

## NEW STATE OF PLAY IN INFORMATION SYSTEMS RESEARCH: THE PUSH TO THE EDGES

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## Appendix A

### Coding Procedures

In this appendix, we describe the procedure followed for coding articles including sampling frame, scheme, process, and validation.

#### **Sampling Frame**

Every fifth article in *MISQ* and *ISR* between 1998 and 2012 was sampled for coding. Editorials, research notes, and research method articles were not considered. Further, articles that focused on design science, IS teaching/education, or the disciplinary state of the field were excluded. Articles that focused on substantive IS phenomena were the input to the coding process, whether approached theoretically or empirically.

#### **Coding Scheme**

The coding scheme covered the following three aspects: (1) type of study, (2) treatment of the IT artifact, and (3) form of theoretical borrowing. Further details are provided below.

**Type of study** was classified as one of the following: analytical modeling, content analysis, econometrics, experiment, Delphi studies, longitudinal panel data, meta-analysis, qualitative, simulation, survey, or pure theory.

**Treatment of the IT artifact** was classified per Orlikowski and Iacono's (2001) typology: tool, proxy, ensemble, computational, and nominal view. Here *tool* is defined as the engineered artifact expected to do what its designers intend it to do; *proxy* conceptualizations is defined as the focus on one or a few key elements in common that are understood to represent or stand for the essential aspect, property, or value of the information technology captured through some set of surrogate (usually quantitative) measures—such as individual perceptions, diffusion rates, or dollars spent; the *ensemble* view suggests that the IT artifact is only one element in a “package,” which also includes the components required to apply that technical artifact to some socio-economic activity; the *computational* view concentrates expressly on the computational power of information technology and is interested primarily in the capabilities of the technology to represent, store, retrieve, and transmit information,

thereby supporting, processing, modeling, or simulating aspects of the world; in the *nominal* view, IT artifacts are not described, conceptualized, or theorized and technology is essentially absent, constituting neither an independent nor a dependent variable in that technology is the omitted variable here.

**Form of theory borrowing** was coded in several steps. First, we asked whether the borrowing was primary (directly from outside of IS) or secondary (adopted from a theory already conceptually developed for the IS domain)? Second, what was the degree of change involved in the borrowing of the theory: none, small (changes to a single construct), medium (changes to multiple constructs and therefore also relationships), or large (modifies underlying logic)? Third, was such borrowing done in the manner of instantiation, modification, or extension (as defined in Table 1)? Determining the form of borrowing was done by examining the type of change in the constructs, configurations, and logic that the borrowed theory went through as it was applied within the research domain of each paper.

## **Coding Process**

A coding process was developed and refined through three reviewers categorizing random subsamples of articles independently and then discussing discrepancies. Once high inter-rater reliability was obtained, one reviewer read each article and coded according to the coding scheme. Two additional reviewers well versed in theory in the field served as consultants to resolve issues in coding the articles. For instance, one of the issues to be resolved was to refine the distinction between instantiation and modification. Examples of coded papers are provided in Table 1.

## **Validation**

Discussions across the three coders resolved discrepancies. In addition, the three coders coded a random set of 10 articles independently. The level of agreement among the three coders with regard to primary and secondary borrowing was 100%. To measure the reliability of coding for the type of borrowing and treatment of the IT artifact, we used Fleiss' kappa, which was calculated as 0.831 for type of borrowing and as 0.735 for treatment of the IT artifact, indicating acceptable levels of agreement.

## **References**

- Fleiss, J. 1971. "Measuring Nominal Scale Agreement Among Many Raters," *Psychological Bulletin* (76:5), pp. 378-382.
- Orlikowski, W. J., and Iacono, C. S. 2001. "Research Commentary: Desperately Seeking the 'IT' in IT Research—A Call to Theorizing the IT Artifact," *Information Systems Research* (12:2), pp. 121-134.

