Pushing the contextual envelope: developing and diffusing IS theory for health information systems research

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Abstract

The healthcare sector is a crucial and socially challenging component of modern economies. Information systems (IS) research could contribute to the effective development, application and use of information technologies to manage and coordinate health services. Healthcare also provides opportunities to develop or refine IS theory because of its unique institutional context. To profile IS research in health-related settings, we examine the publication of health information systems research (HISR) in 17 IS journals since 1985. Our analysis revealed a small but growing body of HISR literature. These publications are concentrated in “HISR-friendly journals” and employ a variety of strategies for balancing general IS theories and knowledge with attention to the institutional characteristics of healthcare. We consider the strengths and limitations of these strategies in advancing HISR within the IS field and for contributing to multidisciplinary HISR knowledge.

1. Introduction and motivation

The healthcare industry is one of the most critical components of modern economies. Healthcare spending accounts for a substantial portion of gross domestic

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product (GDP) in many countries (e.g., 14.1% of American GDP; 9.1% of Canadian GDP; average of 8% for 30 countries in the Organization for Economic Cooperation and Development\(^1\)). Balancing economic costs with quality of and access to healthcare services is a growing concern for healthcare professionals, consumers, government policy makers and business managers. Information technology (IT) applications for health care have the potential to improve cost-effectiveness, quality and accessibility of health care. Although IT use in health care has lagged behind other industries (US Congress, 1995; Menon, Lee, & Eldenburg, 2000), significant increases in IT spending in recent years have generated interest in its effects on the healthcare industry cost structure, healthcare quality and patient privacy (e.g., the US Health Insurance Portability and Privacy Act). IT has also opened up new possibilities for “e-health” through telemedicine and remote patient monitoring, with potential improvements in the cost-effectiveness and accessibility of healthcare.

Effective use and beneficial outcomes of IT applications in healthcare are not guaranteed, however. Healthcare applications are technically complex, and the software and hardware markets are considered to be less mature than the IT markets for other industries and for medical technologies. Leaders in the health care field recognize that in addition to technological challenges, high levels of resource commitment and leadership (Garabaldi, 1998), changes in institutional structures (Schriger, Baraff, Rogers, & Cretin, 1997), planned and unplanned changes to health care practices (Massaro, 1993), and attention to social issues (Anderson, Aydin, & Kaplan, 1995; Kaplan, 2001) must also be addressed if the potential benefits of IT in healthcare are to be realized. The health care industry thus poses important social challenges and intriguing research possibilities for researchers interested in the development and use information systems and technologies.

**Health information systems research (HISR)** is our term for the multidisciplinary body of knowledge related to the design, development, implementation and use of information-intensive technologies in healthcare settings. HISR is conducted in a number of academic disciplines and fields (see Fig. 1). The largest contributor to HISR is medical informatics, defined as “the scientific field that deals with biomedical information, data and knowledge—their storage, retrieval and optimal use for problem-solving and decision-making” (Shortliffe & Blois, 2001: p. 21). Medical informatics, itself a multidisciplinary field drawn from medical computer science, information science, and medicine, has focused largely on the design and testing of medical information technologies, such as biomedical devices and electronic patient records. Other contributions come from medicine (cf. Beall, Golladay, Greenfield, Hensinger, & Biermann, 2002; Zrebiec & Jacobson, 2001), the sociology of medicine (cf. Kaplan, 1995; Kaplan & Lundsgaarde, 1996), diffusion of medical technologies (cf. Kumar & Motwani, 1999), information systems (cf. Further reading), health promotion (cf. Bessell et al., 2002; Chiasson & Lovato, 1999; Cline & Haynes, 2001)

and information science (cf. Deibel & Greenes, 1995). A number of HISR topics have been examined in each of these fields, building the foundations for a multidisciplinary body of knowledge on practical and research issues.

In this paper, we examine the publication of HISR studies in information systems (IS) research journals. The IS field has a long-standing interest in the development and application of information technologies and in the economic, social, and organizational implications of information technology—issues of critical importance in healthcare. Myers and Baskerville (2002) suggested that the IS field has “a tremendous opportunity to take a more prominent, leading role within the larger community of scholars interested in the development, use, and impact of information technology and systems in broadly defined social and organizational settings” (p. 8), and they specifically mention this potential in medical fields. However, healthcare represents a markedly different social and technical context compared with many of the industries where IS research is conducted, and IS theory developed (e.g., manufacturing, transportation, financial services). To effectively diffuse IS theory\(^2\) to new social settings, requires systematic attention be given to variations in the social contexts in which theory is applied (Avgerou, 2001). Moreover, the shaping and reshaping of information technologies over time

\(^2\) We define IS theory broadly, as tightly or loosely defined concepts that speculate on social and technical relationships between IT, IS and social outcomes. Much IS theory originated in other disciplines and has been refined or applied to examine IT/IS issues. Examples, we would classify as “IS theory” include the technology acceptance model (TAM) and structuration theory and IT productivity models as applied to IS/IT phenomena.
and across social settings demands theoretical consideration (Orlikowski & Iacono, 2001). Healthcare provides important opportunities to “push the contextual envelope” of IS theory by confronting theoretical assumptions embedded in current IS theory that has been largely developed in other institutional settings and by developing contextually nuanced theory meaningful for multidisciplinary HISR. This reciprocal exchange would facilitate both the diffusion of IS theory into the HISR domain and also enrich IS theory development.

Are IS journals developing contributions from (and to) IS theory in health information systems research? In this paper, we examine HISR publications in IS journals to determine what type and how much HISR has been published in the IS literature and to assess how the interplay of IS theory and the healthcare context is dealt with in these publications. We first use Orlikowski and Iacono’s (2001) categories to characterize how HISR publications theorize the IT artifact and then assess authors’ strategies for applying and adapting IS theory in healthcare contexts. Our analysis reveals a small body of HISR literature (about 1.2% of IS publications), concentrated in journals with editorial policies favorable to contextually anchored studies. A relatively high percentage of these articles fall into Orlikowski and Iacono’s ensemble category, emphasizing the social and political context around IT and IS. A high percentage also address the influence of the healthcare setting on the meaning and applicability of IS theory in that context, using a variety of strategies. These strategies highlight theoretical challenges and opportunities to inform healthcare information systems use and development. They also illustrate opportunities to develop or test IS theories and to assess their applicability in varied social contexts.

In the next section, we describe the methods used to identify and analyze HISR in the IS literature. Section 3 highlights findings on the frequency of HISR publications in the IS literature, the distribution across journals, and the approaches to theorizing about the IT artifact and IS theory-healthcare context in HISR. Our discussion centers on how HISR publications in IS journals address the task of reconciling IS theory with the healthcare context and the opportunities for knowledge exchange that these strategies provide. We then consider various paths forward to facilitate the use and development of IS theory through HISR.

2. Study design and methods

Our empirical analysis focused on three questions about HISR in IS journals: (i) what and how much HISR has been published in IS journals; (ii) which journals publish HISR; and, (iii) how are research findings theorized within the healthcare context and within an IS theoretical framework. To answer these questions, we conducted a search of IS literature, from 1985 through mid-2003 journal issues. The 1985 starting time marked the beginning of electronic database indexes (such as ABI Inform) that catalogue business and IS journal articles when we began this project. We searched for HISR publications in three bibliographic databases (ABI
Inform, Ebsco Host/Business Source Premier, and Uncover3), using combinations of the following terms: physician, hospital, medical, healthcare (and health care), information system, and information technology. We selected articles appearing in 14 peer-reviewed journals that publish IS research (e.g., MIS Quarterly, Information Systems Research, and Database), as well as three (3) organizational journals that sometimes publish IS research (e.g., Organization Science, Organization Studies, and Human Relations). The scope of journals included in the search was primarily limited to those indexed in these electronic catalogues. However, some North American journals we categorized as international journals were not included in these catalogues. We selected papers published in these outlets that examined some aspect of information technology or system use in a health care context. We excluded short articles announcing or describing bio-medical technologies (commonly published in Communications of the ACM, for example) but otherwise erred towards the inclusion of descriptive pieces.

