the gross fixed capital formation of the lessee. Where the contract agreement is only for one year but annual payments are made to extend the licence, the situation is more akin to an operating lease where the lessee acquires a service from the lessor. However, the task force concluded that if the intent was for the lessee to use the asset for more than one year (i.e. renew the licence) then it should be regarded as gross fixed capital formation of the end user.
- licences of less than one year – the software is treated as consumption expenditure of the licence holder.

Bundling of packaged software

In many cases, vendors sell computer hardware and computer software together as a 'bundle' and the purchaser will not necessarily know how much of the purchase price relates to the computer software component as opposed to the computer hardware component. When reporting spending on computer hardware and computer software to ABS surveys, respondents are asked to estimate the relative proportions of a bundled purchase. However, in some cases respondents are unable to do this and the combined total is then simply reported against computer hardware. The practice of 'bundling' will lead to some understatement of reported computer software spending and corresponding overstatement of computer hardware spending.

Computer games

There are no international standards or guidelines on whether computer games should be included in the definition of 'computer software'. While there are arguments either way, in principle we would prefer to exclude them from the ICT satellite account, although in practice this can only be done in a limited way. One reason for the 'in principle' decision is that the same software will drive applications run on a range of different platforms, some of which are clearly not computer hardware according to internationally accepted product definitions. Also, while some games can be networked, many are not.

Australian production

Australian production of software occurs in all industries, including government administration. While much of this is centred around the ICT specialist industries (where customised software is mainly produced), substantial amounts are also produced in other industries, especially own account software. It is this latter component that causes the most difficulties.

ICTIS is the source of information for software production by the computer services industry grouping, with estimates based on revenue from the provision of software services. It also provides information for the manufacturing industry which contributes to software production through copying and packaging of software.

Customised software

Customised software is generally produced under contract to a particular client rather than being intended for reproduction. It is generally provided by businesses in the computer services industry and one practical issue is establishing the boundary between software production and computer services more generally. Typically, the following services are provided within the computer services industry:

1. Customised software services and solutions (including web site design and other Internet applications)
2. Computer systems analysis
3. Software maintenance
4. Computer hardware consultancy
5. Computer hardware maintenance and repair
6. Disaster recovery
7. Data processing services
8. Computer time sharing
9. Information storage and retrieval

Category 1 relates to customised software. Category 2 includes such things as functional analysis and detailed analysis, and is considered largely related to customised software. Much of software maintenance (Category 3) is in reality an improvement to existing software (since software does not wear out like tangible capital goods) and could also be considered a customised software product. The remaining categories making up 'computer services' do not relate to the creation of software.

Although ABS surveys ask for details of income from businesses in the computer services industry, in some cases they are unable to itemise their receipts to accurately identify the customised software service component. In these cases, it was necessary to estimate the proportion of total computer service income relating to customised software. For example, ICTIS provided information on income from web site design, other Internet applications and other customised software services. These are all considered to be related to customised software. ICTIS also captured income from 'other computer consultancy services'. Based on a general understanding of the composition of this item, 60% of this category was allocated to customised software production.

Own account software

Own account software describes that software developed by an entity's own employees for its own use. It is valued according to its estimated market value, or if this is not possible, the market value is approximated by summing the costs of production (including both labour and non-labour costs, and consumption of fixed capital). Own account software is regarded as being produced by the business or government entity and is therefore part of its output and gross value added. As it is a capital item produced for own use, it is also regarded as gross fixed capital formation by that business or government entity. Own account software ranges from the development of large scale systems in large organisations to small scale building of databases around packaged software. In that sense all industries contribute to the wider 'economy-wide ICT industry' and are included in the scope of the satellite account.

Own account software *continued*

In principle, both own-account and customised software under development should be recorded as work in progress until finished and available for use. At that point, both become part of gross fixed capital formation. In practice, data constraints mean it is most likely that gross fixed capital formation will be recorded as work progresses. This is the approach used in the satellite account.

Deriving values for own-account software production of industries outside the computer services industry grouping is a vexed issue. ABS and international experience has been that it is not possible to collect satisfactory information directly from businesses on the costs of own-account software development. During the collection of EAS and GTS 2002–03, Australian accounting standards in force at that time allowed for the recognition of internally generated intangibles as assets. Nevertheless, accounting practice was mixed. ABS experience from EAS 2002–03 was that only very large, discrete software developments had a strong chance of being capitalised and therefore the reported EAS value was substantially understated. On the other hand, general government sector units were more likely to record internally generated software as assets. The latest International Accounting Standards generally prohibit the recognition of internally generated intangible assets and so the costs are now likely to be written off, generally indistinguishably from other business expenses. The adoption by the Australian Accounting Standards Board of the International Accounting Standards from 2005 means that internally generated software will now be recognised in business accounts as assets only under very restrictive circumstances.

In recognition of these practical data collection problems, the OECD software task force recommended that:

'...In practice, business reports on software capitalisation underestimate software capitalisation and may be affected by changes in tax regulations and business practices. As a consequence, member countries are recommended to implement an estimate of gross fixed capital formation in software independent from the estimate derived from business reports on capitalised software.'

