

## Book Reviews

**Process-Aware Information Systems: Bridging People and Software Through Process Technology.** Edited by Marlon Dumas, Wil van der Aalst, and Arthur H.M. ter Hofstede. Hoboken, NJ: Wiley. 409 pp. \$99.95. (ISBN: 10 0-471-66306-9)

Process-Aware Information Systems (PAISs) are among today's hottest topics in the science and practice of information systems. Business processes, workflow management systems, groupware, project management products, enterprise application integration, and business-to-business integration attract a lot of attention from R&D professionals in information systems, management sciences, software engineering, and business-oriented computer science. The book provides an integrated introduction to these areas that have evolved somewhat independently of one another in an overarching framework. Unlike other titles in this area, the book focuses on technological aspects rather than managerial or strategic aspects, presenting a set of common underlying principles to effectively model, design, and implement process-aware information systems.

As stated in the Preface, the purpose of the book is to "provide a unifying and comprehensive overview of the technological underpinnings of the emerging field of process-aware information systems engineering." It is apparently a formidable task. Despite that the book is not exhaustive in terms of coverage of specific techniques, the editors are successful in establishing a broad framework and systematically organizing intelligent works that span the technological spectrum of PAISs, including major concepts, modeling languages, techniques, standards, and tools.

Graduate and advanced undergraduate students, teachers, and researchers in computer science and information systems will find the book an excellent textbook for a topic-oriented course. There are 15 chapters in the book, which can be conveniently covered in a typical university semester. Each chapter begins with a short, general description of the problem domain and then progresses to relevant concepts and specific techniques. I especially like the numerous examples and illustrations that clarify and simplify complex topics. At the end of each chapter, there are thought-provoking exercises ranging from simple questions to projects and possible assignment subjects. This is very useful for classroom settings.

Practitioners working on workflow and business process management, groupware and teamwork, enterprise application integration, and/or business-to-business integration projects will find the book a valuable reference book as well. Each chapter is self-contained and directly accessible, and the book, on a whole, represents different technical aspects of PAISs in a logically coherent way. Besides, the placement of references at the end of each chapter instead of in a long exhaustive list at the end of the book is extremely valuable to those who want to learn about a particular subtopic or get a quick reference.

Also worth mentioning is an up-to-date reading and resource list in the Appendix. It consists of extra suggested readings (complementary to those at the end of each chapter) and URL pointers to relevant portals, standardization bodies, initiatives, and consortia. Brief descriptions and comments are presented for each resource, directing users to further information regarding various aspects of PAISs.

The first four chapters form a conceptual basis for understanding of process-aware information systems and a general framework to

organize the whole book. It not only discusses major concepts such as process, information systems, and PAIS, but also provides an overview of languages, techniques, and standards at a broad level. After illustrating some of the ongoing trends in information systems as a context of the emergence of an increasing number of PAISs, Chapter 1 then proceeds to an excellent discussion of the definition of a PAIS and different dimensions to classify PAISs. It is according to one of the classification schemes, "according to the nature of the participants" (i.e., P2A, P2P, A2A), that the following three chapters are organized.

Chapter 2 gives a survey of P2A processes as embodied in WFMSs, in which workflow management is introduced as a generic concept. However, concrete commercial workflow management systems are not presented and hence, there are no proof-of-concept systems to exemplify the terminology, models, or functions of WFMSs. Chapter 3 explains and characterizes relatively more human-centric P2P processes and systems to support collective group interactions. Chapter 4, on the other hand, introduces more system-centric A2A processes with an innovative view that EAI and B2B integration are really two sides of the same coin, i.e., both are relevant and require each others' cooperation to integrate application systems and businesses. Although only the basic concepts and approaches are introduced, references to comprehensive, technical, and historical discussions are provided for further study.

Chapters 5 through 8 are dedicated to process modeling languages. Chapter 5 demonstrates clearly how UML, a visual and object-oriented modeling standard, though primarily designed for modeling software systems, can be applied to business process modeling. Activity, class, object, sequence, and structure diagrams in UML are examined to describe five major perspectives of process models. Another widely used standard, eEPC, together with its supportive platform, ARIS, are introduced in Chapter 6. A concise section, "How to Correctly Model EPCs" adds particular value to its usefulness in practice, which consists of straightforward rules to avoid common pitfalls and easy-to-follow guidelines to model EPCs. Chapter 7 delivers an effective description of Petri nets from multiperspectives: as a visual tool, as a formal language, and as mathematical structures. Both elementary and high-level Petri nets are analyzed with an eye on modeling single processes, multiple processes, and resources.

