

ANNUAL SURVEY ON INFOCOMM MANPOWER FOR 2006



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1. SUMMARY

Amid the buoyant economic expansion, infocomm manpower grew by 7.5% to reach 119,700 in 2006. This is in tandem with the 7.6% growth of Singapore's employed labour force. With 2,100 infocomm job vacancies, the total infocomm jobs in 2006 reached 121,800 compared to 117,100 in 2005. This represented a growth of 4.0%.

The total number of infocomm jobs created in 2006 was 4,700.

About half of the infocomm manpower worked in infocomm organisations and the other half in end-user organisations. *Infrastructure Support* (23%), *Infocomm Sales & Marketing* (15%) and *Software & Solution Implementation* (9%) represented the three largest infocomm job categories in 2006.

About one-third of the infocomm job vacancies are in infocomm organisations; the remaining two-thirds are in end-user organisations. *Database Management* (15%), *Infrastructure Support* (14%) and *Project Management* (12%) were the top three job categories with the highest vacancies, comprising about half the number of the total vacancies.

The profile of infocomm manpower remained fairly unchanged from 2005. Male to female ratio sustained at 2 to 1 and those in their 30s still formed the largest group. The infocomm workforce continued to be dominated by those who had tertiary education and the discipline of study is likely to be in computer studies.

Infocomm manpower movement saw higher volume of new hires and resignations. Retrenchment is at a three year low.

2. INTRODUCTION

Infocomm manpower surveys have been carried out by IDA annually since 1999. This is the 8th in the series.

Infocomm manpower is a person engaged primarily in infocomm-related work either in an IT or telecommunication equipment and/or services provider, or user organisation. He/She must be employed by the Singapore-based organisation on a full-time/part-time basis either as a permanent or direct contract staff to work in Singapore or to station overseas. The work of the person:

- a) May include the development, distribution, implementation, support, operation, sales or marketing of telecommunication, computer hardware/software, IT services or multimedia contents; and
- b) Is classified under one of the job categories given in [Annex A](#).

The definition does not include infocomm manpower under the employment of contractors and subcontractors.

2.1 Survey Objective

To determine the demographic characteristics, growth, projection and critical infocomm skills of infocomm manpower.

2.2 Methodology

Representative samples of infocomm and end-user organisations were selected from the Department of Statistics' Establishment Sampling Frame.

2.3 Report Structure

All manpower figures in the report refer to June 2006 figures.

3. INFOCOMM MANPOWER

3.1 Current Infocomm Manpower

The number of employed infocomm manpower grew by 7.5% to reach 119,700 in 2006 (Table 3.1).

About half of the infocomm manpower worked in infocomm organisations and the other half in end-user organisations. Both infocomm organisations and end-user organisations registered 9.2% and 5.7% growth in 2006 respectively. For the first time since 2001, the number of infocomm manpower employed in infocomm organisations was higher than the number employed in end-user organisations.

Table 3.1: Infocomm Manpower for 2001-2006

Organisation Category	2001	2002	2003	2004	2005	2006
Infocomm Organisations	50,700	51,800	51,600	53,900	55,600	60,700
End-User Organisations	51,400	52,100	52,700	54,100	55,800	59,000
Overall	102,100	103,900	104,300	108,000	111,400	119,700

a. Market Segment

Organisations in the *Hardware* segment employed the largest share of infocomm manpower ([Table 3.2](#)) in 2006. It is also the segment with the highest increase in the number of employed infocomm manpower within infocomm organisations in 2006.

Table 3.2: Infocomm Manpower in Infocomm Organisations by Sector

Segment	2001 (%)	2002 (%)	2003 (%)	2004 (%)	2005 (%)	2006 (%)
Hardware	27	27	27	25	26	28
IT Services	23	26	25	25	22	23
Telecommunications	16	20	20	19	23	22
Software	22	18	19	21	20	19
Content Services	12	9	9	10	9	8
Total	100	100	100	100	100	100

Base: All infocomm manpower in infocomm organisations (2001-50,700; 2002-51,800; 2003-51,600; 2004-53,900; 2005-55,600 and 2006-60,700.).

Within the end-user organisations, the *Financial Services* sector (37%) was the largest employer of infocomm manpower ([Table 3.3](#)) in 2006. It is also the sector with the highest increase in the number of employed infocomm manpower within the end-user organisations in 2006.

Table 3.3: Infocomm Manpower in End-User Organisations by Sector

Sectors	2001 (%)	2002 (%)	2003 (%)	2004 (%)	2005 (%)	2006 (%)
Financial Services	35	22	24	20	20	37
Wholesale and Retail Trade	22	18	17	17	21	18
Manufacturing	14	13	13	13	12	14
Real Estate, Renting and Business Activities	12	13	14	14	13	13
Education	6	12	12	13	11	4
Transport and Storage	5	11	7	7	10	3
Construction	4	1	3	4	1	2
Others	2	10	10	11	12	10
Total	100	100	100	100	100	100

Base: All infocomm manpower in end-user organisations (2001-51,400; 2002-52,100; 2003-52,700; 2004-54,100; 2005-55,800; 2006-590,000.).

b. Job Category

In 2006, the top three employed infocomm manpower job categories were *Infrastructure Support* (23%), *Infocomm Sales & Marketing* (15%) and *Software & Solution Implementation* (9%) (Table 3.4).