The task force further recommends an indirect macro-approach to the estimation of own account software using data on the number of software professionals and other information. That is:

'...best practice for the estimation of own-account software investment at macro level is the following;

1. Estimate the labour cost of own-account software

= Labour cost of software professionals (number of software professionals * Average compensation).

Adjustment 1: Exclude labour cost linked to the production of software to be sold (however, do not exclude labour costs for originals for reproduction).

Adjustment 2: Exclude labour cost linked to other activities (maintenance, management, etc.).

2. Add non-labour costs of own-account software (intermediate consumption, consumption of fixed capital and net operating surplus).

Adjustment 3: in adding non-labour costs, avoid double counting costs that have already been recorded as purchases.

This approach is essentially that used in the ASNA and in the satellite account. The exception being that the value of output (and investment) estimates used here and in the ASNA do not include an imputation for consumption of fixed capital and net operating surplus. Insufficient data exist to reliably estimate these components and the valuation therefore falls somewhat short of a full market price equivalent. The estimates for investment in own account software included in the satellite account were

Own account software *continued*

introduced into the ASNA 2004–05 release in late 2005. Previous estimates in ASNA were based solely on labour costs.

The method used to derive estimates of own account software in the ASNA and in the satellite account involves many assumptions and approximations and the estimates should be regarded as 'indicative' only. The method is described in some detail below.

OPERATION OF THE OWN ACCOUNT SOFTWARE ESTIMATION MODEL

The five step model described below was used to generate own account software estimates for all sectors. Estimates for general government – based on adjusted GTS data – were then deducted from this total to derive the estimate for private/public businesses. As mentioned earlier, this residual estimate is significantly higher than that directly collected from businesses in EAS 2002–03.

Step 1. Number of software professionals:

The starting point is estimating the number of software professionals employed. In Australia, LFS collected total number of 'computing professionals' (ASCO 2231) employed in 2002–03. The LFS figure includes contractors who are, technically, self employed.

Step 2. Proportion of time 'software professionals' spent writing software:

Persons classified as 'computing professionals' will not spend all their time working on software development. Also, not all stages in the development of a software product should be considered part of the valuation of the final product. The OECD software task force has described the following stages in building software:

1. Feasibility analysis
2. Functional analysis
3. Detailed analysis
4. Programming
5. Tests
6. Documentation
7. Training
8. Maintenance

According to the software task force, only those costs associated with stages 2 – 6 should be included in the value of the own account software asset. Activities such as LAN administration, help desk operation, IT security and so on are excluded. In addition, there are other non-software related activities undertaken by 'computing professionals' such as those associated with hardware architecture and maintenance.

An important input to the own account software estimation model is the proportion of time computing professionals spend writing this type of software. Case studies of several large organisations were used to estimate this proportion.

Step 3. Estimate (and remove) time spent producing software for market output:

Of those computer professionals assumed to be producing software, a proportion will already be contributing to the market output of businesses in ICT specialist industries and will therefore need to be deducted to avoid double counting with customised software. ICTIS publishes estimates of 'ICT employment numbers' for each ICT specialist industry and this source was used to make an appropriate deduction. An estimate of ICT employment associated with production of customised software was then required.

The ICTIS definition of ICT employment includes all those:

'...who spent the majority of their time engaged in ICT activity and includes help desk staff, information technology managers, electronics engineers, systems managers, administrators, analysts, designers and programmers, application programmers and computer and communications technicians. Data entry and call centre staff are excluded.'

Own account software continued

This ICTIS measure is therefore broader than ASCO 2231, but since only ICT employment of the computer services industry was used in the calculation of customised software, the correspondence should be quite reasonable (the computer services industry will, for example, employ minimal numbers of telecommunication technicians).

Employment related to writing software for own use is therefore derived as employed 'computing professionals' (ASCO 2231) from LFS, less ICTIS-based 'ICT employment' in the computer services industry.

We can be certain that these persons are not exclusively engaged in writing software and, as stated, we estimated the proportion of time that computing professionals spent writing own account software.

Step 4. Apply earnings data to time spent producing own account software:

Using these assumptions, and using an average weekly wage cost derived from the Survey of Employment, Earnings and Hours for ASCO 2231, the salary cost directly associated with production of own-account software is derived.

Step 5. Estimate relevant non-labour costs:

In addition to labour costs, related non-labour costs need to be incorporated in order to produce estimates on a 'sum of costs' valuation. Again, there is limited information available to do this, and an analysis of several large own account software developments was undertaken to determine the ratio of wage costs to related non-wage costs for this type of work.

Imports and exports

The OECD software task force identified a number of ways in which software can be traded internationally:

- Physical disc (including manuals) where valuation is based on the medium rather than how it is used
- Installed on equipment
- Physical or on-line copy where licences are paid to use one or multiple copies
- Physical or on-line copy for reproduction and on-selling (including bundled with hardware)
- Customised software in physical format
- Informal purchases on-line
- International transactions between affiliated businesses.

These transactions may be recorded as trade in goods or services, including licence and royalty transactions. This can contribute to measurement difficulties and will lead to understatement where customs information alone is taken into account. The ABS takes account of associated services flows through its Survey of International Trade in Services, though the capturing of these flows is not straightforward.

