

# CAREERS IN INFORMATION SYSTEMS

## INTRODUCTION

Information Systems is still one of the newest industries in the world and, partly for this reason, there is no clearly defined job structure. Instead there are a large number of interconnected opportunities for career development, ranging from the most mundane types of work using a word processor, to the most exciting which might involve the design of components used for space travel. In between these extremes there are a very wide variety of jobs demanding knowledge of the various aspects of the computing industry and using skills such as programming or systems analysis.

Although computers, the machines, are at the heart of the industry, most jobs within the career structure involve working with people, communicating with them at all levels and sorting out business-related problems. Computing is rarely ever boring and the opportunities that such a career brings are challenging and rewarding; rewarding not only in the sense of being quite well paid, but also in respect of giving a high level of job satisfaction.

There are two distinct areas of computing employment, the one for "computer users" and the second for "computer practitioners/professionals", although there is a very blurred overlap between the two. Nonetheless the distinction is adequate at an introductory level. Currently it is estimated that, in the UK, some 3 million people are employed as "users" (although this is likely to be an under estimate) and this number is forecast to double during the course of the next five years. In comparison the number of "computing practitioners/professionals" in the UK is somewhere around 300,000 and is falling.

## COMPUTER USERS

Computer users are people whose main job is not in computing, but who use computers to assist them in their day-to-day activities, in the same way that some people use telephones or motor cars without being telephone engineers or motor vehicle designers. This sector of employment is so incredibly wide (because the use of computers is influencing so many different aspects of our lives) that it is possible only to identify a small sample here.

- **CAD Operators.** CAD (Computer Aided Design) is the modern replacement for the work of a draughtsman. People who use this computerised facility require a number of the skills of the traditional draughtsman and, as such, really require training as an engineer, rather than as a computing specialist. The use of CAD software will form a part of any modern course in engineering, but only as a *part* of such a course.
- **Graphics Designers.** Many aspects of computer work involve the skills of graphics design and this is immediately evident in two areas, the first being CAD (discussed earlier) and the second being Desktop Publishing. True design capabilities are very desirable attributes especially in the latter application as well as in designing advertisements to promote computer related products. In general, however, such attributes are not contained within computer training courses; they are far more the prerogative of courses in art and design.

- **Other Professions.** Most professionals, for example accountants, doctors, etc, nowadays use computerised accounts packages rather than manual systems. Whilst it is valuable for computer professionals to have *some* knowledge of such packages it is more important for professionals, as computer users, to be trained within more traditional business studies courses, and specialising subsequently.
- **Administration/Secretarial.** Most secretaries, typists, clerks and office staff use computers nowadays as tools in the modern office. In general their needs are limited to the use of word processing packages, spreadsheets, databases and desktop publishing and much of this work is covered in modern secretarial courses. There will be a small number of such staff, generally at a supervisory level, who need to do rather more, possibly in respect of controlling a networked computer system; such people will train initially in the more standard aspects of secretarial work and may be sent for specific network administration training subsequently if they prove suitable to undertake such work - it will rarely form part of their basic training.

### **IS/IT PRACTITIONERS/PROFESSIONALS**

This, rather smaller category, embraces all those who substantially earn their living through the development and maintenance of computer systems, and this covers, again, a wide variety of jobs. Those identified here are the ones most likely to be of interest to aspiring practitioners:

- **Applications Programmer.** A computer system works by obeying the instructions contained within a program (or suite of programs) and a typical program might, for example, provide the necessary instructions to undertake the monthly payroll. A programmer has the job of designing each program, coding it in an appropriate programming language, testing and fully documenting it - the programmers frequently work in teams, each person contributing a share towards the development of the (suite of) programs,. Programmers need to be very logical in their thought processes, capable of problem solving and thorough by ensuring that the programs are fully tested.
- **Systems Analyst.** A computer system will almost certainly contain one or more suites of programs, but there will be many other components as well. For instance, the overall design of the system itself will involve discussions with computer users and managers in order to design the best possible system - this brings out the 'people' skills of the analyst as well as the knowledge they possess of the business aspects of the system as distinct from just the hardware and software considerations. A computer system exists to meet the needs of the business and a program is actually no more than a (relatively small) component in the system. It is within this far broader context that the analyst will be employed and indeed one of their functions will be to pass on to the programmers the details of the applications programs which they will have to write. The analyst has a far greater involvement with the business aspects of the system and has far more to do with the people who will use the system and many of whom will have contributed to its design.

