EDITOR'S COMMENTS

Perspectives on Time

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What is something that plays an important role in most of the things that you do, but about which you often don't consciously think? It's time. Most people have, on one occasion or another, paused and consciously thought about the strange nature of time. Most people then must quickly revert to considering ways of making a living to support themselves and their families. It is only the fortunate few who can spend their time on time, or who need to consider its intricacies in doing their work. In this editorial, I include some of my own reflections on time. While some are more personal, others could…and maybe should…apply to the research that you are doing.

In reviewing articles published in *MIS Quarterly* during my tenure as Editor-in-Chief from January 1, 2005, to December 31, 2007, I observed that many articles implicitly reflect time, and others explicitly theorize and/or measure it. Many authors of empirical studies consider the time that has elapsed from the start to the end of a phenomenon that they are studying. This is especially true in longitudinal studies. Some researchers measure time explicitly, such as in terms of the minutes it takes to complete an online search task; a few build mathematical models and include time as a variable; several focus on stages that occur over time. Still others use questionnaire measures that either try to capture an aspect of time (i.e., frequency of use in a time period, perceptions about how quickly time is passing) or capture time as an aspect of another construct (i.e., overload in which a person has too many things to do at a given point in time or efficiency in which performance is gauged with respect to a unit of time). Of the 103 articles published from 2005–2007, there have been 38 with measures that reflect aspects of time.

Time is also reflected in theoretical articles, reviews, and a research essay that were published in the last 3 years. For example, an index is developed to measure the temporal dispersion aspect of virtual team dispersion (O'Leary and Cummings 2007); a review of culture in IS research includes time orientation and monochronism versus polychronism (Leidner and Kayworth 2006); a theoretical model explores the temporal aspects of knowledge conversion (Massey and Montyoa-Weiss 2005).

In more cases than not, time is a silent visitor to the research I reviewed. Maybe the researcher is considering long-term versus short-term effects, but does describe how long-term is distinguished from short-term (which, by the way, is not easy to do). Or the researcher implicitly suggests that a change occurs over time, but does not explicitly discuss the role of time. In other cases the researcher considers an event, such as a web-based search, without measuring time explicitly.

In this editorial, I would like to reflect upon various aspects of time. The broadest temporal perspective offers an opportunity to reflect upon an on-going debate in our literature. I hope several other perspectives will cause you to pause and consider how you are using time in building/refining theories and conducting your research. The remaining perspectives focus on my personal evaluation of potential exciting avenues for Information Systems research and my view of my time as my term as Editor-in-Chief draws to a close. I describe these perspectives in a little more detail below and the remainder of the editorial illustrates them. I hope you have as much fun "reading" this editorial as I have had in developing it and working with the illustrator, Joo Kim.

- **Time and the IS discipline** — There has been considerable debate lately about whether or not we should have a single guiding paradigm or multiple paradigms. With the first illustration, I hope to put the debate into perspective. We are a young discipline…arguably too young to have a single paradigm.

- **Measuring time in IS research** — This illustration focuses on how time and change over time is measured in articles published over the last 3 years in *MIS Quarterly*. Based on my review, it appears that IS researchers could benefit from more explicitly considering measure of time in their research. A "must" read for anyone interesting in developing theories with a temporal aspect and testing them is the award winning article by T. R. Mitchell and L. R. James (2001).

- **Interesting directions for IS research on time** — One fun thing about writing editorials is that I get to present my views. This illustration proposes five directions of research on time that I personally find interesting. I intend to conduct research in at least some of these areas….when I have the time (which will be soon, I hope). They are:
  - *Temporal Structures* — Orlikowski and Yates (2002, p. 686) propose that "people in organizations experience time through the shared temporal structures they enact recurrently in their everyday practices." These temporal structures could include project schedules to pace work activities, family members' schedules to coordinate work and home life, seasons and religious holidays to take vacations, etc. A challenge individuals and organizations face is reconciling these different temporal structures to make it possible to work and take part in non-work activities.
  - *Virtual Team Rhythms* — Maznevski and Chudoba (2000) found that successful global virtual teams experienced a rhythm in their interactions that are sequenced in a repeating pattern over time.
  - *Time Visions* — Not all people are concerned about deadlines. Not all people view time linearly as an arrow with a past, present, and future. Rather, peoples' perceptions about time vary across a number of temporal dimensions resulting in a myriad of time visions (Saunders et al. 2004). Differences in time visions can subtly influence team performance and dynamics, especially on global virtual teams whose members are from a variety of cultures.
  - *Time on the Internet* — The Internet may change our perceptions of time…of our workday, of deadlines, of the home/work life balance. It may support our natural preferences for doing one thing or many things at a time. We can even get lost in time if we get fully absorbed online.
  - *Virtual Teams and Time* — A long history of research starting with group support systems has looked at changes in the use of communication and information technologies by team members over time. Manju Ahuja and I (Saunders and Ahuja 2006) developed a framework proposing how the progress of time affects virtual team structures, processes and outcomes that I would like to test.