To answer the first question, we examined the absolute number and the relative percentages of HISR work published in these journals, using an estimate of the total number of articles in each journal across the time period.4 To answer the second question, we compared absolute and relative numbers of HISR publications among journals. Table 1 documents the results of these empirical analyses. For the third question, we conducted two content analyses to assess how authors approached theorizing the IT artifact and the healthcare context. We used Orlikowski and Iacono’s (2001) classifications of IT artifact theorizing to categorize each article, based on the abstract and by reviewing discussion and conclusion sections. We then compared our percentages in each category with Orlikowski and Iacono’s percentages from articles published in Information Systems Research. As a top-tier journal, ISR provides an indication of theorizing practices in the IS field. Table 2 summarizes these findings.

We also classified the articles using four categories to characterize the authors’ strategy for dealing theoretically with the healthcare setting: (i) IS only papers focus on defining new IS theory or testing and refining pre-existing IS theories; how the study’s healthcare context might influence theoretical constructs, assumptions, or analysis was not explored, (ii) IS-healthcare papers primarily focus on developing or testing IS theories, with some consideration of general or specific institutional issues in healthcare settings that influence study findings; (iii) healthcare-IS papers use theories or concepts, drawn from or applied in IS research, to inform the analysis of the empirical findings, but also to explore contextual influ-

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3 These online database are available through the libraries at the authors’ universities; public URLs cannot be supplied.

4 To arrive at an estimate of total number of articles published for each journal, we examined one issue from the 1985/1986 timeframe or the first year of publication, one from the most recent year included in the electronic references, and one from a mid-point in the 1985/1986–2003 timeframe or the journal’s publication history if publication began after 1985/1986. We averaged the number of research publications in the three issues to arrive at an average number of publications per issue for each journal. This estimate provided a sense of relative publication rates of HISR papers to all papers in each journal.
ences on IS/IT within the healthcare setting; and (iv) healthcare only papers primarily describe healthcare technologies, systems, or implementation projects, with little consideration of IS theory. We coded articles in the second or third categories if they included some consideration of both IS theory and the healthcare context. Table 3 summarizes these findings.

Before proceeding to discuss findings, we would like to acknowledge several limitations of our study. Relying on electronic indices limited our selection of journals to those indexed by common commercial systems. Thus, our profile of the litera-

**Table 1**

<table>
<thead>
<tr>
<th>Journal</th>
<th>Number of HISR articles</th>
<th>First year journal index</th>
<th>Issues per year</th>
<th>Total issues</th>
<th>Est. Avg. per Issue</th>
<th>Est. total articles</th>
<th>Est. % HISR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communications of the ACM</td>
<td>36</td>
<td>1985</td>
<td>12</td>
<td>216</td>
<td>31.7</td>
<td>6,847</td>
<td>0.5%</td>
</tr>
<tr>
<td>Database</td>
<td>5</td>
<td>1998</td>
<td>4</td>
<td>20</td>
<td>4.7</td>
<td>94</td>
<td>5.3%</td>
</tr>
<tr>
<td>Decision support systems</td>
<td>19</td>
<td>1985</td>
<td>4</td>
<td>72</td>
<td>7.5</td>
<td>540</td>
<td>3.5%</td>
</tr>
<tr>
<td>European Journal of IS</td>
<td>7</td>
<td>1993</td>
<td>4</td>
<td>40</td>
<td>7.3</td>
<td>292</td>
<td>2.4%</td>
</tr>
<tr>
<td>Human relations</td>
<td>2</td>
<td>1985</td>
<td>12</td>
<td>216</td>
<td>5.7</td>
<td>1,231</td>
<td>0.2%</td>
</tr>
<tr>
<td>Information and Management</td>
<td>17</td>
<td>1985</td>
<td>8</td>
<td>144</td>
<td>4.7</td>
<td>676</td>
<td>2.5%</td>
</tr>
<tr>
<td>Information and organization</td>
<td>7</td>
<td>1991</td>
<td>4</td>
<td>48</td>
<td>2.7</td>
<td>129</td>
<td>5.4%</td>
</tr>
<tr>
<td>Information systems research</td>
<td>2</td>
<td>1991</td>
<td>4</td>
<td>48</td>
<td>5</td>
<td>240</td>
<td>0.8%</td>
</tr>
<tr>
<td>Information Technology and People</td>
<td>12</td>
<td>1989</td>
<td>4</td>
<td>56</td>
<td>4.3</td>
<td>240</td>
<td>5.0%</td>
</tr>
<tr>
<td>International Journal of Information and Management</td>
<td>11</td>
<td>1993</td>
<td>4</td>
<td>40</td>
<td>6.3</td>
<td>252</td>
<td>4.4%</td>
</tr>
<tr>
<td>Journal of Management Information Systems</td>
<td>9</td>
<td>1985</td>
<td>4</td>
<td>72</td>
<td>8.3</td>
<td>597</td>
<td>1.5%</td>
</tr>
<tr>
<td>Journal of End User Computing</td>
<td>10</td>
<td>1993</td>
<td>4</td>
<td>40</td>
<td>5.3</td>
<td>212</td>
<td>4.7%</td>
</tr>
<tr>
<td>Journal of systems management</td>
<td>9</td>
<td>1985</td>
<td>12</td>
<td>216</td>
<td>4.3</td>
<td>928</td>
<td>1.0%</td>
</tr>
<tr>
<td>Management information systems quarterly</td>
<td>8</td>
<td>1985</td>
<td>4</td>
<td>72</td>
<td>6.7</td>
<td>482</td>
<td>1.7%</td>
</tr>
<tr>
<td>Organization Science</td>
<td>2</td>
<td>1993</td>
<td>4</td>
<td>40</td>
<td>5.7</td>
<td>228</td>
<td>0.9%</td>
</tr>
<tr>
<td>Organization Studies</td>
<td>3</td>
<td>1985</td>
<td>4</td>
<td>72</td>
<td>5.7</td>
<td>410</td>
<td>0.7%</td>
</tr>
<tr>
<td>The Information Society</td>
<td>6</td>
<td>1985</td>
<td>4</td>
<td>72</td>
<td>4</td>
<td>288</td>
<td>2.1%</td>
</tr>
<tr>
<td>Total</td>
<td>165</td>
<td>1,484</td>
<td>13,686</td>
<td>1.2%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2  
Theorizing about the IT Artifact in HISR from 1985–2003

