Glossary

3D Audio

3D Audio is a technique that is used to provide additional depth to normal stereo sound. Conventional stereo is normally made into 3D Audio by putting stereo speakers into a room with a device which analyses the sound from the speakers. The device feeds data back to the sound system which then readjusts the sound in order to give the impression that the speakers are further apart than they actually are.

In computer systems the speakers tend to be smaller and closer together than in personal entertainment systems. 3D Audio techniques can be used to improve the sound quality. There is a range of 3D Audio devices which work with the sound card of the PC.

As well as improving the sound by giving the impression that the speakers are further apart than they really are, true 3D Audio can increase the range of sound position — normal stereo sound places a sound at any point between the two speakers (left and right). True 3D Audio can place the sound anywhere — left/right, near/far, up/down. The research group described in this book were working on an enhancement to this so the position of the sound reflected the position of the sound source. For example, in a teleconference, if the speaker in the remote location talks as (s)he is walking across the room, the sound would move in the speakers to reflect that movement. At the time, this worked through headphones and was very effective in adding an extra contextual clue.

Artefact

An Artefact is a "thing" made by human workmanship. In the context of this book, Artefact is used to indicate objects, articles, and "things" which have been created by communities to assist them in their work and which may have some of the community's knowledge embedded in them. Examples in this book might be some of the tools which are used by seafarers to help them with navigation — these items have been created over many years by the community of seafarers and handed down. Artefacts do not have to be concrete — a process or procedure may be an Artefact. The procedure helps newcomers to a community by providing set steps. As the newcomer becomes more of an old-timer, (s)he may develop the confidence to "break" or improve the procedure.

Artificial Intelligence (AI)

Coined by John McCarthy at the Massachusetts Institute of Technology in 1956, the term Artificial Intelligence describes the branch of computer science which attempts to make computers act like human beings. There have been a large number of AI languages and techniques. Two common languages are LISP and Prolog. Current techniques include neural networks (systems which try to develop intelligence by simulating the types of connections found in animal brains), cased based reasoning and ontologies.

As well as the expert systems described in this book, AI has been (and still is) used in a number of fields:

Games: This is perhaps one of the areas where AI has made the most advances. Computers can now play games, like chess, against a human user. One computer, IBM's Deep-Blue, beat a world champion (Gary Kasparov) in 1997. Chess on the PC is now available for home users.

Natural Language Processing: Developing computers to the point where they can understand natural, spoken, human speech has proved to be more difficult than first thought. If it were successful, it would have many advantages — users could interact with computers without any specialised skills. The user could simply give an instruction as they would to another human and the computer would obey the command. Progress to date has resulted in some language translation programs but these programs are not as good as human translators. For example, an early system, when given the phrase "out of sight, out of mind," translated it as

"invisible, insane." Progress has also been made with speech to text systems. These are voice recognition systems and some are now proving popular for domestic PCs — but they do not *understand* what is being said. These systems are simply dictation systems and they must be "trained" by the user in order to obtain a reasonable degree of accuracy. However, they are constantly improving as the specification of domestic PCs continues to improve and can handle ever more processing demands. *Robotics:* A lot of progress has been made in this field, particularly in those applications where a machine has to do simple repetitive tasks (for example, the automotive industry). The range of applications is growing as exemplified by the solar-powered robot lawnmower which is now available for the domestic market. The processing required in robotics is to allow the robot to see, hear and react to its environment.

Asynchronous

In IT terms, Asynchronous means not synchronised, i.e., something does not occur at pre-determined or regular intervals. For example, communication where date can be sent intermittently rather than in one single stream is said to be Asynchronous. From this perspective a telephone conversation can be described as Asynchronous because both parties can speak when they want. If it were synchronous, each communication partner would have to wait for a specified interval before (s)he could speak. However, when we talk about different communications media being Asynchronous, it is generally taken to mean that the communication partners do not have to be present at the same time — thus e-mail and voice mail would be seen as Asynchronous media.

Autopoiesis

Autopoiesis is based in the field of biology. It is the process at the heart of Autopoietic Theory which is the collective term for a body of work developed by Humberto Maturana and Francisco Varela, two biologists from Chile. They originally used it in the field of neurobiology to characterise living systems. The process of Autopoiesis characterises living systems as living machines (Maturana was not content with listing features of the systems in order to define life). Rather he was trying to capture, in some way, the unchanging feature of a living system around which natural selection operates.

The notion of Autopoiesis has been applied to the social sciences and has developed into a theory of knowledge of a social system and has provided an opposing view to the cognitivist approach. Von Krogh and Roos (1996, pp. 2-3) describe it as proposing that the world is not a pre-given state to be represented. The world is brought forth through the creative act of cognition. From this perspective knowledge and information are developed in the brain and in social systems. Developing information is simply to "put data in form." Knowledge is developed internally in a self-referential manner. Knowledge, therefore, is private and the organisation is seen as a simultaneously open and closed system; it is open with respect to data but closed with respect to information and knowledge.

Avatar

An Avatar is a representation of a character in a virtual environment, often taking human or beast forms. The user can change the characteristics of the Avatar, for example, hair colour, overall colour, clothes style and colour. As the user interacts in the virtual environment, the Avatar will move around the environment, e.g., walking in the direction instructed by the user. The Avatar can also interact with Avatars of other users. Avatars are becoming more sophisticated and can, for example, change facial expressions during interaction with other Avatars.

Boundary Objects

As groups or communities from different domains work with each other or communicate with each other they develop different types of boundary objects across intersecting social worlds' through the process of creation and management.