Table 3.4: Infocomm Manpower by Job Category in 2006

Job Category	(%)
Infrastructure Support	22.6
Infocomm Sales & Marketing	15.4
Software & Solution Implementation	9.3
Software Development	7.5
Infocomm Consulting & Solutioning	6.6
Project Management	5.8
Digital Media & Animation	5.2
Database Management	4.4
Software Design	3.4
CIOs, CTOs and IT Managers	3.2
Systems Integration	2.7
Enterprise Networks Management	2.5
Infocomm Research & Development	1.9
Telecommunication Systems Management	1.7
Infocomm Quality Assurance	1.4
Infocomm Security	1.3
Enterprise Networks Design	1.2
Business Process Outsourcing Management	1.1
Infocomm Education & Training	1.1
Telecommunication Systems Design	0.9
Technical Writing	0.6
Games Development	0.3
Total	100.0

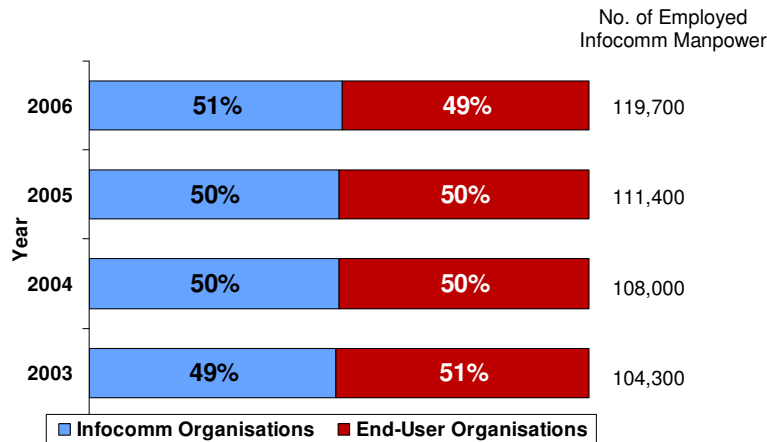
Base: All infocomm manpower (Overall-119,700)

3.2 Profile of Infocomm Manpower in Singapore

a. Type of Organisation

The split of infocomm manpower between infocomm organisations and end-user organisations remained almost constant between 2003 and 2006 (Figure 3.1).

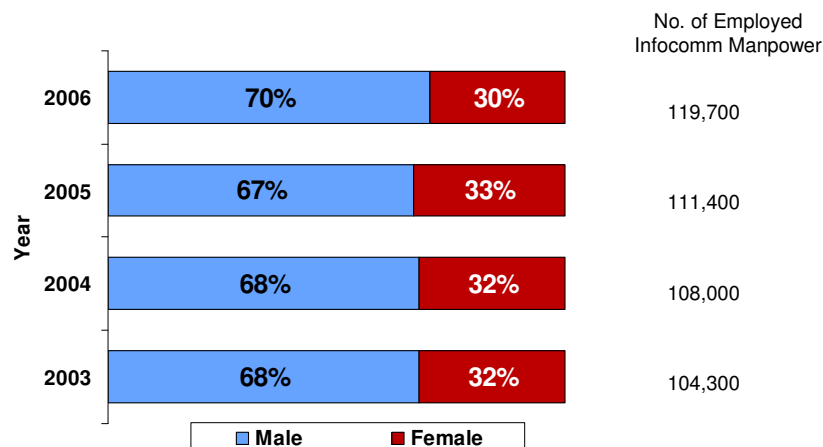
Figure 3.1: Infocomm Manpower by Organisation Type (2003-2006)



b. Gender

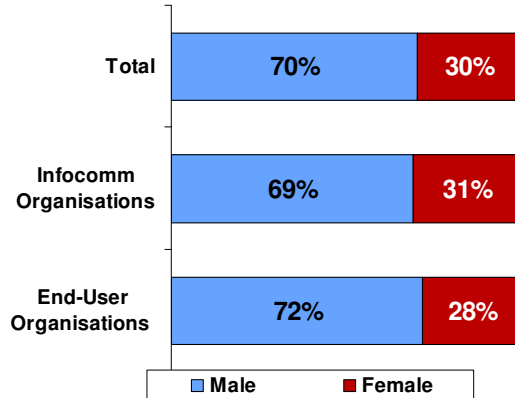
The proportion of male to female infocomm manpower remained fairly constant with a ratio of 2 males to 1 female employed (Figure 3.2).