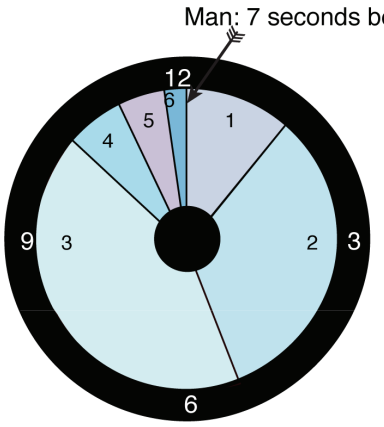
- **My time** — In this illustration, I look at my life in three temporal ways. First, I look at my time as an *arrow* that moves linearly from past, present, and future. I start the time-line with my first degrees, my marriage and start of my family, up through my time as editor. The units of time are homogeneous…although lately it seems as if one unit of time (years) is getting much shorter. (Please note the arrow is moving upward.) I also consider my life from the perspective of changing life *stages* alternating with changing emphasis on family, education, and work. Finally, I look at the *event* of my EICdom (that is term as Editor-in-Chief). This unit of time differs qualitatively from other units of time in my life. In this event, which occurred from 2005 through 2007, I focused on increasing the number of diamond cutters (i.e., developmental reviewers) in our discipline. I continued the trend set by my predecessors to make the editorial board (and consequently the publications) in *MIS Quarterly* more global. Further, I was very pleased that we increased the number of articles published in *MIS Quarterly* through changes in the journal's dimensions and print font, and, in 2006, through the publication of a fifth issue for the first time.

- **A time for thanks** — It has been an honor and pleasure to serve the Information Systems discipline as Editor-in-Chief, Senior Editor, and Associate Editor of *MIS Quarterly*. My work in these roles was made much easier because of the efforts and dedication of members of our community. In the last illustration, I recognize some of these individuals whose efforts over the last 3 years have played an important role in maintaining the quality of the journal. I also acknowledge the assistance of the many individuals who through their reviews for the journal helped refine the research of their colleagues and furthered the research goals of the IS community. Finally, I thank those of you who submitted your quality research to *MIS Quarterly*. Your research has been instrumental in *MIS Quarterly*'s recent high ISI impact factors (i.e., 4.98, 4.73).

Time and the IS Discipline

In the grand scheme of things, Information Systems as a discipline hasn't been around very long. As shown in the timeline below, it is a relatively new discipline, especially when you consider that mathematics has been around for close to five millennia.

As a matter of fact, man hasn't been on this earth all that long. If you were to map the entire history of the earth to a 12 hour period (as in the Clock of Eras), humans would not appear until the last 7 seconds. Given this framing, can we expect our discipline to have converged to a single paradigm?



Clock of Eras

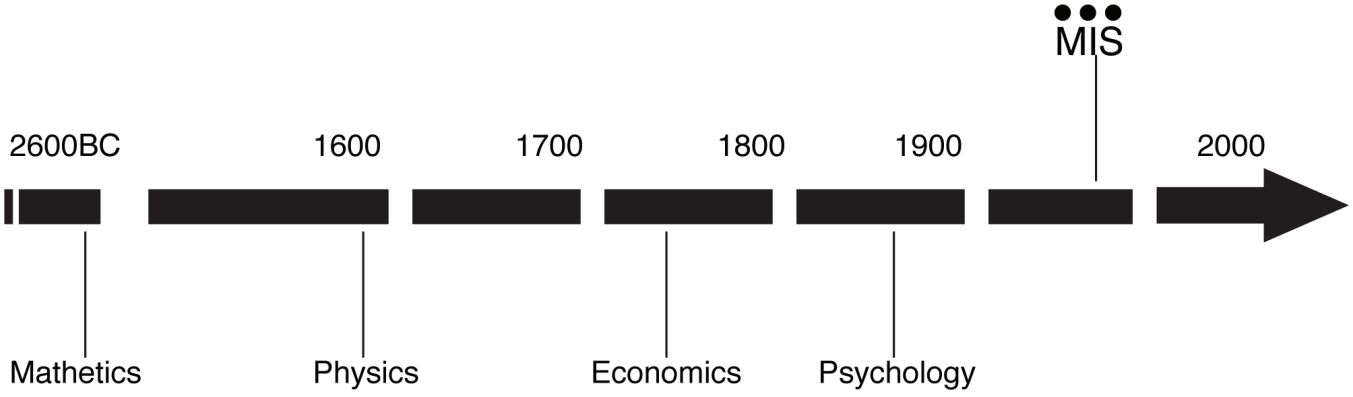
Are we being realistic in our expectations for our young discipline?