Star (1989) and Star and Griesemer (1989) have done a lot of work with boundary objects. Star (1989) describes them as being "objects plastic enough to be adaptable across multiple viewpoints, yet maintain continuity of identity." As explained in this book she identified four types:

• Repository
• Ideal type
• Terrain with coincident boundaries
• Forms

Star and Griesemer (1989, p. 393) explained the concept as "an analytic concept of those scientific objects which both inhabit several intersecting worlds … *and* satisfy the informational requirements of each of them. Boundary objects are objects which are both plastic enough to adapt to local needs and the constraints of several parties employing them, yet robust enough to maintain a common identity across sites. They are weakly structured in common use, and become strongly structured in individual site use. These objects may be abstract or concrete. They have different meanings in different social worlds but their structure is common enough to more than one world to make them recognisable, a means of translation. The creation and management of boundary objects is a key process in developing and maintaining coherence across intersecting social worlds."

Mambrey and Robinson (1997) studied the role of documents in a flow of work through a hierarchy and found that there were artefacts (in their case documents, folders, etc.) which strongly supported the work of Star (1989) and Star and Griesemer (1989)

Chat Log

A Chat Log is the record of a chat session between two or more people. Chat is real-time communication between two or more people using a computer. A user can initiate a chat session with another user and they can then communicate by typing on the keyboard. The text which they enter will be visible on their partner's computer.

The Chat Log mentioned in this book stretches the definition in that it was the written record of a teleconference. As the group progressed the meeting, one of the members was making notes online. They called this their "Chat Log." This "Chat Log" also formed the minutes of the meeting.

Cognitivism/Representationism

The development of Cognitivism in the 1960s was a reaction to the strict focus on behaviour which was demanded by the behaviourist school. Many theorists disagreed with this, thinking it must be possible to learn with no externally visible signs of changed behaviour, i.e., there were aspects of learning for which behaviourism could not account. Cognitivists therefore tried to go inside the head of the learner in order to see how learning activated (and changed) mental processes.

Cognitivists view knowledge as mental constructs (or schemas) inside the head. These schemas are representations of the outside world. The

learning process is regarded as the process by which these schemas are memorised.

In Cognitivism, the acquisition of knowledge is measured by what learners *know*, unlike in behaviourism where it is measured by what they *do*. The learner is regarded as an information processor and therefore learning is seen as processing symbols.

The Cognitivist Approach is concerned with:

• Symbolic representations
• Rule manipulation
• Rule modification

At around the same time that Cognitivism was gaining ground, early research was being undertaken in Artificial Intelligence (AI). This research demonstrated computers deciphering codes and producing proofs. This, perhaps, is one of the reasons why expert systems were not totally successful — AI was perhaps restricted to the Cognitivist Approach and did not take other approaches (e.g., constructivism) into account.

Common Ground

As explained in some detail in this book, Common Ground is a notion used by Clark (1996) in his discussion of the use of language. Clark had taken earlier discussions of Common Ground, analysed them and used the most suitable aspects for his work. He felt that Common Ground is "important to any account of language use that appeals to 'context'" (Clark, 1996, p. 92) in that, when referring to context, none of these accounts of language provide a definition of context. Clark felt that Common Ground could help with this. He notes that Common Ground is essential to coordinating joint action. More importantly for the notion of Communities of Practice is the notion of communal Common Ground: "We often categorise people by nationality, profession, hobbies, language, religion, or politics as a basis for inferring what they know, believe or assume" (Clark, 1996, p. 100). As an example, he describes a situation where he meets someone for the first time. He discovers she is a classical music enthusiast and he therefore suddenly has a much improved picture of her as he is a classical music enthusiast himself. He assumes that she would know everything that such an enthusiast would know. Having established

that they are both enthusiasts they now "have a shared basis for taking all this information to be common ground" (Clark, 1997, pp. 100-101).

Competitive Advantage

Much has been written about how to achieve Competitive Advantage. Robson (1994) suggests that Competitive Advantage is something which *might* follow if an organisation gets everything else right. Other commentators try to identify specific actions a company can take in order to generate Competitive Advantage, for example, rapid implementation of the latest technology.

Porter (1985) argues that the basis for above average performance in the long run is a sustainable Competitive Advantage. He suggests that without a sustainable Competitive Advantage, all a company can do is skim off the largest profits it can for as long as it can. He proposes that there are two types of Competitive Advantage:

• Cost leadership and
• Product differentiation

These lead to three strategies for pursuing Competitive Advantage:

(a) *Cost* — become *the* lowest cost producer. The organisation needs to seek out *every* source of potential cost advantage and be concerned with pursuing economies of scale.

(b) *Differentiation* — in this case the organisation seeks to become the best performer in the sector in some aspect of the product which is highly valued by customers (apart from cost). The organisation also seeks one particular aspect of its performance and positions itself uniquely to meet the needs of its clients in this area. Although a premium is paid for this uniqueness it is important that the organisation still maintains some sort of cost parity with its competitors.

(c) *Focus* — strategy to target a selection of a particular group or sector. The organisation will then tailor its strategy specifically to target the needs of this group or sector. This strategy may bring Competitive Advantage within the target group but will not deliver wider Competitive Advantage. In order to generate this Competitive Advantage, the organisation will need to exploit the weaknesses of its competitors which are operating on a broader basis.