Figure 3.2: Infocomm Manpower by Gender (2003-2006)



The proportion of male to female infocomm manpower was the same for both infocomm and end-user organisations ([Figure 3.3](#)).

Figure 3.3: Infocomm Manpower by Organisation Type and Gender, 2006

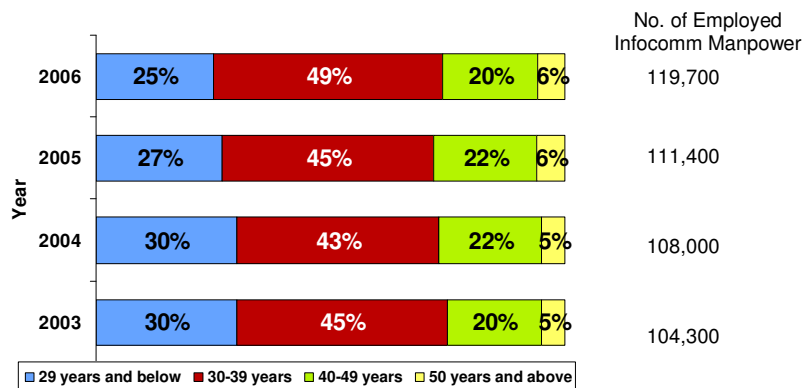


Base: All infocomm manpower (Overall-119,700; infocomm organisations-60,700; and end-user organisations-59,000.).

c. Age

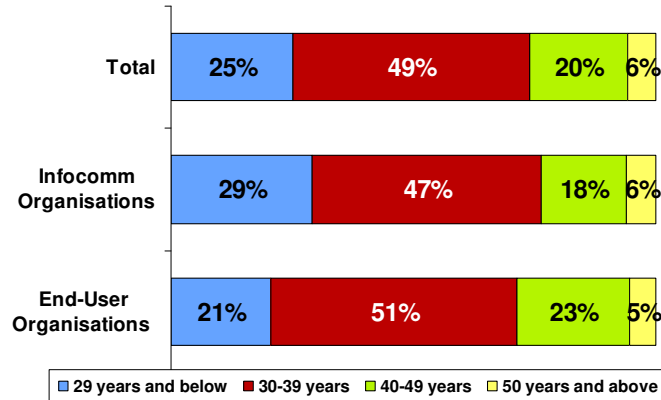
The largest proportion of infocomm manpower was aged between 30-39 years ([Figure 3.4](#)). This proportion is increasing in recent years, indicating that more infocomm manpower may be staying in the profession. The infocomm pool is a younger bunch, considering that 26% is 40 yrs and over, compared to the resident labour force composition of 52%.

Figure 3.4: Infocomm Manpower by Age (2003-2006)



Infocomm organisations had a slightly higher number of employed infocomm manpower aged 29 years and below compared to end-user organisations (Figure 3.5).

Figure 3.5: Infocomm Manpower by Organisation Type and Age, 2006

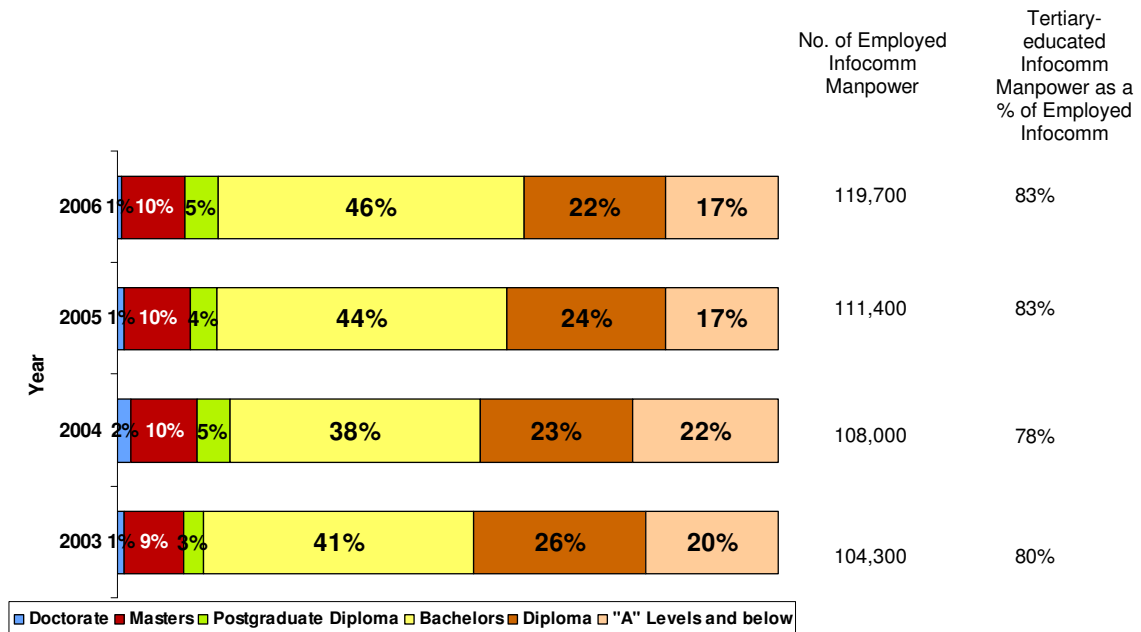


Base: All infocomm manpower (Overall-119,700; infocomm organisations-60,700; and end-user organisations-59,000.).