- **Systems Programmer.** Whereas the applications programmer designs and codes programs to undertake business functions, the systems programmer is far more involved with the process of getting the computer system itself (both hardware and software) to function more efficiently. If the applications program is not working as fast as perhaps is necessary, then the systems programmer will investigate the environment in which that program is working and try to 'fine tune' it. Perhaps a suitable comparison is with the vehicle engineer who can 'tune' a car engine to make it perform better. It is unlikely that there will be many such programmers employed in a typical company whereas that same company may employ a substantial number of applications programmers, nonetheless systems programmers will often be employed within the staff of the large computer manufacturers to ensure that the computers sold to their customers are ready to undertake business applications in the most efficient manner.
- **Information Systems (IS) Manager.** The title carries with it a fairly clear picture of the role of the post holder. Responsibility at this level includes that for all computer systems developed within the company, all of the applications which are being supported by the company's computer system, the hardware itself, and the staff employed within the department. In a very few cases the IS Manager may even have sufficient influence to hold a place on the company's Board of Directors - this is a reflection of the importance of the computer system to the company's mainstream business.
- **Network Administrator.** Most companies nowadays use Local or Wide Area Networks to enable their computers in different parts of the organisation to communicate with one another and to share access to corporate information. To control this access someone has to be responsible for such a network, allocating passwords to users, ensuring that data is held confidentially and securely, and that the network operates efficiently.

The control of this is the responsibility of the Network Administrator although the term Network Controller is sometimes used interchangeably. Where there is a large computer system within the company, the Network Controller will operate under instruction from the IS Manager; in small companies such a person may undertake overall responsibility for all hardware within the installation.

- **Help-Desk Operator.** With the growth of 'computer users' within a company there is need for someone who is familiar with the packages such people use in order to be able to provide a 'help' function within the company, someone to whom users can turn when they encounter difficulty. Such a person may not in practice only deal with the 'standard' applications packages which can be purchased - quite frequently they will be expected to offer assistance with problems on the company's network when users experience difficulty in using it and, in general, with the variety of problems such users may experience. Although they are meeting the needs of users such Help-Desk Operators are far more extensively trained and certainly are counted as practitioners in their own right.
- **Software Engineer.** Software engineers are, like systems programmers, employed to get the best out of the computer but at the design stage - they are generally employed by computer manufacturers or by software houses who will employ them to design such things as compilers (used to translate programs as written by the programmer into programs that can be obeyed by the computer itself), operating systems, and other computer software which is put in place to help the computer to undertake business applications more efficiently.
- **Hardware Engineer.** Just as software engineers are involved in the 'fine-tuning' of computer software, so too are hardware engineers involved with the design and manufacture of computer

hardware, the processors which control them, disk memory, etc. Again they are usually employed by the computer or component manufacturers.

- **Computer Sales.** Companies who either make computers or supply software require knowledgeable staff to sell their products to an increasingly computer-literate public - this applies whether they are engaged in selling products across the counter at the 'local' computer store in the high street, or whether they are selling the company's products to the Boards of large companies. Sales staff need to be fully conversant with the products and applications as they may be dealing with items potentially selling for well in excess of a million pounds, this knowledge is critical if they are to be successful.
- **Maintenance Engineer.** Although modern computers are extremely reliable, faults can still occur and engineers are required to repair them. Maintenance engineers are employed generally either by the computer manufacturers themselves, or by those companies set up in business for the express purpose of maintaining computers and computer systems.
- **Trainers and Lecturers.** In order to train people either as users or as computer practitioners it is necessary that staff exist explicitly for this purpose. They may be employed in one of a very large number of assorted workplaces, ranging from computer manufacturer to university. Individually they may specialise in specific aspects either of computer software, hardware, systems analysis, 'people' skills and so forth.