<table>
<thead>
<tr>
<th>IT Artifact categorya</th>
<th>IT Artifact subcategory</th>
<th>HISR articles in this category</th>
<th>% of all HISR articles</th>
<th>% of all ISR articlesb</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tool view:</strong> engineered artifact, with social impact “built in”</td>
<td>Labor substitution: changes (usually reduction) in labor force composition</td>
<td>0</td>
<td>0.0%</td>
<td>0.5%</td>
</tr>
<tr>
<td></td>
<td>Productivity: Prosthetic devices that enhance labor efficiency and capability</td>
<td>13</td>
<td>7.3%</td>
<td>6.8%</td>
</tr>
<tr>
<td></td>
<td>Info processing: IT as information processors to enhance communication</td>
<td>20</td>
<td>12.1%</td>
<td>8.5%</td>
</tr>
<tr>
<td></td>
<td>Social relations: changing social relations, hierarchies, and social networks</td>
<td>13</td>
<td>8.5%</td>
<td>4.5%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>46</td>
<td>27.9%</td>
<td>19.8%</td>
</tr>
<tr>
<td><strong>Proxy view:</strong> key property that stands for essential properties of technology</td>
<td>Capital: investments, measured in dollars, as variable in other assessments such as productivity</td>
<td>2</td>
<td>1.2%</td>
<td>9.0%</td>
</tr>
<tr>
<td></td>
<td>Diffusion: assessments of the adoption of IT or the process of adoption</td>
<td>2</td>
<td>1.2%</td>
<td>4.5%</td>
</tr>
<tr>
<td></td>
<td>Perception: measures of users’ perceptions</td>
<td>10</td>
<td>6.1%</td>
<td>4.5%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>14</td>
<td>8.5%</td>
<td>18.0%</td>
</tr>
<tr>
<td><strong>Ensemble view:</strong> systems of social networks, groups, alliances, and “black boxes”</td>
<td>Development: Artifact in social formation</td>
<td>16</td>
<td>9.7%</td>
<td>4.0%</td>
</tr>
<tr>
<td></td>
<td>Production network: focus on supply-side networks that invent, build and diffuse technology</td>
<td>5</td>
<td>3.0%</td>
<td>1.1%</td>
</tr>
<tr>
<td></td>
<td>Embedded: enmeshed in a social network; neither an independent or dependent variable</td>
<td>17</td>
<td>10.3%</td>
<td>4.0%</td>
</tr>
</tbody>
</table>

(continued on next page)
<table>
<thead>
<tr>
<th>IT Artifact category&lt;sup&gt;a&lt;/sup&gt;</th>
<th>IT Artifact subcategory</th>
<th>HISR articles in this category</th>
<th>% of all HISR articles</th>
<th>% ISR articles in this category&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structure:</strong> like embedded, but examined through more macro and institutional structures</td>
<td>7</td>
<td>4.2%</td>
<td>3.4%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>27.2%</td>
<td>11.4%</td>
<td></td>
</tr>
<tr>
<td><strong>Computational view:</strong> computational power, and the capabilities of technology to represent, store, retrieve and manipulate information</td>
<td><strong>Algorithm:</strong> describes the computational systems in technology in extensive detail</td>
<td>16</td>
<td>9.7%</td>
<td>3.4%</td>
</tr>
<tr>
<td><strong>Model:</strong> represents social processes through graphical and structured notation; data modeling, simulation, etc.</td>
<td>12</td>
<td>7.3%</td>
<td>20.9%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>17.0%</td>
<td>24.3%</td>
<td></td>
</tr>
<tr>
<td><strong>Nominal view:</strong> references to IT in “name only” without substantive focus in the article</td>
<td>Total</td>
<td>32</td>
<td>19.4%</td>
<td>24.8%</td>
</tr>
</tbody>
</table>

<sup>a</sup> Categories used by Orlikowski and Iacono (2001); summary descriptions are the authors’ interpretations.

<sup>b</sup> These are percentages from Orlikowski and Iacono’s (2001) analysis (p. 128).
ture may more accurately reflect North American IS research than IS research in other regions. We also did not access two important outlets for HISR papers: book chapters in edited books and conference papers. These outlets will contain additional, relevant papers. However, given the timeframe of our study we expected a majority of these papers would have found their way into journals. Including organizational journals may have pulled down the average HISR publication rate slightly. However, we wished to be comprehensive in our collection of HISR by including journals that publish institutional and contextually anchored IS studies. Our content analysis and coding of the articles into Orlikowski and Iacono’s (2001) categories necessarily entailed subjective judgments that were sometimes equivocal; a number of articles could have fallen into more than one category. For example, Menon and Lee’s (2000) article in *Decision Support Systems* examines the capital investments in IT in the healthcare industry and its effect on productivity. While the authors examine the IT artifact from a capital perspective, we decided that the ultimate focus of the paper is on IT’s effect on healthcare productivity. Despite these limitations, we believe our profile of HISR publications in the IS literature provides sufficient evidence for our purposes.

### 3. Findings: HISR in IS journals

We identified 165 articles as HISR. Further reading lists all articles uncovered in our empirical analysis. In the following discussions, we note particular publications as examples of the classification schemes we used to analyze HISR literature. The total includes articles that were clearly research publications, whether they were predominantly descriptive cases or theoretically oriented analysis, detailed discussions of healthcare technologies or information systems, and opinion pieces with in-depth discussions about the possible applications of information technology in healthcare. Among these publications, we found clusters of articles from groups of co-authors pursuing HISR (e.g., R. Kohli, G. Forgionne, K. Kim, B. Lee, and

<table>
<thead>
<tr>
<th>Theory–context strategy</th>
<th>Count</th>
<th>% of all HISR articles</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>IS only</em>: authors primary attention is generalizable theory without consideration of interaction with the healthcare context</td>
<td>29</td>
<td>17.6%</td>
</tr>
<tr>
<td><em>IS-healthcare</em>: authors primary attention is generalizable theory with some consideration given to the interaction with the healthcare context</td>
<td>46</td>
<td>27.9%</td>
</tr>
<tr>
<td><em>Healthcare-IS</em>: authors examine phenomena in healthcare context, using theory to explain phenomena, possibly extending or building theory in this context</td>
<td>29</td>
<td>17.6%</td>
</tr>
<tr>
<td><em>Healthcare only</em>: authors primary attention is to describing IS or IT in healthcare context with little consideration of theory</td>
<td>61</td>
<td>36.9%</td>
</tr>
</tbody>
</table>
N. Menon). We also found several clusters of articles related to large-scale health information system events (e.g., nine articles addressed the implementation of an inter-organizational system with the National Health Service in Britain). A few special issues on health information systems and technologies drew together HISR publications (e.g., *Communications of the ACM*, August 1997 issue, and *Journal of End User Computing*, Vol. 13: 3–5). The relative number of HISR publications represents 1.2% of all publications in the 17 journals we examined.

Table 1 shows the estimated percentage of articles dedicated to HISR in each journal during the timeframe examined. About one third of these journals dedicated less than 1% of their publications to HISR, nearly a third dedicated over 4% to HISR, and the remainder published 2–3% HISR. Although *Communications of the ACM* had the highest absolute number of articles (36), it had one of the lowest percentages of HISR at 0.5%. *Decision Support Systems* had the second-highest absolute number (19), accounting for 3.5% of its overall publications and 11.5% of HISR papers. These journals are outlets for information systems, decision sciences, medical informatics, and other research fields, and some of the articles we identified as HISR publications could also apply to these research domains. *Information and Management* had the third highest absolute number of HISR publications (17 papers), accounting for 2.5% of its publications, and 10.3% of all the HISR papers identified. Of the two top-tier IS journals, *MIS Quarterly* published eight articles (1.7% of MISQ publications) and *Information Systems Research* published two articles (0.8% of ISR publications).