# Appendix B

## Existing Research Exemplars of Extension

Citation	Description	Treatment of IT	Reference Theory	Primary Borrowing	Classification	Magnitude	Rationale
Lamb, R., and Kling, R. 2003. "Reconceptualizing Users as Social Actors in Information Systems Research," <i>MIS Quarterly</i> (27:2), pp. 197-236.	Theory paper reconceptualizing the concept of "user" as a social actor whose social interactions are infused with IT use.	Ensemble	Labeling theory, Institutional theory, Structuration	Yes	Extending	Major	<ul style="list-style-type: none"> <li>✓ Using a clear, borrowed frame, the authors look at data and are able to reconceptualize a central construct, thereby essentially adding a whole new way of seeing users.</li> <li>✓ While there is no change in configuration, the paper offers a total perspective reversal with regard to how social actors are seen in the IS context.</li> </ul>
Ragu-Nathan, T. S., Tarafdar, M., Ragu-Nathan, B. S., and Tu, Q. 2008. "The Consequences of Technostress for End Users in Organizations: Conceptual Development and Empirical Validation," <i>Information Systems Research</i> (19:4), pp. 417-433.	Examines the effect of technostress on job satisfaction and organizational and continuance commitment.	Proxy	Transaction-based theory of stress	Yes	Extending	Major	<ul style="list-style-type: none"> <li>✓ Theorizes the nomological network of stress in IT contexts and creates a very specific conceptualization (and measurement) of technology-related stress.</li> <li>✓ Offers a unique configuration between various technology and stress-related constructs.</li> <li>✓ Situates stress deeply embedded in a technology context.</li> </ul>
Dennis, A. R., Fuller, R. M., and Valacich, J. S. 2008. "Media, Tasks, and Communication Processes: A Theory of Media Synchronicity," <i>MIS Quarterly</i> (32:3), pp. 575-600.	Builds the media synchronicity construct/theory.	Ensemble	Communication/Media richness theory	Yes	Extending	Major	<ul style="list-style-type: none"> <li>✓ Theorizes critical features of digital technology so as to understand the material basis of media synchronicity—not just practices or perceptions. Goes beyond media richness by recognizing specific features of digital technologies.</li> <li>✓ Relates the new media synchronicity construct to more well-known constructs.</li> <li>✓ Focuses on a rich representation of the IT artifact, which has a central role, and ties it with different logic to communication outcomes.</li> </ul>

# Appendix C

## Illustrations and Examples of Genres

	Research Approach	Illustrative Research Projects	Examples from Literature That Have Some Attributes of This Genre
Opening to the Right: Blue Ocean Theorizing	<p><i>Powerful and internally consistent conjecture where both the constructs and logic are developed indigenously or through new powerful analogies. The theorist can loosely base such work on observations and antinomies, or use data as illustrations or thought experiments. This is largely a creative endeavor.</i></p>	<p><b>Project:</b> Development of a typology that illustrates levels of embeddedness by integrating social and material properties of IT.</p> <p><b>Project:</b> Develop the concept of “information volume” as a salient property of information that restructures its boundaries based upon contextual conditions.</p>	<p>Nolan (1979) plotted a small sample of IT department budget data and developed a descriptive and prescriptive “stages of growth” theory that explained how organizational computing would evolve through the tensions between management slack and control.</p> <p>Dennis et al. (2008) proposed media synchronicity theory. It draws loosely upon media richness literature, but articulates a novel view of media properties, including several original constructs that focus on achieving successful communication processes through rich technology (media) capabilities that influence synchronicity.</p>
<b>Enriching Mid-Range Theory (Script)</b>	<p><b>Current:</b>  <i>Instantiation: A model is built that applies constructs, configurations, and/or logic from the external theory to an IS context. The flow is one way between the external theory and IS.</i></p> <p><i>Modifying: The model modifies constructs, configurations, and/or logic drawn from an external theory (or theories) to conceptualize an IT-based phenomenon. The external theory (and constructs) are locally adapted to IS.</i></p> <p><b>Desirable:</b>  <i>Extension: The model adds new constructs, and therefore possibly also new configurations and/or logics to the external theory in order to capture an IT-based phenomenon. Thereby, the model extends understanding of the source theory for the IT context.</i></p> <p><i>The flow is two way between the external theory and IS and (IS challenges assumptions of external theory).</i></p>	<p><b>Project:</b> Examination of the governance of open source software. Use the constructs and logic of transaction cost economics to predict governance structure. Constructs (e.g., asset specificity) are simply adopted to the software context (e.g., the asset specificity of the software).</p> <p><b>Project:</b> Using multiple social theories (e.g., social response theory), develop a model of IT artifact appropriation with specific constructs on how users can make choices regarding IT functionality.</p> <p><b>Project:</b> Project starts with the resource based view (RBV) and presents a model that demonstrates that IT resource homogeneity and combinability (not heterogeneity, as described by RBV logic) among clusters of networked firms is a source of competitive advantage for the cluster. RBV logic is thereby modified under certain IT-based phenomena.</p>	<p>Teo et al. (2003) drew from institutional theory to examine various institutional constructs and their prediction of the intention to adopt financial electronic data interchange.</p> <p>Tanriverdi et al. (2007) drew from modular systems theory and built a model for predicting and explaining sourcing mechanisms based on the level of IT modularity and IT detachability.</p> <p>DeSanctis and Poole (1994) blended institutional and decision-making perspectives to generate unique insight into the implementation and impacts of information technologies.</p> <p>Swanson (1994) used the IS environment to significantly expand the classic dual core theory of administrative and technical innovations to include the IS core in his tri-core model of IS innovation. This was later expanded by Lytinen and Rose (2003) to a quad core model.</p>