d. Highest Qualification

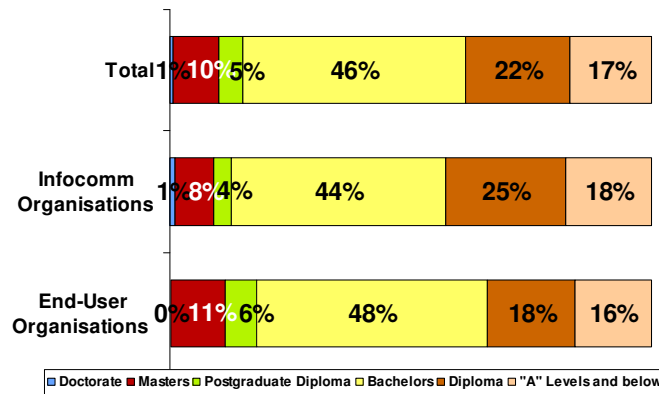
Infocomm manpower continued to comprise workers with relatively higher qualifications. 83% of infocomm manpower had tertiary education i.e. having at least diploma qualifications (Figure 3.6).

Figure 3.6: Infocomm Manpower by Highest Qualification (2003-2006)



End-user organisations had a slightly higher proportion of employed infocomm manpower with tertiary qualification compared to infocomm organisations (Figure 3.7).

Figure 3.7: Infocomm Manpower by Organisation Type and Highest Qualification, 2006

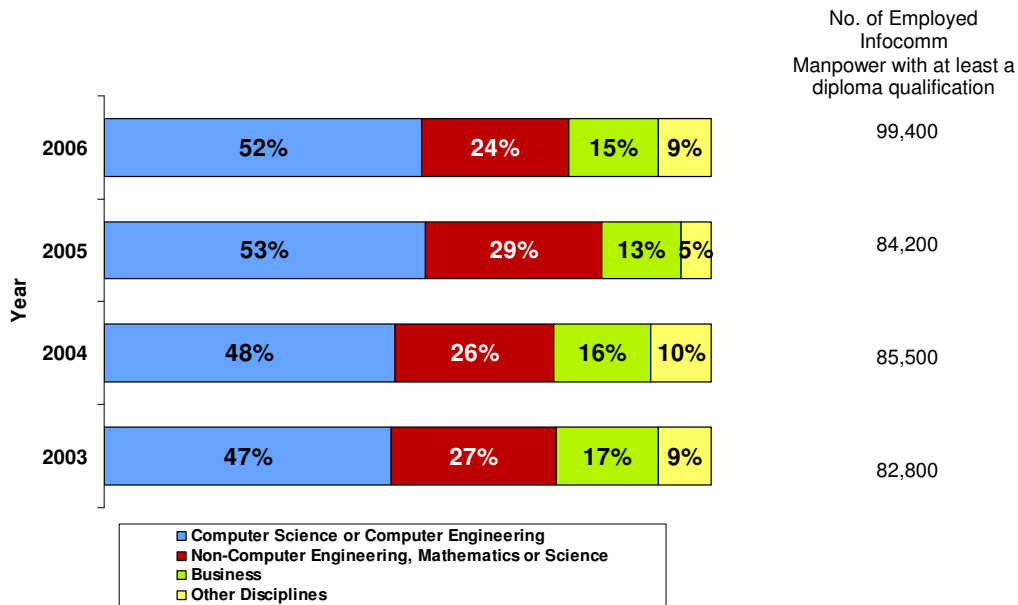


Base: All infocomm manpower (Overall-119,700; infocomm organisations-60,700; and end-user organisations-59,000.).

e. Discipline of Study

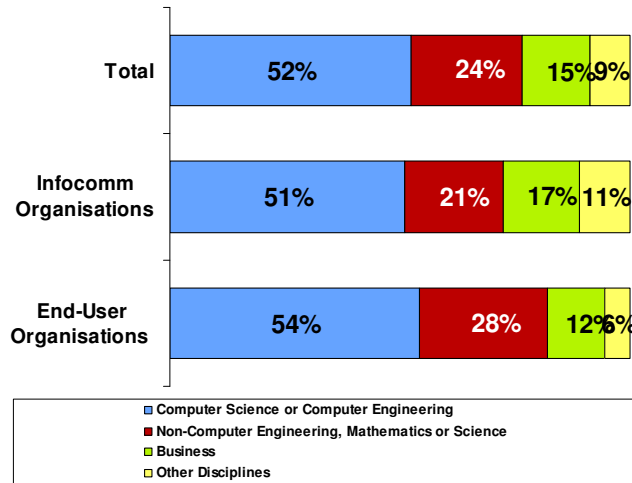
Nearly four-fifths of infocomm manpower with at least diploma qualification, possessed either a mathematics, computer science, computer engineering or other engineering qualification (Figure 3.8).