Some journals appear to be HISR-friendly: *Information Technology & People* (12 articles, 5.0% of IT&P publications, 8.0% of all HISR publications identified), *Information and Organization*\(^5\) (seven articles, 5.4% of I&O publications, 4.2% of all HISR publications), and *Database* (five articles, 5.3% of Database publications, 3% of all HISR articles). These findings are consistent with the editorial missions of these journals to publish “studies of new technologies and uses that have a special impact on organizational communications, change processes and work practices, and that reflect the varying societal and infrastructural conditions in which information technology is deployed” (IT&P) and to “publish original scholarly articles on the relationships between information technologies and social organizations” (Information and Organization). Organizational journals with editorial missions to publish research from a broad spectrum of organizational, institutional and societal settings have published few HISR papers. For example, *Organizational Studies* (three papers, 0.7% of its publications), with its mission to extend beyond management of business organizations and to promote interdisciplinary exchange, and *Organization Science* (two papers, 0.9% of its publications) which calls for research on ‘novel’ organizations, had relatively few HISR articles. These low percentages may indicate the limited space devoted to information technology research. This was true of *Human Relations*, which publishes many research articles about healthcare, but had only two information-systems related articles.

\(^5\) Formerly *Accounting, Management and Information Technologies*. 
Table 2 summarizes HISR publications according to Orlikowski and Iacono’s (2001) IT artifact categorizations of Information Systems Research publications. Compared to the publications in ISR, we found HISR authors were more likely to adopt a tool view (27.9% vs. 19.8%) or an ensemble view (27.2% vs. 11.4%) of the technology artifact. They were less likely to adopt the computational (17.0% vs. 24.3%) or proxy (8.5% vs. 18.0%) views, and somewhat less likely to adopt a nominal view of the IT artifact (19.4% vs. 24.8%).

Of the articles adopting a tool view of technology, 13 addressed IT’s effect on productivity specifically in the healthcare field. Menon and Lee’s (2000) article in Decision Support Systems formed hypotheses about healthcare productivity from IT investments. Their investigation of hospital accounting data and the introduction of diagnostic related groups (DRG, a form of cost accounting) and associated IT did show changes in cost containment post-DRG implementation, and suggested that IT was substituted for both medical labor and capital after implementation. This was due to the decentralization of computing and the increasing use of computers in medical diagnosis. Twenty articles examined the IT artifact from an information processing perspective, arguing that various technological infrastructures can support important information flows in healthcare. White and Gabler’s (1988) article in Information and Management examined the information processing capabilities of a hospital local area network, arguing that this technological infrastructure effectively supported both the decentralization and integration requirements of information within a healthcare organization. Thirteen articles were interested in the potential of information technology to alter social relations between stakeholders. Pedersen and Larsen’s (2001) article in Decision Support Systems focused on the potential changes in distributed knowledge management (social relations) brought about by the implementation of a decision support system (DSS). They showed how a product state model (PSM) applied to a patient medical history and treatment record, combined with a decision support system, resulted in substantial cost savings due to professionals’ sharing of information and knowledge.

In HISR publications, proxy views were notably lower than in ISR for capital (1.2% vs. 9.0%), somewhat lower for diffusion (1.2% vs. 4.5%), but slightly higher in perception (6.1% vs. 4.5%). Of the HISR articles utilizing a proxy view of information technology, two articles focused on IT as capital, ultimately examining its effect on productivity. One of the two HISR articles in ISR was an assessment of capital spending in healthcare, which also examined its effect on organizational productivity (Menon et al., 2000). Devaraj and Kohli’s (2000) article in the Journal of Management Information Systems used the healthcare management literature to incorporate control variables into their analysis of IT investment and business process reengineering, and their effect on performance (net patient revenue per day and per admission). Based on tailored theoretical models and lagged analysis they found that IT investment did lead to organizational profitability, and that BPR initiatives did lead to reduced mortality and increased patient satisfaction. Two HISR articles addressed diffusion. George, Nunamaker, and Valacich’s (1992) article examined the innovation process of an electronic meeting
system (EMS) in the Indian Health Service. Their paper contributed to an understanding of the organizational diffusion of EMS in a natural setting. Ten articles viewed the IT artifact through perception. For example, Henry and Stone’s (1994) article in the Information Resource Management Journal examined computer self-efficacy and outcome expectancy with hospital staff members using a computer-based medical information system. Their results confirmed that management support, ease-of-use, computer self-efficacy, and outcome expectancies had a positive influence on satisfaction.

Much HISR literature adopted an ensemble view of technology—more than double the percentage found in ISR publications. Ensemble views were higher across all categories, including development (9.7% vs. 4.0%), production network (3.0% vs. 1.1%), embedded (10.3% vs. 4.0%), and structure (4.2% vs. 3.4%). Sixteen articles focused on the social network around technology development. Legare and Dourouzou’s (1995) article in Information Technology & People examined the development of a specific network-based information technology called the Resource and Advice for Practitioners (RAP). Their findings indicated that social explanations of the healthcare context could explain why network-based information technologies reinforced the divisions between specialists in a mental health setting. Five HISR articles used the production network approach to theorizing. Bloomfield and McLean’s (2003) article in Information and Organization examined the information technology systems that have been used within the British National Health Service to transition mental health services and care into the community. Seventeen articles focused on the embedded nature of information systems. Beyon-Davies’s (1994) article in the International Journal of Information Management examined a global data modeling project with the UK National Health Service. He uncovered various technical–social myths about data modeling that restrict the group’s examination of informal IS. Seven articles focused on a particular macro and institutional approach called the structure approach. Davidson’s (2000) article in Information Technology & People used genre theory to examine work practices of medical personnel. She suggested that examining well-developed genres (rules and resources that people draw upon to make sense of their work) in the healthcare field could inform our understanding of genre theory in other contextual settings.

In HISR, computational views represented a lower percentage compared to ISR publications, because the model approach was much lower (7.3% vs. 20.9%), despite a higher level of algorithmic approaches to the IT artifact (9.7% vs. 3.4%). We found 16 articles that focus on the algorithm view of IT. Detmer and Shortliffe’s (1997) article in Communications of the ACM examined how a system prototype with specific algorithms, called MedWeaver, could promote the diffusion of medical knowledge among practitioners. These medical informatics researchers suggested that knowledge diffusion in medicine would be supported by cross-disciplinary work between medicine, information science, and computer science. Twelve HISR articles focused on the model view of IT. Darzentas and Spyrou’s (1993) article in the European Journal of Information Systems examined the soft systems methodology (SSM) for developing an information system for primary care.
SSM helped participants examine subsystem issues and develop a flexible interface shell to allow flexible information gathering within this complex environment.

Thirty-two HISR articles took a nominal view of information technology. For example, Kim and Michelman’s (1990) article in MIS Quarterly had a borderline interest in transaction processing systems. However, they predominantly focused on the strategic potential of information systems in the healthcare field, providing a cross-disciplinary lens of IS strategic approaches to healthcare. Similarly, Kaplan and Duchon (1988) discussed a healthcare systems development project, but the paper’s emphasis was to illustrate how qualitative and quantitative research methods could be used in a complementary fashion in IS research.

Particular journals published papers adopting certain approaches to the IT artifact. For example, 11 of the 12 Information Technology & People articles and five of the seven Information and Organization articles were classified in one of the ensemble categories, while 20 of the 36 Communications of the ACM articles were classified in the tool view. In Decision Support Systems, eight of the 16 HISR publications used algorithm approaches. Together, CACM and DSS accounted for two-thirds of the computational view HISR publications, reflecting the boundary role these journals play among IS, computer science, management and decision science and medical informatics. Information and Management showed the widest dispersion of approaches, including articles in ten of the 14 IT artifact categories. The highest absolute and relative number of nominal articles comes from the Journal of Systems Management with six of nine articles.

