

# Computing Professionals and Information About Developments in Information Technology

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*This paper reports the results of a survey of the methods used by computing professionals to keep up to date with developments in information technology. Information channels representing a range of formats and sources of information are studied. The results support the contention that accessibility of an information channel is a more influential factor than the perceived importance of the channel in choices of methods used to keep up to date. Exploratory multivariate analyses indicate the existence of information gathering strategies, and that there is a relationship between strategies and difficulty experienced in keeping up to date.*

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## INTRODUCTION

The need for computing professionals to keep up to date with developments in their field is acknowledged by professional associations, members of the profession, and researchers (e.g. Nelson, 1991). Professional associations, such as the Australian Computer Society, emphasise continuing education through training and publication programmes, and provide opportunities for their members to meet and discuss topics of current concern. Most computing personnel spend some time reading to keep up to date (DEET, 1990a). Yet, concern continues to be expressed about ability to keep up to date with developments in information technology (e.g. Buckler, 1992). This paper presents the results of a survey designed to identify the strategies used by computing professionals to keep up to date with developments in information technology, and to explore the relationship between information gathering strategies and satisfaction with ability to keep up to date.

## Information Channels

Information about developments in information technology is available from a variety of sources in a range of formats. The sources include professional associations, suppliers and manufacturers of hardware and software, hardware and software user groups, universities, commercial publishers and training companies, and the organisation in which an information seeker works. Formats include different types of publication (e.g. newspapers, journals, magazines, and books), training courses, seminars, conferences, electronic information services and networks, and personal contact.

In this paper, we use the term 'information channel' to describe the various combinations of source and format that contain information about developments in information technology. Thus, Computerworld, a news magazine, published by the commercial publisher, IDG, is an example of the "Commercial IT industry publications" information channel; the source, IDG, is a commercial publisher in the information industry; and the news magazine is in published format. Table Three contains a list of the information channels included in this study.

## Information Gathering Strategies

There has been little study of the methods used by Australian computing professionals to keep up to date with developments in information technology. Two large-scale studies of Australian computing personnel's skills and education and training requirements included methods used to keep up to date among their observations, although information gathering was not a focus of either study. The IBM (1983) "manpower" study of the Australian "data processing industry" noted that users of computing systems appear to rely almost entirely on suppliers and employer provided education and training for continuing education. The DEET (1990a) study of education and training needs of Australian computing personnel found that 83% of the respondents read periodicals, and trade and technical literature.

The prominence of suppliers and trade sources in these responses is consistent with the results of studies of other

professions in other countries, e.g. British architects (Snow, 1975) and teachers (Hounsell, Martin and Needham, 1979), and North American manufacturers (Keller, 1986) and small business executives (Baker, 1987). These studies, and those of Allen (e.g. 1977) also note the importance of interpersonal communication in the transfer of technical information. In each of these studies, the most commonly used channels are readily available to the respondents. The view that accessibility of an information channel significantly influences the channel's use is supported by Klobas and Clyde's (1990) study of methods used by Western Australian librarians to keep up to date with developments in information technology. The respondents to this study most commonly used professional journals and newspapers to keep up to date. Klobas and Clyde concluded that the ready availability of publications to librarians may account for that profession's high use of newspaper and journal articles.

Theoretical models of information in decision making incorporate characteristics believed to determine the value or quality of the information. These models (e.g. Taylor, 1986) commonly include characteristics of relevance, accuracy or validity, and currency. However, O'Reilly (1982), in a study of decision making in an American organisation, found that accessibility dominated quality as a determinant of use of information sources by decision makers.

O'Reilly's decision study and Klobas and Clyde's information gathering study field observations suggest that a computing professional's information gathering behaviour will be influenced by the accessibility of information channels. There appears to be at least a trade-off between the accessibility of an information channel and the perceived quality of the information carried by that channel.

The current study describes methods used by computing professionals to keep up to date with developments in information technology, and makes a first attempt at identification of common information gathering strategies. The importance placed by computing professionals on different information channels is described and compared with use, as a basis for further study of the relationship between accessibility and information quality.