Figure 3.8: Infocomm Manpower by Discipline of Study (2003-2006)



Infocomm organisations had a higher proportion of tertiary-educated infocomm manpower with non-computer engineering, mathematics or science disciplines compared to end-user organisations (Figure 3.9).

Figure 3.9: Infocomm Manpower by Organisation Type and Highest Qualification, 2006



Base: All infocomm manpower (Overall-119,700; infocomm organisations-60,700; and end-user organisations-59,000.).

4. SKILLS SHORTAGE

4.1 Skills with the Highest Shortage

The ranking of the “top five skills with the highest shortage” was derived by weighting the responses given by organisations when asked to rank the top five skills which their organisation deemed to have the highest shortage, according to the level of importance.

The top three skills with the greatest shortage in 2006 were *Application Development*, *Project Management* and *Database Administration* (Table 4.1).

Table 4.1: Skills With The Highest Shortage in Ranking Order by Organisation Type

Skills	Overall	Infocomm Organisations	End-User Organisations
Application Development	1	1	4
Project Management	2	2	1
Database Administration	3	3	2
Software Development - General Skills	4	10	3
Web Programming	5	18	5
IT Services and Business Management - General Skills	6	8	7
Maintenance	7	7	11
Business / Requirement Analysis	8	5	13
Infocomm Security - General Skills	9	27	6
Security Administration	10	23	8
Helpdesk/ Customer Support	11	12	12
Enterprise Networks	12	11	16
Database - General Skills	13	24	9
Architecture	14	9	20
RFID	15	4	26
Infrastructure Support - General Skills	16	15	18
Network and Communications - General Skills	17	37	10
System Administration	18	19	17
Infocomm Sales & Marketing	19	13	24
Process Re-engineering	20	17	23
System Analysis	21	6	52
Script Programming	22	32	19
Art & Design	23	22	22
Digital Media - General Skills	24	41	15
Business Continuity/Disaster Recovery	25	45	14
Soft Skills	26	16	36
Security Audit	27	42	21
Infocomm Business Skills	28	21	32
Wireless Technologies	29	28	29
Operating Systems/Platforms	30	31	30
Hardware Development - General Skills	31	36	28
Rendering	32	14	64
Outsourcing Management	33	39	27
Embedded Systems	34	20	41
Technical Writing	35	26	35
Research & Development - General Skills	36	44	31
Risk Management	37	54	25
Data Analysis	38	29	40
Relationship Management	39	30	39
Wide Area Networks	40	25	58

Base: Overall (9,100 companies), Infocomm Organisations (3,100 companies), End-User Organisations (6,000 companies). These have been extrapolated to the population.

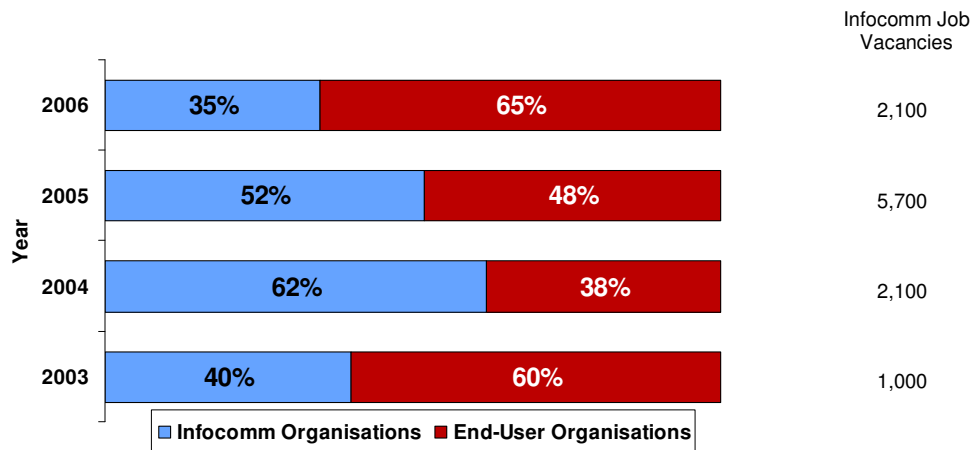
5. VACANCY, GROWTH & INFOCOMM JOB CREATION

5.1 Current Vacancies for Infocomm Manpower

a. Type of Organisation

The number of infocomm job vacancies in 2006 is 2,100. Infocomm organisations had about one-third share of the vacancies, rest of vacancies were attributed by end-user organisations.