1 hour = 375,000,000 years

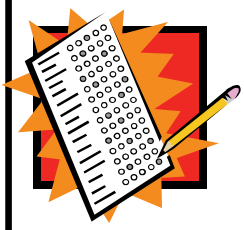
	Era	Years	Clock Time
1	Hadean	700,000,000	1 hour 52 minutes
2	Archaean	1,300,000,000	3 hours 28 minutes
3	Proterozoic	1,957,000,000	5 hours 12 minutes
4	Paleozoic	295,000,000	47 minutes
5	Mesozoic	183,000,000	29 minutes
6	Cenozoic	65,000,000	10 minutes

Adapted from http://www.fossils-facts-and-finds.com/clock_of_eras.html

A Timeline of Disciplines



Measuring Time in IS Research

Measure of Time	Study in *MIS Quarterly*: 2005-2007
Elapsed Time	Avgerou & McGrath (2007); Bhattacherjee & Sanford (2006); Chen & Forman (2006); Cotteleer & Bendoly (2006); Gattiker & Goodhue (2005); Hanseth et al. (2006); Kanawattanachai & Yoo (2007); Kuechler & Vaishnavi (2006); Lapointe & Rivard (2005); Liang et al. (2006); Nickerson & Muehlen (2006); Pavlou et al. (2007); Pavlou & Fygenson (2006); Porra et al. (2005); Sherif et al. (2006); Silva & Hirschheim (2007); Slaughter et al. (2006); Soh et al. (2006)
Time on Task/System	Allen & March (2006); Jiang & Benbasat (2007); Mitchell (2006); Padmanabhan et al. (2006); Poston & Speier (2005); Tam & Ho (2006); Webster & Ahuja (2006)
Survey Item 	Ahuja & Thatcher (2005) – 1 item: *Quantitative Overload*; Ahuja et al. (2007) – 4 items: *Work Exhaustion*, 4 items: *Perceived Work Overload*; Banker et al. (2006) – 1 item: *JIT*, 2 items: *Plant Performance Time to Market*; Gattiker & Goodhue (2005) – 4 items: *Task Efficiency*; Karahanna et al. (2006) – 2 items: *Usage Intensity*; Kettinger & Lee (2005) – 1 item: *Responsiveness,*2 items: *Reliability*; Limayem et al. (2007) – 2 items: *IS Continuance Usage*; Malhotra et al. (2005) – 1 item: *Information Quality Timeliness*; Ray et al. (2005) – 3 items: *Customer Service Response Time*
Time in periods	Chen & Edgington (2005); Oh & Lucas (2006); Ryu et al. (2005)
Life cycle stage	Brown & Venkatesh (2005); Slaughter et al. (2006)
Index of Temporal Dispersion	O'Leary & Cummings (2007)

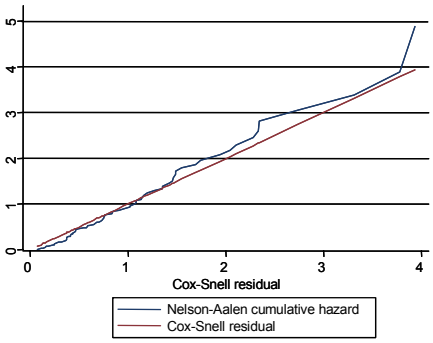
Chen & Edgington (2005) look at time in periods using mathematical modeling