### Satisfaction with Ability to Keep Up to Date

There is evidence that computing professionals are not satisfied with their ability to keep up to date with developments in information technology (e.g. Buckler, 1992). It may be possible to identify information gathering strategies that are more successful than others in the sense that adopters of a 'successful' strategy report little difficulty keeping up to date, and are confident in their ability to do so. However, characteristics of the information gatherer are also likely to influence satisfaction with ability to keep up to date. For example, other characteristics such as feelings of control over work in general may influence confidence as discussed by Mackay (1988) in her examination of users of an electronic mail system for communication and information gathering. This paper reports on some exploratory analyses of the relationship between information gathering strategies and satisfaction with ability to keep up to date.

## THE SURVEY

The survey was conducted by questionnaire. The questionnaire was designed to be easy to read and understand and to require no more than ten minutes to complete. The questionnaire was based on that used in Klobas and Clyde's similar study of librarians, but modified after being trialled with twenty computing professionals to prompt for use of an expanded list of information channels, including additional electronic and interpersonal channels.

Information technology was defined very broadly to cover all aspects of the technology of information delivery, including hardware, software, communications and systems methodology. Respondents were free to define "development" in relation to their own work and professional activities rather than being provided with a definition of "development" as, for example, a technological breakthrough. This methodological technique recognises that what is a development to a professional working in one field may be received knowledge to another.

The questionnaire listed information channels that may be used to gather information about developments in information technology, divided by format. Respondents were asked to indicate which sources they had used recently and to rate the importance of each source to their work on a Likert-type scale where 1 was labelled "Not Important" and 5 was labelled "Vital". "Recently" was defined as within the past two months for publications, personal contacts, and electronic information services, and during the past two years for training courses, seminars, and conferences. The respondents were also asked to respond to a group of statements about their ability to keep up to date with developments in information technology and the need for new information services. Respondents were provided with a 7 point scale where 1 was marked "Strongly Agree" with the statement and 7 marked "Strongly Disagree". The scale was anchored in the centre with 4 marked "Neither Agree nor Disagree", to allow the scale to be collapsed to group together respondents who agreed with each statement (ratings 1 to 3) and respondents who disagreed (ratings 5 to 7).

The questionnaire was mailed to all members of the Western Australian branch of the Australian Computer Society (ACS) as an insert to the monthly newsletter, Off-Line. Personally addressed letters were sent as a follow up one month after distribution of the newsletter. A total of 226 responses was received, a 17.4% response rate.

The method used to distribute the questionnaires limited potential respondents to those who read the ACS's monthly newsletter. The respondents are therefore likely to be drawn only from those Western Australian members of the ACS who actively keep up to date with developments in their profession. We therefore caution against using them to represent the information gathering activities of computing professionals in general.

## THE RESPONDENTS

### Demography

Characteristics of the survey respondents are summarised in Table One. The respondents were compared with the population

of computing professionals in Western Australia on the most recently available census data, from 1986 (DEET, 1990b). The respondents reflect the population in sex and location of work. The figures in Table One show that they are generally older, more experienced, and more educated than the population.

Table 1. Characteristics of Respondents, and Comparison with 1986 Census of Computing Industry (DEET, 1990a).

	Study % <sup>a</sup>	Census % <sup>b</sup>
<b>Sex</b>		
Male	84.5	79.0
Female	15.5	21.0
<b>Age</b>		
15-24	6.3	20.0
25-34	25.1	46.9
35-44	43.0	26.8
45-54	22.9	5.1
55+	2.7	1.2
<b>Qualifications</b>		
Higher Degree (Dip, Masters, PhD)	32.4	} 42.1
Bachelors Degree	37.3	
No Degree	30.2	
<b>Experience</b>		
Less than five years	15.5	n/a
5 - 9 years	12.8	
10 - 14 years	19.5	
15 - 19 years	18.1	
20 - 24 years	21.7	
25 or more years	11.9	
<b>Position</b>		
Managerial	32.7	n/a
Technical/professional	50.5	
Educator/Student/Other	16.8	
<b>Field</b>		
Supervision or management	32.7	n/a
Programming and Analysis	29.7	
IS strategic planning	7.1	
Other technical and support	13.7	
Teaching or training	8.4	
Student	4.9	
Not employed in IS	3.5	
<b>Sector</b>		
Private	49.3	66.0
Public	50.7	34.0
<b>Organisational Size</b>		
20 staff or less	16.4	n/a
21 - 100 staff	12.8	
101 - 1000 staff	21.7	
More than 1000 staff	42.0	
<b>Industry</b>		
Mining & Manufacturing	13.0	18.4
Wholesale and Retail Trade	2.4	16.3
Finance & Business Services	31.2	33.1
Public Administration	16.8	7.8
Education, Museum & Library	16.8	7.8
Other	19.8	16.6
<b>Location</b>		
Metropolitan	95.9	94.5
Other	4.1	5.5

