

Adaptive Health Management Information Systems

Concepts, Cases, and Practical Applications

FOURTH EDITION



Joseph Tan

Professor, McMaster University
DeGroote School of Business
Hamilton, ON, Canada

with

**Phillip Olla
(& Joshia Tan)**



JONES & BARTLETT
LEARNING



World Headquarters
Jones & Bartlett Learning
5 Wall Street
Burlington, MA 01803
978-443-5000
info@jblearning.com
www.jblearning.com

Jones & Bartlett Learning books and products are available through most bookstores and online booksellers. To contact Jones & Bartlett Learning directly, call 800-832-0034, fax 978-443-8000, or visit our website, www.jblearning.com.

Substantial discounts on bulk quantities of Jones & Bartlett Learning publications are available to corporations, professional associations, and other qualified organizations. For details and specific discount information, contact the special sales department at Jones & Bartlett Learning via the above contact information or send an email to specialsales@jblearning.com.

Copyright © 2021 by Jones & Bartlett Learning, LLC, an Ascend Learning Company

All rights reserved. No part of the material protected by this copyright may be reproduced or utilized in any form, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without written permission from the copyright owner.

The content, statements, views, and opinions herein are the sole expression of the respective authors and not that of Jones & Bartlett Learning, LLC. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not constitute or imply its endorsement or recommendation by Jones & Bartlett Learning, LLC and such reference shall not be used for advertising or product endorsement purposes. All trademarks displayed are the trademarks of the parties noted herein. *Adaptive Health Management Information Systems: Concepts, Cases, and Practical Applications, Fourth Edition* is an independent publication and has not been authorized, sponsored, or otherwise approved by the owners of the trademarks or service marks referenced in this product.

There may be images in this book that feature models; these models do not necessarily endorse, represent, or participate in the activities represented in the images. Any screenshots in this product are for educational and instructive purposes only. Any individuals and scenarios featured in the case studies throughout this product may be real or fictitious, but are used for instructional purposes only.

This publication is designed to provide accurate and authoritative information in regard to the Subject Matter covered. It is sold with the understanding that the publisher is not engaged in rendering legal, accounting, or other professional service. If legal advice or other expert assistance is required, the service of a competent professional person should be sought.

15401-6

Production Credits

VP, Product Management: Amanda Martin
Director of Product Management: Cathy Esperti
Product Manager: Danielle Bessette
Product Assistant: Tess Sackmann
Project Specialist: Kelly Sylvester
Digital Project Specialist: Rachel Reyes
Senior Marketing Manager: Susanne Walker
Manufacturing and Inventory Control Supervisor: Amy Bacus
Composition: codeMantra U.S. LLC

Project Management: codeMantra U.S. LLC
Cover Design: Kristin E. Parker
Senior Media Development Editor: Shannon Sheehan
Rights Specialist: Rebecca Damon
Cover Image (Title Page, Part Opener, Chapter Opener):
© phasin/Getty Images and © gonin/Getty Images
Printing and Binding: Sheridan Books
Cover Printing: Sheridan Books

Library of Congress Cataloging-in-Publication Data

Library of Congress Cataloging-in-Publication Data unavailable at the time of printing.
LCCN: 2019946986

6048

Printed in the United States of America

23 22 21 20 19 10 9 8 7 6 5 4 3 2 1

Contents

New to This Edition xi
Dedication xiii
Acknowledgments xv
Foreword xvii
Preface xix
About the Editors xxi

PART I Emergent HMIS Perspectives 1

Chapter 1 Emerging Perspectives in Health Information Systems/Technologies (Health IS/IT) 3

Joseph Tan

Scenario: Charting the Future of Philips HealthSuite Digital Platform Toward a New Vision of Connected Health 4

I. Introduction 5
 II. Scoping the HMIS Field: A Digital Health Ecosystem Perspective 6
 III. Major Health IS/IT Components 13
 IV. HMIS Cultures 20
 V. Conclusion 22

Notes 22
 Chapter Questions 23

Chapter 2 Precision Medicine: Decoding the Biology of Health and Disease 25

James M. Snyder with case scenario by Joseph Tan

Scenario: Origo—Crafting a Precision Medicine Platform for Cancer Patients on a Global Scale 26

I. Introduction 27
 II. Background: What Is PM? 27
 III. Key Events in the History of PM 30
 IV. Current Perspective 32
 V. Future Trends 35
 VI. Conclusion 41