Table 3 summarizes our IS–healthcare coding of the HISR literature. Twenty-nine of the HISR articles (17.6%) fit the IS only category. In some of these articles, the authors simply mentioned that the study occurred in or was relevant to a healthcare setting. The primary goal in these articles was to develop or test an IS theory, independent of context. Mitchell and Zmud (1999), for example, examined the effect of tight/loose IT and work process fit and the nature of the innovation on project performance, focusing on general theoretical concepts in IS theory. There was only a brief note that the survey and interview participants were drawn from the healthcare industry. Thompson’s (2002) article in Information and Organization, although reporting on the development of a health information system, focused almost exclusively on the sociological and methodological implications of an interpretive action research project.

At the other extreme, 61 HISR articles (36.9%) focused on descriptive accounts of healthcare IS/IT phenomena, with little or no engagement of IS theory or concepts (healthcare only category). For example, Lincoln, Essin, and Ware’s article (1993) in The Information Society described the challenges in developing an electronic patient record system that meets healthcare’s coordination needs. While offering good descriptive detail, the article authors used little pre-existing IS topics or theories that might transform the discussion into something more general to IS design. Similarly and Palley (1991) described how three hospitals adjusted to the implementation of diagnostic related groupings (DRGs), a cost accounting concept used in healthcare, without engaging IS theory in his analysis. Descriptive or prescriptive accounts of
healthcare technologies were common in this category, with many published in *Communications of the ACM* \(^6\) (28 articles, 46\% of healthcare only category).

Nearly half of HISR articles explored the interplay between IS theory and the healthcare setting, either by considering how the healthcare context might influence application or interpretation of IS theory (*IS-healthcare* category, 27.9\%), or by applying and elaborating IS theory within an empirical study in healthcare (*healthcare-IS* category, 17.6\%). The use of healthcare-related terms in an article’s title highlighted the relative focus on IS theory in the *IS-healthcare* category vs. the focus on healthcare in *healthcare-IS* category: 26 of the 46 IS-theory-healthcare articles (56\%) did not use any healthcare terms in the title, whereas four of the 29 healthcare-IS articles (14\%) omitted a specific reference to healthcare in the title.

In the former category, Hu, Chau, Shen, and Tam’s (1999) article in the *Journal of Management Information Systems* used the technology acceptance model (TAM) to assess physician’s intention to adopt telemedicine. They discussed results that deviated from theoretical expectations by noting that physicians are professional practitioners, and therefore their attitudes and evaluations of technology may differ from traditional TAM subjects (e.g., college students in laboratory studies). Franz, Robey, and Koeblitz (1986) explained the lack of change in user attitudes about patient-care information system before and after its implementation. Focusing on the hospital setting and a specific project, they indicated that a lack of change in user attitudes was consistent with organizational and interaction (i.e., “contextual”) perspectives on IT implementation, rather than technological determined theories like IT-triggered social change.

Articles in the *healthcare-IS* category addressed the interaction of context and theory by applying IS theory to analyze issues in the healthcare context. In doing so these articles sometimes challenged taken-for-granted assumptions in IS theory, or developed bounded theories. Bloomfield, Coombs, Cooper and Rea (1992) in *Accounting, Management and Information Technology* examined the development of a resource management system in the National Health Service (NHS) of the UK, using Latour’s actor network theory (ANT) for theoretical guidance. ANT was employed to explore the political and social diversity of individual and group interpretations of the IT system, pointing to varying social constructions of technology within the complex institutional setting of healthcare. Sillince and Frost (1993) reconsidered the use of system development approaches, developed in other business settings, which are divorced from the political and contextual realities of healthcare. Through a detailed and theoretically organized portrayal of the difficulties in determining requirements in such a setting, they demonstrated how assumptions about IS development were challenged in the healthcare setting. These assumptions included the low status of administrators, the unimportance of strategic management, the importance of data protection of patient records, and government and political issues.

\(^6\) A-theoretic approaches are common in medical informatics evaluation studies as well (Kaplan, 2001).
Again, journals displayed different publication patterns. *Communications of the ACM* had the highest number of articles focusing on *healthcare only* (28 of the 36 *CACM* publications), as well as three articles in the *healthcare-IS* category. Six of the nine articles in the *Journal of Systems Management* fell into *healthcare only* and the other three into the *healthcare-IS* category. On the other hand, two top-tier IS journals (*MISQ*, *ISR*) have published only articles in the *IS-healthcare* or *IS-only* category. Several journals have published a wide variety of HISR papers, notably *Information Technology & People* (two *healthcare only*; three *healthcare-IS*; and seven *IS-healthcare*), *European Journal of Information Systems* (two *healthcare only*; two *healthcare-IS*; and three *IS-healthcare*), *Information and Management* (four *healthcare only*; four *healthcare-IS*; five *IS-healthcare*, and four *IS only*), and *Information and Organization* (three *healthcare-IS*; three *IS-healthcare*; and one *IS only*).

Our two categorizations of HISR publications intersect in several interesting ways, suggesting various niches of HISR publications exist in the IS literature. Table 4 shows the distribution of IT artifact categories over the four categories of IS theory/healthcare context theorizing. Most *tool views* of healthcare IS/IT fell into the *healthcare-only* category, in which authors did not attempt to bridge between healthcare-specific description and analysis and an IS knowledge base. *Computational views*, on the other hand, were nearly split between the *IS-only* category, in which authors typically were concerned with a generalized algorithm or model and only mentioned its applicability to healthcare, and the *healthcare-only* category, in which the authors were concerned with algorithms or models explicitly for healthcare application. These publications are, we believe, most akin to and overlapping with medical informatics research geared towards building and testing healthcare technologies; the majority of these publications appeared in *CACM* or *DSS*, journals that serve as outlets for medical informatics as well as IS research.

In journals that publish more social and organizational studies, there was much overlap between the *ensemble* views of the IT artifact and *IS-healthcare* and *healthcare-IS* theoretical approaches: 82% of *ensemble* publications fell into one of these categories; 54% of *IS-healthcare* publications and 41% of the *healthcare-IS* publications took the *ensemble* view. This intersection is not surprising, given the socially embedded nature of ensemble views. These publications, which explored social, organizational, and developmental issues with healthcare IS/IT while attempting

| Tool views | 4  | 5  | 6  | 31 |
| Proxy views | 2  | 6  | 6  | 0  |
| Ensemble views | 3  | 25 | 12 | 5  |
| Computational view | 14 | 2  | 1  | 11 |
| Nominal views | 6  | 8  | 4  | 14 |

**Table 4**

<table>
<thead>
<tr>
<th>Strategies for balancing theory generalizability and relevance to healthcare</th>
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<tr>
<td>IS-only</td>
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<tr>
<td>Tool views</td>
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<td>Proxy views</td>
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<tr>
<td>Ensemble views</td>
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<td>Computational view</td>
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<td>Nominal views</td>
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to link healthcare-specific issues to general IS knowledge, appeared in a wide variety of IS journals.

Finally, we noted an upward trend in the absolute number of HISR publications in IS journals over time (see Table 5), reflecting both the general increase in the number of IS journal outlets and the amount of IS research published as well as a relative increase in the amount of HISR publications. Notably, from the earliest time period we examined (1985–1989) to the most recent (2002–2003), HISR publications increased from about 0.5% to approximately 1.7% of all IS publications. This represents an increase from an average of three HISR papers published in IS research outlets per year to an average of 15 per year—an impressive rate of growth within the HISR literature. However, in absolute terms, this is an average of less than one HISR publication per journal per year.