Figure 5.1: Infocomm Job Vacancies



b. Job Category

The top three job categories with the highest number of vacancies were *Database Management* (15%), *Infrastructure Support* (14%) and *Project Management* (12%) ([Table 5.1](#)). The second and fourth ranked categories were also among the top three job categories of employed infocomm manpower ([Table 3.4](#)).

Table 5.1: Infocomm Job Vacancies by Job Category and Organisation Type, 2006

Job Category	Overall (%)	Infocomm Organisations (%)	End-User Organisations (%)
Database Management	15	11	17
Infrastructure Support	14	10	17
Project Management	12	3	16
Software & Solution Implementation	11	9	12
Software Development	8	12	6
Infocomm Sales & Marketing	7	21	0
Infocomm Consulting & Solutioning	7	2	10
Software Design	4	5	4
Chief Information Officers (CIOs), Chief Technology Officers (CTOs) and IT Managers	4	1	5
Infocomm Quality Assurance	3	0	4
Infocomm Security	3	3	3
Systems Integration	2	5	1
Technical Writing	2	6	0
Enterprise Networks Management	2	2	1
Digital Media & Animation	1	3	0
Business Process Outsourcing Management	1	0	2
Infocomm Education & Training	1	3	0
Enterprise Networks Design	1	0	1
Infocomm Research & Development	1	1	0
Telecommunication Systems Management	0	1	0
Telecommunication Systems Design	0	1	0
Games Development	0	0	0
Total	100	100	100

5.2 Projected Growth of Infocomm Manpower

The overall demand for infocomm manpower jobs is expected to rise by a Compound Annual Growth Rate (CAGR) of 6.8% between 2007 and 2008. Organisations projected the largest growth to be in job categories such as *Software Design*, *Infocomm Research & Development*, and *Software, Solution & Implementation* (Table 5.2), indicating rising demand for the higher end value added jobs. Taking the perspective by sectors, the need for infocomm personnel in

infocomm organisations is projected to exceed that of end-user organisations (Table 5.3).

Table 5.2: Compound Annual Growth Rate by Job Category

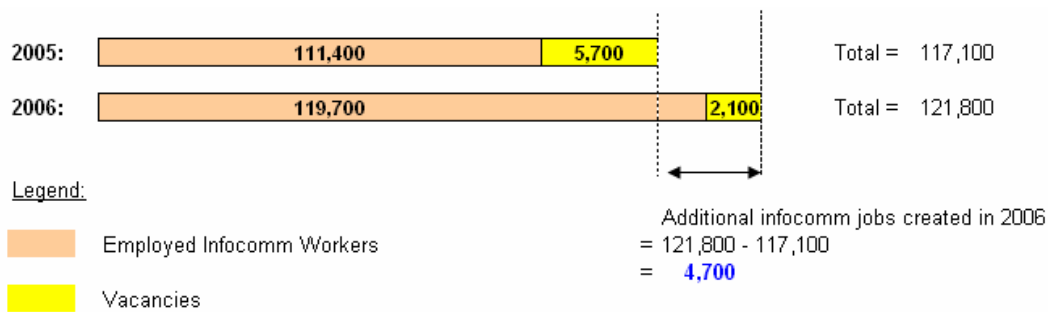
Job Category	CAGR for 2007-2008
Overall	6.8%
Software Design	20.3%
Infocomm Research & Development	19.7%
Telecommunication Systems Design	14.2%
Software & Solution Implementation	14.1%
Software Development	12.9%
Digital Media & Animation	9.6%
Infocomm Security	8.9%
Enterprise Networks Management	6.9%
Infocomm Sales & Marketing	6.3%
Technical Writing	6.3%
Business Process Outsourcing Management	5.2%
Chief Information Officers (CIOs), Chief Technology Officers (CTOs) and IT Managers	5.0%
Enterprise Networks Design	4.7%
Database Management	4.5%
Systems Integration	3.9%
Project Management	3.6%
Infocomm Education & Training	2.3%
Infrastructure Support	2.1%
Games Development	1.9%
Infocomm Quality Assurance	1.4%
Telecommunication Systems Management	1.3%
Infocomm Consulting & Solutioning	0.6%

Table 5.3: Compound Annual Growth Rate by Sector

Sector	CAGR for 2007-2008
Overall	6.8%
Infocomm Organisations	
Hardware	1.6%
IT Services	15.8%
Telecommunications	4.8%
Software	20.5%
Content Services	4.0%
Infocomm Organisations Overall	9.8%
End-User Organisations	
Financial Services	-0.5%
Wholesale and Retail Trade	6.7%
Manufacturing	3.2%
Real Estate, Renting and Business Activities	9.2%
Education	-0.6%
Transport and Storage	7.5%
Construction	3.5%
Others	7.3%
End-User Organisations Overall	3.6%

5.3 Infocomm Job Creation

The total number of infocomm jobs created in 2006 was 4,700 derived as follows:



*Not drawn to scale.

