Preface

The challenges of improving healthcare systems through the use of information technology are many. However, the potential rewards of helping society and human condition are also great. Agent systems can have a real and significant impact in healthcare because healthcare systems are innately complex and a paradigm which is sufficiently sophisticated is needed when simulating these systems. The autonomy of agents, in a multi-agent system, naturally and logically maps into actors, components, and systems within healthcare. However, while the potential is great, the actual impact of agent simulation is currently still limited to primarily research focused endeavors. With this book we begin the process of moving the research closer to the practice. We do this because of the steady advances in agent simulations and the perspective that healthcare is moving more and more towards embracing technology and is part of the solution for effective and efficient services.

In this book, we present work from researchers around the world who describe their advances in agent-based systems in order to model and simulate components of the healthcare system. In order to put the collected works of these agent researchers in some type of context, we invited a physician to tell about the needs and challenges of healthcare environment. We also asked an economist to discuss the issues around resources and the mechanisms to value and rank factors within the healthcare system. Lastly, to enhance the understanding of the progress to date, a summary of a number of important research papers in the area of agents in healthcare is included.

We are truly fortunate to have such a competent and diverse list of contributing authors for this book. The works presented span the wide breadth of agent application in healthcare looking at both practical and theoretical issues. The contributions are sure to catch the interest of both researchers in the field of agent systems and also the practitioners of healthcare in terms of both active physicians and those involved in the administration of healthcare systems.

This book is organized into four sections. The first section is titled “An Overview of Healthcare Systems Issues” and includes a chapter by an active neuro-surgeon who is familiar with many aspects of healthcare delivery in Canada, the United States and the United Kingdom. This is followed by a chapter on the economics of resource allocation within healthcare. The final chapter in this section is a review of eight recent papers in agent-based systems in healthcare.

The second section is titled “Healthcare Modeling Systems” and includes a chapter on the development of a large multi-faceted healthcare model and its various components. This is followed by a chapter on an agent modeling system of an operating theatre. We follow with a more theoretical chapter of how to do modeling in healthcare using role-based systems.

The third section is titled “Physician/Patient Support Systems” and this section begins with a chapter on a multi-agent system that automates clinical guidelines. This is followed by a chapter that focuses on modeling wellness for both the patient as well as the physician. The next two chapters discuss agent systems to help pick specialists and to help medical personnel learn about the function of organs using an agent simulation.
The last section of the book is titled “Population Modeling Systems” and begins with a chapter focused on modeling mental health and the retrieval of appropriate information to manage and control this illness. The next chapter in this section looks at the use of agent systems to help understand the issues around healthcare service and delivery in developing countries, and the final chapter is focused on modeling social behaviors in populations using agents for illnesses such as HIV.

Chapters for this book were solicited by a public call on a number of web sites, list-servers and through direct email to active researchers. Authors were asked to submit a chapter proposal and the proposals were reviewed by the editors. We received 15 proposals and requested chapters from 14 researchers. The completed chapters were first reviewed by the editors and then double blind reviewed by other contributors. Of the 14 submitted chapters one was rejected and one was withdrawn by the authors. Thus 12 chapters were accepted for the final manuscript and enhanced by the authors based on the reviewers’ comments. Ultimately, in consultation with the publisher, an additional review chapter was added in order to enhance the coverage of the subject matter. Thus, the final manuscript contains 13 chapters of original, new research contributions and one review chapter of recent research results.