a. n = 226; b. N = 2672

Nearly one third (32.7%) of the respondents occupied managerial or supervisory positions at the time of the survey. Fifty percent occupied technical or professional positions. Those respondents in employment were almost equally divided between the private and the public sectors. The sample has a higher proportion of public sector employees (50.7%) than the population (34.0%). More public sector respondents had higher degrees than private sector respondents (42.5% compared with 25.5%); and were employed in managerial positions (59.5% vs. 40.5%).

Table One shows that most respondents work in organisations with more than 100 staff. While the sample is representative of the Financial and Business Services industry group, a higher proportion of the sample is in public administration, education, museum and library services (33.6% of sample compared with 15.6% of population), and a lower proportion is in wholesale and retail trade (2.4% compared with 16.3%).

### Ability to Keep Up To Date

Respondents were asked to indicate their agreement or disagreement with a series of statements about information technology. These statements were used to measure the level of difficulty experienced keeping up to date, and the respondent's confidence in their ability to keep up to date. Table Two presents responses to these statements.

A majority of respondents (65.4%) found it difficult to keep up to date with technological developments, while a smaller proportion (37.5%) reported low confidence in their ability to keep up to date. Cross tabulation of difficulty with confidence showed that a group of respondents reported both difficulty keeping up to date and confidence in their ability to do so. It seems that this group of respondents (16.1%) was sufficiently able to overcome the difficulty experienced to report confidence in their ability to keep up to date. However twice as many respondents (32.6%) found it difficult and were not confident in their ability to keep up to date. Over fifty percent of respondents (53.9%) agreed that there is a need for new services to keep people up to date with developments in IT.

There were no significant differences between demographic groups in ability to keep up to date, or confidence in ability to keep up to date.

## RESULTS

### How Computing Professionals Keep Up to Date

Overall, the surveyed computing professionals were diligent in their attempts to keep up to date with developments in information technology. The median number of information channels used to keep up to date by respondents to this study was 14 (the average was 13.8). Only two respondents (0.9%) reported taking no action, and two reported using 32 different information channels.

The information channels are ranked in order of frequency of use in Table Three. The most frequently used information channels were commercial information technology industry

Table 2. Agreement with Satisfaction Statements.

Statement	n	Strongly Agree		Neither Agree Nor Disagree			Strongly Disagree	
		1	2	3	4	5	6	7
		%	%	%	%	%	%	%
I find it difficult to keep up to date with developments that affect me	225	10.7	19.1	35.6	8.4	15.6	6.7	4.0
I am confident that I am able to keep up to date with developments that affect me	225	5.8	15.2	26.3	15.2	27.2	7.6	2.7
New services are required to keep people in my field up to date with developments in IT	224	10.7	19.6	23.6	25.8	9.3	7.6	3.6

Table 3. Use of Information Channels.