Supply and use of software

Although the ABS collects a wealth of ICT-related data compared with many countries, the nature of software means that more than the usual amount of judgement and approximation were needed to integrate the data within the supply and use framework. This problem has been recognised internationally, as many countries have observed substantial differences between data for the supply of software into the economy and data for purchases of software by businesses, government and households. Particular problem areas identified relate to the difficulty of measuring imports and the production of own account software on the supply side, and the tendency for business surveys (such as EAS) to understate business and government investment on the use side.

Broadly, the approach adopted for valuing software in the satellite account has been to examine and confront the data available from the various sources and, after investigation, make judgements about what data are likely to be of the highest quality. These data are given preference and are used as benchmarks to adjust data considered of lower quality

*Supply and use of software
continued*

or to derive some items as a residual. Generally, the estimates of supply into the economy have been used to benchmark the data for use of software and gross fixed capital formation has been derived as a residual.

*Gross fixed capital formation,
by industry*

Estimates of gross fixed capital formation by industry have been derived for own account software and for purchased (packaged and customised) software. The industry estimates for own account software are based on LFS employment numbers for 'computing professionals', after deducting an estimate of numbers of workers engaged in customised software production. The industry estimates for gross fixed capital formation of purchased software are necessarily based on the directly collected (EAS and GTS) investment data--adjusted to the benchmark derived from the supply side on a pro rata basis.

COMPUTER SERVICES

'Computer services' as a product in the satellite account covers a range of activities, including maintenance and repair of ICT products, disaster recovery, data processing services, computer time sharing, information storage and retrieval and help desk functions. The prime data source for information on computer services (ICTIS) includes customised software solutions within its broader description of 'computer services'. In the satellite account, 'computer services' excludes production (including enhancement) of computer software.

Separating 'customised software' solutions from 'computer services' is a necessary step, since the national accounts treat customised software as a capital item and spending on computer services as intermediate and final consumption. They are separate ICT products. Issues relevant to this step are described earlier in this appendix.

In relative terms, imports are not overly significant to the supply of computer services, and the estimate of domestic production therefore represents the majority of supply of computer services. Supply side estimates have a much firmer basis than do the demand side numbers and they therefore underpin the estimates on the use of computer services. Households consume relatively small amounts of these services, with the largest proportion being consumed by business and government units as a current expense. Exports of computer services are thought to be relatively small. Since we do not have information on business and government spending on computer services, intermediate consumption has been derived as a residual.

The industry-based estimates of intermediate consumption of computer services are derived using a composite indicator of industry activity made up of industry data on net capital stock of computer hardware, net capital stock of computer software, and industry expenditure data (from EAS and GTS) on ICT contractors and consultants. All three factors are equally weighted to form an indicator that is applied to the Australia total.

*Understatement adjustment
applied to ICTIS data*

Because ICTIS includes only employing businesses, it was decided to include an upwards adjustment to certain ICTIS results to estimate for the contribution of non-employers. The ABS undertook a study to establish the extent of non-employers in industries covered by ICTIS. Such a study is only indicative and drawing firm conclusions can be difficult. Nevertheless, it provided a very useful broad indication of the likely understatement, especially when combined with an informed view of business structures typically used within these industries. For example, it is clear that the provision of telecommunication provider services is dominated by large, employing firms and we are comfortable in concluding that no adjustment to ICTIS data for non-employers was required for this industry.

*Understatement adjustment
applied to ICTIS data continued*

It is clear that significant numbers of non-employers operate in the computer services industry. Therefore, for the purpose of the satellite account, an 8 per cent upward adjustment based on the study mentioned above has been applied to the ICTIS figures for computer services income of the computer services industry. No adjustments for non-employing businesses have been made for any other industry.

TELECOMMUNICATION SERVICES

Broadly defined, 'telecommunication services' is made up of 'phone carrier services' and 'Internet provider services'. The supply and use of each of these components has been independently derived and is described below.

Phone carrier services

Phone carrier services represent the largest single ICT item in Australia. Australian production primarily occurs in the telecommunication services industry, with minor contributions from ICT wholesalers and the computer services industry. Estimates of Australian production of phone carrier services are derived from the ICTIS collection which provides a breakdown of the various types of phone carrier services including, for example, data and text services, short messaging services (SMS), other mobile and paging services, as well as basic telephony services. Estimates of international trade in these services are generated within the BOP system, while HFCE of phone carrier services has been estimated using the 2003–04 HES.

Intermediate consumption of phone carrier services by business and government has been collected through the EAS and GTS collections. However, supply side and HFCE estimates are considered more soundly based for this product and intermediate consumption has therefore been derived as a balance within the ICT product supply and use framework. It is encouraging to observe that the figure derived as a residual for intermediate consumption is almost identical to the figures reported in EAS and GTS. EAS and GTS have been used to generate industry-based estimates of spending on phone carrier services.

Internet provider services

The value of total supply of Internet provider services is collected through ICTIS. A small number of ISPs are not collected by ICTIS, for example, ISPs run by community organisations; however the impact of these ISPs is thought to be minimal. Estimates on the use side are not directly available from ABS collections. An indirect method of estimating household spending on Internet provider services has produced results of defensible quality (see below). Intermediate consumption of Internet provider services is derived as a residual.