$$(1+M_n)\times\Big(\sum_{j=1}^{J}\Big(\Big(\sum_{i=1}^{I}C^{t}\times X_{ijt}\Big)\times\Big(\frac{\sum_{i=1}^{I}\varepsilon_{ijt}\times X_{ijt}}{L_j}\Big)\Big)-\sum_{i=1}^{I}\sum_{j=1}^{J}MV_j\times\varepsilon_{ijt}-\sum_{i=1}^{I}\sum_{j=1}^{J}C^{t}\times X_{ijt}-\sum_{i=1}^{I}\sum_{j=1}^{J}C^{KC}\times v_j\times Y_{ijt}-(1+M_t^{T})\times\Big(\sum_{j=1}^{J}\sum_{i=1}^{I}C^{t}\times X_{ijt}\Big)\times\Big(\frac{\sum_{i=1}^{I}\varepsilon_{ijt}\times X_{ijt}}{L_j}\Big)\Big)\times\frac{\sum_{i=1}^{I}\sum_{j=1}^{J}Y_{ijt}}{\sum_{i=1}^{I}\sum_{j=1}^{J}X_{ijt}}$$

Summary: Most articles (18) measured time in terms of elapsed time (i.e., 1 week, 16 years, etc.) Nine used questionnaire or interview items, usually where time was implicit in measuring some other constructs such as overload, IS usage, or efficiency. Only three studies operationalized the time-related construct with more than two items, suggesting that the reliability of the measures could be improved. Three others included time as a variable in mathematical models; seven explicitly measured time, i.e., the number of minutes to complete an online task; two applied life cycle stages; and, one developed a temporal index of dispersion in virtual teams.

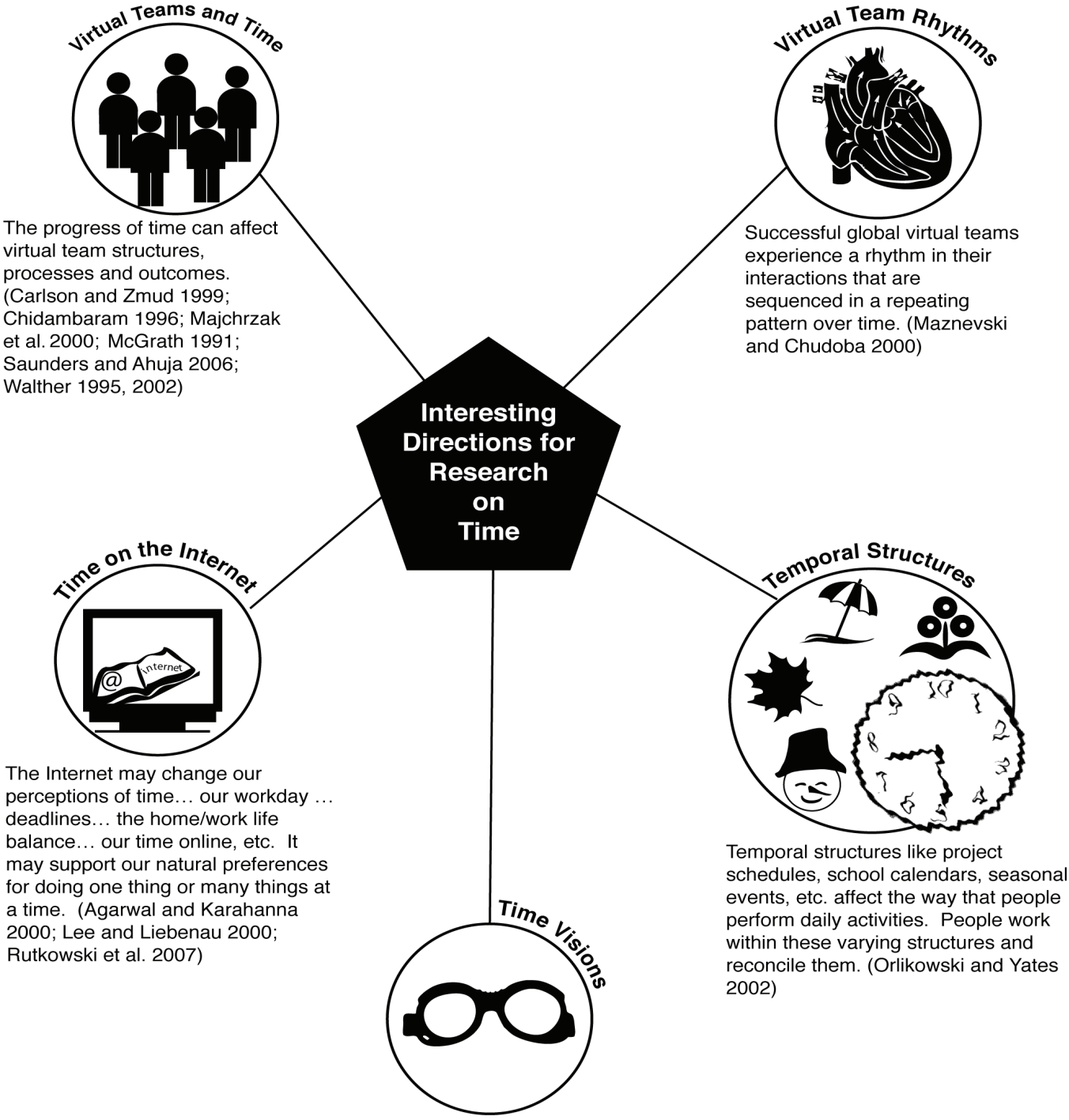
A MUST READ:

Mitchell, T.R. and James, L.R. (2001). Building Better Theory: Time and the Specification of When Things Happen, *Academy of Management Review, 26, 4,* 530-547.

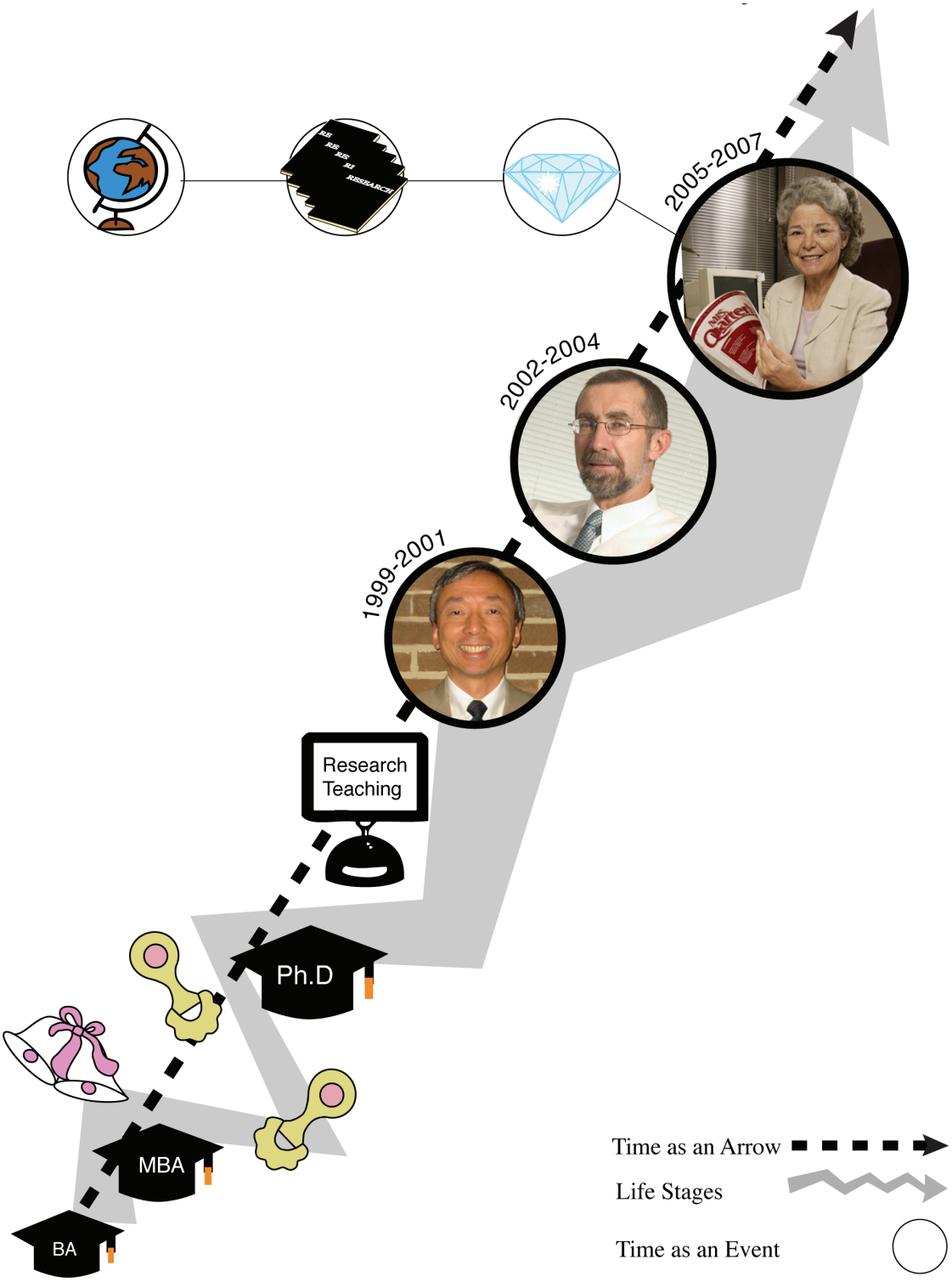


Mitchell (2005) looks at change over time using Cox regression models

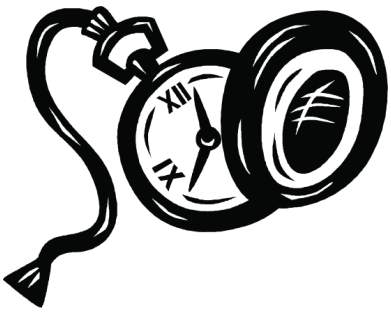
Interesting Directions for Research on Time



My Time


2005-2007
2002-2004
1999-2001
Research
Teaching
Ph.D
MBA
BA
Time as an Arrow
Life Stages
Time as an Event

A Time for Thanks



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References

Agarwal, R., and Karahanna, E. "Time Flies When You're Having Fun," *MIS Quarterly* (24:4), 2000, pp. 665-694.

Ahuja, M. K., Chudoba, K. M., Kacmar, C. J, McKnight, D. H., and George, J. F. "IT Road Warriors: Balancing Work-Family Conflict, Job Autonomy, and Work Overload to Mitigate Turnover Intentions," *MIS Quarterly* (31:1), 2007, pp. 1-17.

Ahuja, M. K., and Thatcher, J. B. "Moving Beyond Intentions and Toward the Theory of Trying: Effects of Work Environment and Gender on Post-Adoption Information Technology Use," *MIS Quarterly* (29:3), 2005, pp. 427-459.

Allen, G. N., and March, S. T. "The Effects of State-Based and Event-Based Data Representation on User Performance in Query Formulation Tasks," *MIS Quarterly* (30:2), 2006, pp. 269-290.

Avgerou, C., and McGrath, K. "Power, Rationality, and the Art of Living Through Socio-Technical Change," *MIS Quarterly* (31:2), 2007, pp. 295-315.