Power (1985) also points out that it is not usually possible to operate cost leadership and differentiation strategies at the same time unless the company also has:

• Prime mover advantage
• Structural advantage
• Technological advantage

There is a Competitive Advantage when the organisation can deliver the same benefits as its competitors *but* at a lower cost (cost advantage) or can deliver benefits which are *greater* than those of competing products (differentiation advantage). A Competitive Advantage therefore enables the organisation to deliver superior value for its customers and greater profits for itself.

It is important to note that the aim is to deliver *sustainable* Competitive Advantage. It may be the case that an organisation implements a piece of technology which gives them an immediate Competitive Advantage but which is something that can easily be replicated by other organisations. As a result, the organisation will no longer have something unique delivering Competitive Advantage. Rather it has become the case that the "unique" piece of technology has now become standard in the field and not having it leads to competitive *disadvantage*.

Computer Mediated Communication (CMC)

This quite simply refers to communication media which needs a computer to function. Examples are e-mail, instant messaging, text messaging, Internet forums, Internet relay chat (IRC) and video conferencing. Even though computers are now routinely used in the telephone system, the telephone is not regarded as a CMC as the use of the computer is not essential — the phone system functioned before the introduction of computers.

Constructionism/Constructivism

These two terms are often used interchangeably and in this book perhaps I, too, am guilty of this. However, strictly speaking, Constructionism is more of an educational method based on the Constructivist Theory of learning.

Constructivism as a theory of learning is based on the notion that knowledge and meaning is *constructed* by the knower or learner based on mental activity or mental construction. People learn by taking new information and adding it to what they already know. It is said that people learn most effectively when they construct their own understanding, therefore the emphasis is on the student rather than the teacher. The student, rather than the teacher, is the one who is interacting with events and objects. As a result of this interaction the student gains an understanding of the features of such events and objects and thereby constructs conceptualisations and solutions.

The theory of Constructivism was a reaction to the notion that knowledge can be transmitted from teachers to learners — that the ideas expressed in text books or lectures are simply transmitted into the student's mind. For a Constructivist, learning means that the learner builds complex knowledge structures and must consciously think about deriving meaning. Through the effort of doing so, meaning is constructed through knowledge structures. The meaning, however, may bear no relation to the real world [consider the simple (or naïve) theories developed by younger children]. The basis of the differences between Constructivism, Cognitivism and Behaviourism is that knowledge is seen as a constructed entity rather than as a given. Therefore, according to Cognitivists, knowledge cannot be transmitted from one person to another. Rather, it has to be constructed (or re-constructed) by each person.

Contextual Design

Contextual Design is a work analysis and redesign method based on grounded theory and ethnographic techniques. In this book, we concentrated on Contextual Inquiry for data gathering and then we used the Contextual Design models for handling the data.

Contextual Design goes through a number of stages:

Data Gathering Using Contextual Inquiry. This follows a form of "master-apprentice" model enhanced by the four principles of context, partnership, interpretation and focus.

Once the data has been gathered it is analysed using a number of steps:

Interpretation Session. Each interview is talked through by the person who did the interview. New interpretations are suggested and notes are recorded.

Models are created for each interview:

• Flow Model
• Sequence Model
• Artefact Model
• Cultural Model
• Physical Model

Once the models have been created, an affinity diagram is created from them — i.e., themes are extracted from the models and are grouped by placing together any extracted pieces of data which appear to fit together. This gives a hierarchy of themes.
The models are then consolidated, i.e., a consolidated flow model is created from the individual flow models to give a picture of the whole organisation. The same is done for each of the other types of model.
The consolidated models and the affinity are then "walked," i.e., examined for any other interpretations. The customer is involved in this stage. The idea is that the data from the models is used to drive an innovative design, ending up with a prototype which can be implemented.

Database

A Database is an organised collection of information which can be retrieved according to specific criteria. Strictly speaking, a Database does not have to be electronic (e.g., a card index file can be regarded as a database), but current usage tends to take for granted that a Database is electronic and the data held in the Database can be retrieved by a computer. A database is made up of fields — each field is a single piece of information about an entity, e.g., name, title, address line 1, address line 2. Early databases were held in "flat files" — i.e., each entity had a row in a table. Each cell in the row held a specific piece of information. The problem with flat file databases was that data which was relevant to a number of entities had to be entered anew for each entity. Relational databases hold a number of tables which are linked by "relations." This means that if a piece of data is relevant to a number of entities it is entered

only once and then linked to each of the relevant entities. Modern databases can be of immense size and can drive full information systems.

Data Mining

Data Mining is undertaken by a type of database application which searches data to find hidden patterns. The term is often used (mistakenly) to refer to software which presents data in new ways. True Data Mining software goes further than this. Not only does it present the data in new ways but it also looks for hidden patterns and relationships. This is an immensely useful tool for marketing professionals. For example, it can help retail organisations find customers with common interests or it can help companies make use of the mass of data which they can retrieve from their websites.

Data Warehousing

An organisation may have many different systems and databases in place across the organisation. Data Warehousing generally means the combination of many of these diverse databases across an organisation in order to give an ordered picture of the diverse data which, in turn will support management decision making. A Data Warehouse will contain a wide variety of data which is then presented in a format which will give an understandable picture of the state of the business at a particular point in time.

Distributed Cognition

Developed in the 1980s by Edwin Hutchins and colleagues, Distributed Cognition (DC) tackles the debate as to whether cognition is primarily individual or social. DC claims that cognition takes place over both the individual and the environment thus combining aspects of Cognitivism (cognition is only in the mind) and Situationism (cognition is in the environment). It moves away from the Cognitivist view that regards the individual as an information processor.
Important parts of DC are:

• The use of artefacts and
• Representations

Artefacts can be seen to have knowledge of other people embedded in them. This is not like the attempts of knowledge engineers to replicate

knowledge in a system. The artefacts of DC are more like tools which help the user do his/her job. They do not mean that the user does not need knowledge to use them — rather the user needs a different type of knowledge.