HOUSEHOLD FINAL CONSUMPTION EXPENDITURE

The satellite account generates estimates of HFCE on Internet provider services through a method utilising data from HUIT and the IAS.

HUIT provides detailed information on numbers of households with 'Internet access'. This information has been collected for some time and, as might be expected, the resulting time series shows strong growth in numbers of households with Internet access. IAS supplies information on the proportion of households with dial up Internet access and with broadband access (including a breakdown across various ranges of broadband download speed). Together these data allow the construction of a profile of the numbers of households with Internet connections, by type of Internet connection. To this we add observed prices for monthly ISP costs (for dial up access, basic broadband and high speed broadband packages) to derive HFCE on Internet provider services.

The model rests on a number of assumptions, one of which is that household Internet connections are used only for household purposes and not for business-related purposes. On the other hand, we have used monthly prices for Internet Service Provider (ISP) services that do not include an estimate for Internet connection charges, or for ISP charges for 'excess' use. Internet connection charges are difficult to measure because HUIT data provide only a net increase in Internet connections by

Internet provider services continued

households (i.e. connections less disconnections), and because ISPs frequently offer free Internet connections. There are no data available on ISP charges for 'excess' use. In short, there are a number of factors that we are unable to reliably account for but the net overall impact of these assumptions will be at least partially off-setting. The resulting estimates of HFCE on Internet provider services are considered defensible.

MEASUREMENT OF TELECOMMUNICATION ASSETS

Supply of telecommunication assets is comprised of imports and domestic production, with own account production (construction) of telecommunication assets being a notable inclusion.

Estimates of imports of telecommunication equipment are drawn directly from the ABS International Trade System. Because these are goods imports and are therefore generally physically shipped into Australia, customs information are believed to provide good coverage. Mobile phones comprise over one third of the value of these imports.

Domestic production of telecommunication assets is made up of two broad components--the manufacture of telecommunication equipment in Australia and the construction of telecommunication assets on own account by telecommunication service providers. Data on the first component are collected by the ABS from relevant Australian manufacturers. Estimation for the second component is described below.

On the demand side, HES provides the basis for estimation of HFCE, while EAS and GTS collect gross fixed capital formation on telecommunication equipment.

Telecommunication equipment is a narrower concept than telecommunication assets – the latter includes own account (construction) work on telecommunication structures. Intermediate consumption of businesses and government mostly relates to purchases of mobile phones and the equipment used in own account production of telecommunication assets. Directly collected data relating to gross fixed capital formation and margins complete the picture for supply and use of telecommunication assets.

Own account (construction) work by telecommunication providers

The 'standard' ABS ICT product definition (see Appendix 3) defines a range of products making up 'telecommunication equipment'. Essentially, this definition includes only telecommunication equipment. However, a substantial amount of telecommunication equipment is purchased to be integrated within telecommunication structures such as transmission towers and telecommunication networks more generally. In the satellite account we have chosen to treat spending on construction activities that are integral to the operation of telecommunication equipment as part of ICT output, value added and gross fixed capital formation. Appendix 2 contains a more complete discussion of this treatment.

Estimates of own account construction by telecommunication service providers were made by summing acquisitions of broadly defined 'telecommunication assets' of the major businesses involved. The value of these acquisitions was then partitioned into the following cost components: purchases of telecommunication equipment; labour costs; and cost of purchases of 'materials' consumed in building the assets. This was done using both publicly available information and returns submitted to the EAS collection. In practice, and consistent with the measurement of own account software, no allowance for consumption of fixed capital or net operating surplus has been included in the valuation of own account construction work by telecommunication service providers.

The total value of these telecommunication assets was treated as output of telecommunication service providers – own account production (construction) of telecommunication assets – and as gross fixed capital formation. The telecommunication equipment purchased by the telecommunication service providers for use in own account production was treated as intermediate consumption to avoid double counting these assets within gross fixed capital formation. The impact on 'ICT GDP' of this

APPENDIX 5 METHODOLOGICAL ISSUES *continued*

*Own account (construction)
work by telecommunication
providers continued*

treatment is equivalent to the value of labour and material costs involved in the own account construction activity.

Margins

ICTIS does not provide sufficient data from which to estimate margins related to telecommunication equipment and calculations are complicated by the impact of mobile phones on the data. Businesses organising mobile phone 'plans' appear to be recording purchases of mobile phones as an explicit expense item, but revenue from the sale of these phones is subsumed within 'Income from provision of mobile and paging services'. Consequently, we have not allocated a margin to mobile phones sold as part of a 'plan'. It is instead included as part of telecommunication services.

Mobile phones

A decision has been made to treat spending on mobile phones by business and government as intermediate consumption rather than as gross fixed capital formation in the satellite account. This is not a clear-cut matter and a valid case could also be made to treat this spending as gross fixed capital formation, since mobile phones are typically used repeatedly or continuously in production by producing units for more than one year. On the other hand, producing units are themselves generally treating these purchases as a current expense rather than as a capital cost. More importantly, the SNA93 (paragraph 6.158) 'small tools' rule allows for certain items that might otherwise be 'capital' in nature to be treated as intermediate consumption provided they are small, inexpensive and are used to perform relatively simple operations. Further, the expenditures should be made regularly and be small compared with expenditures on machinery and equipment. These guidelines provide solid support for the treatment adopted.