Banker, R. D., Bardhan, I. R., Chang, H., and Lin, S. "Plant Information Systems, Manufacturing Capabilities, and Plant Performance," *MIS Quarterly* (30:2), 2006, pp. 315-337.

Bhattacherjee, A., and Sanford, C. "Influence Processes for Information Technology Acceptance: An Elaboration Likelihood Model," *MIS Quarterly* (30:4), 2006, pp. 805-825.

Brown, S. A., and Venkatesh, V. "Model of Adoption of Technology in Households: A Baseline Model Test and Extension Incorporating Household Life Cycle," *MIS Quarterly* (29:3), 2005, pp. 399-426.

Burton-Jones, A., and Gallivan, M. J. "Toward A Deeper Understanding of System Usage in Organizations: A Multilevel Perspective," *MIS Quarterly* (31:4), 2007, pp. 657-679.

Carlson, J. R., and Zmud, R. W. "Channel Expansion Theory and the Experiential Nature of Media Richness Perceptions," *Academy of Management Journal* (42:2), 1999, pp. 153-170.

Chen, A. N. K., and Edgington, T. M. "Assessing Value in organizational Knowledge Creation: Considerations for Knowledge Workers," *MIS Quarterly* (29:2), 2005, pp. 279-309.

Chen, P., and Forman, C. "Can Vendors Influence Switching Costs and Compatibility in an Environment with Open Standards?," *MIS Quarterly* (30:Special Issue), 2006, pp. 541-562.

Chidambaram, L. "Relational Development in Computer-Supported Groups," *MIS Quarterly* (20:2), 1996, 143-165.

Cotteleer, M. J., and Bendoly, E. "Order Lead-Time Improvement Following Enterprise Information Technology Implementation: An Empirical Study," *MIS Quarterly* (30:3), 2006, pp. 643-660.

