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Re-examining the Status of "IT" in IT Research - An Update on Orlikowski and Iacono (2001)

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ABSTRACT

Nearly 10 years ago, Orlikowski and Iacono examined the conceptualization of Information Technology in Information Systems Research (ISR) articles published in 1990s, and found that the majority of these articles were not thoroughly engaged with IT artifact. They proposed that IS researchers should start to theorize about the IT artifact and employ rich conceptualizations of IT. In order to assess the field's response to Orlikowski and Iacono's recommendations, and obtain an up-to-date image of the contemporary IS research, we carried out a similar analysis on a recent set of articles, i.e. the full set of papers published in the last three years of ISR, Management Information Systems Quarterly (MISQ), and Journal of the Association for Information Systems (JAIS). Our results reveal no drastic progress in terms of deeper engagement with IT artifact; 30% of the articles in our set are virtually mute about the artifact, and only 10% are employing an ensemble view of IT. Nevertheless, there are informative discrepancies between patterns in our results and those in the original study, and noticeable differences among the three journals. Implications of these findings for future research will be discussed.

Keywords

IT Artifact, Technology Conceptualization, IS Discipline.

INTRODUCTION

The phrase "*it is not about the technology*" has almost reached a status of taken-for-grantedness among businesspeople when they talk about issues like organizational change, business process re-engineering and even ERP implementation (McAfee, 2007). Two possible meanings can be attributed to this phrase. First, it might indicate that technology is no silver bullet; it cannot solely transform every aspect of an organization. This meaning is only against a strong version of technological determinism, i.e. the belief that technology determines several social/economical/cultural aspects of a society; as put by late anthropologist, Leslie White, "*the technological factor is therefore the determinant of a cultural system as a whole. It determines the form of social systems, and technology and society together determine the content and orientation of philosophy*" (cited in Winner, 1977, p. 76). Obviously, proponents of such extreme viewpoint are quite scarce - Winner (1998) calls such determinism "laughable" in contemporary academic circles. However, the second meaning –usually the one implied-, is that in conducting research, the details of the technology can be simply ignored in favor of more important organizational and behavioral aspects, thus it is safe to treat the technology as a "black-box". As put by Orlikowski and Barley (2001) such approaches "*reduce technology to an abstract material cause in the name of generalizability*" (p. 148).

Noting such prevalent ignorance and taken for granted conceptualization of technology in the IS field, Wanda Orlikowski and Suzanne Iacono published a commentary entitled "*Desperately Seeking the 'IT' in IT Research–A Call to Theorizing the IT Artifact*". The key message of their article was that the "*information technology is not a major player on its own playing field*" (p. 130). They showed that most of the published studies in the IS field tended to overlook the conceptual significance of IT artifact by using simplistic measures, disconnecting it from social settings, black-boxing it, or even virtually not including it in their studies. They called for further theorizing about IT artifact and incorporating richer conceptualizations of it within IS studies.

Orlikowski and Iacono have been quite successful in bringing the abovementioned paucity of "technology-aware" research to the collective attention of the IS community; since 2001, the paper has received 150+ citations in ISI journals. The commentary also heated up a relevant debate about the identity crisis of the IS field; in a response to Orlikowski and Iacono call for theorizing about IT artifact Benbasat and Zmud (2003) published their seminal piece on defining the core properties of IS field around the IT artifact and its nomological net. This article in turn received a large number of commentary pieces from other IS scholars - see for example Agarwal and Lucas (2005) for a rather opposing view and a review of previous responses. While we try not to wade into the intensely-explored core/identity debate[1] , our objective in this manuscript is to re-examine the status of technology in IS research, i.e. whether -almost a decade after Orlikowski and Iacono's observations and suggestions- IT researchers do include more elaborated conceptualizations of IT artifact in their publications or not. The outcome of our study would be twofold; first, we put forward an up-to-date scheme of the current state of the field in terms of its engagement with Information Technology, and second, we will identify challenges and shortcomings in current conceptualizations and theories of IT artifact and propose potential venues for advancing the status quo.