Chapter 8 closes this part with a more abstract discussion of patterns that can be used to evaluate and adapt modeling languages. Twenty control-flow patterns ranging from very simple patterns such as sequential routing to complex patterns involving complex synchronizations such as discriminator patterns are presented and grouped into six categories. However, these categories are empirical and no explicit criteria to classify patterns are presented.

Part III, "Techniques," includes three chapters: process design and redesign (Chapter 9), process mining (Chapter 10), and transactional business processes (Chapter 11). One of the strengths of Chapter 9 is that it delves into two concrete process redesign methods that can be exploited according to different redesign goals. One is based on heuristic redesign best practices; the other exploits an information processing perspective on business processes. Chapter 10 presents an overview of process mining with event logs, followed by an in-depth discussion of a specific algorithm: the  $\alpha$ -algorithm. Some possible solutions are proposed to solve the problems while using the  $\alpha$ -algorithm. In Chapter 11, an old technique, transaction management, is investigated in the context of modern processing languages. Atomicity, from the most widely used ACID transaction model, is identified as the transactional property

most applicable in the area of workflow and business process management. Six system development platforms and standardization initiatives are examined in terms of their support to the concept of "atomicity."

Chapters 12 through 15, composing the last part of the book, represent effective efforts to apply the concepts, modeling approaches, and techniques in practice. I find it helpful to have some knowledge of XML and XML schema while going through the XPDL (Chapter 12) and BPEL (Chapter 13) examples and exercises in this section. Chapter 12 briefly introduces five standardization groups that endeavor to improve process integration. A process description language, XPDL and an interoperability protocol Wf-XML, both developed by WfMC, are then presented in detail. Chapter 13 introduces a useful standard BPEL that aims to develop PAISs in a highly distributed, heterogeneous, and networked environment. The book ends with two PAIS development tools: Staffware and FLOWer. Both contain effective toolsets for production process management, although the FLOWer case-handling approach also aims for flexibly structured processes based on an information-driven approach.

Overall, the book paints a rather thorough picture of process-aware information systems. It provides an integrated introduction to many relevant topics with a strong emphasis on techniques necessary for development and implementation of PAISs. The book will become an inspiring textbook and a valuable source of reference for R&D professionals and practitioners active in the fascinating interdisciplinary area of PAIS.

**Hongyan Ma**

*Department of Information Studies  
University of California, Los Angeles  
Los Angeles, CA 90095-1520  
E-mail: hym@ucla.edu*

Published online 9 November 2006 in Wiley InterScience  
(www.interscience.wiley.com).  
DOI: 10.1002/asi.20456

**Stimulated Recall and Mental Models: Tools for Teaching and Learning Computer Information Literacy.** Lyn Henderson and Julie Tallman. Lanham, MD: Scarecrow Press, 2006. 289 pp. \$55.00. (ISBN: 0-8108-5222-5)

In February 2006, the Educational Testing Service (ETS) announced the release of its brand new core academic assessment of its Information and Communication Technology (ICT) Literacy Assessment. The core assessment is designed to assess the information literacy of high school students transitioning to higher education. Many of us already know ETS for some of its other assessment tools like the SAT and GRE. But ETS's latest test comes on the heels of its 2005 release of an advanced level of its ICT Literacy Assessment for college students progressing to their junior and senior year of undergraduate studies. Neither test, ETS insists, is designed to be an entrance examination. Rather, they are packaged and promoted as diagnostic assessments.

We are in the grips of the Information Age where information literacy is a prized skill. Knowledge is power. However, information literacy is not merely creating flawless documents or slick PowerPoint presentations on a home PC. It is more than being able to send photos and text messages via cell phone. Instead, information literacy is gauged by one's ability to skillfully seek, access, and retrieve valid information from credible and reliable sources and using that information appropriately. It involves strong online search strategies and advanced critical thinking skills. And, although it is not clear whether they seized the opportunity or inherited it by default, librarians are in the vanguard of teaching information literacy to the next generation of would-be power brokers.