Representations can be a way of presenting a problem. The way the problem is presented and represented will make a difference as to how the problem is solved. This is then also linked to how data is presented. The example given in this book (as reported by Hutchins, 1990) describes how navigational data is presented in different artefacts — taken off a reader, on a chart, in a log book, etc. In this case the data is represented in different states and propagated across different media.

Downsizing

In some industries, organisations are finding that they are having to make staff redundant. This may well be due to a change in the economic climate which means that the optimal size for that organisation is now smaller than was previously the case. An example might be the automotive manufacturing, as these organisations have had to reduce costs and have implemented automation on the manufacturing line. Downsizing is how managers respond to the change in circumstances.

E-Mail

E-mail is the abbreviation for electronic mail. This is a form of messaging over computer networks. Initially restricted to internal computer networks, e-mail is now worldwide and mainstream thanks to the development of the Internet.

In order to send e-mail, the user needs:

(a) An e-mail client to read and write e-mails
(b) Access to an e-mail server. This may be in the same organisation as the user or it may be a service provided by the user's Internet Service Provider (ISP)
(c) An e-mail address
(d) An e-mail address of the message recipient

The user writes the e-mail and sends it immediately or can save it to be sent at a later stage. A written e-mail will find its way to the recipient's

electronic mailbox. If the recipient is online (s)he will probably be notified by the e-mail system that there is e-mail for them. If the recipient is not online, (s)he will have to go online at intervals and check the mail to see if anything has arrived for him/her. Once (s)he has read the mail, (s)he can delete it, save it, forward to one or more people, or print it.

An e-mail can also be sent to a group of people as opposed to an individual. This can be a very useful function but should be used with care. In fact, e-mail in general should be used with care — once an e-mail has been sent it cannot be stopped and there have been many cases of people receiving e-mail which was not intended for them. In some cases this has resulted in severe financial damage to an organisation or to disciplinary proceedings being instigated against an individual. Although it is, perhaps, the most well-established of the CMCs e-mail, it is still a relatively new medium and users still make mistakes. As a result of this, e-mail etiquette and usage advice is available to help users try to avoid misunderstandings and mistakes.

e-Meeting

An e-Meeting is a meeting which takes place using CMCs. The team in the case study used a variety of media — video conferencing, phone conferencing, and collaborative tools. They referred to all the meetings where one or more partners were in a remote location as "e-Meetings."

Ethnography

For some people, Ethnography describes any qualitative research project which has the aim of rich description. Ethnography is much more than this. It is a research method which has its roots in anthropology but which, in recent times, has also been applied in the fields of sociology, education, psychology and business.

Ethnography is a qualitative research method which uses a broad range of data collection techniques. However, the main tools tend to be observation and semi-structured interviewing. Documentary and survey data, if used, tend to be used as supplementary material (Gill & Johnson, 1997). The main tool is probably extended participant observation. The thinking behind this approach is that the social world is best investigated in context as it cannot satisfactorily be reproduced in an artificial setting such as would be needed for an experiment. The participant observation is generally the first major undertaking in the field. As its name suggests, the researcher plays a dual role. (S)he becomes a participant in the life of the

community being studied in order to gain an understanding of what that life entails. At the same time, (s)he must also act as an observer, viewing the community from the point of view of an outsider. The participant observation is supported by the open semi-structured interviews — the questions are specific but open-ended and the interview format also allows the researcher scope to extend areas of interest if necessary. Artefacts produced by the community are also collected as they embody characteristics of the community.

Executive Information Systems (EIS)

Kaniclides (1997) notes that defining an EIS is difficult because there are many definitions available, none of which are universally accepted. (This means that there is no standard definition.) The definitions proposed differ depending on the point of view of the person making the definition and also on the context of the system itself. Additionally, the rate of technological development is quickly making the features, characteristics and capabilities of EIS constantly change.

Due to the difficulties in providing a definition, Kaniclides (1997) offers some characteristics which characterise EIS:

"EIS are primarily designed for direct use by senior management. The computer skills required to operate them are therefore not particularly demanding ... They are often used without the need of technical assistance and are flexible to match the individual user's decision making style ... They are designed to support unstructured non-repetitive decisions associated with upper levels of management and provide features such as drill-down capabilities, and exception reporting. The support of executive decision making also requires fast access to information both internal and external to the organisation ... Information is extensively presented in a graphical format to enhance the standard textual and tabular capabilities of EIS" (Kaniclides, 1997, p. 18).

Expert System

An Expert System is an AI system designed to perform a task which would normally be undertaken by a human expert. A knowledge engineer creates the Expert System after studying the work of the human expert. The knowledge engineer translates the work of the human expert into rules which can be understood by the computer. Early Expert Systems were

intended to replace the human expert and were, generally, unsatisfactory (Davenport & Prusak, 1998). Later versions are designed to *aid* the human expert. Some examples of Expert Systems are systems to diagnose an illness, plan and schedule delivery routes, and undertake financial forecasting.