Notes 41
 Chapter Questions 43
 Biography 43

Technology Review I

Review on Big Data Analytics in Health Care . . . 44

Abir Belaala, Labib Sadek Terrissa, Nouredine Zerhouni, Christine Devalland, and Joshia Tan

Introduction 44
 Background 45
 Analytical Techniques 49
 Discussion 60
 Conclusion 63

Notes 63
 Biographies 67

Chapter 3 Adoption and Commercialization of Digital Health 69

Greg Moon and Phillip Olla

Scenario: Accenture: Adding AI Bots to Enhance Digital Health Solution 70

I. Introduction 70
 II. Background 71
 III. Current Perspective 72
 IV. Future Directions 76
 V. Conclusion 78

Notes.....78
 Chapter Questions.....79
 Biography.....80

Policy Review I

**Online Health Information Seeking:
 Recasting Access and Digital Equity 81**
Fay Cobb Payton and Lynette Yarger

I. Introduction.....81
 II. Accessing Health Information Beyond
 the Internet.....88
 III. Alternative Means of Accessing Health
 Information.....88
 IV. Future Directions.....90
 Notes.....90
 Biographies.....91

Mini-Case (Part I)

**Ginger.io: Mental Health
 Behavioral Analytics 93**
Phillip Olla and Greg Moon

I. Introduction.....93
 II. Commercialization.....93
 III. Moving Forward.....93
 IV. Takeaway.....94
 Notes.....94

**PART II HMIS Technology and
 Applications 95**

**Chapter 4 Data in Digital Health
 Systems.....97**

Siti A. Arshad-Snyder

Scenario: Network Connectivity for Connected
 Health in U.S. Health System.....98
 I. Introduction.....98
 II. Background.....99

III. Healthcare Data..... 100
 IV. Issues and Problems Related to
 Health Data..... 104
 V. Addressing Issues and Problems
 Related to Data..... 106
 VI. Future Trends of Data and
 Data Analytics..... 108
 VII. Conclusion..... 109

Notes..... 110
 Chapter Questions..... 111
 Biography..... 111

Technology Review II

**Big Data, Geospatial Technology, IoT, and
 Cloud Computing for Health Systems..... 112**
*Prabha Susy Mathew, Anitha S. Pillai,
 and Joseph Tan*

I. Introduction..... 113
 II. Geospatial Data and Technologies
 in Health Care..... 114
 III. Geospatial Analytics..... 115
 IV. SBD Unique Security Requirements..... 116
 V. Geospatial Technology, Big Data, IoT,
 and Cloud Convergence..... 118
 VI. Use Cases of Healthcare IoT, Cloud,
 and Geospatial Data..... 121
 VII. Conclusion..... 121

Notes..... 122
 Biographies..... 124

**Chapter 5 Digital Health Enterprise
 Software: SCM, CRM,
 and ERP..... 125**

Joshia Tan with Joseph Tan

Scenario: Customer Relationship Management
 with Blue Cross Blue Shield of Minnesota.... 125
 I. Introduction..... 126
 II. Supply Chain Management..... 127
 III. Customer Relationship Management ... 130

IV. Enterprise Resource Planning 131
 V. Conclusion 137
 Notes..... 139
 Chapter Questions..... 139

Technology Review III
Supply Chain Management (SCM)
for Health Systems 140

Matilda Isaac Mustapha and Joseph Tan

Introduction..... 141
 Innovative Standard of Care..... 141
 Resource Optimizing 143
 Supply Chain Management and Cost 144
 Supplier Cost in Supply Chain Management ... 145
 Optimizing Supply Identifiers 146
 Engineering Approaches to Supply
 Chain Management..... 146
 Organizational Culture and Supply
 Chain Management..... 146
 Technology Orientation in Supply
 Chain Management..... 147
 Managerial Implications of Supply
 Chain Management Implementation..... 147
 Conclusion 148
 Notes..... 148
 Biography 149

Chapter 6 Key Patient-Centric
Technologies: EHR, CPOE,
CDS, and PP 151

Joseph Tan with Phillip Olla and Joshia Tan

Scenario: How Samsung Health Redefines
 Personal Fitness and Beyond 152
 I. Introduction 153
 II. What Are Electronic Health Records,
 Computerized Physician Order Entry,
 Clinical Decision Support, and Patient
 Portals? 154