The release of *Stimulated Recall and Mental Models*, therefore, could not have been timelier. It describes an empirical qualitative, case study research conducted by authors Lyn Henderson and Julie Tallman in which they studied the mental models of school librarians teaching K-12 students how to use electronic databases.

In this research, funded by the Spencer Foundation, Henderson and Tallman studied and analyzed the mental models of their subjects, six American and four Australian school librarians, as they went about the task of teaching students one-on-one how to access and retrieve the information they needed for class assignments from electronic databases. Each librarian and student underwent a structured pre-lesson interview to ascertain their mental models (the sum of their prior learning and experiences) regarding the upcoming lesson. The lesson followed immediately and was carefully video- and audio-recorded, with the full knowledge of the librarian and her student. After the lessons, both student and librarian were interviewed with the intent of learning what each were thinking and feeling at specific points during the lesson, using the recordings as memory joggers. After the first librarian-pupil session, the student was freed but the librarian was re-studied tutoring a second learner. Again, the teacher and new student were pre-interviewed, their lesson was recorded, and they were debriefed using the recordings for stimulated recall.

It is important to note here the use of the recordings to create *stimulated recall*. Though considered a dubious practice by many respected researchers, Henderson and Tallman expend considerable time and effort in this book trying to establish the credibility of stimulated recall as a valid research tool. I find it interesting that the authors report that their realization of the value of stimulated recall was a collateral benefit of their study; they claim the original objective of their research was to analyze and compare the pre- and post-lesson mental models of the teacher-librarians (p.15). Apparently, this realization provided the inspiration for this book (pp. 1 & 208). Hence, its place of importance in the book's title.

In Chapter 1, the authors present a thorough overview of their research. They describe their research methodologies, the tasks of their book, and the rationale and objectives for their study. Basically, they want to (a) discover the librarians' mental models before the lesson; (b) determine if those mental models coincided with (were predictive of) their actual teaching styles during the lesson; (c) observe if the librarians responded to situations during the lesson and adapted their teaching methods accordingly or if their teaching methods were set by their mental models; and (d) know if the librarians would learn from their teaching after reflecting on their first lesson and then change their mental models for the second lesson.

Chapter 2 is devoted to the literature review establishing the existence of mental models. In addition to recent works, sufficient historical works are included for the authors to establish a theoretical basis for mental models. They discuss at length the cognitive representation, functions, and characteristics of mental models. They also present a comparison of mental models between novices and experts, recognizing the varying information literacy skills among the librarians and the students. Further, they advance the concept that mental models are not only individually acquired but can also be realized in groups. Unfortunately, some of the literature mentioned in this chapter is merely boxed-scored. Also, there is scant mention of contrary research.

Henderson and Tallman explore in Chapter 3 the theoretical methodology of stimulated recall. Despite acknowledging "some interesting criticisms" and "the growing number of studies" to the contrary (p. 91), the authors strive to present stimulated recall as a valid research tool through the use of examples and literature review. Whether or not they succeed is entirely a judgment value call on the part of individual readers. Surely, some will embrace their arguments and others will not.

In Chapter 4 the researchers tender a case study of one of their subject librarians. Readers receive an intimate view of the evolution of her mental models, provoked by the stimulated recall method, as she progresses through the pre-interview, in-action, and reflective stages of her two lessons. She has firmly held beliefs that school librarians should be subject experts, yet she professes some inadequacies with her own

expertise concerning the technology and databases she uses in the lessons. Indeed, when she encounters compounding difficulties during the second session, her self-esteem suffers as a result of the trammels of technology. Eventually, after undergoing the stimulated recall and post-interview, the librarian becomes "more reflective and less emotional" (p. 129).

Chapter 5 offers another case study of another subject librarian. Unlike the teacher in the previous chapter, this subject was more certain of her skills and abilities in teaching the students to search the electronic databases. She prepares little for the task, relying on her competence to get her and her students successfully through the lessons. Here is an educator who sees her role as that of facilitator rather than teacher. She demonstrates considerable skill in determining the students' prior knowledge, utilizes appropriate questioning techniques, and interprets their verbal and nonverbal cues during the lessons to guide her instructional strategies. Yet, during the reflective post-lesson interview with stimulated recall, she is quite hard on herself while self-evaluating her questioning procedures.