6. INFOCOMM MANPOWER MOVEMENT

6.1 Infocomm Manpower as New Hires

There was a 29% increase of number of new hires between the period 1st June 2004 to 31st May 2005 and the period of 1st June 2005 to 31st May 2006.

Table 6.1: Newly Hired Infocomm Manpower

Period	Total
1st June 2003 to 31st May 2004	14,700
1st June 2004 to 31st May 2005	17,200
1st June 2005 to 31st May 2006	22,200

For the period of 1st June 2005 to 31st May 2006, end-user organisations had more infocomm manpower recruited as new hires than infocomm organisations ([Table 6.2](#)).

Table 6.2: Newly Hired Infocomm Manpower for the Period of 1 June 2005 to 31 May 2006 by Organisation Type

Organisation Type	Total
Infocomm Organisations	10,500
End-User Organisations	11,700
Overall	22,200

The top reason cited by companies which had an increase in infocomm manpower was business expansion. They based the increase in Singapore, largely due to the availability of skilled infocomm manpower.

Table 6.3: Reasons for Increase in Infocomm Manpower in Ranking Order

Reason For Increase	Rank
Business expansion	1
Improved business outlook	2
Establishment of Singapore infocomm operations as regional hub	3

Table 6.4: Reasons for Basing the Infocomm Manpower Increase Singapore in Ranking Order

Reason For Basing In Singapore	Rank
Availability of skilled infocomm manpower	1
Relatively competitive manpower costs	2
Larger international talent pool	3

6.2 Infocomm Manpower Resignations

The number of infocomm manpower who had resigned, increased by 16.2% between the period 1st June 2004 to 31st May 2005 and the period of 1st June 2005 to 31st May 2006 (Table 6.5).

Table 6.5: Resigned Infocomm Manpower

Period	Total
1st June 2003 to 31st May 2004	12,200
1st June 2004 to 31st May 2005	12,300
1st June 2005 to 31st May 2006	14,300

For the period of 1st June 2005 to 31st May 2006, infocomm organisations had more infocomm manpower who resigned compared to end-user organisations (Table 6.6).

Table 6.6: Resigned Infocomm Manpower For the Period of 1 June 2005 to 31 May 2006

Organisation Type	Total
Infocomm Organisations	8,200
End-User Organisations	6,100
Overall	14,300

6.3 Infocomm Manpower Retrenchments

The number of retrenched infocomm manpower had decreased from 1,500 to 610 between the period 1st June 2004 to 31st May 2005 and the period of 1st June 2005 to 31st May 2006 (Table 6.7).

Table 6.7: Retrenched Infocomm Manpower

Period	Total
1st June 2003 to 31st May 2004	1,000
1st June 2004 to 31st May 2005	1,500
1st June 2005 to 31st May 2006	610

Infocomm companies retrenched more infocomm manpower than end-user organisations (Table 6.8).

Table 6.8: Retrenched Infocomm Manpower For the Period of 1 June 2005 to 31 May 2006 by Organisation Type

Organisation Type	Total
Infocomm Organisations	480
End-User Organisations	130
Overall	610

The top reason cited by companies which had a decrease in infocomm manpower was high labour costs, followed by poor business and restructuring of business processes.

Table 6.9: : Reasons for Increase in Infocomm Manpower in Ranking Order

Reason For Decrease	Rank
High labour costs	1
Poor business	2
Restructuring of business processes for greater work efficiency	3
High productivity of infocomm manpower, hence smaller pool required	4
Reorganisation of businesses (i.e. merger or change in internal management)	5
Lack of availability of skilled infocomm manpower	6
High operating costs other than labour costs	7
Outsourcing of infocomm operations to enterprises located in Singapore	8
Outsourcing of infocomm operations to locations outside Singapore	9

ANNEX A: Description of Each Job Category

1. Infocomm Research & Development

Infocomm Researchers and Developers are those who are involved in research and experimental development (R&D) work in the infocomm area. This comprises creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of knowledge to devise new applications. R&D is a term covering three activities: basic research; applied research; and experimental development. Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view. Applied research is also original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective. Experimental development is systematic work, drawing on existing knowledge gained from research and/or practical experience that is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed.

2. Games Development

Games Developers are concerned with software development specialising in digital technology that creates games for VCDs, DVDs, computers, mobile devices and game consoles.

3. Digital Media & Animation

Digital Media personnel are concerned with the presentation and/or consumption of media and content in one or multiple or integrated digital manner. The content can include sound, graphics, video, text, animation or any other form of information representation.

Digital animators are concerned with simulation of movement created by displaying a series of pictures, or frames. Examples of animation include television, commercials, films, internet and interactive presentations, etc.

Activities include:

- Drafting and design
- 2D/3D illustration and modelling
- Visual effects
- Texture generation
- Rendering
- Staging and movement

Activities may also include cross-platform modelling and other post production activities.