Global

"Global" is intended to refer to an organisational form which has developed as a result of the increased globalisation of business. Zwass (1992) described the Global organisation as a "centralised federation [where] Foreign operations are seen as pipelines for delivery of goods and services to a unified global market in search of economies of scale and scope." Karimi and Konsinski (1991) explain that in such a concern the flow of goods, information and resources is generally a one-way process from the central home base to the subsidiary, with strategic decisions being made by senior management at the central home base. The standard design of the product and manufacturing is on a global scale with the worldwide activities being centrally coordinated bring economies. The systems structure is centralised with databases and provides central planning and control to maintain tight control over subsidiaries as a high degree of coordination is necessary.

Globalisation

The rapid development of communication and information technologies has meant that people and organisations around the globe are more connected than ever before. This has also made it more possible for money and information to travel around the world at a speed never known before. International travel and international communication are now commonplace for a larger part of the population than ever before. Boundaries are blurring as organisations establish a presence in many different locations in order to take advantage of local conditions (e.g., cheaper labour). The forces of globalisation allow businesses (and other organisations) to function to some degree as if national borders did not exist and to work on a global stage.

Grounded Theory

More correctly called "The Discovery of Grounded Theory," this is a method for collecting and analysing qualitative data. The theory is

developed inductively from the body of data which has been collected, i.e., the method is concerned with discovering theory which is grounded in social settings. After a body of data has been collected, the researcher develops themes or conceptual categories from the data. (S)he makes new observations to elaborate on or clarify these conceptions and more data can be collected to confirm (or otherwise) the initial observations. This can be an iterative process with the end result that tentative hypotheses and concepts are developed from the data itself.

Initially a social sciences research method, Grounded Theory has usefully been applied to Information Systems research as researchers have come to realise the importance of the social aspects of IS. This is particularly visible in the development of the Contextual Design method.

Instant Messaging

This is a useful type of computer-based communication. Within the Instant Messenger, the user can create a list of contacts. The system will then alert the user when one of the contacts is online and available for communication. Using the Instant Messenger, the communication partner can swap files and chat (using the keyboard) in real time — as if they have a private chatroom. A key advantage brought by the Instant Messenger is social awareness — if you see a friend is online you are more likely to engage in ad-hoc communication.

There are several Instant Messengers, each with different standards. This means that if you want to use instant messaging with a colleague or friend, then (s)he must have the same Instant Messenger as you.

Intelligent Agents

Intelligent Agents are software programs which are mainly used on the Web to make computing easier. They are currently used in Web browsers to help with retrieving and delivering information — the user can specify certain parameters or preferences and the agent will search the Internet and return the results to you automatically. As well as news retrieval, the agents can also act as shopping assistants.

International

This is another new organisational structure which has been defined as a result of Globalisation. An organisation may develop from being a multinational corporation to being an international corporation. It is

defined by Karimi and Konsynski (1991) as having a coordinated federation organisational structure with the subsidiaries being dependent on the home base for such things as processes and ideas. This form of organisation requires much more control and coordination than is necessary in a multinational company. Knowledge and expertise are transferred to the foreign subsidiaries, but there is nevertheless still some scope for the local development of new products, strategies and ideas. Zwass (1992) added that the foreign subsidiaries are seen as "appendages to the domestic corporation where core competencies are honed."

Internet

Quite simply, the Internet is an international computer network connecting millions of computers and smaller networks, decentralised by design and owned by no one.

The Internet originally comes from work funded by the U.S. Government who developed the ARPANET (ARPA = Advanced Research Projects Agency) thinking it was useful in a military sense — it was intended to be resilient in the case of attack. A lot of defence data was transmitted over this network but in 1983 it was split into ARPANET and MILNET as security was not felt to be good enough and too many people had access. ARPANET gradually became the Internet which is now accessible to anyone with a PC, a modem and a phone line. Internet usage has grown spectacularly in recent years. In 1987, there were 20,000 computers with numbers growing at 15% per month. In 1994, there were 3 million and in 1997 it was expected that there would be more than 1 billion computers connected. It is very rare now to find an organisation, no matter how small, without access to the Internet. Schools have connected to the Internet to take advantage of the wealth of information which is available.

Internet Relay Chat (IRC)

Developed in Finland in 1988, IRC has become a very popular facet of the Internet. It is beginning to gain acceptance as a popular and cheap alternative to long distance telephone calls. IRC is a chat system and it allows users anywhere on the Internet to join in live discussions.

To join a discussion you will need an IRC client and access to the Internet. The client sits on the user PC and sends messages to the IRC server and receives messages back from the server. The IRC server broadcasts messages to all users who are logged on to the same channel — there can

be many discussions going on at once, each in its own channel.

In IRC, discussions happen in real time and the conversation is live — as soon as you log on, other users can see you there and when you enter some text, everyone else on your channel immediately see it. IRC is a medium which can cause newcomers some difficulties, therefore it is worthwhile reading the instructions and getting to grips with the IRC client before entering a discussion.

Intranet

An Intranet functions like an organisation's private Internet in that it uses the same protocols and hosts websites and web pages. These look just like any other website and web page, and function in the same way except that access is restricted to authorised users. An Intranet will generally be situated behind a firewall to minimise the risk of unauthorised access.

Intranets are used to share information and are now being used for collaborative work. This means that they are attracting attention from the Knowledge Management field.

Knowledge Base

Earlier definitions of a Knowledge Base were restricted to Knowledge-Based or Expert Systems. They referred to the part of the system which held facts and rules which were needed to solve problems and which were expressed using some type of formal knowledge representation.

More recently, the term has come to be used to refer to a central repository of information, e.g., a database of related information about a specific subject. It is a computer-based resource which can be easily disseminated (often on the Internet) and is often part of a Knowledge Management system. The aim of having a Knowledge Base is that it can facilitate the collection of information, its organisation, retrieval and dissemination.