The rest of this manuscript is structured as follows: First, we review the findings of the original study. In a subsequent section, we explain our coding procedure and report on the results of assessment of a recent set of articles. We then discuss the implications of our study along with its limitations, and will wrap up with a short conclusion.

ORLIKOWSKI AND IACONO OBSERVATIONS

Orlikowski and Iacono analyzed 177 articles published between 1990-1999 in ISR. Using grounded theory approach they identified 14 conceptualization of IT in this set of articles. These were then classified into 5 general clusters. Table 1 (next page) illustrates these conceptualizations and their clustering.

[1] The debate received so much attention that in a recent JAIS editorial, Rudy Hirschheim (2006) literally called for ending the debate, stating that "*Enough is enough. Let's move on now*" (p. 702).

Tool View	
Technology is the engineered artifact, expected to do what its designers intend it to do	
Labor Substitution	IT would substitute for and replace labor
Productivity	IT as devices that enable individuals and social institutions to extend their reach and achieve performance benefits in the course of their ongoing socio-economic activities
Information Processing	IT alters and enhances the ways that humans and organizations process information
Social Relations	IT alters social relationships: social roles may change, hierarchies may become more or less salient, business processes may be modified, communication may require choices among different media and task.
Proxy View	
Shared assumption: the critical aspects of IT can be captured through some set of surrogate measures	
Perception	IT presented in terms of measures of users' perceptions of the technology, i.e. EOU, PU, Intention to use
Capital	IT conceptualized and measured in terms of dollars
Diffusion	IT represented by measures of diffusion and penetration of a particular IT artifact within some socio-institutional context, such as firm, industry, society
Ensemble View	
Focus on the dynamic interactions between people and technology	
Development Project	Focus is on the social process of designing, developing, implementing technical artifact, usually in specific organizational context and over time…examine the roles of key stakeholders in ISD projects, how such roles engender conflict, power moves, symbolic acts, and influence methodologies on development processes.
Production Network	Technology development is viewed at the level of industry/nation-state; national and international IT policies and the market forces operating within specific countries and regions
Embedded System	Focus on better understanding of how technology is used in a particular way: technology is neither a DV nor IDV; it is enmeshed with the conditions of its use; it is an evolving system embedded in a complex and dynamic social context with conditions of its use.
Structure	Focus is also on the ways in which technology is enmeshed in the conditions of its use, yet the conceptualization is grounded in ideas drawn from structuration theory. Technology is seem to embody social structures built in by designers
Computational View	
Focus on the capabilities of technology to represent, manipulate, store, retrieve and transmit information, thereby supporting, processing, modeling or simulating aspects of the world	
Algorithm	Algorithmic endeavor to build new/enhance existing computational systems; named and described in technical detail the computational system; reported on the prototyping and testing of the system (modeled and implemented and operating).
Model	Represent social, economic, and informational phenomena through methodology of data modeling/simulation; develop mathematically specified mechanisms, techniques and approaches; intent to build computational capabilities that facilitate the representational and modeling work of the researcher
Nominal View	
IT artifact is absent	IT/IS used as background information. The conceptual and analytical emphasis is elsewhere; IT artifact is not described, conceptualized or theorized, constituting neither DV nor IDV.

Table 1 Different Views of IT Artifact Identified by Orlikowski and Iacono (2001)

Table 2 (reproduced from the original study) shows the frequency and percentage of each conceptualization of technology. The authors observed that the only 12.5% of the articles in this population have taken the 'ensemble' view to technology whereas the very nature of technology including all its fundamental characteristics (e.g. social construction, contextually embeddedness, fragility, complexity, emergence and dynamism) is subject to discount in other views. Even the ensemble view itself might overlook some of the multi-generational and emergent aspects as "*designers, developers, users, regulators, and other stakeholders engage with evolving artifacts over time and across a variety of contexts*" (p. 132).