Gattiker, T. F., and Goodhue, D. L. "What Happens After ERP Implementation: Understanding the Impact of Interdependence and Differentiation on Plant-Level Outcomes," *MIS Quarterly* (29:3), 2005, pp. 559-585.

Hanseth, O., Jacucci, E., Grisot, M., and Aanestad, M. "Reflexive Standardization: Side Effects and Complexity in Standard Making," *MIS Quarterly* (30:Special Issue), 2006, pp. 563-581.

Jiang, Z. (J.), and Benbasat, I. "The Effects of Presentation Formats and Task Complexity on Online Consumers' Product Understanding," *MIS Quarterly* (31:3), 2007, pp. 475-500.

Kanawattanachai, P., and Yoo, Y. "The Impact of knowledge Coordination on Virtual Team Performance Over Time," *MIS Quarterly* (31:4), 2007, pp. 783-808.

Karahanna, E., Agarwal, R., and Angst, C. M. "Reconceptualizing Compatibility Beliefs in Technology Acceptance Research," *MIS Quarterly* (30:4), 2006, pp. 781-804.

Kettinger, W. J., and Lee, C. C. "Zones of Tolerance: Alternative Scales for Measuring Information Systems Service Quality," *MIS Quarterly* (29:4), 2005, pp. 607-623.

Kuechler, W. L., and Vaishnavi, V. "So, Talk to Me: The Effect of Explicit Goals on the Comprehension of Business Process Narratives," *MIS Quarterly* (30:4), 2006, pp. 961-979.

Lapointe, L., and Rivard, S. "A Multilevel Model of Resistance to Information Technology Implementation," *MIS Quarterly* (29:3), 2005, pp. 461-491.

Lee, H., and Liebenau, J. "Time and the Internet at the Turn of the Millennium" *Time & Society* (9:1), 2000, pp. 43-56.

Leidner, D. E., and Kayworth, T. "*Review*: A Review of Culture in information Systems Research: Toward a Theory of Information Technology Culture Conflict," *MIS Quarterly* (30:2), 2006, pp.357-399.

Limayem, M., Hirt, S. G., and Cheung, C. M. K. "How Habit Limits the Predictive Power of Intention: The Case of Information Systems Continuance," *MIS Quarterly* (31:4), 2007, pp. 705-737.

Liang, H., Sharaf, N., Hu, Q., Xue, Y. "Assimilation of Enterprise Systems: The Effect of Institutional Pressures and the Mediating Role of Top Management," *MIS Quarterly* (31:1), 2007, pp. 59-87.

Majchrzak, A., Rice, R. E., Malhotra, A., King, N., and Ba, S. "Technology Adaptation: The Case of a Computer-Supported Inter-Organizational VT," *MIS Quarterly* (24:4), 2000, pp. 569-600.

Malhotra, A., Gosain, S., and El Sawy, O. A. "Absorptive Capacity Configurations in Supply Chains: Gearing for Partner-Enabled Market Knowledge Creation," *MIS Quarterly* (29:1), 2005, pp. 145-187.

Massey, A. P., and Montoya-Weiss, M. M. "Unraveling the Temporal Fabric of Knowledge Conversion: A Model of Media Selection and Use," *MIS Quarterly* (30:1), 2006, pp. 99-114.

Maznevski, M. L., and Chudoba, K. M. "Bridging Space over Time: Global Virtual Team Dynamics and Effectiveness," *Organization Science* (11:5), 2000, pp. 473-492.

McGrath, J. E. "Time, Interaction, and Performance (TIP): A Theory of Groups," *Small Group Research* (22:2), 1991, pp. 147-174.

Mitchell, T. R., and James, L. R. "Building Better Theory: Time and the Specification of When Things Happen," *Academy of Management Review* (26:4), 2001, pp. 530-547.

Mitchell, V. L "Knowledge Integration and Information Technology Project Performance," *MIS Quarterly* (30:4), 2006, pp. 919-939.

Nickerson, J. V., and zur Muehlen, M. "The Ecology of Standards Process: Insights from Internet Standard Making," *MIS Quarterly* (30:Special Issue), 2006, pp. 467-488.

O'Leary, M. B., and Cummings, J. N. "The Spatial, Temporal, and Configurational Characteristics of Geographic Dispersion in Teams," *MIS Quarterly* (31:3), 2007, pp. 433-452.

Oh, W., and Lucas, Jr., H. C. "Information Technology and Pricing Decisions: Price Adjustments in Online Computer Markets," *MIS Quarterly* (30:3), 2006, pp. 755-775.