Having a well-organised Knowledge Base can save money for an organisation by reducing the amount of time people spend trying to find information.

If a Knowledge Base is implemented as part of an AI project, it will often have the capability to "learn" built into it.

In this book, a number of Knowledge Bases were discussed in the case studies. These tended to be well-structured databases which were

available, for example, to both technicians and end users. The value derived from the Knowledge Bases in these cases was dependent upon the domain knowledge of the person using the knowledge base.

Legitimate Peripheral Participation

This is the process by which a newcomer to a community will gradually work his or her way to full participation in the community (Lave & Wenger, 1991). Lave and Wenger's (1991) examples were based around the apprenticeship model where a newcomer (the apprentice) was allowed to undertake basic tasks (i.e., in the case of tailors, cutting basic shapes out of cloth). As they became more experienced, they were given more complicated tasks until finally they became old-timers and could participate fully.

Lotus Notes

Lotus Notes is a suite of groupware programs developed by the Lotus Development Corporation. Groupware is software which helps groups to work with the members connected via a computer network. Organisations can share documents, work on documents together and collaborate even though the communication partners might be in different locations.

Marginals

Marginals are community members who are members of different communities (Star & Griesemer, 1989). Wenger (1998) also recognised the importance of these people but he referred to them as "brokers." As they are members of different communities they will have experience of the customs, languages and relationships in the different communities of which they are members. This brings a number of benefits, for example, it means that marginals are in a position to help with mutual understanding. It also means that they bring a different perspective to a problem which might help with its solution.

MS Exchange

MS Exchange is the mail server developed by the Microsoft Corporation. A mail server is software which handles files, e-mails and information in response to an e-mail client. An e-mail sent to an e-mail address will arrive

at a user's mailbox on a mail server from where it can be retrieved by the user's e-mail client.

Multimedia

Multimedia refers to the ability of computers to present information in a variety of ways — text, graphics, images, video, animation and sound. In most cases, this is integrated, meaning that the presentation of information can be presented using many different ways at once.

Due to the rapid increases in PC performance, coupled with decreases in price, multimedia PCs are now mainstream whereas only a few years ago multimedia on a PC was uncommon. It is not unusual now for a PC to be able to edit and play video film.

Multimedia applications are very large and therefore the most effective media are CD-ROM and DVD.

Multinational

The Multinational Organisation is a development of a domestic exporter which has further developed its international operations. In the multinational operation, production, sales and marketing are decentralised to foreign locations whereas general administration and financial management are controlled from the home base (Laudon & Laudon, 1995). In such a company, the foreign subsidiaries may have a substantial degree of operating independence as products are adapted to suit local demands and conditions (Karimi & Konsynski, 1991).

Multi-User Dungeons (MUDs)

A Multi-User Dungeon (also called a Multi-User Dimension) is a virtual space where users can set up an Avatar to represent themselves and, through which, they can interact with other users. Originally a MUD was a fantasy game played out in medieval scenarios with castles, dragons, other beasts and magic items. Now the term MUD tends to refer to any cyberspace environment where multiple users can communicate in real time, often in a text based format

NetMeeting

NetMeeting is an application that was developed by the Microsoft Corporation to help users work collaboratively. It is incorporated into Internet Explorer (Microsoft's Web browser) and supports chat sessions,

whiteboard, application sharing and document sharing.

At the time of the case study, the respondents felt that it was not a particularly intuitive application. It was used because the members of the CoP were highly IT literate and were therefore well placed to make best use of the potential offered by the application. At the time, they did not recommend it to other users in the organisation because they felt users would struggle to use the application and would have an unsuccessful meeting.

NT

Windows NT is one of the Windows family of operating systems developed by the Microsoft Corporation. It is a 32-bit operating system designed for network environments and is therefore targeted at the business market. Windows NT Server is designed to run the server in a network environment and NT Workstation is intended to run on the client machines in the network.

Object Oriented Multi-User Dungeons (MOOs)

A MOO is an object oriented development of a MUD system.

Ontologies

An Ontology is a form of knowledge representation and is a vehicle for knowledge sharing and reuse. The term "ontology" comes from metaphysics and the philosophical sciences where it means a systematic account of existence and is used to explain the nature of reality. Artificial Intelligence assumes that if something exists it can be represented and the field of AI has absorbed the term where it is used to mean an explicit and formal representation (or specification of the representation) of all the entities, objects and concepts of the area of interest. It also covers the relationships between all these entities so is intended to be a high level formal specification of a specific knowledge domain.

Optical Character Recognition (OCR)

OCR is a system that reads text from a printed sheet and converts it into a form which can be read by a computer. Even scanners in the domestic user market now come with OCR software.

If a piece of text is scanned using the scanner's normal settings, then the scanner will take an image of the text. If it is scanned using the OCR program, the text will be scanned directly into a file which can be edited using a word processor. Text scanned using the OCR application can be likened to a Scrabble board — the words and letters can be manipulated. A piece of text scanned using the scanner's normal settings will be akin to a photograph of the Scrabble board — it will look the same but nothing can be manipulated.

OCR systems become ever more powerful and can now cope with many different fonts. However, they still have difficulty with handwriting.

Outsourcing

Outsourcing is similar to downsizing in that it is a way in which an organisation might seek to reduce costs by cutting the number of staff employed. In this case, the organisation will pay another company to provide services which were previously performed in-house, for example, IT support.