Rank	Information Channel	Use	
		No.	%
1	Commercial IT industry publications	189	83.6
2	Computer pages of newspapers	176	77.9
3	Professional association publications	174	77.0
4	Supplier/manufacturer newsletters	160	70.8
5	Books	156	69.0
6	People in own organisation	153	67.7
7	Supplier/manufacturer seminars	152	67.3
8	Supplier/manufacturer courses	146	64.4
9	Suppliers (personal contact)	145	64.2
10	Trade catalogues	124	54.9
11	Professional association seminars	116	51.3
12	In house training courses	112	49.6
13	User group publications	108	47.8
14	Professional association courses	101	44.7
15	Professional association conferences	97	42.9
16	People outside own organisation (not elsewhere specified)	92	40.7
17	In house seminars	85	37.6
18	Fellow members of a professional association	83	36.7
19	User group seminars	76	33.6
20	Consultants	73	32.3
21	Librarian in own organisation	68	30.1
22	Fellow user group members	63	27.9
23	User group training courses	61	27.0
24	Tertiary institution degree courses	53	23.5
24	Supplier/manufacturer conferences	53	23.5
26	Tertiary institution seminars	50	22.1
27	Publicly available electronic information services	41	18.2
28	User group conferences	36	15.9
29	In house conferences	32	14.2
30	Librarians or information brokers from outside own organisation	29	12.8
31	Tertiary institution courses (not elsewhere specified)	28	12.4
32	Conferences held by tertiary institutions	12	5.3

publications, the computing pages of daily newspapers, professional association publications and newsletters produced by suppliers and manufacturers.

**Format**

The respondents to this survey were frequent users of printed information. Table Four summarises use of information by format. Publications were used by nearly all respondents (96.5%), and training courses (89.8%) were used about as frequently as discussions with colleagues (interpersonal contact, 88.1%). Electronic information services were the least used channels (26.5%).

Table 4. Information Formats used by Computing Professionals.

Format	Use	
	No.	%
Publications	218	96.5
Training courses	203	89.8
Personal contact	199	88.1
Seminars	184	81.4
Conferences	131	58.0
Electronic Information Services	60	26.5

**Sources of Information**

Commercial information providers (91.2%) and hardware and software suppliers and manufacturers (90.3%) were the most widely used sources of information, followed by professional associations (88.5%), as shown in Table Five. User groups were less widely used. The commercial information providers include publishers of information industry magazines, and commercial training organisations.

Table 5. Sources of Information used by Computing Professionals.

Source	Use	
	No.	%
Commercial information providers	206	91.2
Suppliers/manufacturers	204	90.3
Professional associations	200	88.5
Employing organisation	178	78.8
User groups	147	65.0
Tertiary institutions	89	39.4

**Demographic Differences in Use**

Respondents with less than five years experience in the computing industry used fewer information channels than their more experienced colleagues, an average of 9.7 information channels compared with 14.6 ( $t=-4.27, df=221, p<0.001$ ). This difference is reflected in the larger mean number of information channels used by respondents in managerial and supervisory positions (managers: 15.7, others: 12.9,  $t=3.09, df=221, p<0.01$ ).

As shown in Table Six, we found no significant differences between the proportions of public and private sector respondents who attended training courses and seminars, although a higher proportion of public sector respondents attended conferences (corrected chi-square=3.49,  $df=1, p=0.06$ ). The view that public sector computing professionals had greater access to training courses, seminars and conferences had been expressed to us during our planning of the study. This was not supported for training courses and seminars.

**Table 6. Private and Public Sector Attendance at Training Courses, Seminars and Conferences.**

	Sector	
	Private	Public
Training courses (%)	91.3	92.5
Seminars (%)	83.5	83.0
Conferences (%)	53.4	67.0
No. of Respondents	103	106

Organisation size was related to the use of information resources provided by the organisation (see Table Seven). With increasing organisation size, there is increasing use of information provided by the organisation, including library services. This reflects the findings of the DEET (1990a) report on education and training needs of computing workers in Australia that large organisations provide internal training to their computing personnel more often than small or medium-sized organisations.