III. Historic Evolution of EHR, CPOE, CDS,
 and PP 155
 IV. Electronic Health Records 156
 V. Computerized Physician Order 158
 VI. Clinical Decision Support 158
 VII. Patient Portals 159
 VIII. Benefits and Challenges of EHR,
 CPOE, CDS, and PP 160
 VIII. Conclusion 163

Notes..... 165
 Chapter Questions..... 166

Chapter 7 Pharmacy Informatics:
Technologies for the
Medication Use Process and
Professional Education..... 167

Misty Jensen and Ping Ye

Scenario: The SAPHIRE Project 168
 I. Introduction..... 169
 II. Background 170
 III. Current Perspective 170
 IV. Future Trends..... 181
 V. Conclusion 182
 Notes..... 182
 Chapter Questions..... 185
 Biographies 185

Mini-Case (Part II)
The Case of Lose It! 186

Joseph Tan with Michael Dohan

Introduction..... 186
 Learning How to Use Lose It!..... 186
 Benefits Versus Downsides of Using Lose It! 187
 Conclusion 187
 Note..... 188
 Biography 188

PART III HMIS Planning and Management 189

Chapter 8 Digital Health Strategic Planning and Strategies for Health Systems 191

Joseph Tan and David Pellizzari

Scenario: *The Future Big Data, Big Health Gains Scenario*..... 192

I. Introduction..... 193

II. Strategic Information Systems Planning and Strategic Awareness..... 196

III. Situational Analysis (SA)..... 199

IV. Strategy Conception and Formulation..... 203

V. Strategy Implementation (SI)..... 204

VI. Conclusion..... 205

Notes..... 205

Chapter Questions..... 206

Biography..... 207

Policy Review II

Roles and Responsibilities of Health Systems Leaders and Managers 208

Joseph Tan with Phillip Olla and Joshia Tan

Vision..... 209

Strategy..... 209

Execution..... 210

Characteristics of Healthcare Leaders and Managers..... 211

Specific Health IT Roles and Responsibilities..... 213

Conclusion..... 214

Notes..... 215

Chapter 9 Decision Aiding and Predictive Systems: A Framework for Data Mining and Machine Learning for Health Systems Management 217

Saumil Maheshwari, Anupam Shukla, and Joseph Tan

Scenario: Open Health Tools for Interoperable Health Care..... 218

I. Introduction..... 219

II. Data Mining (DM) and Machine Learning (ML) for Health Care..... 219

III. Framework..... 221

IV. Contributions of DM–ML in Health Care.. 229

V. Conclusion..... 233

Notes..... 234

Chapter Questions..... 239

Biographies..... 239

Chapter 10 The Role of Informatics in Public Health 241

April Moreno Arellano

Scenario: Aligning Clinical and Public Health Data Standards Through Partnership with the Public Health Data Standards Consortium..... 242

I. Introduction..... 242

II. Global Public Health..... 244

III. EHR as a Comprehensive Tool for Health Care..... 248

IV. HL7 Message Examples..... 250

V. Relevant Data Elements for Chronic Disease Surveillance of Prediabetes and Hypertension..... 251

VI. Conclusion..... 252

Notes..... 253
 Chapter Questions..... 254
 Biography 254

Chapter 11 Health IS/IT Project Implementation, Innovation Procurement, and Services Management255

Joseph Tan with Phillip Olla and Joshia Tan

Scenario: Wellcentive—Philips Population Health Management Solution..... 256

- I. Introduction..... 257
- II. Critical Success Factors for Health IT Implementation 258
- III. Strategic Planning and Management Issues 261
- IV. Health IT Implementation Stages 267
- V. Innovation Procurement (IP) 274
- VI. IT Services Management Concepts 277
- VII. Conclusion 279

Notes..... 280
 Chapter Questions..... 281

**Mini-Case (Part III)
 Physician Intervention in Reducing Readmissions and Tele-Health Solution..... 282**

Jacqueline S. Jones, Sam Kazziha, and Mohan Tanniru

Introduction..... 282
 Readmission Strategy of Cardiac Patients at a Nursing Home 284
 Conclusion 286

Notes..... 287
 Biographies..... 287

PART IV HMIS Standards, Policy, Governance & Future 289

Chapter 12 Clinician Confidentiality, Privacy, and Ethical Issues in the Digital Age291

Charie Faught

Scenario: Privacy and Security Policy and Subsequent Theft of Patient Information 292