PowerPoint

PowerPoint is presentation software developed by Microsoft. Using PowerPoint (or other similar packages), the presenter can show slides, notes, graphics, animations, etc., to accompany the presentation.

Qualitative Data

Qualitative Data are data that have been gathered using qualitative methods such as participant observation and open semi-structured interviews. In this case data is gathered from observing the community being studied. It returns a mass of data in the form of notes and observations as opposed to data which are returned from *quantitative* methods (e.g., surveys and questionnaires) which lend themselves to statistical analysis. Qualitative data need analysing in a very different way, for example the extraction of themes leading to the inductive development of theory. *(See also Grounded Theory.)*

Reification

Reification means taking something from your experience and giving it a concrete form. For example, all communities have their practice (i.e.,

what they *do*) and will create tools, stories, procedures and artefacts which reflect that practice. In these cases the practice has been reified.

Representation Propagation

This refers to the occasions in Distributed Cognition where a representation is transferred (i.e., propagated) over or between different states or media. *(See Distributed Cognition.)*

Representationism/Cognitivism

(See Cognitivism.)

Rightsizing

"Rightsizing" is simply a euphemism for downsizing. *(See Downsizing.)*

Search Engines

A search engine is a program which searches documents for keywords and returns a list to the user of all the documents where the keywords were found. The most common application for this technology is the Internet where users can choose from a range of search engines (e.g., Altavista [http://www.altavista.com]; dogpile [http://www.dogpile.com]) to search for pages on the World Wide Web. When a user enters a search term, the search engine does not go and search the World Wide Web. Behind the scenes, part of the search engine ("spider") is permanently trawling the World Wide Web and fetching as many documents as possible. Another part of the search engine (the indexer) then indexes the words in the document. It is this index that is searched when a user enters a keyword search.

Smartboard

Also called an Interactive Whiteboard, this is a whiteboard that acts like a gigantic computer screen. It can show exactly the same as a computer screen (applications, video, multimedia, video conferencing images). Using special pens it can also be directly written on. This input can then be sent directly to the printer. In the case study in this book, the Smartboard was used in an E-meeting. It was showing the images from two desktop video conferencing cameras and Mike was making notes from the meeting. At the end of the meeting he sent the notes to be printed

on the printer which was situated in the same room as the American partners. This technology is now starting to make its mark in schools.

SSADM — Structured Systems Analysis and Design Method

SSADM is a set of standards which were developed for systems analysis and design in the 1980s. It was primarily aimed at large projects and was intended to reduce the failure rate.

It covers the life cycle of a system design and uses three main techniques to look at:

• Data structures
• Data access requirements
• Processing (updating) of data
• Permitted sequences of events which change data
• User interaction with the system

The three techniques are:

Logical Data Modelling: in this stage the data requirements of the proposed system are identified, modelled and documented. The main purpose of this stage is to divide the data into:

(a) entities — things or people about which data will need to be held
(b) relationships between the entities

Having identified these two parts, further steps are taken to create the optimum data model.

Data Flow Modelling: a technique for analysing processing. In this stage, the interest is in how data moves around an information system and how it is accessed and changed. This is also identified, modelled and documented. The models are decomposed into different levels and identify primarily:
(a) Processes — activities or actions which change data from one form to another
(b) Data stores — where data is held

(c) External entities — which send data to the system or receive data from the system

(d) Data flows — routes which the data can take

Entity Behaviour Modelling: events which can affect an entity and the order in which they occur. They are identified, modelled and documented for each entity in the form of entity life histories and entity event matrices.

Each of these techniques provide a different view of the system and must be checked and cross-referenced against each other to provide a complete view or model of the system which is being designed.

The above techniques fall into one of the following stages. SSADM has five separate stages (listed below) which are each further sub-divided into step and tasks:

(a) Feasibility Study: step to ascertain whether a system would adequately support the business processes and whether it is worth proceeding further, i.e., it assesses the economic justification for the system.

(b) Requirements Analysis: Assuming the findings of Stage 1 are positive, the next step is to identify the requirements of the new system. The main step to achieving this is to model the processes of the existing (probably manual) system.

(c) Requirements Specification: This stage goes beyond the requirements and creates a detailed specification. New techniques will be identified for some stages of the processing.

(d) Logical System Specification: In this stage the logical specification of the system is produced.

(e) Physical Design: An actual database design and a set of programming specifications are created from the logical design.

SSADM is not a parallel process — each step builds on the steps which have gone before. It is too large and complicated for most projects and is best suited to any system which has:

• A complex, static data structure
• Largely straightforward processing
• Potential evolution in processing but not in data

Synchronous

In computer terms, synchronous means that something happens at regular intervals. Communication between a computer and a device is asynchronous as it can take place at any time and the interval is likely to be irregular. However, communication within the computer itself is generally synchronous because it is governed by the clock of the Central Processing Unit (CPU).

In terms of communication media, synchronous means taking place at the same time, i.e., the telephone is a synchronous medium.
(See also Asynchronous.)

Tele-Conferencing

A Tele-Conference is a multi-party conversation held via telephone or some other telecommunications connection. In the examples in this case study, the participants were in two locations with a group in each location being gathered around a polycom. (A polycom is a central speaker with a keyboard and three microphones.) Modern telephones often have the function built in to allow the user to set up a conference call with a number of other users.