Cluster	Conceptualization of Technology	Freq.	%	Freq.	%
Nominal View	Absent			44	24.8
Computational View				43	24.3
	Algorithm	6	3.4		
	Model	37	20.9		
Tool View				36	20.3
	Labor Substitution Tool	1	0.5		
	Productivity Tool	12	6.8		
	Information Processing Tool	15	8.5		
	Social Relations Tool	8	4.5		
Proxy View				32	18.1
	Perception	8	4.5		
	Diffusion	8	4.5		
	Capital	16	9.0		
Ensemble View				22	12.5
	Development Project	7	4.0		
	Production Network	2	1.1		
	Embedded System	7	4.0		
	Structure	6	3.4		
Total				177	100%

Table 2 Classification of Articles in ISR (1990–1999) (Orlikowski and Iacono, 2001)

Recognizing this gloomy state of IT artifact presence in IS research, Orlikowski and Iacono then called for IS scholars to start theorizing about IT artifact and its use, while taking into account the computational, cultural, temporal and contextual elements associated with it. They aimed at "*a rich and growing repertoire of useful concepts and theories of IT artifacts*". In the next section, we will examine the current state of the IS field and try to find out if richer conceptualizations of IT artifact have been proposed and incorporated by researchers or not**.**

ASSESSING CURRENT STATE OF THE FIELD

Journal Selection and Article Coding

In this study, we reviewed the last three years (2006-2008) of three journals, namely, Management Information Systems Quarterly (MISQ), Information Systems Research (ISR), and the Journal of the Association for Information Systems (JAIS). Inclusion of MISQ and ISR as the best representatives of the field seems clear as these two maintain the highest impact factors among all IS journals (4.978 and 2.054, respectively). In case of JAIS, although it is a relatively new publication, yet it is perceived to be an eligible candidate for being the third A+ journal of the field ((Dennis, Valacich, Fuller, and Schneider, 2006). The journal is affiliated with the prestigious Association for Information Systems (AIS), benefits from a very strong editorial board, and is among the AIS senior scholars "basket" of 6 top journals (Saunders and Benbasat, 2007).

A total of 259 articles were found in the above set of journals, following Orlikowski and Iacono , we removed 47 articles which were providing broad commentaries on the field/literature, e.g. Klein and Rowe (2008) on IS doctoral programs, or Hirschheim (2008) on reviewing conceptual papers. The remaining 212 articles were analyzed (Table 3).

Journal	Issues Covered		Total No.	Selected Articles
ISR	Vol. 16, Issue 4 (Dec. 2005)	Vol. 19, Issue 3 (Sep. 2008)	68	57
MISQ	Vol. 30, Issue 1 (Mar. 2006)	Vol. 32, Issue 4 (Dec. 2008)	98	84
JAIS	Vol. 7, Issue 1 (Jan. 2006)	Vol. 9, Issue 9 (Sep. 2008)	93	55
		Total	259	196

Table 3 Selected Set of Articles

Orlikowski and Iacono have used a grounded theory approach, i.e. open coding, and identified 14 conceptualization of IS. Since they do not provide detailed elucidation of their coding or clustering procedure, an exact replication of their method is not possible. We adopted their 14 conceptualizations in our coding process. The process was as follows:

The first and the second author coded all the articles in the population independently, based on their own understanding of Orlikowski and Iacono's classification, and without any a-priori discussion. Coding of a paper normally demanded a thorough assessment of its abstract, theoretical backgrounds, hypothesis/models, and key conclusions. In certain cases the authors had to read through the arguments and sometimes the whole text. This round resulted in a joint probability of agreement of 0.66 and a Cohen's kappa (Cohen, 1960) of 0.56. Landis and Koch (1977) propose the following scale for interpreting the degree of inter-coder reliability measured by Kappa: (0.21-0.40): "Fair"; (0.41-0.60): "Moderate"; (0.61-0.80): "Substantial"; (0.81-1.00): "Almost Perfect." Hence, our inter-coder reliability in the first round taps into the "moderate" level (we will discuss this issue in the following section). After this round, all the authors went through the patterns of discrepancies in coding and tried to reconcile their understanding of Orlikowski and Iacono by means of establishing certain conventions for coding (e.g. not to consider IT-related standards as IT artifacts). Then, in light of these conventions, once again the first two authors discussed each disagreement and achieved a consensus. According to Larsson (1993), resolving discrepancies using a consensus approach is a "superior way to correct coding mistakes" (p. 1521). Still, for 8 articles an agreement could not be reached; these were presented to the third author who arbitrated the differences; her decisions were eventually enacted.