- I. Introduction..... 292
- II. Current Perspective 292
- III. 1996 HIPAA Rules..... 294
- IV. Health Information Technology..... 297
- V. Potential Issues Arising from Technology Use 299
- VI. Solutions and Recommendations..... 303
- VII. Future Trends and Conclusion 305

Notes..... 306
 Chapter Questions..... 309
 Biography 309

**Policy Review III
 Health IT Standards Adoption in Health Systems 310**

Sanjay Sood and Joseph Tan

Introduction..... 310
 ICD and Other Standards 311
 HL7.....312
 DICOM314
 Adoption of DICOM Standards..... 316

Web Standards	316
Conclusion	317
Notes	317
Biography	318

Chapter 13 AI and Social Media Analytics for Health Systems: Understanding Consumers' Preferences in Healthcare Services 319

Adela S. M. Lau, Kristine Baker, Katherine Kempf, Katie Grzyb, Sijuade Oke, Eric Tsui, Liege Cheung, Marie-Claire Slama, and Min Su

Scenario: Use AI and Social Media Analytics for Healthcare Consumer Preference Analysis	320
I. Introduction	320
II. Consumer Shopping, Behavioral Changes, and E-Health Services	321
III. Social Media Analytics (SMA) and AI	322
IV. Zocdoc Case: SMA Use and Consumer's Preference on E-Health Services	327
V. Conclusion	337
Acknowledgments	338
Notes	338
Chapter Questions	340
Biographies	340

Chapter 14 Health Care Globalization Through Health Information Technology Enabled Initiatives 343

Anantachai Panjampairom and Philip F. Musa

Scenario: UPMC and KingMed Diagnostics Collaboration	344
I. Introduction	345

II. Tele-Care, Telemedicine, Tele-Health, and E-Health	347
III. Types of Telemedicine	347
IV. The Economic Perspectives of ICT and E-Health	350
V. Factors Influencing the Adoption of E-Health	353
VI. Barriers to E-Health Adoption	354
VII. Stakeholder Analysis	356
VIII. WHO'S Strategic Framework for E-Health Development	358
IX. Flow of Resources Between Developed and Developing Countries	360
X. Conclusion	361

Notes	361
Chapter Questions	365
Biographies	365

Chapter 15 Exploring Healthcare Futures: Emerging Technology in Health Care 367

Phillip Olla, Rajib Biswas, and Joseph Tan

Scenario: Orbita Driving Innovation in Conversational Artificial Intelligence (AI) and Voice Technology Solutions for Health Systems	368
I. Introduction	369
II. Developing Trends of Healthcare BDA ...	370
III. Key Emerging Technologies in the Next 5–10 Years	375
IV. Reinventing Healthcare Futures	381
V. Conclusion	382
Notes	383
Chapter Questions	386
Biography	386

Mini-Case (Part IV)

The Leadership of Future Health 387

Joseph Tan with Joshia Tan

The Leadership of Future Health 387

Conclusion 388

Note 388

PART V HMIS Practices and Cases 389

Case 1 Digital Health Technology Commercialization Strategies 391

Greg Moon and Phillip Olla

Digital Health 391

Categories of Global D-Health Solutions 391

Categories for Commercial D-Health Systems 392

Commercialization Strategies 393

A Note on Financing Digital Health Companies 399

Case Questions 400

Notes 400

Case 2 The Impact of Electronic Medical Records (EMRs) on Clinical Workflow and Practices: Perspectives of MS, a Physician Resident in Ottawa, Canada 403