**Table 7. Use of Organisational Information Resources.**

Organisation Size	Total Resp.	Organisational Resources	
		Users	%
20 staff or less	37	25	67.6
21 - 100 staff	29	21	72.4
101 - 500 staff	32	23	71.9
501 - 1000 staff	17	14	82.4
More than 1000 staff	95	86	90.5

**Patterns of Use**

While we expected much of the respondents' information gathering behaviour to be based on accessibility of sources rather than a coherent strategy, we expected some respondents to have adopted strategies, consciously or unconsciously. An

exploratory analysis of the data using nonlinear principal components analysis identified nine potential information gathering strategies, of which six are readily interpretable. These strategies are not independent of one another: some respondents adopted more than one strategy, while others appear to have no strategy at all either searching widely and indiscriminately or so narrowly that no strategy is discernible. Technical details of the analysis are given in Table Eight.

The six interpretable strategies have been labelled Guided External, Self-directed External, University, User Group, Guided Employer, and Self-directed Employer. The strategies reflect different emphases on sources external or internal to an organisation, preferences for guided or self-directed information gathering, and preference for information from employer, university, user group, or other external source. A summary of each strategy is given below.

**1 Guided External**

Emphasis is on professional association and supplier channels. Format is predominantly seminar and interpersonal contact.

**2 Self-directed External**

Emphasis on use of electronic networks for access to electronic mail, bulletin board systems, and other electronic information channels. Quite high use of commercial information industry publications. Low use of external specialists, and moderate use of other external sources of information.

**3 University**

Characterised by attendance at university-sponsored seminars, conferences, and non-degree courses. Associated with low use of supplier channels. Universities may be considered to be sources of expert information, from a source independent of suppliers and manufacturers.

**4 User Group**

Characterised by attendance at user group seminars, courses, and conferences. Low patronage of similar university-based activities. A similar strategy to the University strategy in the sense that user groups also provide expert supplier-independent information, but user groups are product specific, whereas university activities provide a wider range of information.

**5 Guided Employer**

Concentrated on information channels available as a result of a person's employment, predominantly attendance at courses and seminars provided by employer and discussions with supplier representatives (presumably those who call in to the employer's premises). Associated with low use of all external sources, apart from supplier representatives.

**6 Self-directed Employer**

Adopters gather information from colleagues in same organisations, and organisation's library, but make little use of formal organisational information channels such as training courses.

Table 8. Summary Results of Principal Components Analysis.

DIMENSIONS VARIABLES	I	II	III	IV	V	VI	VII	VIII	IX	
	Guided External	University	User Group	Guided Employer	Not Association	Not University or Supplier	Self-directed External I	Self-directed External II	Self-directed Employer	
Professional association seminars	.636				-.391					
Fellow members of a professional association	.608									
Professional association conferences	.544				-.429					
Professional association courses	.535									
Professional association publications	.471									
Suppliers (personal contact)	.606					-.345				
Supplier/manufacturer seminars	.570									
Supplier/manufacturer newsletters	.531	-.512								
Trade catalogues	.510									
Supplier/manufacturer courses	.468									
Supplier/manufacturer conferences	.461					-.349				
User group seminars	.517		.477							
User group publications	.504									
Fellow user group members	.473									
User group training courses	.456		.536							
Other people outside own organisation										
Tertiary institution seminars		.539								
Conferences held by tertiary institutions		.530				-.380				
Tertiary courses (not elsewhere specified)		.490								
User group conferences			.489							
Computer pages of newspapers			-.441							
In house training courses				.594						
In house seminars				.485						
Publicly available electronic info services							.517	.544		
Consultants							.419			
People in own organisation									-.420	
Librarian in own organisation									.445	
Tertiary institution degree courses								-.390		
Total Fit: 0.5853	Lambda	0.20	0.07	0.06	0.06	0.05	0.04	0.04	0.04	0.03

Nonlinear Principal Components Analysis (SPSS PRINCALS procedure) suggests the existence of nine non-orthogonal dimensions that summarise patterns of use of the 32 information channels. Each of the nine dimensions extracted from the data explained more than 3% of the variation in the data. The dimension loadings of each variable that loaded more than abs(0.350) are given in the table. The six potential strategies noted in the paper are based on the dimensions with positive directions. The principal characteristic of Dimensions V and VI, which have been omitted from discussion is lack of use of specific information channels. Dimensions VII and VIII have been discussed as a single strategy, although the analysis suggests there are two different self-directed external strategies; this difference may, however, reflect the structure of the data collection instrument.