Findings

Our research objective was to assess the conceptualization of IT artifact in the last three years of MISQ, ISR, and JAIS. We used the entire population of the articles. Likewise, Orlikowski and Iacono examined the whole population of ISR articles from 1990-99. Therefore, since there has been no sampling of data, we will employ descriptive statistics rather than

inferential statistics. Table 4 and the radar chart in Figure 1 provide a means to compare the findings of Orlikowski and Iacono with the current status of the field.

Cluster	Conceptualization of Technology	Original Study (1990-1999)		Current Study (2006-2008)		Change
		Freq.	%	Freq.	%	%
Nominal View		**44**	**24.9**	**58**	**29.6**	**4.7**
Computational View		**43**	**24.3**	**20**	**10.2**	**-14.1**
	Algorithm	6	3.4	9	4.6	1.2
	Model	37	20.9	11	5.6	-15.3
Tool View		**36**	**20.3**	**53**	**27.0**	**6.7**
	Labor Substitution	1	0.6	1	0.5	-0.1
	Productivity	12	6.8	10	5.1	-1.7
	Information Processing	15	8.5	28	14.3	5.8
	Social Relations	8	4.5	14	7.1	2.6
Proxy View		**32**	**18.1**	**45**	**23.0**	**4.9**
	Perception	8	4.5	33	16.8	12.3
	Diffusion	8	4.5	9	4.6	0.1
	Capital	16	9.0	3	1.5	-7.5
Ensemble View		**22**	**12.4**	**20**	**10.2**	**-2.2**
	Development Project	7	4.0	7	3.6	-0.4
	Production Network	2	1.1	2	1.0	-0.1
	Embedded System	7	4.0	9	4.6	0.6
	Structure	6	3.4	2	1.0	-2.4
Total		177	100.0	196	100.0	

Table 4 Classification of Articles by Conceptualization of IT – Current vs. Original Studies