Brandon Lam and Joseph Tan

Introduction 403

Patient Charting/Documenting 404

Centralized Application to Access Patient’s Medical Records 405

Orders 406

Access to Resources 406

Mobile Access (Tablets, Phones) 406

Clinics 408

Reference Value 408

Privacy of Patients 410

EMR Implementation 410

Case Questions 411

Notes 411

Biography 411

Case 3 St. Joseph Mercy Oakland (SJMO): Digital Leadership in Health Care 413

Mohan Tanniru, Jack Weiner, and Monica Garfield

Background of SJMO 414

Healthcare Industry Landscape 415

Organizational Structure of Hospitals 416

Information Technology (IT), Systems, and SJMO Capabilities 416

SJMO’s Digital Transformation 417

Case Scenario 1—Early Warning System (2009–2014) 417

Case Scenario 2—Performance Dashboard (2010–2012) 419

Case Scenario 3—Intelligent Care Systems (2012–2015) 420

Case Scenario 4—Medication Board (2014–2015) 422

Case Scenario 5—RSVP (2014–2015) 423

Looking Forward 423

Case Questions 424

Notes 424

Biographies 424

**Case 4 Theranos: Innovating
an Industry Primed for
Innovation427**

*Chloe Nyitray, Brandon Nixon,
Grace Simpson, and Joseph Tan*

Introduction..... 427
Elizabeth’s Upbringing and History..... 427
Developing the Disruptive Technology..... 428
Seeking Partnerships 429
Elizabeth’s Rise to Fame..... 430
Warning Signs: Myths Versus Reality..... 430
The Beginning of the End..... 431
The Downfall of Theranos..... 431
Theranos and Elizabeth’s Future..... 432
Case Questions 432
Notes..... 432
Appendix A—Theranos Investment
Rounds 434

Appendix B—List of Theranos
Investors..... 435
Appendix C—Glassdoor Reviews
as of July 2018 436
Biographies..... 437

**Case 5 Patients Like Me (PLM): Social
Media in Public Health439**

*Phillip Olla, Brianna Mozariwskyj,
Vickee Le, and Ly Le*

Introduction..... 439
SM Adoption in Health Care 439
Patients Like Me (PLM)..... 440
Conclusion 441
Case Questions 441
Notes..... 442
Biographies..... 442
Index..... 443

New to This Edition

Adaptive Health Management Information Systems, Fourth Edition, is for those instructors needing and wanting to keep pace with rapidly evolving perspectives in the field of healthcare management information systems (HMIS) and e-health digitalization. Not just a regular update of the previous edition, this new edition is vastly reorganized, revised, and reformatted with numerous contributed pieces from experts in all HMIS-related fields. To improve the previous edition, we have added much needed discussions in contemporary topics, such as precision medicine, digital health commercialization, pharmacy informatics, big data analytics, and AI (artificial intelligence). Therefore, this new edition, containing new motivating scenarios related to digital health technology applications, is also packed with creative developments and designs of real-world examples; stimulating chapter questions; glossary; illustrative graphics, tables, and exhibits; and additional readings. Significant updates and complete revisions have been incorporated throughout the text—so much so that readers familiar with the previous editions of this work would not have recognized this work as a derivative of the previous ones.

Specific updates:

- **Content.** Rich, extensive coverage of topics in HMIS and Health IT/IS domains across all dimensions, with contemporary perspectives, emerging technological applications, and implementations from developed and developing countries to serve as examples in enhancing the understanding of topics.
- **Scenarios.** Real-world, realistic scenarios set the stage for topic discussion and motivate student readers. A short reflection is also provided at the end of each scenario to develop students' imagination.
- **Technology Reviews.** Background readings on technological topics to enhance understanding of contemporary research and developments in Health IT/IS domains.
- **Policy Reviews.** Background readings on policy-related areas to enhance understanding of policy implications for trends in Health IT/IS domains.
- **Mini-Cases.** Reflective readings for students to draw lessons from various parts of the major sections of the text.
- **Chapter Questions.** Short and long questions to stimulate classroom discussion and promote learning of various topics discussed in the text.
- **New Major Cases.** A range of relevant new cases to enhance understanding of the materials and promote further interactions among students and between student groups and instructors.

Dedication

To the memory of all those loved ones, who have since passed away as I worked through various editions of this enduring text; to my students and colleagues, who have contributed to my near 30 years of teaching and learning; and those who have enjoyed my works in the fields of health services administration, health informatics, business and e-health information systems, e-Business informatics and strategies; and to my inner and expanding circle of friends and relatives, especially my own beloved family members who have all assisted me one way or another to hone my thinking and fuel my lengthy academic publishing and writing career.

—Joseph Tan

Acknowledgments

Above and beyond those to whom I am indebted while assembling previous editions of this text, I must acknowledge the generous help of those newly added academic and professional contributors, including those who were brought on board by my co-editor, Dr. Philip Olla. Dr. Olla has personally assisted in revising parts of the writing of various contributed pieces in this new edition. Sincere gratitude is also to Mr. Joshia Tan for his insights and copyediting efforts in making this revised edition not only a more appealing text, but one that would be more readable and valuable for both students and instructors.