*Household final consumption
expenditure*

The 2003–04 HES provided detail on household expenditure on telecommunication equipment. It asked householders to separately identify outright purchases of mobile phones and payments related to mobile phone 'plans'. Of the latter, we have estimated a certain proportion relates to the 'purchase' of the mobile handset itself. Overall, the estimates of HFCE telecommunication equipment are thought to be sound.

Intermediate consumption

We might normally expect the vast majority of expenditure by producers on telecommunication assets to be treated as gross fixed capital formation. However, because of the treatment we have adopted for own account (construction) of telecommunication assets and because business and government spending on mobile phones have been treated as intermediate consumption, a significant amount of expenditure is allocated to intermediate consumption.

*Gross fixed capital formation,
by industry*

Because the satellite account includes own account (construction) work on telecommunication assets in its definition of 'ICT output', this is also included in gross fixed capital formation of telecommunication assets. Derivation of this item has been described above, and the resulting estimate has been entirely allocated to the telecommunication services industry. The remaining gross fixed capital formation relates to business and government spending on telecommunication equipment (but not mobile phones). EAS and GTS data provide both national and industry estimates for this item.

COMPUTER HARDWARE

As with all other ICT products in the satellite account, estimates for computer hardware were generated within a supply and use framework. Supply side estimates are considered superior to the demand side numbers and these provide the benchmark estimate.

COMPUTER HARDWARE

continued

Australian production of computer hardware is relatively small and is mainly undertaken by manufacturers of ICT products. ICT wholesalers and computer service providers both contribute smaller amounts, primarily related to computer hardware installation services. The majority of Australia's supply of computer hardware is imported from overseas.

Estimates of imports of computer hardware are drawn directly from the ABS International Trade System and are published in ICTIS. Because these are goods imports and therefore almost invariably physically shipped into Australia, customs information should provide good coverage. Even so, there are classification issues, particularly in relation to the various parts that may or may not relate (partially or wholly) to computer hardware. These issues were investigated in the course of constructing the satellite account and it was decided that no adjustment to ICTIS computer hardware import data was required.

Trade margins relating to computer hardware are based on ICTIS data. For ICT wholesalers, ICTIS provides estimates of value of purchases of computer hardware and sales of computer hardware. This provides the basis for estimating wholesale margins on computer hardware, though the practice of 'bundling' of computer hardware and packaged computer software is a factor affecting our interpretation of this data source (see entry on 'bundling' in this appendix).

Household spending on computer hardware is based on HES data. The HES collects household spending on 'computer equipment' separately from 'computer software'. Nevertheless, the HES figure for 'computer equipment' contains an element of bundled packaged software and this component has been estimated and removed based on an analysis of a typical computer purchase.

Within the ICT product supply and use framework, gross fixed capital formation on computer hardware was derived as a residual, reflecting the judgement that supply-side data are, overall, more robust than the various demand side data. Nevertheless, the ABS collects information on business and government spending on computer hardware through, respectively, its EAS and GTS collections. The gross fixed capital formation computer hardware value from these collections is somewhat lower than the figure generated in the satellite account. There are a number of possible reasons why this has occurred, including, especially, the effect of leased computer hardware. This apparent understatement was corrected for by benchmarking the estimates to supply side data.

Leasing

There is evidence that significant amounts of ICT computer hardware (and telecommunication equipment) are leased by their users. There are potentially two ways that leasing computer hardware can hinder our attempts to measure these products.

First, if both the lessee and lessor are reporting the same ICT product as capital expenditure to ABS surveys then a double-count exists. In practice, survey respondents appear to be following finance lease accounting rules and double-counting does not appear to be an issue. If it were happening, we would expect to see exceptionally large figures for capital expenditure for computer hardware and telecommunication equipment in the Finance and Insurance industry (where most lessors are operating). However, this is not the case.

The other problem potentially arises in the EAS and GTS collections, where respondents are required to report spending on computer hardware and telecommunication equipment acquired under finance lease arrangements as 'capital expenditure'. However, in some cases, lessees have misreported this spending as 'rent, leasing and hiring' expenditure (an appropriate response only for assets used under an operating lease). While every effort has been made to 'clean' the survey data as far as possible, it is likely that the reported EAS survey data somewhat understate actual levels of ICT-related capital expenditure.

APPENDIX 5 METHODOLOGICAL ISSUES *continued*

Leasing continued

In practice, the satellite account derived gross fixed capital formation computer hardware as a residual, and EAS and GTS were used only to derive industry details for this item. Thus the issue of leasing has had minimal impact on the estimates produced.

APPENDIX 6 QUALITY OF THE ESTIMATES

INTRODUCTION

Overall, the ABS considers that the estimates are of reasonable quality, especially at the most aggregated level, such as for ICT gross value added and ICT GDP. However, because the satellite account is the product of development work requiring a number of assumptions and synthetic estimates for some components, the estimates should be considered experimental. There is less confidence in the quality of the results at various levels of disaggregation. For example, the boundary between 'customised software' and 'computer services' is reasonably clear in principle, but in practice it can be quite difficult for survey respondents to separate these two components.