Orlikowski, W., and Yates, J. "It's About Time: Temporal Structures in Organizations," *Organization Science* (13:6), 2002, pp. 684-700.

Padmanabhan, B., Zheng, Z., and Kimbrough, S. O. "An Empirical Analysis of the Value of Complete Information for eCRM Models," *MIS Quarterly* (30:2), 2006, pp. 247-267.

Pavlou, P. A., and Fygenson, M. "Understanding and Predicting Electronic Commerce Adoption: An Extension of the Theory of Planned Behavior," *MIS Quarterly* (30:1), 2006, pp. 115-143.

Pavlou, P. A., Liang, H., and Xue Y. "Understanding and Mitigating Uncertainty in Online Exchange Relationships: A Principal-Agent Perspective," *MIS Quarterly* (31:1), 2007, pp. 105-136.

Porra, J., Hirschheim, R., and Parks, M. S. "The History of Texaco's Corporate Information Technology Function: A General Systems Theoretical Interpretation," *MIS Quarterly* (29:4), 2005, pp. 721-746.

Poston, R. S., and Speier, C. "Effective Use of Knowledge Management Systems: A Process Model of Content Ratings and Credibility Indicators," *MIS Quarterly* (29:2), 2005, pp. 221-244.

Ray, G., Muhanna, W. A., and Barney, J. B. "Information Technology and the Performance of the Customer Service Process: A Resource-Based Analysis," *MIS Quarterly* (29:4), 2005, pp. 625-652.

Rutkowski, A. F., Saunders, C., Vogel, D., and van Genuchtern, M. "Is It Already 4 a.m. in Your Time Zone? Focus Immersion and Temporal Dissociation in Virtual Teams," *Small Group Research* (38:1), 2007, pp. 98-129.

Ryu, C., Kim, Y. J., Chaudhury, A., and Rao, H. R. "Knowledge Acquisition via Three Learning Processes in Enterprise Information Portals: Learning-By-Investment, Learning-By-Doing, and Learning-From-Others," *MIS Quarterly* (29:2), 2005, pp. 245-278.

Saunders, C. S., and Ahuja, M. "Are All Distributed Teams the Same? Differentiating Between Temporary and Ongoing Distributed Teams," *Small Group Research* (37:6), 2006, pp. 662-700.

Saunders, C. S., Van Slyke, C., and Vogel, D. "My Time or Yours? Managing Time Visions in Global Virtual Teams," *Academy of Management Executive* (18:1), 2004, pp. 19-31.

Sherif, K., Zmud, R. W., and Bowne, G. J. "Managing Peer-to-Peer Conflicts in Disruptive Information Technology Innovations: The Case of Software Reuse," *MIS Quarterly* (30:2), 2006, pp. 339-356.

Silva, L., and Hirschheim, R. "Fighting Against Windmills: Strategic Information Systems and Organizational Deep Structures," *MIS Quarterly* (31:2), 2007, pp. 327-354.

Slaughter, S. A., Levine, L., Ramesh, B., Pries-Heje J., and Baskerville, R. "Aligning Software Processes with Strategy," *MIS Quarterly* (30:4), 2006, pp. 891-918.

Soh, C., Markus, M. L., and Goh, K. H. "Electronic Marketplaces and Price Transparency: Strategy, Information, Technology, and Success," *MIS Quarterly* (30:3), 2006, pp. 705-723.

Tam, K. Y., and Ho, S. Y. "Understanding the Impact of Web Personalization on User Information Processing and Decision Outcomes, *MIS Quarterly* (30:4), 2006, pp. 865-890.

Waller, M. J., Conte, J. M., Gibson, C. A., and Carpenter, M. A. "The Effect of Individual Perceptions of Deadlines on Team Performance," *Academy of Management Review* (26:4), 2001, pp. 586-600.

Walther, J. B. "Relational Aspects of Computer-Mediated Communication: Experimental Observations Over Time," *Organization Science* (6:2), 1995, pp. 186-203.

Walther, J. B. "Time Effects in Computer-Mediated Groups: Past, Present and Future," in *Distributed Work,* P. Hinds and S. Kiesler (eds.), MIT Press, Cambridge, MA, 2002, pp. 236-257.

Webster, J., and Ahuja, J. S. "Enhancing the Design of Web Navigation Systems: The Influence of User Disorientation on Engagement and Performance," *MIS Quarterly* (30:3), 2006, pp. 661-678.