

Health Informatics
(formerly Computers in Health Care)

Kathryn J. Hannah Marion J. Ball
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Tim Benson

Principles of Health Interoperability HL7 and SNOMED

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*This book is dedicated to my sons
Laurence, Oliver, Alex and Jamie.*

Foreword

Health data standards are a necessary component for interoperability in health care. Aggregation of health-related data mandates the use of standards, and aggregation is necessary to support safe and quality care. The American Recovery and Reinvestment Act (ARRA) includes \$19 billion in direct funding and an additional \$18.5 billion in returned savings tagged to the use of health information technology (HIT). The resulting expanding use of HIT has engaged a growing number of stakeholders, many of whom are now realizing the value of standards.

All aspects of the process of creating and effectively using electronic health records (EHRs), which meet the requirements of “meaningful use,” require standards. From the planning stages of effective use of HIT through reference information models, data models, use cases, story boards, and domain analysis models; to defining the data elements with common terminologies, definitions, data types, units and other attributes; to templates, clinical statements, clinical documents and data interchange; and to the EHR, its functional requirements in multiple sites and presentations; to decision support standards; and including standards for security and privacy. These standards extend beyond definition standards, to use standards for linkage among disparate systems to standards for reports (claims, infectious disease reports, patient summaries).

With the increasing demand for individuals knowledgeable in what standards are available and when and how to use those standards, this book is most welcome. The author, Tim Benson, has been engaged in the creation of standards since the beginning. His experiences span organizations – including HL7, CEN, and ISO, and terminologies such as SNOMED and LOINC. He has engaged the global community and understands similarities as well as differences among the global community. He has a top reputation as a teacher and writer within the international community. I know no other individual who is more qualified to write this book than Tim Benson.

In *Principles of Healthcare Interoperability HL7 and SNOMED*, Tim focuses on major contributors to the set of required standards. In the first section, he lays out a framework for why interoperability is important and what is needed to accomplish that interoperability. Although there are several contributing Standards Developing Organizations (SDOs) in the global community, Health Level Seven is perhaps preeminent. Its standards are widely used, and cover the full spectrum of

applications. Its membership is international (currently including over 35 countries) and includes the major HIT vendors and representatives of the full set of stakeholders. The International Healthcare Technology Standards Developing Organization (IHTSDO) is rapidly promoting SNOMED CT as the preferred terminology in health care. But at the same time, while focusing on HL7 and SNOMED CT, he includes much useful information on other standards and other organizations.

Readers will find this book easy to read, even if it is their first exposure to standards. In this rapidly changing field, this book is a must for anyone who is involved or has interest in the use of health information technology – and who is not.

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Preface

Health care has to cross the quality chasm, to become safer, more efficient and effective (Institute of Medicine 2001). The transformation of health care depends critically on interoperability, enabling computers to share information and deliver information from where it originates to where it is needed.

When interoperability is commonplace, patients, clinicians, managers, and researchers will enjoy secure access to the right information at the right time and the at right place; they will make more soundly based decisions, leading to better patient outcomes and fewer mistakes. Interoperability is a prerequisite for the process reengineering that will reduce the waste of unnecessary costs, errors, delays, and futile repetition.

There is nothing new in this (Blum and Duncan 1990; Hayes and Barnett 2008). Why has it not happened? At a technical level it cannot take place until we agree, implement, and deploy the sort of stringent standards that are needed for plug and play between the disparate computer systems found in health care.

These standards will almost certainly be based on HL7 and SNOMED CT working together as a tightly specified language for exchanging health-care information. All languages depend on grammar and words. HL7 provides the grammar as standardized structures for healthcare communication, rather like English or French grammar, while SNOMED CT provides a comprehensive clinical terminology, analogous to a dictionary.

The documentation of HL7 and SNOMED runs to tens of thousands of pages and creates a steep learning curve and barrier for entry. This book sets out to provide an introduction to these standards, focusing on the core principles in a way that is understandable to the average analyst, student, clinician and manager.

