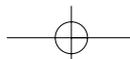
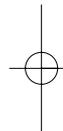
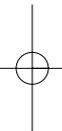


# Researching Information Systems and Computing



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Briony J. Oates

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# List of Abbreviations

ACM	Association of Computing Machinery
AIS	Association for Information Systems
BCS	British Computer Society
CASE	Computer-Aided Software Engineering
CERN	European Organisation for Nuclear Research
IEEE	Institute of Electrical and Electronic Engineers
IS	The information systems discipline
IT	Information Technology
LAN	Local Area Network
SD	Standard Deviation
SDLC	Systems Development Life-Cycle
SSM	Soft Systems Methodology
UML	Unified Modelling Language
XP	Extreme Programming

## Preface

This book is an introductory text on research methods for those in the information systems (usually shortened to IS) and computing disciplines. It is suitable for individual study by novice researchers, particularly those embarking upon masters or PhD research. It can also be used by a tutor as a course text for a taught course in research methods for IS and computing at either masters or senior undergraduate level. It can also be helpful to more experienced researchers who want to learn about particular research approaches with which they are not currently familiar.

IS researchers study how information systems are developed and used by individuals, groups, organizations, and society. Often those information systems involve the use of computers. IS researchers study the interaction between the social sphere of people and their organizations and the technical sphere of systems based upon information and communication technologies. They study the processes by which systems are analysed and designed, the contributions they make to business effectiveness, the reasons for the failure of some computer systems and the impact information technology has on our modern world.

Computing researchers are also concerned with the development and use of systems based upon information and communication technologies. They include computer scientists who focus on the mathematical underpinnings of computer-based products, software engineers who research into the process of developing high-quality, reliable systems, web developers who specialize in Internet applications, and animators and artists who develop games, virtual reality environments and digital multimedia applications. Unlike IS researchers, computing researchers have tended to concentrate more on the technical sphere than the social. However, there are increasingly calls for computing researchers to pay greater attention to the viability of their computer-based products and processes in the real world away from the lab, to ensure that their theories and systems are properly validated. Some computing researchers are therefore paying greater attention to the social sphere and its interaction with the technological sphere – like IS researchers.

Since both IS and computing researchers are interested in the development and use of systems based upon information and communication technologies, albeit often from different perspectives, it is appropriate to address them both in this one book. However, the two communities of IS and computing have developed separately, with discrete bodies of literature and differing preferred research approaches. This book

therefore makes clear where the two communities differ in approach, includes examples of research from both disciplines and cites work from the literature of both.

It addresses:

- the kinds of research questions addressed in IS and computing;
- the research approaches used in IS and computing;
- examples of previous research from the IS and computing literature;
- the analysis and evaluation of research projects in IS and computing.

The book discusses the nature of research and the research process, and explains how to do a literature review, the starting point for most research projects. It then covers the main research strategies used in IS and computing (surveys, design and creation, experiments, case studies, action research and ethnography) and the main data generation methods (interviews, questionnaires, observation and documents). It addresses both quantitative and qualitative data analysis. It also explains the different underlying philosophical paradigms of research (the scientific method and positivism, interpretivism and critical research) and relates them to the different research strategies. Some guidance is also given on how to present the results of research, whether via an article or thesis, conference paper or software demonstration. Of course, the book also discusses the ethics of research and the need to ensure that the actions of researchers do not cause harm to others (physiological, psychological, social, political or economic).

Since the Internet and World Wide Web are such important technology-based information systems in our modern world, attention is also paid throughout the book to possible research topics *about* the Internet and World Wide Web, and to how they can be used *within* research approaches in IS and computing. Some web addresses are given of useful resources for IS and computing researchers. These were all correct at the time of writing this book but, of course, sites move and change their address or disappear entirely. If a web address no longer seems to be valid, try entering relevant keywords into a search engine – often this will enable you to track down the new address.

## How to Use This Book

Here are some suggestions on how to use this book, whether you are an individual novice researcher, a lecturer or instructor using it as a course text, or an experienced researcher.

### *Individual novice researchers*

If you are a novice researcher, probably a newly enrolled masters or PhD student, I recommend that you read all the chapters in this book. Then you will have a good

overview of the range of approaches used in IS and computing, and will be able to choose the one(s) most appropriate to your needs and interests. Each chapter includes some practical exercises to help you test your understanding of the concepts explained in that chapter. If possible, discuss your answers to the questions with a fellow student or work colleague – by comparing your answers and exploring any differences you will increase further your understanding of the topics. Use the evaluation guides provided in almost every chapter to help you analyse and evaluate the research of others, particularly the work you read as you study the previous literature in your discipline. Once you have decided your research topic's appropriate strategy, data generation method(s) and underlying philosophical paradigm, you can obtain more detailed information about them by following up each chapter's suggestions for further reading.

### *Instructors and lecturers*

If you are teaching a course in research methods for IS and computing, this book can be an appropriate course text. I have used the material to teach both undergraduates and postgraduates. The chapters average 5000–6000 words and are written in a student-friendly style. Students can therefore be asked to read one or two each week. Some of the practical work suggested in each chapter can be carried out by the students in class. Alternatively they can do the work in their own time and give seminar presentations on their findings. They can also give seminar presentations that discuss the further reading suggestions provided at the end of each chapter. The practical work usually includes an exercise asking students to analyse and evaluate a piece of research based on a particular strategy or data generation method. The intention is to encourage students to read critically, and to recognize where insufficient information about the research process means that we must treat the reported research findings with some caution. There is a variety of ways to tackle this exercise:

- Since each chapter cites published examples of a particular strategy or method being used in IS and computing research, the students can analyse and evaluate one of them. (This requires particular care for undergraduate students. Many IS papers include a lot of social theory with which students may not be familiar and many computing articles include sophisticated mathematical work that some students may find off-putting.)
- The lecturer can require that some other research paper be studied and evaluated – one whose content is known to be relevant and at an appropriate level for the class members.
- The students can be asked to do a literature search to find and evaluate another example of published work based on that strategy or method.
- One group of students can be asked to carry out a small piece of research based on a particular strategy or method, and present their research process and findings to the class. The other class members then analyse and evaluate their colleagues' work.

## *Experienced researchers*

If you are reading this book as an experienced researcher, you can dip into those chapters that explain any research approaches with which you are unfamiliar. I also recommend that you read the first three chapters, to gain an appreciation of the book's structure and style, and its definition of what is meant by 'research'.

## **Acknowledgments**

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