As computers were used more and more and management was demanding more appropriate systems for their expensive outlay, this state of affairs could not go on. There were three main changes:

- There was a growing appreciation of that part of the development of the system that concerns analysis and design and therefore of the role of the systems analyst as well as that of the programmer.
- There was a realization that, as organizations were growing in size and complexity, it was desirable to move away from one-off solutions to a particular problem and toward a more integrated information system.
- There was an appreciation of the desirability of an accepted methodology for the development of information systems.

2.3 Information systems development methodology

It was to answer the problems discussed in the previous section that methodologies were devised and adopted by many organizations. We have already discussed the term methodology. An **information systems development methodology** can be defined as:

> A collection of procedures, techniques, tools, and documentation aids which will help the systems developers in their efforts to implement a new information system. A methodology will consist of phases, themselves consisting of subphases, which will guide the systems developers in their choice of the techniques that might be appropriate at each stage of the project and also help them plan, manage, control, and evaluate information systems projects.

But a methodology is more than merely a collection of these things. It is usually based on some 'philosophical' view, otherwise it is merely a method, like a recipe. In Part VI we look in detail at 25 distinct methodologies. Methodologies may differ in the techniques recommended or the contents of each phase, but sometimes their differences are more fundamental. Some methodologies emphasize the human aspects of developing an information system, others aim to be scientific in approach, others pragmatic, and others attempt to automate as much of the work of developing a project as possible. These differences may be best illustrated by their different assumptions, stemming from their 'philosophy' which, when greatly simplified, might be that, for example:

- a system that makes most use of computers is a good solution;
- a system that produces the most appropriate documentation is a good solution;
- a system that is the cheapest to run is a good solution;
- a system that is implemented earliest is a good solution;
- a system that is the most adaptable is a good solution;
- a system that makes the best use of the techniques and tools available is a good solution;
- a system that is liked by the stakeholders is a good solution.

Techniques and tools feature in each methodology. Particular techniques and tools may feature in a number of methodologies. A **technique** is a way of doing a particular activity in the infor-

mation systems development process, and any particular methodology may recommend techniques to carry out many of these activities. In Part IV we look at 29 different techniques.

Each technique may involve the use of one or more **tools** that represent some of the artefacts used in information systems development. A non-computer-oriented example may help. Two techniques used in the making of meringues are (1) separating the whites of eggs from the yolks and (2) beating the whites. The methodology may recommend the use of tools in these processes, for example, an egg separator and a whisk. In this text, tools are usually automated, that is, computer tools, normally software to help the development of an information system. In Part V we look at 8 tools. These tools might enable some development tasks to be done automatically or semi-automatically. Indeed, some tools have been designed specifically to support activities in a particular methodology. Others are more general purpose and are used in different methodologies.

This book is about methodologies, the differences between them, why these differences exist, and which methodology might be appropriate in given circumstances. As we shall see, methodologies differ greatly, often addressing different objectives. These objectives could be:

1. *To record accurately the requirements for an information system.* The methodology should help users specify their requirements or systems developers investigate and analyse user requirements, otherwise the resultant information system will not meet the needs of the users.
2. *To provide a systematic method of development so that progress can be effectively monitored.* Controlling large-scale projects is not easy, and a project that does not meet its deadlines can have serious cost and other implications for the organization. The provision of checkpoints and well-defined stages in a methodology should ensure that project-planning techniques could be applied effectively.
3. *To provide an information system within an appropriate time limit and at an acceptable cost.* Unless the time spent using some of the techniques included in methodologies is limited, it is possible to devote an enormous amount of time attempting to achieve perfection.
4. *To produce a system which is well documented and easy to maintain.* The need for future modifications to the information system is inevitable as a result of changes taking place in the organization and its environment. These modifications should be made with the least effect on the rest of the system. This requires good documentation.
5. *To provide an indication of any changes that need to be made as early as possible in the development process.* As an information system progresses from analysis through design to implementation, the costs associated with making changes increase. Therefore, the earlier changes are effected, the better.
6. *To provide a system that is liked by those people affected by that system.* The people affected by the information system, that is, the stakeholders, may include clients, managers, auditors and users. If a system is liked by the stakeholders, it is more likely that the system will be used and be successful.

An information systems development methodology, in attempting to make effective use of information technology, may also attempt to make effective use of the techniques and tools available. Information systems development methodologies are also about balancing technical aspects with behavioural (people-oriented) aspects. As we shall see in the book, there are many views as to where this balance lies and how the balance is achieved in methodologies. At one extreme are the methodologies aiming at full automation of information systems development as well as the information system itself. However, even in these systems people need to interact with the system. At the other extreme, perhaps, are attempts at full user participation in the information systems development project and user-led design. Even here, user solutions may make full use of the technology, and there are a growing number of tools designed to aid users develop their own information systems. The balance between technological aspects and people aspects is one that we will return to as it is a continual theme in information systems development.

Having stated that this book is about information systems development methodologies, not all organizations use a standard methodology. They might have developed their own or adapted one to be more appropriate for their own circumstances. Many organizations may only use some aspects of a standard methodology. Other organizations use no methodology at all. The ways that organizations use (or do not use) information systems development methodologies will be another theme of the book.