Transnational

This is the direction for which many international companies appear to be aiming. It is an organisational form which appeared in the late 80s to early 90s. Zwass (1992) describes it as an "integrated network" where all units contribute on an equal basis to integrated worldwide activities. They are not regarded as having to merely execute a centralised strategy as "each … is viewed as a source of ideas, skills, capabilities and knowledge that can be beneficial to the company as a whole" (Karimi & Konsynski, 1991).

The national subsidiaries are coordinated but the firm is still able to respond to local needs by virtue of the fact that subsidiaries are not totally subordinate to headquarters. They have the opportunity to contribute as equals. The nature of such a company enables it to coordinate facilities and for people to respond quickly to circumstances anywhere. In many cases, the firm can appear to be stateless and probably not have national headquarters. Rather, it has regional headquarters with possibly a world headquarters.

Developments in IT and telecommunications have enabled the development of this kind of concern as the speed of communication enables the concern to consider the whole world to be one market. Problems of distance and time are greatly reduced.

UNIX

UNIX is a multi-user, multi-tasking operating system which was designed specifically for use in a networked environment. Created at Bell Labs in the early 1970s, it was designed to be powerful, stable and flexible. It has become a very mature operating system. Its origins can still be seen in the command line operation and the cryptic commands it uses.

UNIX has become very popular in large organisations and universities.

Video-Conferencing

This is a meeting or discussion carried out between communication partners who are in different locations but who can see and hear each other using electronic media such as video. The images and audio data are transmitted by a telecommunication network. The conference can take place anywhere in the world.

A high quality video image will need a lot of bandwidth so high fidelity video conferences tend to take place in specialist suites over high bandwidth networks. Desktop video conferencing is more popular because it is more affordable — both in terms of the cameras and the required bandwidth. The video image is of a much lower quality but it gives the communication partners some context. A user can be at his or her PC with a camera on top of it, speaking on the telephone and seeing images of his/her communication partners on the PC screen.

Virtual Environment (VE)

"A collaborative computer mediated social environment that enables geographically dispersed participants to make contact through an artificially generate sense of proximity known as 'tele-presence.' This is manifested through the various communication devices that are employed by the participants" (Conkar, 1999, p. 9).

Virtual Reality (VR)

VR is an artificial environment created by computers to represent a virtual world. It appears to the user as though (s)he is immersed in the world as

it reacts to the user's actions. The user may well be wearing a VR suit with sensors in gloves and other parts of the suit. A helmet will have goggles or a screen which shows the image to the user. It may also track the movement of the eyes and show different images depending the direction in which the user is looking. As the user turns, a different image will be presented; the user may stoop to pick up and object and, because of the sensors in the gloves, will feel as though (s)he is actually touching the object — so at least three of the senses are catered for (touch, hearing, sight).

Great advances are being made in VR systems but they still need very powerful processing and therefore have not yet become mainstream.

Virtual Team

Lipnack and Stamps (1997) define a virtual team as follows:

"A virtual team, like every team, is a group of people who interact through interdependent tasks guided by a common purpose.
The image of face-to-face interactions among people from the same organisation typifies our older models of teamwork. What sets virtual teams apart is that they routinely cross boundaries. What makes virtual teams historically new is the awesome array of inter-active technologies at their disposal" (Lipnack & Stamps, 1997, pp. 6-7).

Voice Mail

Voice Mail is much more than an answering machine. It is more like e-mail for voice messages in that a full voice mail system will allow a spoken message to be saved, forwarded or replied to.

War Stories

These are stories told based on the teller's experience and which are told to illustrate a point, perhaps as a contribution to problem solving. The teller's colleagues may learn something from the story. It may make them think of something else or lead them to come up with something new and innovative. War stories can be part of the creative process.

World Wide Web (WWW)

The WWW is a system of servers on the Internet which hold documents formatted in html (hypertext mark-up language). Html documents can

hold links to other documents and can include images, animations, sound and video. This means that a user can start with one document and follow a trail of discovery as (s)he follows links to other documents. These documents can be held on servers all over the world but this is totally invisible to the user. In order to read these pages, the user will need a program which can read pages written in html. These programs are called web browsers. Two of the most popular web browsers are Microsoft's Internet Explorer and Netscape's Navigator.

It is important to remember that the WWW is *not* synonymous with the Internet — not all servers on the Internet are part of the WWW.

Web Form

Early web pages could only *present* information. Later developments meant that could then also *collect* information. A Web Form is a form on a web page which can take input from a user. Once the form is filled in, the data is then passed back to the organisation for processing. The data might be a survey, user details for subscription, a purchase, a booking, a CV submission, or anything else where an organisation is collecting data from its users via the Web.

Yellow Pages

These take their name from the telephone directories with listings according to service. In terms of Knowledge Management, Yellow Pages are directories of experts within the organisation.

Y2K

Also known as the Millennium Bug, the Millennium problem and the Y2K problem, Y2K was a major computer problem as the end of the 20th century approached. It was found that a number of computer systems written at a time when memory was at a premium could only represent a year in two digits (e.g., is 03, 1903 or 2003?). This problem mainly affected "legacy" systems which were written in the 1970s and 1980s — the writers of these systems were probably astounded that they were still in use at the end of the century, long after the end of their life expectancy. The problem also affected some personal computers because the BIOS systems were found to be at risk. This meant that organisations were checking every PC and millions of lines of programming code.

Predictions were made of worldwide computer meltdowns at midnight on December 31, 1999, but predictions of disaster were wide of the mark. The question still remains — was the problem as serious as predicted after all or was it hyped by people earning a lot of money working on the problem? Or was the lack of disaster due to the planning and all the work which had been put in, in advance, to tackle the problem?