The estimates were prepared from a wide range of statistical sources. Most key data sources are compatible with the desired national accounting basis, however in some instances this is not the case and some data sources are less than completely satisfactory in terms of coverage, concepts and/or timing.

Estimates of own account computer software produced by non-general government units were generated using modelling techniques that required use of significant assumptions, as described in some detail in Appendix 5. Estimation techniques essentially follow those recommended by the OECD software task force and represent international best practice. Nevertheless, this remains a challenging area in estimation, and users are warned to exercise caution when using own account software estimates. The estimation of own account production of telecommunication assets by telecommunication service providers essentially follows the general principles for valuation of own account production of capital goods as outlined in the international standards for national accounts (SNA93), and as used by the major telecommunication service providers.

The ABS International Trade System is not purpose-designed to capture ICT product detail. Instead, fine level international trade data are examined and each product category is designated as either ICT or non-ICT in nature. Since some of the product items are in reality partially related to ICT products and partially to other products, this compilation technique represents a potential quality issue. This is especially the case for certain types of components which may find use in a wide range of final goods.

The measurement of international trade in computer software is known to be a difficult area for official statisticians. The OECD in its *Information Technology Outlook, 2004* comments that recorded international trade in computer software is surprisingly low. There are a number of reasons why this is the case – reasons principally related to the nature of software production and the way in which software is traded across borders. Appendices 5 and 7 provide a fuller description of relevant issues and of related work recently undertaken by the ABS.

Within the national accounts, wholesale and retail margins are generally estimated indirectly rather than being based on purpose-designed surveys, so the estimates are an approximation. Nevertheless, ICTIS 2002–03 provides appropriate structural data that allow the generation of estimates of wholesale margins on various ICT products. Retail margins on ICT goods have been estimated at least partly through reference to the related wholesale margins. In dollar terms, it seems clear that the greater proportion of sales of ICT goods are through wholesalers rather than retailers.

Overall, data sources for the supply of ICT products are considered superior to the independently-derived demand-side estimates. Supply side estimates have generally been accepted and adjustments made to the use estimates considered weakest. In practice, this has generally meant that intermediate consumption or gross fixed capital formation were derived as residuals. Given this approach, the fact that resulting revisions to official estimates of gross fixed capital formation of computer hardware and computer software have been relatively modest, provides some confidence in the estimated levels (past and present) for these aggregates.

APPENDIX 6 QUALITY OF THE ESTIMATES *continued*

INTRODUCTION *continued*

Estimates of the number of persons employed in ICT-related occupations have been derived from the LFS. As this is a household survey, it has some deficiencies when used to derive detailed industry estimates. In order to mitigate some of these potential quality problems, estimates of employment have been published at the ANZSIC division level.

APPENDIX 7 RELATIONSHIPS WITH OTHER ABS SERIES

UPDATED NATIONAL ACCOUNTS ANNUAL BENCHMARKS

Investigations conducted in the course of producing this satellite account have driven revisions to time series data on gross fixed capital formation of computer hardware and computer software contained in ASNA 2004–05. These revisions are explained in the feature article '*Updated National Accounts annual benchmarks*' available on the ABS web site at www.abs.gov.au (Ausstats – Publications – 5204 (2004–05) – Main features). Nevertheless, the current price industry details published here for gross fixed capital formation on computer hardware and computer software represent an update on those published in ASNA 2004–05. Timing constraints meant that it was not possible to finalise the industry details in time for the 2004–05 ASNA estimation round but this alignment will be done as soon as practicable. While industry details differ between the two publications, totals for Australia, in both current price and chain volume measures, are consistent for all capital measures.

IMPORTS OF PACKAGED SOFTWARE

Estimates of imports of packaged software in the satellite account are higher than those published in ICTIS and implicit in current BOP and International Trade and ASNA publications, though all ABS collections employ the same product definition for packaged software. The nature of software means that it can be traded in a variety of media, it can be transmitted electronically, it can be bundled and it can be copied multiple times within the importing country. This adds complexity to the measurement of transactions.

The satellite account, while using the sources of direct information mentioned above, also involved a degree of cross checking of information with major ICT wholesalers reporting to ICTIS on the origin (foreign or domestic) of their packaged software acquisitions. This has resulted in higher estimates of imports of packaged software in the satellite account than in BOP and International Trade and ICTIS. The data contributing to the alternative estimates are subject to ongoing investigation by confronting and reconciling data reported by significant businesses in the Survey of International trade in Services and ICTIS.