4. Software Design

Software Designers are involved in planning and sourcing the components of a system.

Activities include:

- Analysis of needs
- Design of system and components, including customisation of interfaces
- Data structure design

5. Software Development

Software Developers are involved in creating the components of a system.

Activities include:

- Coding or building and testing system components
- Database query coding

- 6. Software & Solution Implementation**

Software & Solution Implementation personnel are involved in installing system components in accordance with the project requirements.

Activities include:

 - Installation planning
 - System testing
 - Handover
 - System maintenance & support

- 7. Telecommunication Systems Design**

Telecommunication Systems Designers are involved in designing the electronic distance communications of all data types including data, text, pictures, voice and video.

Activities include:

 - Analysis of the physical properties of the transmission medium
 - Design effective coding and encoding mechanisms
 - Planning, design and configuration of the architecture of telecommunication systems
 - Telecommunication network engineering

- 8. Telecommunication Systems Management**

Telecommunication Systems Managers are involved in managing the electronic distance communications of all data types including data, text, pictures, voice and video.

Activities include:

 - Maintaining telecommunication systems
 - Telecommunication systems management and administration, including resource optimisation

- 9. Enterprise Networks Design**

Enterprise Networks Designers are involved in establishing computer communications and resource sharing within an organisation.

Activities include:

 - Network planning, design and configuration
 - Network engineering

- 10. Enterprise Networks Management**

Enterprise Networks Managers are involved in maintaining computer communications and resource sharing within an organisation.

Activities include:

 - Network administration
 - Network management
 - Network support

- 11. Systems Integration**

Systems Integrators are involved in bringing together the separate parts of a system to ensure that the system as a whole functions correctly.

Activities include:

 - Integration planning
 - Integration analysis and design
 - Integration testing

Activities may also involve the interfacing of existing systems and possibly new systems such that they become sub-systems of a larger system.

12. Infrastructure Support

Infrastructure Support personnel are involved in providing continuing management, fault detection, correction and enhancements to the installed system. They are also involved in managing the infrastructure between the network and the system. Their job also includes the management and administration of corporate systems like email, servers and computing equipment.

Activities include:

- Technical advice and service delivery
- User training
- Bug fixes and work-arounds
- Capacity planning
- Minor enhancements and customisation
- Version control
- Production maintenance
- Service level assessment
- Software infrastructure management
- Monitoring against predefined thresholds
- Change control
- Alert management
- Inventory

Activities also include disaster recovery and business continuity services.

13. Database Management

Database Managers are involved in managing and maintaining the components of a database system.

Activities include:

- Query structuring
- Development testing
- Meta data management
- User rights management

14. Infocomm Security

Infocomm Security personnel are concerned with activities involving the overall corporate security, including network, applications and security administration.

Activities include:

- Audit
- Risk analysis
- Storage
- Web administration
- Scripting
- Small business centres
- Server management

15. Business Process Outsourcing Management

Business Process Outsourcing managers are concerned with activities involving the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed.

Activities include:

- Business transformation, including operations/customer management
- Client support
- Contract management
- Quality management
- Data support centres

16. Infocomm Quality Assurance

Infocomm Quality Assurance personnel are concerned with ensuring product integrity and compliance with customer requirements or in maintaining software quality within an organisation

- 17. Infocomm Consulting & Solutioning**
Infocomm Consultants offer solutions to answer the clients' needs. To solve the clients' demands, they often form a group of specialists, whom they co-ordinate with or direct, so as to integrate ideas into a definite solution.
- 18. Project Management**
Project Managers ensure that targets are achieved while optimising the use of resources over the course of infocomm projects.
Activities include:
- Project definition
 - Project scope management
 - Project cost management
 - Time management
 - Quality management
 - Human resource management
 - Communications management
 - Risk management
 - Procurement management
 - Client/ customer management
- 19. Chief Information Officers (CIOs), Chief Technology Officers (CTOs) and IT Managers**
CIOs, CTOs and IT managers are involved in determining and formulating policies, best practices and/or business strategies. They manage activities at the highest level of management and are accountable for enterprise results or the business unit's effectiveness. They are the overall managers of infocomm resources and functions, and are responsible for technology strategy, product direction and technology standards. They also manage mega and/or multiple projects at a strategic level.
- 20. Infocomm Sales & Marketing**
Infocomm Sales and Marketing professionals are responsible for the sales and marketing activities of infocomm products (including telecommunication equipment) and/or services.
- 21. Infocomm Education and Training**
Infocomm Educators and Trainers are those who teach or train people in infocomm skills/courses. Infocomm skills/courses include handling information technology and communications equipment, using software/design applications and Internet-based applications.
- 22. Technical Writing**
From the first word on user requirements to the last word on how the system works, Technical Writers document, explain, translate and interpret technical speak into plain language. Their output includes user and maintenance manuals, training documents and packaging materials for software and other products. Technical writers also produce highly technical documents for administrators, designers, developers and programmers.