4. Discussion

Our analysis of HISR publications in the IS literature revealed a small but growing body of literature that explores a range of theoretical approaches to the diffusion and development of IS theory in healthcare settings. Our analysis also highlighted the central role that context plays in studies of healthcare information systems and technologies. Compared with Orlikowski and Iacono’s sample of research from *ISR*, the percentage of *ensemble* representations of the IT artifact in HISR publications was more than double what they found. Moreover, nearly 83% of HISR publications gave at least moderate attention to healthcare influences on theory or on how IS/IT is shaped by the healthcare setting. The relatively small percentage of *IS-only* studies suggests that the healthcare industry is motivated and organized differently enough from typical industrial settings of IS research that theoretical assumptions need to be examined in this context. The concentration of HISR publications in journals with editorial policies favorable to contextually anchored research and to research conducted in industries not traditionally examined in IS research (e.g., health care, education, government) provides further evidence of the interweaving of research attention to both healthcare and IS in HISR publications.

A number of IS scholars have commented on the importance of social context in formulating and testing IS theory (cf. Avgerou, 2001; Lee, 1994; Ngwenyama & Lee, 1997; Porra, 1999). Studies have typically focused on the organizational subsystem

<table>
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<tr>
<th>Time period</th>
<th>HISR pubs</th>
<th>Est. % total IS pubs</th>
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<tbody>
<tr>
<td>1985–1989</td>
<td>13</td>
<td>0.5%</td>
</tr>
<tr>
<td>1990–1993</td>
<td>25</td>
<td>0.8%</td>
</tr>
<tr>
<td>1994–1997</td>
<td>39</td>
<td>1.2%</td>
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<tr>
<td>1998–2001</td>
<td>60</td>
<td>1.8%</td>
</tr>
<tr>
<td>2002–2003</td>
<td>28</td>
<td>1.7%</td>
</tr>
</tbody>
</table>

* Count omits some 2003 issues of some journals published after the analysis was completed.
or organizational level of analysis (Avgerou, 2000; Brown, 1999; Brown 
& Magill, 1998; Ciborra & Lanzara, 1989; Davies, 1991; Gopal & Prasad, 2000; Hayes 
& Walsham, 2001; Orlikowski, 1993; Porra, 1999). Recently, IS research attention 
has been directed at the national level or at organizations operating within a 
national context, to examine socio-economic, governmental and cultural influences 
on IT/IS (cf. Avergou, 2001; Barrett, Sahay, & Walsham, 2001; Kumar, Van Dissel, 
& Bielli, 1998). However, with a few exceptions (cf. Barrett & Walsham, 1999; 
Crowston, Sawyer, & Wigand, 2001) little attention has yet been given to the 
interaction of IS/IT and industry structure (Crowston and Myers, in press).

Industry characteristics and institutional structures of the healthcare organiza-
tional field (Scott, Ruef, Mendel, & Caronna, 2000) differ markedly from industries 
typically studied in IS research (e.g., manufacturing, airlines, financial institutions 
as well as services, information technology) and appear to be particularly significant in 
IS/IT research in healthcare. The healthcare industry is both highly institutiona-
ized, in terms of professional roles and regulatory oversight, and operationally and 
technically complex (Scott, 1987). Unlike top-down hierarchical control structures 
found in many industries, the healthcare field has a dual administrative structure of 
medical personnel and administration. Lee and Pow (1996), Kaplan (1994) and 
Anderson (1997) illustrated how these institutional structures increase the complexity 
of developing and implementing information systems among medical professionals. 
Furthermore, healthcare is a complex mixture of for-profit and not-for-profit 
motives, and government, private not-for-profit, and private for-profit enterprises, 
with national differences due to regulatory and market structures. Healthcare “out-
puts” include not only measures of costs, profitability and a service sector focus on 
customer satisfaction and choice, but also societal values such as quality-of-life, the 
absence of disease, and public health (Bodenheimer, 1999). Communicable disease 
outbreaks such as HIV and SARS demonstrate the complex causes and economics of 
human health, and health organizations’ roles in its maintenance and improvement.

We suggest that in HISR studies, institutional and structural differences between 
healthcare and the commercial, for-profit industries that have traditionally been 
the subject of IS research bring to the foreground a number of tacit assumptions 
that underlie IS theory. When venturing into the relatively foreign setting of 
healthcare, pre-existing IS research topics, constructs, and theories need to be 
reshaped to deal with these institutionally unique issues. For example, consider the 
difficulties a researcher might encounter fitting healthcare actors such as patients 
and physicians and healthcare IT/IS phenomena such as telemedicine into typical 
IS theoretical categories. Is telemedicine a type of virtual groupware, a knowledge 
system, a communication medium, or something else? Are physicians managers, 
knowledge workers, users or a combination of these? Are patients merely con-
sumers of health services? And if so, is their role in a tele-health consultation simi-
lar to an e-retail customer? A researcher would need to move beyond general IS 
theories of user resistance, measures of user satisfaction, and critical theoretical 
views of management hegemony during technology implementation in order to 
explore fully this healthcare IS/IT phenomenon. The theoretical concepts would 
need to account for agency and regulatory relationships among physicians, hospi-
tals and insurers (whether government or private). These concepts would also need to account for the complex and varied nature of medical knowledge and practice patterns among specialist physicians, and the institutional roles of professional groups (physicians, nurses, pharmacists, etc.).

If the researcher’s goal is to develop general IS theory applicable in many settings, research in healthcare poses significant challenges and opportunities for theory development and testing. The theory must be sufficiently abstract to rise above the specific influences of the healthcare context, or contextual influences must be conceptualized at an abstract level applicable beyond the healthcare context. Some social scientists have questioned whether general theory is possible or desirable (Collins, 1998; Flyvbjerg, 2001; Giddens, 1984). We would refocus this either-or argument by suggesting that various tradeoffs points between general IS theory and practical relevance to any one context are possible and perhaps unavoidable. Our analysis of HISR publications highlighted several strategies researchers have used to balance attention to the contextual specificity of healthcare and theoretical generalization of IS knowledge. Each approach involves tradeoffs between the two and presents different opportunities for knowledge sharing and development between IS and healthcare domains. To illustrate these strategies, we examine examples in each of the IS-healthcare categories described in Table 3.

4.1. **IS-only approaches to HISR**

Table 4 suggests that, although HISR publications in this category spanned IT-artifact theorizing categories, nearly half of these publications adopted a computational view of the IT artifact. We noted earlier these publications represent a niche of HISR that overlaps decision sciences, medical informatics, and information systems. Here, we will focus on a study representative of IS research that examines social and organizational issues in IS/IT. The study adopted a tool view of the IT artifact (social relations) to develop an IS research interest (IT influence on group process) while treating the healthcare setting (a hospital) generically as organizational context (IS-only approach).

Dennis and Garfield (2003) used adaptive structuration theory to investigate whether a group support system (GSS) contributed to participative processes and outcomes. Project teams composed of administrative nursing staff members were charged with improving customer service at a hospital. Those teams that used a GSS exhibited more participative, democratic processes and identified programs directed at their own concerns rather than management’s unstated agenda (p. 289). This study illustrates how a healthcare setting can be generalized to serve the needs of IS theory development. By choosing an organizational process found in many organizations, i.e., task force meetings to develop quality improvement plans, the authors were able to focus on some aspects of context (the series of organizational meetings) and to disregard specific influences of the healthcare setting on outcomes. The authors acknowledged limitations posed by the organizational context, noting that “the organizational culture of this hospital might have set the stage for our findings. Would we find these same results had we studied a flatter organiza-
tion (i.e., an Internet start-up?)” (p. 315). Thus, the hospital’s social structure is treated abstractly in terms of hierarchy (flat or tall) and serves only as a possible limitation to study findings.