Henderson and Tallman, in Chapter 6, examine the positive benefits of the use of stimulated recall throughout their research. They use stimulated recall in the study to more precisely reveal the school librarians' as well as the students' thought processes as they progressed through their lessons. The authors admit that, in some instances, based on their experiences and observations, they came to the wrong conclusions about the lessons they were observing on the videotapes. For example, their observation and recordings did not capture one school librarian watching her pupil's eyes and determining that the child was struggling with the keyboard. The librarian was able to adapt the lesson accordingly but the researchers incorrectly concluded she had strayed from one of her pre-interview mental models of teaching. Only when the educator pointed to the video and noted, *here is where I noticed . . .*, did the researchers realize they made the wrong conclusion. The authors suggest that without the stimulated recall post-interview, they may well have generated different results.

Chapter 7 compares at length the Chapter 4 librarian's procedure-focused, product-driven pedagogy to the Chapter 5 librarian's concept-focused, edification-driven pedagogy. Henderson and Tallman then discuss whether the librarians controlled, or were controlled by, their prevailing mental models at varying points in their lessons. The authors also explain how and why they believe, from their research, that teachers' mental models can be prophetic indicators of their teaching styles and strategies.

This book is evidence that Henderson and Tallman were meticulous in following their established protocols and especially in their record keeping while conducting their research. There are, however, a few issues in the study's framework and methodology that are worth noting. First, although the research was conducted in two different countries—the United States and Australia—it is not clear from the writing if the librarian-pupil pairs of each country hailed from the same schools (making the population opportunistic) or if the sampling was indeed more randomly selected. Readers do know, though, that the librarians were free to select the students they tutored from within their respective schools. Thus, there appears to be no randomness.

Second, "[t]he data collection tools and questionnaires were grounded in a [single] pilot study with a [single] teacher-librarian" (p. 7). Neither the procedures used nor the data collected from the pilot study are presented to establish its reliability and validity. Therefore, readers are left with only limited confidence in the study's instrumentation.

Further, it is obvious from the reading, and admitted by the researchers, that the recording equipment in open view of the study's subjects skewed the data. That is, one of the librarians under study confessed that were it not for the cameras, she would have completely deserted one of her lessons when encountering what she perceived to be overwhelming obstacles; a classic example of the Hawthorne Effect in research.

Yet, despite these issues, researchers Henderson and Tallman make a respectable case in this book for the validity of both mental models and stimulated recall. The mental models developed during the pre-

lesson interviews seem remarkably accurate when observing the school librarians during the lessons. Additionally, while the librarians were able to adapt their lessons based on situations, they generally did so within their mental models of what constitutes good teachers and good teaching. As for the value of reflecting on their teaching performance, the authors report the not-so-startling denouement that while it is easy to identify and define malpractice and to commit to changing performance errors, it is often difficult to actually implement those improvements. Essentially, what is first learned is best learned and what is most used is best used. In the end, however, the authors rightfully call for further study to be conducted by themselves and others.

ETS's core ICT Literacy Assessment is not currently a mandatory college entrance examination. Neither is the advanced ICT Literacy Assessment a mandatory examination for promotion to upper level undergraduate studies. But it would be naïve not to expect some enterprising institutions of higher education to at least consider making them so in the very near future. Consequently, librarians of all stripes (public, academic, school, or others) would do well to read and study *Stimulated Recall and Mental Models* if they are truly committed to leading the charge on advancing information literacy in the Information Age. In this book are some valuable how-tos for instructing patrons on searching electronic databases. And some of those same principles could be applicable to other areas of information literacy instruction.

#### Darrell Cook

*El Centro College Library  
Dallas County Community College District  
Dallas, TX 75202  
E-mail: dcook@dccc.edu*

Published online 1 December 2006 in Wiley InterScience  
(www.interscience.wiley.com).  
DOI: 10.1002/asi.20472

**Multimedia Content and the Semantic Web: Methods, Standards and Tools.** Edited by Giorgos Stamou and Stefanos Kollias. Chichester, United Kingdom: John Wiley, 2005. 392 pp. \$120.00. (ISBN: 470-85753-6)

The concept of the semantic web has emerged because search engines and text-based searching are no longer adequate, as these approaches involve an extensive information retrieval process. The deployed searching and retrieving descriptors are naturally subjective and their deployment is often restricted to the specific application domain for which the descriptors were configured. The new era of information technology imposes different kinds of requirements and challenges. Automatic extracted audiovisual features are required, as these features are more objective, domain-independent, and more native to audiovisual content. This book is a useful guide for researchers, experts, students, and practitioners; it is a very valuable reference and can lead them through their exploration and research in multimedia content and the semantic web.