There are several individuals whom I must especially thank: first, the publisher, who swiftly agreed to the need for an update of the text, and very patiently waited for the contributions to come in, who was flexible with the submission of the final overdue manuscript when loved ones passing away caused delays, when there were challenges connecting with some of the previous contributors, and when awaiting new contributors to complete their follow-up revisions after receiving feedback from the editorial team members (myself,

Olla, and Josh). Finally, several of my students (Dr. Michael Dohan, Chloe Nyitray, Grace Simpson, Brandon Nixon, and Mr. David Pellizzari) also collaborated at different times for adding the new content of the book.

I am thankful to all who contributed for volunteering their time, efforts, and patience with my ongoing disruptive returns to them for more details and changes, and I am also particularly grateful to my wife, Leonie Tan, and son, Joshia Tan, who have ceaselessly encouraged me in every way possible to go on with my revising the text when all of us were going through very challenging times of overseeing the passing away of two beloved brothers—one, my own elderly brother, Paul and the other, my wife's younger brother, Peter—throughout the duration of this project.

To all of these individuals and to my family members, friends, students, and relatives, I offer my many thanks for the support and encouragement provided to me. Much of the value of this work is due to their contributions and assistance.

—Joseph Tan

Foreword

Dr. & Professor Norm Archer

McMaster University
Hamilton, ON, Canada

As you can see from the chapters in this volume, we are living in times where there are rapid advances in information and communication technologies (ICT). These may surpass our ability to quickly adapt them to meet practical needs. Health care often lags in terms of technology adaptation. This is due to a variety of barriers, but technology can provide some solutions:

- In the absence of widespread accepted standards, initial surges of HMIS development resulted in the growth of information silos that cannot intercommunicate. Efficient service provision requires information sharing. This problem is slowly being overcome by interoperability solutions. A less expensive solution is the DHIS 2 (District Health Information System) open source system. It is in use in 60 countries, including 40 countries in Africa, Asia, and Latin America. Many have adopted DHIS 2 as a nationwide standard, thus eliminating problems such as interoperability, retraining mobile staff, and healthcare system integration.
- The adoption of new technology supports rapid and efficient record keeping, data retrieval, communications, and applications in a variety of devices, resulting in massive floods of (Big) Data about patient health and management. A barrier is often a lack of trained and experienced staff to organize these data and to develop efficient methods that use health data analytics, including machine learning and/or decision support through deep learning.
- A barrier in many healthcare institutions is that they have been distracted by data breach and data hostage problems, requiring much time and money to be spent on improving data security. A resulting side benefit is better management of patient privacy.
- Precision medicine looks promising, and has been used effectively in some cases. A barrier is the high cost of specialized molecules to treat small groups of people, resulting in unaffordable treatments. There is no practical solution in sight as of yet.
- Personal computing has radically changed the dynamic of written communications. But physicians now work longer hours to do tasks formerly done by assistants. This barrier prevents spending sufficient time with patients; as a result, the strongest predictor of physician burn-out is the amount of time spent doing computer documentation. Artificial intelligence (AI) solutions may eventually be able to reduce this documentation load.
- Computer system support affects physicians through work structuring, thereby reducing practice flexibility. This is not necessarily a barrier; well-designed systems may in fact help physicians to make better decisions from evidence-based medicine, improving care quality.

- Intelligent digital assistants, such as Alexa and Cortana can understand voice and be activated by voice commands to accomplish basic tasks. This improves user adaptability, and may take over some of the documentation needs of healthcare professionals.

Ultimately, virtual care (telemedicine) allows individuals to connect online anytime, anywhere with healthcare providers and other health professionals through secure text and video. A barrier to this approach is the shortage and the cost of highly trained professionals, which may have to be supplanted partially by a combination of AI and online health self-management, including prevention and treatment of chronic disease among older adults and the elderly.

Biography

Norm Archer, PhD (Physics), is *professor emeritus* of the DeGroot School of Business, McMaster University. He teaches courses in electronic health (eHealth) and information systems and has published widely on eGovernment, eBusiness, and eHealth; more specifically, Professor Archer and his students conduct research on eHealth applications and systems; eBusiness; identity theft; supply chain management; project management; change management in eGovernment; and mobile commerce. He has a major responsibility in the collaborative MSc eHealth program that is a joint undertaking by the DeGroot School of Business, Faculty of Health Sciences, and the Computing and Software Department in the Faculty of Engineering.