GLOSSARY

Basic price	The amount receivable by the producer from the purchaser for a unit of a good or service produced as output, minus any tax payable plus any subsidy receivable on that unit as a consequence of its production or sale; it excludes any transport charges invoiced separately by the producer.
Compensation of employees	The total remuneration, in cash or in kind, payable by an enterprise to an employee in return for work done by the employee during the accounting period. It is further classified into two sub-components: wages and salaries; and employers' social contributions. Compensation of employees is not payable in respect of unpaid work undertaken voluntarily, including the work done by members of a household within an unincorporated enterprise owned by the same household. Compensation of employees excludes taxes such as payroll tax payable by the employer on the wage and salary bill.
Computer services	This product grouping covers a range of activities, including maintenance and repair of ICT products, disaster recovery, data processing services, computer time sharing, information storage and retrieval and help desk functions. In the satellite account this grouping excludes production (including enhancement) of computer software.
Consumption of fixed capital	The reduction in the value of fixed assets used in production during the accounting period resulting from physical deterioration, normal obsolescence or normal accidental damage. Unforeseen obsolescence, major catastrophes and the depletion of natural resources are not included in this item.
Employment	Includes full-time and part-time employees, employees absent on paid or prepaid leave, managerial and executive employees, permanent, temporary and casual employees and working proprietors and partners. Also includes self-employed persons and persons working for one hour or more without pay in a family business or on a farm.
Exports	The value of goods exported and amounts receivable from non-residents for the provision of services by residents.
Final consumption expenditure – general government	Net expenditure on goods and services by public authorities, other than those classified as public corporations, which does not result in the creation of fixed assets or inventories or in the acquisition of land and existing buildings or second-hand assets. It comprises expenditure on compensation of employees (other than those charged to capital works etc.), goods and services (other than fixed assets and inventories) and consumption of fixed capital. Fees etc. charged by general government bodies for goods and services sold are offset against purchases.
Final consumption expenditure – households	Net expenditure on goods and services by persons and expenditure of a current nature by private non-profit institutions serving households. This item excludes expenditures by unincorporated businesses and expenditures on assets by non-profit institutions (treated as gross fixed capital formation). Also excluded is expenditure on maintenance of dwellings (treated as intermediate expenses of private enterprises), but personal expenditure on motor vehicles and other durable goods and the imputed rent of owner-occupied dwellings are included.
Finance lease	Under a finance lease arrangement a change of ownership from the lessor to the lessee is deemed to have taken place, even though the leased goods legally remain the property of the lessor during the period of the lease. Under this arrangement, gross fixed capital formation is therefore attributed to the sector and industry of the lessee.
Gross domestic product	The market value of goods and services produced in Australia within a given period of time after deducting the cost of goods and services used up in the process of production but before deducting allowances for the consumption of fixed capital. Thus gross domestic product, as defined here, is at 'market prices'.
Gross fixed capital formation	Expenditure on fixed assets – dwellings, other buildings and structures, machinery and equipment, livestock, intangible fixed assets and ownership transfer costs. The machinery and equipment category includes plant, machinery, equipment, vehicles, etc. Expenditure on repair and maintenance of fixed assets is excluded, being chargeable to

GLOSSARY *continued*

Gross fixed capital formation <i>continued</i>	the production account. Additions to fixed assets are regarded as capital formation. Also included is compensation of employees and other costs paid by private enterprise in connection with own-account gross fixed capital formation. Expenditure on dwellings, other buildings and structures, and machinery and equipment is measured as expenditure on new and second-hand assets, less sales of existing assets. Ownership transfer costs comprise stamp duty, fees and commissions of real estate agents, conveyancing fees and miscellaneous government charges.
Gross mixed income of unincorporated enterprises	The surplus or deficit accruing from production by unincorporated enterprises. It includes elements of both compensation of employees (returns on labour inputs) and operating surplus (returns on capital inputs).
Gross operating surplus	The operating surplus accruing to all enterprises, except unincorporated enterprises, from their operations in Australia. It is the excess of gross output over the sum of intermediate consumption, compensation of employees, and taxes less subsidies on production and imports. It is calculated before deduction of consumption of fixed capital, dividends, interest, royalties and land rent, and direct taxes payable, but after deducting the inventory valuation adjustment. By national accounting convention, gross operating surplus for general government is equivalent to the consumption of fixed capital for this sector.
Gross value added	The value of output at basic prices minus the value of intermediate consumption at purchasers' prices. The term is used to describe gross product by industry and by sector. Basic prices valuation of output removes the distortion caused by variations in the incidence of commodity taxes and subsidies across the output of individual industries.
Information and Communication Technology	Information and Communication Technology refers to the technologies and services that enable information to be accessed, stored, processed, transformed, manipulated and disseminated, including the transmission or communication of voice, image and/or data over a variety of transmission media.
Inventories	Consist of stocks of outputs that are held at the end of an accounting period by the units that produced them prior to their being further processed, sold, delivered to other units or used in other ways. Also includes stocks of products acquired from other units that are intended to be used for intermediate consumption or for resale without further processing.
ICT income	Consists of all income from the sale, distribution and provision of ICT goods and services.
ICT industry grouping	Refers to the Division or Group of the Australian and New Zealand Standard Industrial Classification (ANZSIC) that selected ICT activity falls within.
ICT Computer services industry grouping	Refers to businesses classified to the following ANZSIC classes: <ul style="list-style-type: none"> ■ 7831 Data processing services ■ 7832 Information storage and retrieval services ■ 7833 Computer maintenance services ■ 7834 Computer consultancy services.
ICT GDP	Equals ICT gross value added plus taxes paid less subsidies received on ICT products. ICT GDP is a satellite account construct to enable comparisons with the most widely recognised national accounting aggregate, GDP. While useful in this context, the ICT gross value added measure should be used in making comparisons with other industries or between countries.
ICT gross value added	The value of output of ICT products at basic prices less the value of intermediate consumption inputs (at purchasers' prices) used in producing these ICT products. This measure is directly comparable with the value added of 'conventional' industries such as mining and manufacturing and should also be used for comparisons across countries.
ICT Manufacturing industry grouping	Refers to businesses classified to the following ANZSIC classes: <ul style="list-style-type: none"> ■ 2841 Computer and business machine manufacturing