The book is well organized, and introduces the concept of the semantic web and multimedia content analysis to the reader through a logical sequence from standards and hypotheses through system examples, presenting relevant tools and methods. But in some chapters readers will need a good technical background to understand some of the details. Readers may attain sufficient knowledge here to start projects or research related to the book's theme; recent results and articles related to the active research area of integrating multimedia with semantic web technologies are included. This book includes full descriptions of approaches to specific problem domains such as content search, indexing, and retrieval. This book will be very useful to researchers in the multimedia content analysis field who wish to explore the benefits of

© 2006 Wiley Periodicals, Inc.

emerging semantic web technologies in applying multimedia content approaches.

The first part of the book covers the definition of the two basic terms *multimedia content* and *semantic web*. The Moving Picture Experts Group standards MPEG7 and MPEG21 are quoted extensively. In addition, the means of multimedia content description are elaborated upon and schematically drawn. This extensive description is introduced by authors who are actively involved in those standards and have been participating in the work of the International Organization for Standardization (ISO)/MPEG for many years. On the other hand, this results in bias against the ad hoc or nonstandard tools for multimedia description in favor of the standard approaches. This is a general book for multimedia content; more emphasis on the general multimedia description and extraction could be provided.

Semantic web technologies are explained, and ontology representation is emphasized. There is an excellent summary of the fundamental theory behind applying a knowledge-engineering approach to vision problems. This summary represents the concept of the semantic web and multimedia content analysis. A definition of the fuzzy knowledge representation that can be used for realization in multimedia content applications has been provided, with a comprehensive analysis.

The second part of the book introduces the multimedia content analysis approaches and applications. In addition, some examples of methods applicable to multimedia content analysis are presented. Multimedia content analysis is a very diverse field and concerns many other research fields at the same time; this creates strong diversity issues, as everything from low-level features (e.g., colors, DCT coefficients, motion vectors, etc.) up to the very high and semantic level (e.g., Object, Events, Tracks, etc.) are involved. The second part includes topics on structure identification (e.g., shot detection for video sequences), and object-based video indexing. These conventional analysis methods are supplemented by results on semantic multimedia analysis, including three detailed chapters on the development and use of knowledge models for automatic multimedia analysis. Starting from object-based indexing and continuing with machine learning, these three chapters are very logically organized. Because of the diversity of this research field, including several chapters of recent research results is not sufficient to cover the state of the art of multimedia. The editors of the book should write an introductory chapter about multimedia content analysis approaches, basic problems, and technical issues and

challenges, and try to survey the state of the art of the field and thus introduce the field to the reader.

The final part of the book discusses research in multimedia content management systems and the semantic web, and presents examples and applications for semantic multimedia analysis in search and retrieval systems. These chapters describe example systems in which current projects have been implemented, and include extensive results and real demonstrations. For example, real case scenarios such as ECommerce medical applications and Web services have been introduced. Topics in natural language, speech and image processing techniques and their application for multimedia indexing, and content-based retrieval have been elaborated upon with extensive examples and deployment methods. The editors of the book themselves provide the readers with a chapter about their latest research results on knowledge-based multimedia content indexing and retrieval.

Some interesting applications for multimedia content and the semantic web are introduced. Applications that have taken advantage of the metadata provided by MPEG7 in order to realize advance-access services for multimedia content have been provided. The applications discussed in the third part of the book provide useful guidance to researchers and practitioners properly planning to implement semantic multimedia analysis techniques in new research and development projects in both academia and industry.

A fourth part should be added to this book: performance measurements for integrated approaches of multimedia analysis and the semantic web. Performance of the semantic approach is a very sophisticated issue and requires extensive elaboration and effort. Measuring the semantic search is an ongoing research area; several chapters concerning performance measurement and analysis would be required to adequately cover this area and introduce it to readers.

**Ashraf M.A. Ahmad**

*Computer Science and Information Engineering*

*National Chiao Tung University*

*Hsinchu, Taiwan 300*

*E-mail: Ashraf@csie.nctu.edu.tw*

Published online 30 November 2006 in Wiley InterScience  
(www.interscience.wiley.com).

DOI: 10.1002/asi.20489