Preface

A *Adaptive Health Management Information Systems: Concepts, Cases, and Practical Applications, Fourth Edition* is finally here to aid students and instructors who want to take the next big leap in digital healthcare transformation. Indeed, just as with previous editions, this new edition is not simply an update, but a complete makeover—clearly a reorganized, expanded, and fully revised manuscript with new and logically ordered contributions, still divided into the five common major themes connecting a 15-chapter series, supplemented with Technology and Policy Reviews as well as Cases and Mini-Cases. Several short, medium, and long cases are therefore assembled to promote a wide range of class discussions from the readings and beyond. Put simply, significant updates and complete revisions to all parts of the previous edition have been generated throughout the text so that readers of previous editions would not have recognized this work as a derivative of the other. It is no longer just a new hybrid vehicle that the co-editors have decided to usher in this time; instead, what we got is a “self-driving” vehicle that does away with most, if not all, of the parts powering the old model design that is driver-dependent.

As we begin to witness the power of big health data analytics, geospatial data analytics, and social media analytics, we become more conscious of how the massive data around and about us are changing our behaviors—the way we think, the way we work, and the way we interact with each other. The jobs that we currently do in the ever-growing healthcare systems are gradually fading away, as new roles are defined with advances in technological

interventions and ubiquitous computing. To this end, it is hoped that this newly minted HMIS text will continue to motivate its readers to seek new perspectives, bringing together state-of-the-art knowledge as well as best practices that incorporate the benefits of emerging and innovative technologies discussed throughout this text. As evidenced both in the Contents and the range of shorter and longer cases provided in this text, the ever-growing spectrum of topics to be covered in a health information systems/information technology (health IT/IS) or health informatics courses is expanding. In this new edition, we have attempted to aggregate the different theories, methodologies, and practices into a five-part cluster that readers would be familiar with from previous editions.

Part I, comprising Chapters 1–3 (supplemented with a *Mini-case*, a *Technology Review*, as well as a *Policy Review*), offers emergent perspectives on HMIS. Part II, covering Chapters 4–7 (accompanied by two *Technology Reviews*), concentrates on HMIS technology and applications, whereas Part III, covering Chapters 8–11 (supplemented by a *Policy Review* and a *Mini-case*), shifts focus to HMIS planning and management. Part IV, which encompasses Chapters 12–15, addresses HMIS standards, governance, policy, globalization, and future, and is also supplemented with a *Policy Review* and a *Mini-case*. Finally, a range of shorter and longer cases highlighting HMIS practices and implementation are presented in Part V. Each of these major themes progressively flows from one topic to another to unveil diverse and critical aspects of the hidden HMIS gem.

It is the hope of the editorial team members that this *Fourth Edition* will open eyes, stimulate conversations, and further extend the possibilities and opportunities of future theorists,

methodologists, and practitioners in the HMIS, health IT/IS, and health informatics areas.

Joseph Tan with Philip Olla (& Joshia Tan)

About the Editors

Joseph Tan

Primary author and editor, Joseph Tan, PhD (MIS), MS (Industrial and Management Engineering), BA (Maths/Computer Science), Dip (Civil Engineering), formerly *Wayne C Fox Chair* of eBusiness Innovation, is Professor of eHealth Innovation, eBusiness Strategies, Entrepreneurship & Informatics, DeGroot School of Business, McMaster University. He is the founding and ongoing Editor-in-Chief (EIC), *International Journal of Healthcare Information Systems and Informatics (IJHISI)*, as well as the co-EIC, *International Journal of Applied Research on Public Health Management (IJARPHM)*, with a professional background that spans a broad spectrum of interdisciplinary, multidisciplinary, and trans-disciplinary research areas. He is also EIC, *SpringerBriefs for Healthcare Economics & Management*, and the Senior Associate Editor (eHealth Informatics) of *HLPT: Health Technology & Policy*.

Joseph Tan's 30-year academic and administrative experiences include employment in academia and private and non-profit sector organizations, as well as consulting and program development activities catering to executives and foreign delegation. His management philosophy is to motivate others to work collaboratively on available opportunities (and challenges) so as to effect transformative change; he regularly mentors junior faculty, staff, and adult students. He has been named among the Top 10 most influential professors of informatics with an overall career focus to reshape the landscape of IS/IT applications and promotion in eBusiness/eHealth informatics through cross-disciplinary thinking/

project partnering with diverse practitioners, clinicians, researchers, and a variety of user communities. His leadership style is to influence and inspire others to become self-made leaders, continually achieving higher quality, effective, productive, and respectful contributions in terms of realizing the shared vision and negotiated goals.