	Research Approach	Illustrative Research Projects	Examples from Literature That Have Some Attributes of This Genre
<b>Opening to the Left: Data-Driven Research</b>	<p><i>The World as It Is: Rich descriptive accounts of IT phenomena to facilitate the identification of constructs for theory development.</i></p> <p><i>The World as It Will Be: Accounts of exemplar firms or phenomena that can provide foresight regarding future IT-related problems, alert us to research opportunities, and help us identify what we should be theorizing about.</i></p> <p><i>The Curious World: Rigorously conducted empirical work with curious empirical findings that have no immediate theoretical explanation.</i></p>	<p><b>Project:</b> Study of the corporate use of social media, decisions, budget, governance, users, technologies, attitude, conflict, successes, failures, and impacts.</p> <p><b>Project:</b> In-depth study of company where the CEO took over the role of the CIO and created a unique committee for strategic IT governance.</p> <p><b>Project:</b> Empirical study that demonstrates that usage <i>declines</i> when technology interfaces are simplified, contrary to the expectation that ease of use fosters greater usage.</p>	<p>Wattal et al. (2010) presented a largely descriptive study of data and patterns on the use of social media and presidential elections that opened directions for future research.</p> <p>Posey et al. (2013) facilitated theory development in IS security research by developing a taxonomy of protective behaviors enacted by organizational members to protect information assets based on interview and survey data.</p> <p>Gordon et al. (2010) empirically examined the market value of voluntary disclosures concerning information security and suggested avenues for future empirical and theoretical work.</p> <p>Barley (1986) examined the adoption of computer tomography scanners in two hospitals and found that the effects of the same technology were different.</p>

## References

- Barley, S. R. 1986. "Technology as an Occasion for Structuring: Evidence from Observations of CT Scanners and the Social Order of Radiology Departments," *Administrative Science Quarterly* (31), pp. 78-108.
- Gordon, L. A., Loeb, M. P., and Sohail, T. 2010. "Market Value of Voluntary Disclosures Concerning Information Security," *MIS Quarterly* (34:3), pp. 567-594.
- Dennis, A. R., Fuller, R. M., and Valacich, J. S. 2008. "Media, Tasks, and Communication Processes: A Theory of Media Synchronicity," *MIS Quarterly* (32:3), pp. 575-600.
- DeSanctis, G., and Poole, M. S. 1994. "Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory," *Organization Science* (5:2), pp. 121-147.
- Nolan, R. L. 1979. "Managing the Crises in Data Processing," *Harvard Business Review* (57:2), pp. 115-126.
- Posey, C., Roberts, T. L., Lowry, P. B., Bennett, R. J., and Courtney, J. 2013. "Insiders' Protection of Organizational Information Assets: Development of a Systematics-Based Taxonomy and Theory of Diversity of Protection-Motivated Behaviors," *MIS Quarterly* (37:4), pp. 1189-1210.
- Swanson, E. B. 1994. "Information Systems Innovation Among Organizations," *Management Science* (40:9), pp. 1069-1088.
- Tanriverdi, H., Konana, P., and Ge, L. 2007. "The Choice of Sourcing Mechanisms for Business Processes," *Information Systems Research* (18:3), pp. 280-299.
- Teo, H. H., Wei, K. K., and Benbasat, I. 2003. "Predicting Intention to Adopt Interorganizational Linkages: An Institutional Perspective," *MIS Quarterly* (27:1), pp. 19-49.
- Wattal, S., Schuff, D., Mandviwalla, M., and Williams, C. B. 2010. "Web 2.0 and Politics: The 2008 U.S. Presidential Elections and an E-Politics Research Agenda," *MIS Quarterly* (34:4), pp. 669-688.