## EDUCATION AND TRAINING

With all this plethora of available employment it is not surprising that there is no single recommended course of education available to encompass the needs of all types. Instead it is perhaps most appropriate to try to identify some basic 'ground rules'.

Firstly, there is the question, for the 14-16 year old, of what GCSE subjects to study in order to go further on at the age of 16 into the next stage of education with a computing career in mind. In general there are no hard and fast rules - clearly good results across the board at GCSE level are very desirable - most colleges or sixth form centres will be reluctant to take students on into 16+ education without at least five grade C passes at GCSE level; as regards subjects it should be clearly recognised that Mathematics and English are essential - if they are not achieved at age 16 then they should be attempted again until passed. Despite the clear desirability of having studied GCSE Information Systems or Computer Studies, this is by no means essential - most centres providing for post-16 education recognise that not every student has had the opportunity whilst at school of studying either of these subjects - for this reason most subsequent courses assume no Computing/IT knowledge at all. Desirable subjects, however, if possible should encompass Business Studies especially for those seeking to go into programming or systems analysis. One additional subject which is highly desirable is a foreign language - this is because so many computing companies are anxious to compete within the European Union that many of them actually require new entrants to be able to converse in an European language.

It is at the post-16 level of education where choices have to be made and there are two alternatives available,. "A" level courses, whether at school or colleges of Further Education, offer a progression route into Higher Education (University) courses. For those who feel that computing may be one of the career paths available, but who lack the certainty that this will be the case, to do an "A" level

Computing course is a sound investment. If they feel that Software Engineering or possibly Hardware Engineering may prove to be their forte, then such a course is essential - the same is substantially true if Systems Engineering is one of the career choices to be considered. With Hardware Engineering in particular another "A" level in Electronic Systems or possibly in Physics may be a sound choice.

For those who hanker after Systems Analysis the "A" level in Computing may be a good choice, but it would be particularly beneficial if they also undertook "A" level Business Studies if that choice is available to them. For programming employment it is not essential to obtain a degree, but it is preferable if possible since many employers require this level of qualification even though there is a substantial school of thought that would suggest it is not necessary. Degree courses themselves are extremely variable - some have a clear focus of Computer Science or Software Engineering, but these are less suitable for the potential systems analysts or programmers who need a degree course with a far stronger business focus - titles such as Management of Information Systems, or the equivalent, are to be actively sought for such aspirants.

For Hardware Maintenance the educational provision should be that for any electronic engineering qualification, either taking "A" levels as for Hardware Engineering and then taking a degree in Electronic Engineering.

However, "A" levels do not represent the only way forward at age 16. For any seeking to go into programming or systems analysis an equally valid route is by way of the BTEC National courses in Computing, available at most Colleges of Further Education, especially if these are followed by a Higher National Diploma (HND) in computing as available at a substantial number of Universities and at a few Colleges of Further Education. BTEC National courses (soon to be superseded by GNVQ provisions) and HNDs offer a very practically oriented provision in what is clearly a very practical career.

There are still a few career paths as yet not readily identified. Clearly the potential IS Manager will have had to pursue some other (less senior) career first of all and may have experience of systems analysis and/or programming on the way. Help-Desk staff may benefit from the GNVQ courses in Information Technology, as may those seeking exposure to network administration - although the BTEC National Diploma courses may still offer valuable experience to such candidates.

For those seeking to continue their education by part-time or by correspondence courses those of the IMIS may prove to be of value, noting that IMIS is a professional body in the field of Information Systems Management and one which has an international standing. They are established at four levels, the lowest, the Foundation being at GCSE level, and the next, the Diploma, being at "A" level standard. The Higher Diploma is at HND level and the Graduate Diploma is set at Ordinary Degree level. In all cases the emphasis is upon Information Systems Management. For details of these, or of student membership, write to the Institute at the address given.