Professor Tan has published over 150 papers, abstracts, books and book chapters, editorials, and reviews. His work has appeared in over 30 refereed journals, including *AJHP; Applied Ergonomics; CMI; Computer Graphics Forum; Comm. of the ICISA; CACM; CAIS; Decision Sciences; Encyclopedia of IS; HSMR; HCMF; HCMR; H&HSA; HLPT; Hospital Topics; ISR; Inf. Res.; IJHTM; IJEH; IJHCI; IJMC; IJMTP; IJT&LD; JAMIA; JCIS; Journal of Digital Imaging; JHAE; JHCQ; JMS; Methods of Information in Medicine; Nature, Neural Computing & Applications*, and *THIM*, as well as numerous local, national, and international conference proceedings. Just as with time spent on compiling this revised fourth edition, Professor Tan is currently compiling a new *case text* to bring together insights and lessons learned from various sources during his many years of teaching and learning in the *Connected Health* discipline, including *eBusiness strategies, entrepreneurship, and innovation* areas. Again, this work will be collaborated with other authors, co-editors, and contributors. Another key work being planned is the *Road to Heaven on Earth*, to be released in the coming future.

Dr. Tan has demonstrated skills and ability to serve in both academia and for-profit and non-profit industry. He has achieved

recognized scholarship in teaching and learning with students' nominations for teaching excellence awards. Dr. Tan also appears as an invited keynote speaker for a number of local as well as major national and international conferences across North America, Asia, Africa, and elsewhere, and networks widely with key decision executives and policymakers apart from academic scholars and practitioners at local, provincial/state, national, and international levels, including private, public, and non-governmental organizations and universities. As a well-established educator and negotiator, he has continued to play an active leadership role in curriculum and program accreditation, peer-reviewed journal publications, encyclopedia works and book reviews, online education and programming, planning and organization of symposiums and conferences, development of book series, special issue journals, federal grant proposals, and large-scale international interdisciplinary grant-funded programs.

Phillip Olla

Contributing author and co-editor, Dr. Phillip Olla is a Digital Health specialist with over 20 years of experience working at the leading edge of technology innovation. He is currently the CEO of Audacia Bioscience, a life science company incorporating biomarkers, AI, and smartphone technology to develop innovative diagnostic solutions. Prior to founding Audacia Bioscience, he was the Executive Director of Mobile Diagnostic Services, a social enterprise which created point-of-care diagnostic technology for low-resource global health settings. His professional experience and consulting services span an array of industries and disciplines such as Oracle, 02, Roche Diagnostics, and NASA. Dr. Olla has completed over 50 client consultancy engagements with Fortune 100 companies in 12 countries, successfully assisting with corporate education, technology

deployments, business development, competitor analysis, portfolio analysis, and strategic technology roadmaps. Dr. Olla is an Adjunct Professor at the University of Windsor, and was previously the Director of Research and Professor of Health Informatics at Madonna University in Livonia, Michigan.

Dr. Olla is a public speaker who has presented extensively within the domains of industry and academia and even for non-governmental organizations such as the World Health Organization and the United Nations. Dr. Olla has a PhD in Information Systems from Brunel University in the United Kingdom. His publications include numerous peer-reviewed journal articles, industry reports, seven book chapters, and three books; *Mobile Health Solutions for Biomedical Applications*. He is a Chartered Engineer registered with British Engineering Council and a Fellow of the Chartered Institute of Information Technology.

Joshia Tan

Editorial consultant, Joshia Tan hails from a banking and commercial background. Over the last decade or so, Joshia has held a number of leadership, strategy, sales, and commercialization roles across Brazil, Canada, China, Singapore, and the United States with HSBC—including coverage of some of the largest technology and healthcare/pharmaceutical corporates in the world. Currently, he serves as Senior Vice President of Business Development in Singapore, covering the evolving trade financing needs of Fortune 100 clients across 19 markets in the Asia Pacific region.

Joshia maintains a keen interest in the Digital Health landscape and has authored or co-authored a number of case studies and book chapters; he has also served on various advisory boards for non-profits and holds a Bachelor of Science in Business Administration from Washington University in St. Louis.