Though successful as an IS research strategy, this approach involves potential tradeoffs in relevancy for healthcare. Treating the hospital as a generic organization and abstracting its structural features ignores specific structural issues characteristic of hospitals, i.e., the dual clinical/administrative structure and professional role distinctions between nurses and physicians. For example, the authors reported that the nursing-focused proposals produced by the GSS teams were actually implemented, in contrast to the physician-focused proposals of the non-GSS teams, implying that the participative GSS process increased the likelihood of program implementation. A healthcare audience might question whether this outcome was due to the participative GSS process, or whether physicians simply resisted initiatives directed at them by the nursing staff. Moreover, healthcare professionals might have reservations about whether the results of a study conducted among predominantly female teams of nursing managers to address customer satisfaction issues would similarly apply to team processes that are unique to healthcare, i.e., multidisciplinary teams of physicians, nurses, and other clinical professionals, who work together to develop clinical care guidelines. In such teams, professional norms and distinctions would interact with GSS appropriation processes to influence process and outcomes.

Although the IS-only strategy does not “push the contextual envelope” to engage the healthcare context, as we are advocating, it does provide some opportunities for developing HISR within the IS field and for diffusing IS research to healthcare. Generalizing the healthcare setting makes healthcare organizations more viable settings for empirical field studies aimed at a general IS research audience. Moreover, the findings may have legitimacy with a healthcare audience simply because healthcare professionals participated. If so, such studies may facilitate diffusion of IS knowledge into healthcare. Perhaps most important, the research contacts established between the healthcare organization and IS researchers may facilitate future studies that would examine IS/IT phenomena of specific interest to healthcare.

4.2. IS-healthcare approaches to HISR

HISR publications in the IS-healthcare category also employed a variety of artifact categories to theorize about the IS/IT phenomena. However, over half utilize one of the ensemble approaches, suggesting that the complex social organization of healthcare is deeply implicated in the development and deployment of IS/IT. Nevertheless, these publications pursued a general IS research topic using the healthcare setting opportunistically to pursue theory development or testing. Menon et al.’s (2000) ISR publication provides an interesting example. The paper’s stated purpose is to further theoretical understanding of the productivity paradox, using the healthcare context as a convenient place to address this IS theoretical concern. By examining productivity in hospital settings, using data on capital expenditures not readily available in other industries (i.e., capital as proxy for IT), the authors
claimed that the healthcare setting allowed a level of economic analysis not possible in other industries. Thus, the IS research goal of developing economic theories to explain the relationship between IT and productivity was advanced by stepping into the healthcare industry. The study’s conclusion that there is a positive relationship between IT spending and productivity is relevant to hospital administrators and healthcare planners, however, the author’s emphasis on general questions of IT spending and productivity, with only modest attention given to their potential contributions to understanding IT investments in healthcare specifically, may limit relevance of the study among a healthcare audience.

Overall, the IS-healthcare strategy presents a more balanced stance between contextual specificity and general IS theory development, testing and refinement than the IS only approach. Our classification of publications in these outlets suggests this strategy may be the most viable route to publication in top-tier IS journals such as MISQ and ISR (i.e., low HISR publication rates, with eight of 10 in this category). The extent to which authors engage healthcare issues in theory, analysis and discussion, rather than describing the healthcare setting only to acknowledge boundaries and limitations to generalizability, will determine how relevant these HISR publications are for healthcare audiences.

4.3. Healthcare-IS approaches to HISR

In healthcare-IS studies, researchers explicitly take into account unique aspects of healthcare in order to develop, test or extend theory or to blend IS and healthcare topics. All five major categories of IT artifact theorizing were utilized in this category of HISR, although ensemble approaches were most common. To illustrate this strategy more fully, we consider the study of a physician profiling system—an IS/IT specific to healthcare—which used a tool view of the IT artifact to examine changes in social relations. The authors’ attention to institutional structures of healthcare in their analysis highlighted the study’s relevance for healthcare and refined IS knowledge through the application of a general IS topic (CRM technology) in this organizational field (a healthcare-IS strategy). This study also illustrates the lengths to which researchers must go to pursue this strategy.

Kohli et al. (2001) argue that customer relationship management (CRM) concepts are applicable to nontraditional customer–supplier relationships in their case study of a hospital’s development of a physician profiling system. The authors nonetheless note, “the relationship of hospitals with physicians, insurance companies, and patients’ employers is unique and does not fit the traditional customer–supplier model. Although patients are the end-customers of hospitals, the physicians who admit their patients to the hospitals are also valuable co-customers” (p. 171).

To help fit CRM concepts, with roots in the financial services industry, with these nontraditional relationships, the authors generically defined CRM as “a process through which a seller or service provider manages customer expectations to ensure a long-term relationship and ongoing alignment with dynamic customer needs” (p. 172), and argued that providing physicians with physician profile reports on the quality and cost of their clinical decision-making is a type of CRM-initiative. The
authors then described at some length the context of physicians’ decision-making autonomy vis-à-vis hospital administration and the cost pressures hospitals and physicians together face, to explain institutional pressures for physician profiling. A glossary is provided to explain relevant, specialized healthcare terminology. The case study of a hospital’s implementation of a physician profiling system provided some evidence to substantiate the authors’ theoretical perspective that “a well-designed physician profiling system developed in collaboration with physicians can establish long-term relationships and also improve hospital cost outcomes” (p. 175). Interestingly, the beneficial outcomes for the hospital—reduced consumption of services on a per-patient basis (since US hospitals often receive a fixed reimbursement)—are markedly different from what financial service firms using a CRM system would consider beneficial (i.e., increased consumption of services per client). The authors’ finding of increased loyalty among physicians to the hospital, however, was ambiguous: fewer physicians admitted more patients during the period examined (p. 182).

Publications using the healthcare-IS strategy provide an important bridge between IS and healthcare knowledge domains and represent perhaps the most promising opportunities to “push the contextual envelope” of IS research. By applying IS concepts developed in commercial industries in healthcare settings, and adjusting those concepts to reflect healthcare topics, issues, and institutional structures, such studies demonstrate the relevance and meaning of IS research for healthcare. By engaging IS theory and concepts in HISR studies, researchers also extend current IS knowledge through testing and refinement in a new industrial setting. Because the healthcare industry is markedly different from industries traditionally examined by IS researchers, new constructs, new relationships, and new insights may also emerge. For example, we were struck by Wastell and Newman’s (1990) study of an emergency response dispatching system. The researchers were able to measure psycho-physiological responses to the new system to assess stress levels related to the IT use. We could imagine that monitoring blood pressure among emergency response personnel would seem quite routine and acceptable, whereas a similar study outside a healthcare setting would appear rather odd and be difficult to implement.

4.4. Healthcare only strategies

Studies in this category do not engage IS theory or explicitly consider how the healthcare IS/IT topic might relate to more general IS research concerns. Nonetheless, these studies play a role in fostering knowledge exchange between the IS and healthcare fields. Similar to the IS-only category, a number of these publications adopt a computational view of the IT artifact, tailored specifically to healthcare, and border on or overlap with medical informatics research. A number of publications adopt a tool view, describing healthcare IS/IT and their application. Ensemble approaches describe large-scale IS projects involving a range of healthcare actors (government, physicians, insurers, etc.). For the IS audience, publication of these descriptive studies of healthcare technologies, information systems, and pro-
jects serves an informational role, highlighting advances in healthcare IS/IT and introducing topics and context-specific information of importance in healthcare to the IS research audience. *Healthcare only* studies bring IS researchers into healthcare organizations, providing opportunities to develop research relationships that may lead to more theoretically oriented research. Though descriptive studies do not introduce healthcare audiences to IS theory, the relevance of these articles to that audience may attract readers to the IS literature generally.