GLOSSARY *continued*

ICT Manufacturing industry grouping <i>continued</i>	<ul style="list-style-type: none"> ■ 2842 Telecommunication, broadcasting and transceiving equipment manufacturing ■ 2849 Electronic equipment manufacturing n.e.c. ■ 2852 Electric cable and wire manufacturing.
ICT specialists	<p>Comprises those businesses whose ICT income (as defined above) is 50% or more of the total income of the business, with the exception of businesses classified to the following ANZSIC classes, who are defined as ICT specialist businesses regardless of their income:</p> <ul style="list-style-type: none"> ■ 2842 Telecommunication, broadcasting and transceiving equipment manufacturing ■ 4613 Computer wholesaling ■ 7120 Telecommunications services ■ 7831 Data processing services ■ 7832 Information storage and retrieval services ■ 7833 Computer maintenance services ■ 7834 Computer consultancy services.
ICT Telecommunication services industry grouping	Refers to businesses classified to ANZSIC class 7120, Telecommunication services.
ICT Wholesale trade industry grouping	<p>Refers to businesses classified to the following ANZSIC classes:</p> <ul style="list-style-type: none"> ■ 4613 Computer wholesaling ■ 4614 Business machine wholesaling ■ 4615 Electrical and electronic equipment wholesaling n.e.c.
Imports	The value of goods imported and amounts payable to non-residents for the provision of services to residents.
Intermediate consumption	Consists of the value of the goods and services consumed as inputs by a process of production, excluding the consumption of fixed capital.
Margin	The difference between the resale price of a good and the cost to the retailer or wholesaler of the good sold.
Net capital stock	Represents the net present value of future capital services to be provided by assets.
Net operating surplus	Equivalent to gross operating surplus after deducting an allowance for consumption of fixed capital. See also <i>gross operating surplus</i> .
Other subsidies on production	Consist of all subsidies, except subsidies on products, which resident enterprises may receive as a consequence of engaging in production. Other subsidies on production include: subsidies related to the payroll or workforce numbers, including subsidies payable on the total wage or salary bill, on numbers employed, or on the employment of particular types of persons, e.g. persons with disabilities or persons who have been unemployed for a long time.
Other taxes on production	Consist of all taxes that enterprises incur as a result of engaging in production, except taxes on products. Other taxes on production include: taxes related to the payroll or workforce numbers excluding compulsory social security contributions paid by employers and any taxes paid by the employees themselves out of their wages or salaries; recurrent taxes on land, buildings or other structures; some business and professional licences where no service is provided by the Government in return; taxes on the use of fixed assets or other activities; stamp duties; taxes on pollution; and taxes on international transactions.
Output	Consists of those goods and services that are produced within an establishment that become available for use outside that establishment, plus any goods and services produced for own final use.
Own account gross fixed capital formation	Goods and services produced by an entity that are used for gross fixed capital formation within the same entity. They are valued according to the basic price of similar products sold on the market or by their costs of production if no suitable basic prices are available.

GLOSSARY *continued*

Purchasers prices	The purchaser's price is the amount paid by the purchaser, excluding any deductible tax, in order to take delivery of a good or service at the time and place required by the purchaser.
Satellite accounts	These are accounts which provide a framework linked to the core national accounts and enable attention to be focussed on a certain field or aspect of economic and social life in the context of the national accounts.
Subsidies on products	Subsidies payable per unit of a good or service. The subsidy may be a specific amount of money per unit of quantity of a good or service, or it may be calculated ad valorem as a specified percentage of the price per unit. A subsidy may also be calculated as the difference between a specified target price and the market price actually paid by a purchaser. A subsidy on a product usually becomes payable when the product is produced, sold or imported, but it may also become payable in other circumstances, such as when a product is exported, leased, transferred, delivered or used for own consumption or own capital formation.
System of National Accounts	The System of National Accounts consists of a coherent, consistent and integrated set of macro-economic accounts based on a set of internationally agreed concepts, definitions, classifications and accounting rules.
Taxes on production and imports	Consist of 'taxes on products' and 'other taxes on production'. These taxes do not include any taxes on the profits or other income received by an enterprise. They are payable irrespective of the profitability of the production process. They may be payable on the land, fixed assets or labour employed in the production process, or on certain activities or transactions.
Taxes on products	Taxes payable per unit of some good or service. The tax may be a specific amount of money per unit of quantity of a good or service (quantity being measured either in terms of discrete units or continuous physical variables such as volume, weight, strength, distance, time, etc.), or it may be calculated ad valorem as a specified percentage of the price per unit or value of the goods or services transacted. A tax on a product usually becomes payable when the product is produced, sold or imported, but it may also become payable in other circumstances, such as when a good is exported, leased, transferred, delivered, or used for own consumption or own capital formation.

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