

Chapter 1.11

Geographic Information Systems in Health Care Services

Brian N. Hilton

Claremont Graduate University, USA

Thomas A. Horan

Claremont Graduate University, USA

Bengisu Tulu

Claremont Graduate University, USA

ABSTRACT

Geographic information systems (GIS) have numerous applications in human health. This chapter opens with a brief discussion of the three dimensions of decision-making in organizations — operational control, management control, and strategic planning. These dimensions are then discussed in terms of three case studies: a practice-improvement case study under operational control, a service-planning case study under management control, and a research case study under strategic planning. The discussion proceeds with an analysis of GIS contributions to three health care applications: medical/disability services (operational control/practice), emergency response (management control/planning), and infectious disease/SARS (strategic planning/research). The

chapter concludes with a cross-case synthesis and discussion of how GIS could be integrated into health care management through Spatial Decision Support Systems and presents three keys issues to consider regarding the management of organizations: Data Integration for Operational Control, Planning Interorganizational Systems for Management Control, and Design Research for Strategic Planning.

INTRODUCTION

Geographic information systems (GIS) have numerous applications in human health. At the most basic level, entire research and practice domains within health care are strongly grounded in the spatial dimension (Meade & Earickson, 2000).

Indeed, the pioneering work of Dr. John Snow in diagnosing the London Cholera Epidemic of 1854 not only launched the field of epidemiology, but did so in a manner closely linked with the visual display of spatial information (Tufté, 1997). The health care enterprise has become much more complex since the time of Dr. Snow and so have the technologies that are employed to conduct spatial analysis regarding health care conditions and services (Dangermond, 2000).

This chapter opens with a brief discussion of the three dimensions of decision-making in organizations — operational control, management control, and strategic planning. These dimensions are then discussed in terms of the case study focus of the chapter, which includes a practice-improvement case study under operational control, a service-planning case study under management control, and a research case study under strategic planning. The chapter proceeds with the analysis of GIS contributions to three health care applications: medical/disability services (operational control/practice), emergency response (management control/planning), and infectious

disease/SARS (strategic planning/research). The chapter concludes with a cross-case synthesis and discussion of how GIS could be integrated into heath care management through spatial decision support systems.

BACKGROUND

One definition of a GIS is as “a group of procedures that provide data input, storage and retrieval, mapping and spatial analysis for both spatial and attribute data to support the decision-making activities of the organization” (Grimshaw, 2000, p. 33). One of the most well known models for thinking about the nature of these decision-making activities in the organization is Anthony’s Model.

Anthony's Model implies a hierarchy of organizational decision-making. Here, a qualitative distinction is made between three types of decision-making: Operational Control, Management Control, and Strategic Planning (Ahituv, Neumann, & Riley, 1994). As GIS has developed,

Figure 1. John Snow's map of the Broad Street pump outbreak, 1854



19 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/geographic-information-systems-health-care/26211

Related Content

Bone Age Assessment

S. Kavya, Pavithra Pugalendi, Rose Martina P. A., N. Sriraam, K. S. Babuand Basavaraj Hiremath (2013). *International Journal of Biomedical and Clinical Engineering* (pp. 1-10).
www.irma-international.org/article/bone-age-assessment/101925

Using Extreme Learning Machines and the Backprojection Algorithm as an Alternative to Reconstruct Electrical Impedance Tomography Images

Juliana Carneiro Gomes, Maíra Araújo de Santana, Clarisse Lins de Lima, Ricardo Emmanuel de Souzaand Wellington Pinheiro dos Santos (2021). *Biomedical Computing for Breast Cancer Detection and Diagnosis* (pp. 16-27).
www.irma-international.org/chapter/using-extreme-learning-machines-and-the-backprojection-algorithm-as-an-alternative-to-reconstruct-electrical-impedance-tomography-images/259707

Importance of Biotechnology in the Development of Functional Foods in Emerging Countries: The Case of Chile

Carolina Alejandra Oliu (2017). *Comparative Approaches to Biotechnology Development and Use in Developed and Emerging Nations* (pp. 269-281).
www.irma-international.org/chapter/importance-of-biotechnology-in-the-development-of-functional-foods-in-emerging-countries/169521

Trends and New Advances on Wearable and Mobile Technologies for Parkinson's Disease Monitoring and Assessment of Motor Symptoms: How New Technologies Can Support Parkinson's Disease

Jorge Cancela, Matteo Pastorinoand Maria Teresa Arredondo Waldmeyer (2018). *Biomedical Engineering: Concepts, Methodologies, Tools, and Applications* (pp. 1180-1204).
www.irma-international.org/chapter/trends-and-new-advances-on-wearable-and-mobile-technologies-for-parkinsons-disease-monitoring-and-assessment-of-motor-symptoms/186722

"Do No Harm": Can Healthcare Live Up to It?

Nat Natarajanand Amanda H. Hoffmeister (2009). *Medical Informatics: Concepts, Methodologies, Tools, and Applications* (pp. 1882-1896).
www.irma-international.org/chapter/harm-can-healthcare-live/26343