**Importance of Information Channels**

To determine the importance users attach to the information channels, respondents were asked to rate the importance of each information channel as a source of information on developments in information technology that affect their work.

Table Nine presents the importance ratings of individual information channels. The ten most frequently used channels are marked with an \* in the table. Commercial information industry publications, organisational colleagues, courses and seminars presented by suppliers and manufacturers, personal contact with suppliers, and books are among the ten most highly ranked channels for both use and importance. However, four of the most frequently used channels — supplier and manufacturer newsletters and trade literature, the computer pages of daily newspapers, and professional association publications — are rated low (mean rating below 3.00, the mid-point of the rating scale).

Familiarity with information channels is associated with importance rating. The computing professionals who reported recent use of an information channel rated the channel more highly than those who had not used it recently for all channels.

Table Ten illustrates this difference for the top ten most highly rated information channels.

**Format**

Table Eleven shows the average importance rating for each format. The formats are listed in order of frequency of use. Training courses were the most important format for dissemination of information about developments in information technology. Seminars, personal contact, publications, and conferences were less important, and electronic information services were of low importance.

Format importance ratings also differ between recent users and non-users. The most striking difference is that of conferences. The mean rating for conference attendees was 3.79 compared to the low mean rating of 2.22 for non-attendees.

**Sources of Information**

Table Twelve shows the mean importance rating for each of the information sources and their importance ranking. The sources are ranked quite similarly on use and importance with the notable exception of employing organisations which are ranked as the most important source of information about developments in information technology yet are ranked only fourth in terms of use.

Table 9. Importance of Information Channels.

Rank	Information Channel	Mean Impntance Rating
1	Commercial IT industry publications	3.93*
2	People in own organisation	3.81*
3	Supplier/manufacturer courses	3.66*
4	Books	3.47*
5	Supplier/manufacturer seminars	3.44*
6	Professional association seminars	3.42
7	In house training courses	3.41
7	Professional association conferences	3.41
9	Professional association courses	3.37
10	Suppliers (personal contact)	3.27*
11	Tertiary institution degree courses	3.23
12	People outside own organisation (not elsewhere specified)	3.21
13	User group training courses	3.05
14	Fellow user group members	3.04
15	User group seminars	3.03
16	In house seminars	3.01
17	Fellow association members	3.00
18	Supplier/manufacturer newsletters.	2.99*
19	Supplier/manufacturer conferences	2.97
20	Trade catalogues	2.96*
21	Computer pages of newspapers	2.90*
22	Consultants	2.89
23	Professional association publications	2.86*
24	User group conferences	2.85
25	User group publications	2.84
26	Tertiary institution courses (not elsewhere specified)	2.83
27	Tertiary institution seminars	2.81
28	In house conferences	2.58
29	Librarian in own organisation	2.57
30	Conferences held by tertiary institutions	2.53
31	Publicly available electronic information services	2.21
32	Librarians or information brokers from outside own organisation	2.14

\*Ten most frequently used information channels

Table 10. Comparison of User and Non-User Importance Ratings for the Ten Most Important Information Channels.

Information Channel	Mean Impntance Rating	
	Users	Non-Users
Commercial IT industry publ'ns	4.07	3.17
People in own organisation	4.01	3.38
Supplier/manufacturer courses	3.87	3.27
Books	3.65	3.06
Supplier/manufacturer seminars	3.64	3.02
Professional assoc'n seminars	3.68	3.14
In house training courses	3.85	2.97
Professional assoc'n conferences	3.82	3.10
Professional association courses	3.71	3.09
Suppliers (personal contact)	3.51	3.83

Table 11. Importance of Information Formats.

Format	Importance	
	Mean Score	Rank
Publications	3.18	4
Training courses	3.45	1
Personal contact	3.22	3
Seminars	3.27	2
Conferences	3.14	5
Electronic information services	2.38	6

Table 12. Importance of Sources of Information.