About the Author

Tim Benson graduated from the University of Nottingham as a mechanical engineer, was introduced to health-care computing at the Charing Cross Hospital in London (now part of the Imperial College Healthcare NHS Trust), where he evaluated the socioeconomic benefits of medical computing systems. In 1980, he founded Abies Informatics, Ltd. as one of the first GP computer suppliers. There, he needed a coding system to record consultation details and, with James Read and David Markwell, developed a proprietary system, which became known as the Read Codes. In 1987, a working party set up by the British Medical Association and the Royal College of General Practitioners recommended that this become a national standard in the UK and it went on to become one of the two main tributaries of SNOMED CT. In 1988, he was invited to lead a European project team to examine the need for open standards in health informatics, which led to 2 decades of work on interoperability standards and collaboration with HL7.

Tim is founder of Abies Ltd. and Routine Health Outcomes Ltd. He is an honorary Senior Research Fellow at UCL CHIME (Centre of Health Informatics and Multi-professional Education).

Acknowledgments

Many people have contributed to my understanding of health-care interoperability, HL7 and SNOMED. First, I want to single out David Markwell, my friend and collaborator for 25 years, who has made an enormous personal contribution to both clinical terminology and health-care interoperability. In the HL7 space, I want to acknowledge my debt to Ed Hammond, Mark Schafarman, Jack Harrington, Clem McDonald, Woody Beeler, Charlie Mead, and Bob Dolin. I also want to acknowledge the members of the HL7 Education Committee including Mike Henderson, Abdul-Malik Shakir, Virginia Lorenzi, and Rene Spronk, and members of HL7 UK, notably Charlie McCay, Leo Fogarty, Andrew Hinchley, Martin Whittaker, and Ann Wrightson. In clinical terminology I have learnt much from Alan Rector, Kent Spackman, Ed Cheetham, and Tom Marley. I would also like to thank Roddy Neame, Sigurd From, Georges de Moor, Seref Arikan, and David Ingram.

Series Preface

This series is directed to Health-care professionals, who are leading the transformation of health care by using information and knowledge. Historically, the series was launched in 1988 as *Computers in Health Care*, to offer a broad range of titles: some addressed to specific professions such as nursing, medicine, and health administration; others to special areas of practice such as trauma and radiology; still other books in the series focused on interdisciplinary issues, such as the computer-based patient record, electronic health records, and networked health-care systems. Renamed *Health Informatics* in 1998 to reflect the rapid evolution in the discipline known as health Informatics, the series continued to add titles that contribute to the evolution of the field. In the series, eminent experts, serving as editors or authors, offer their accounts of innovations in health Informatics. Increasingly, these accounts go beyond hardware and software to address the role of information in influencing the transformation of Health-care delivery systems around the world. The series also increasingly focused on the users of the information and systems: the organizational, behavioral, and societal changes that accompany the diffusion of information technology in health services environments.

Developments in health-care delivery are constant; most recently developments in proteomics and genomics are increasingly becoming relevant to clinical decision making and emerging standards of care. The data resources emerging from molecular biology are beyond the capacity of the human brain to integrate and beyond the scope of paper-based decision trees. Thus, bioinformatics has emerged as a new field in health informatics to support emerging and ongoing developments in molecular biology. Translational informatics supports acceleration, from bench to bedside, i.e., the appropriate use of molecular biology research findings and bioinformatics in clinical care of patients.

At the same time, further continual evolution of the field of Health informatics is reflected in the introduction of concepts at the macro or health systems delivery level with major national initiatives related to electronic health records (EHR), data standards and public health informatics such as the Healthcare Information Technology Standards Panel (HITSP) in the USA, Canada Health Infoway, NHS Connecting for Health in the UK.

We have consciously retained the series title *Health Informatics* as the single umbrella term that encompasses both the microscopic elements of bioinformatics

and the macroscopic aspects of large national health information systems. Ongoing changes to both the micro and the macro perspectives on health informatics will continue to shape health services in the Twenty First Century. By making full and creative use of the technology to tame data and to transform information, health Informatics will foster the development and use of new knowledge in health care. As coeditors, we pledge to support our professional colleagues and the series readers as they share advances in the emerging and exciting field of Health Informatics.

Kathryn J. Hannah
Marion J. Ball

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