A tradeoff for IS researchers adopting the healthcare-only approach to HISR is exclusion from top-tier IS journals, which typically require a strong theoretical basis that advances IS knowledge and is of interest to the general IS readership (i.e., not just to healthcare). There are “HISR-friendly” IS journals that publish some *healthcare-only* papers. However, over half of these papers were published in *CACM* or *DSS*, suggesting this approach to HISR is most effective for researchers whose interests align with medical informatics research.

### 4.5. Pushing the contextual envelope to build multidisciplinary HISR knowledge

Our analysis suggests that HISR requires a balance between generalized and specialized theory, a stance recommended by philosophers of science (Collins, 1998; Flyvbjerg, 2001; Giddens, 1984; Latour, 1987). Because the technical and institutional environments of firms traditionally addressed in IS research differ substantially from healthcare, industry-specific research issues may not have been encountered or may have gone unnoticed in IS research. The hidden assumptions in an IS theory could be rendered visible in the healthcare context, thus pushing IS researchers to modify theory to be both more specific to this setting, but also more general in order to encompass healthcare. The result of balancing the use of general IS theory with a consideration of the healthcare context is more bounded theories that would balance the problem of induction (i.e., the generalization is too far removed) against the problem of detail (i.e., theory is too narrow in its contextual coverage) (Lee & Baskerville, 2003). Multilevel theoretical consideration allows researchers to explore the diversity and homogeneity of IS activity at various levels—always aware that human agency may not be unique, and generalized human activity may not be so general. This type of bounded, institutional theorizing has been recommended but not yet received much attention in the IS field (Orlikowski & Barley, 2001; Orlikowski & Iacono, 2001).

In Giddens’ view, the social sciences are reinvigorated with a task to explore the diversity and similarity of human activity and meaning across various social contexts (Giddens, 1984). For IS research, this could mean moving beyond historical alliances with commercial industries into less familiar institutional contexts such as healthcare. Information technology applications and uses have become pervasive in most sectors of social and economic life. An expansion in the locations of IS research may help IS researchers find the many new constituents of IS research that have emerged since the IS field’s founding in the 1960s and 1970s (Markus, 1999). Healthcare is one potential constituent field that has become increasingly interested in business management practices (Scott et al., 2000). There is some evi-
dence that the IS field is responding to this opportunity. We have seen, for example, IS conference mini-tracks dedicated to healthcare topics in recent years, indicating a growing interest and awareness of healthcare information systems among IS researchers and Table 5 illustrates a small upward trend in HISR publications in recent years.

When venturing into unknown terrain, guides and companions are essential. As IS researchers pursue HISR studies, seeking opportunities to collaborate with researchers in other fields, particularly those in medical informatics, will be an important strategy. Our analysis suggests that certain niches within HISR are already shared by IS, medical informatics and decision science researchers. These include some of the tool and the computational approaches to HISR research. IS researchers interested in social and organizational HISR issues may find collaborators among medical informatics researchers in various medical informatics associations, who are interested in the people, organizational, social and human issues related to healthcare IS/IT and are drawn from fields such as sociology, the history of science, and so on. Given historical and institutional differences in these two disciplines alone, opportunities and barriers to the further development of a reciprocal dialogue may exist. IS research historically has been rooted in studies of commercial industries, where the earliest applications of IS occurred. Medical informatics took root as an academic department primarily in schools of medicine with established ties to computer science departments (housed in colleges of arts and sciences) but not with business school information systems departments. However, we are optimistic that through the boundary spanning activities of researchers operating across these fields, collaborative efforts will develop.

5. Conclusions and recommendations

Healthcare is a critical social and economic component of modern economies. Increasingly, information systems and technologies are expected to play a role in cost-effective delivery of healthcare services. In this paper, we focused on developments within the information systems field to the multidisciplinary body of HISR. We argued that healthcare poses significant challenges to IS theory, but, by taking on these challenges, HISR researchers can contribute to this multidisciplinary field as well as expand the body of IS knowledge. We do not underestimate the dif-

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7 For example, the Americas Conference on Information Systems (AMCIS), Hawaii International Conference on System Sciences (HICSS), European Conference on Information Systems (ECIS), and International Federation for Information Processing Working group on IT and Organizations (IFIP 8.2).

8 Thanks to a reviewer for directing us to these groups in the medical informatics community.

9 A thorough examination of the genesis of medical informatics is beyond the scope of this paper. See Shortliffe and Perreault (2001) for a historical discussion of the field’s growth and alliances.

10 Recently, some IS departments have begun to include medical informatics faculty or to develop closer ties. Thanks to our anonymous reviewer for pointing this out to us.
ficulty of this project. IS theory is remote to most practitioners and researchers in healthcare fields, and the healthcare context is foreign to many IS researchers. Developing contextually sensitive HISR within the IS field is one way to build theoretical bridges and develop common conceptual languages that would facilitate knowledge exchange. A critical mass of IS researchers interested in and pursuing HISR studies exists; signs of growth are evident in HISR publication rates and in activity at the conference level. If this nascent interest is to take hold within the IS field, research reported in conferences and edited books must find a path into IS journals for HISR to be recognized as a legitimate specialization within IS. IS journals are publishing an average of one HISR article per year, and top-tier IS journals like MISQ and ISR have even lower rates. We have no absolute measure for what the “right” level of HISR publication might be, but the current rate appears to us to be low, given the need for IS knowledge in HISR, and the opportunities for healthcare to inform IS theory. We are not implying that IS researchers should publish all their healthcare related research in IS journals. We only suggest that HISR publication in IS journals be a viable option, and that these publications can stimulate dialogue and exchange with healthcare researchers. We are encouraged to find some IS journals that are “HISR-friendly” and hope this trend will extend to other IS journals.

To foster knowledge sharing among HISR researchers from these various fields, other steps will also be needed. Myers and Baskerville (2002) outlined strategies that IS researchers might take to encourage use of IS theoretical developments in other disciplines and fields; notably for HISR, they recommended publication of IS research in medical and medical informatics journals and inclusion of IS journals in electronic databases such as Medline. While we agree that IS research can and should be diffused into healthcare research, there are substantial practical and institutional barriers to diffusing IS research directly into medical and medical informatics journals, including tenure and promotion considerations for IS faculty, and editorial resistance to publications that are not legitimized by partnerships with medical researchers or that fail to follow normative research designs modeled on experimental clinical trials (Kaplan, 2001).

We are also concerned that the approach outlined by Myers and Baskerville could imply a one-way transfer or diffusion of IS theory into HISR. We would qualify their recommendation for database indexing of IS journals by noting that mainstream IS research, conducted in commercial industries, does not translate easily or directly into the language and concerns of medical researchers; high quality HISR publications in IS journals, particularly those adopting healthcare-IS strategies for balancing contextual specificity and general IS theory, may be better positioned to initially attract their attention and interest in indexing databases. Special journal issues with a healthcare focus have been effective forums to attract HISR research. Expanding the reach of calls for papers of these special issues to other disciplines, and an open review process that acknowledges field differences in methodological approaches, theoretical focus and interests, and other research norms, would encourage growth of HISR across fields and facilitate knowledge exchange.
Although our literature review and analysis focused on IS research, our comments may be helpful to other fields that contribute to HISR. Pushing the contextual envelope of one’s disciplinary field to participate in an unfamiliar, multidisciplinary research area presents many theoretical and practical challenges. We highlighted several strategies for balancing general IS theory and context specificity and identified niche opportunities for possible collaboration across research fields. We hope this paper will initiate a dialogue within the IS field about the value of HISR and will stimulate interchange between HISR researchers in the IS field, in medical informatics, and other disciplines to continue to build this multidisciplinary body of knowledge.

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References


Further reading

**HISR references/IS journal publications examined**


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