Source	Importance	
	Mean Score	Rank
Commercial information providers	3.35	2
Suppliers/manufacturers	3.22	3
Professional associations	3.13	4
Employing organisation	3.42	1
User groups	2.98	6
Tertiary institutions	3.05	5

No significant differences were found between demographic groups for perceived importance of information sources or formats.

### Ability to Keep Up to Date

#### Difficulty

Logistic regression was used to explore associations between reported difficulty keeping up to date and information gathering strategies. Respondents who agreed with the statement "I find it difficult to keep up to date with developments that affect me" (65.3% of all respondents to the question) were classified as respondents who found keeping up to date "difficult"; respondents who disagreed with the statement (26.3%) were classified as those who found it "not difficult".

A logistic regression equation can be used to calculate the probability that an individual with certain characteristics (e.g. adoption of an information gathering strategy) would find it difficult to keep up to date. To take account of the potentially confounding effects of respondents' demographic characteristics, field of work, experience in information systems, sector of employment, level of education, and sex were included in the analysis.

The SPSS LOGISTIC procedure was used to perform the analyses. Several logistic regression models were considered in this exploratory analysis. The models most capable of correctly classifying respondents as "difficult" or "not difficult" all included level of education and one or more information gathering strategies as factors in estimating the probability that an individual may report difficulty keeping up to date. The model with best prediction capability was:

$$\text{Pr}(\text{Difficult}) = 1 - 1/(1 + \exp(-z))$$

where  $z = -0.7787 - 0.4875\text{Degree} - 0.6948\text{Strategy1} + 0.5351\text{Strategy7} - 0.3838\text{Strategy9}$

This model correctly classified 77.05% of respondents (Model Chi-Square = 24.668, df = 4,  $p < .001$ ; Goodness of Fit Chi-Square = 186.058, df = 178,  $p = 0.324$ ).

The role of education in these models is interpreted as indicating that, for individuals who adopt the same information gathering strategy, the higher the level of education, the higher the probability of difficulty. The role of the strategies in these models is to indicate the extent to which adoption of a strategy is likely to increase or decrease difficulty in the presence of all other factors in the model. (The strategy numbers in the above equation are those presented in Table Eight). The generic internal and external strategies consistently appeared in the exploratory analyses with negative coefficients, indicating that these strategies are associated with increased probability of difficulty. The directed strategies, including strategies directed at specific sources such as tertiary institutions, consistently appeared with positive coefficients, indicating that they are associated with decreased probability of difficulty.

#### *Confidence*

Similar analyses were undertaken for reported confidence in ability to keep up to date. Respondents to the statement "I am confident that I am able to keep up to date with developments in IT that affect me" were classified into those who were confident (47.3% of all respondents to the statement) and those who were not confident (37.5%).

No logistic regression model incorporating information gathering strategy and the demographic factors included in the analysis was able to predict confidence better than random allocation of respondents to the "confident" and "not confident" categories. Factors other than computing professionals' information gathering strategy and demographic characteristics are needed to explain confidence in ability to keep up to date.

## DISCUSSION

The influence of each of the factors noted by researchers as influences on use of information channels is reflected in the results of this study. Accessibility, information quality, and familiarity with information channels influence information gathering behaviour as we discuss in this section.

### *Accessibility*

The influence of accessibility is shown in both the prominence of readily available and low cost information channels in reports of use, and the differences between use and importance, with frequently used channels not necessarily high in importance and high importance channels not necessarily frequently used.

Each of the most frequently used information channels is readily available to computing professionals. For example, suppliers and manufacturers disseminate their newsletters and magazines free of charge to users of their hardware and software, and the computing pages of daily newspapers are 'free' to those who subscribe personally or through their employer to the newspaper. While many of the most frequently used information channels were also highly ranked for importance, four of the most frequently used channels were low. These frequently used but low importance channels are readily available to respondents to our survey, and appear to be used because they are accessible rather than because they carry information of high quality.

Formats that provide current information but to which access is limited, notably conferences and electronic information services which were used by less than half the respondents, were less frequently used than formats that provide more dated information but are more accessible, such as publications. There are also differences between patterns of use and perceived importance of formats. The most striking is that while publications are the most frequently used format, they are considered to be of only moderate importance. The accessibility of publications to respondents to this survey may explain the dominance of publications over other formats. (The sample was self-selected from members of the Australian Computing Society who received and opened the Society's monthly newsletter. This group may be more inclined to read than computing professionals as a whole).

### *Information Quality*

Some findings are less readily explained in terms of accessibility. For example, the high frequency of attendance at training courses provides evidence that courses meet a need for information about developments in hardware and software that directly affect the day to day work of computing professionals, i.e. they are high in relevance.

Similarly, while much of the information provided by the most widely used sources is low cost (e.g. free copies of news magazines and trade literature from suppliers and manufacturers, and association meetings) or readily available (e.g. visits from supplier and manufacture representatives), acces-



sibility is insufficient explanation for the dominance of these sources. The exploratory analysis of information gathering strategies identified strategies that group variables more by source of information than format. (This result is not an artefact of the data collection instrument, which was structured by format not source). Characteristics of the source have a strong influence on strategy. This finding provides some confirmation of Olaisen's (1990) proposition that the cognitive authority of an information source is important to an information seeker.

### Familiarity

We did not collect any data to explain why degree holders report greater difficulty keeping up to date. It may be that they report greater difficulty because they are more aware of information channels, developments, or need to keep up to date than other computing professionals. More structured research is needed to confirm the influence of familiarity with information channels on information gathering behaviour. However, its appearance as a possible influence in this study and others (e.g. Allen, 1977; O'Reilly, 1982; and Klobas, 1991) suggests that it should be given further attention.

### Further Research

This survey has described the information gathering behaviour of a group of Western Australian computing professionals. The framework used for discussion of the findings has been based on earlier research that suggests that accessibility to information channels, and information quality influence information gathering behaviour. While this has proved a satisfactory framework for discussion of the survey results, it has told us little about the nature of influence of each factor and the interaction between them, or the extent to which computing professionals consciously adopt strategies to keep up to date with developments in their field. Some questions that might be asked in future research are: What is the relationship between accessibility and information quality? Do information gatherers consciously trade one off against the other, or do many simply use accessible information channels with no thought of seeking quality information from other sources? If information gatherers are made aware that difficulty may be the result of indiscriminate information gathering rather than more directed strategy, will they change their behaviour?

The analyses that identified potential information gathering strategies and relationships between satisfaction and information gathering strategy following the survey are exploratory only. More structured research is required to confirm their existence in groups other than the survey group, and to understand the relationships between strategies and between strategies and other characteristics of information gatherers.

### CONCLUSIONS

Respondents to this survey reported using a wide range of information channels to gather information about develop-

ments in information technology. They adopted a variety of strategies to keep up to date with developments in information technology, with varying degrees of success. Nearly two-thirds reported that they found it difficult to keep up to date with developments in information technology that affect them, while almost half reported that they were confident that they were able to keep up to date. While difficulty appears to be related to information gathering behaviour, confidence appears to be related to characteristics of the information gatherer other than those associated directly with need for information or information gathering behaviour.

The respondents gathered information predominantly from publications that were readily available to them at low cost. Personal contact with colleagues in their organisation and with suppliers were also widely used information channels. The most widely used channels were accessible but not necessarily important to respondents. The results of exploratory multivariate analyses suggest that difficulty can be reduced by use of selective information gathering strategies rather than by opportunistic use of accessible information or use of a large number of information channels.

Employers were the most important source of information about developments in information technology, and training courses the most important format for delivery of the information, for this group of computing professionals. This is a surprising finding given more than fifty percent of respondents work in non-technical positions. Such an internal focus may restrict innovation and development in applications of information technology to incremental change based on existing installations.

The results of this study suggest that few computing professionals systematically gather information to keep up to date with developments in information technology. Their priorities for information about technological developments are more closely aligned with their day to day work than with innovations in information technology in general. Despite this narrow focus, they report difficulty keeping up to date with developments. While they may be exhorted to adopt more appropriate information gathering strategies, the ease of access to information industry publications and personal contacts will ensure that these information channels continue to be used to keep up to date, regardless of the quality of the information they carry.

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