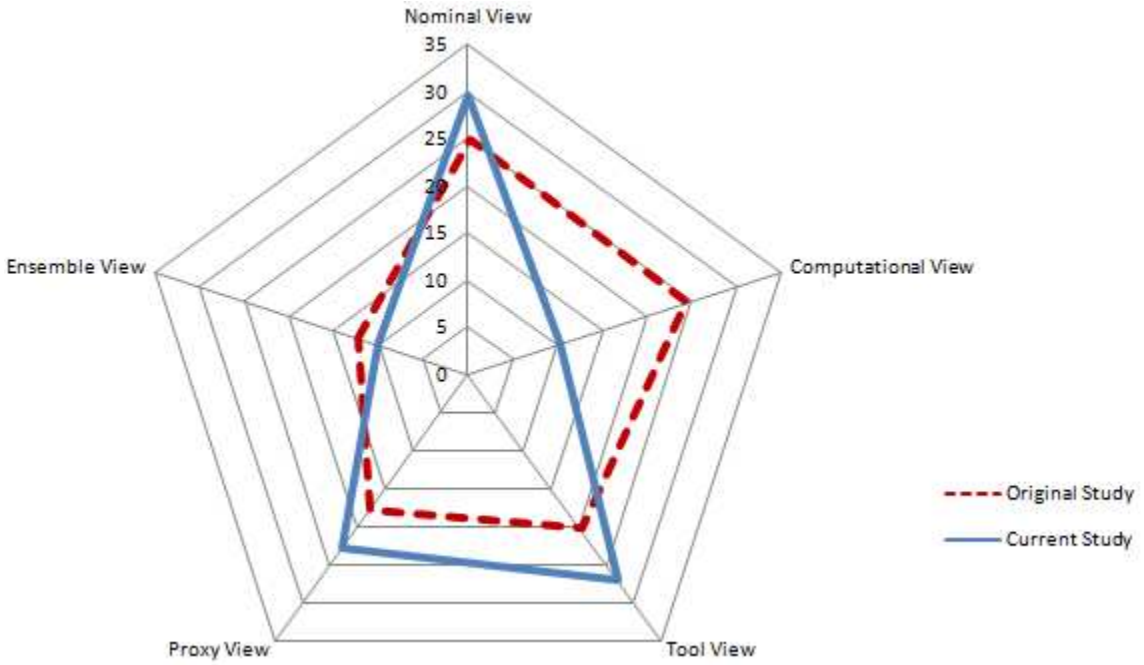

Figure 1 Percentage of Views Current vs. Original Studies

An examination of the above data reveals several points. First and foremost, it seems that nearly 10 years after the original call by Orlikowski and Iacono , even fewer studies employ rich conceptualization of IT artifact, and we are still "desperately seeking the IT in IT research". IT artifact is still essentially absent from 29.6% of IS articles which form the largest cluster among the five views. Second, a comparison of percentage from our sample and that of Orlikowski and Iacono shows a huge drop (24.3% to 10.2%) in the relative number of articles in the "computational view". This observation is consistent with Robey's assertion that "*IS has shifted its identity from a narrow preoccupation on computer programming and application development methodologies to an identity that encompasses the social context of IS development and use*" (Robey, 2003, p. 353). It is also in line with the results of Sidorova et al.'s (2008) latent semantic analysis that shows IS field pays a decreasing attention to IS development. These authors attribute this trend to the institutional affiliation of IS scholars within the business school (and not engineering departments), and also general business trends such as reliance on pre-packaged software which make the practice of development less relevant to many organizations. Finally, within the second level categories, conceptualizing technology as "Perception" shows a considerable increase (its relative proportion is almost quadrupled, i.e. from 4.5% to 16.8%). This can be partially attributed to the boom of "technology acceptance" studies in recent years (Figure 2). These articles typically rely on users' perceptions of technology and assess their attitudes and intentions towards using an IT.

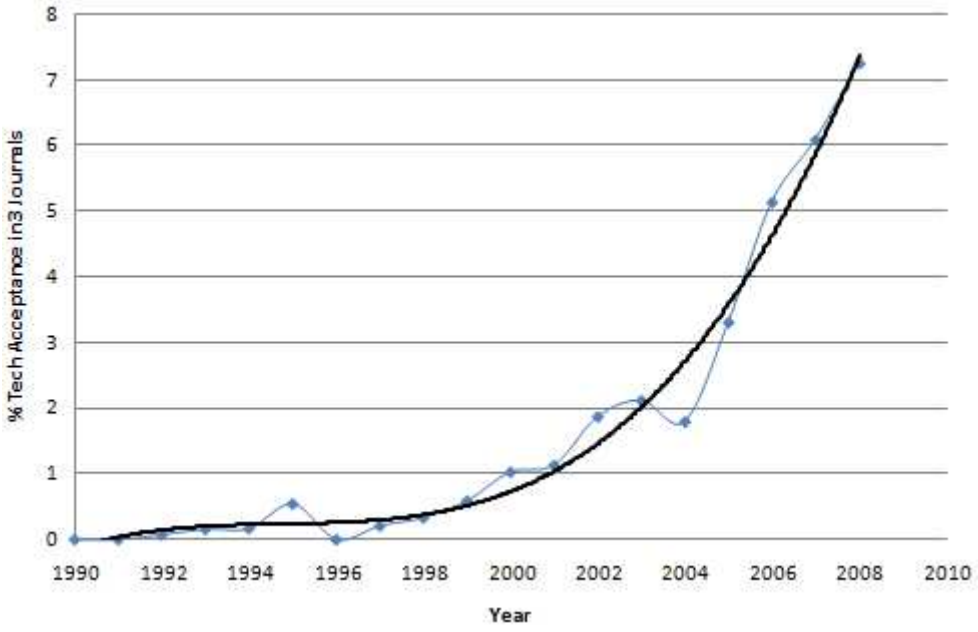

Figure 2 Percentage of Articles Mentioning "Technology Acceptance" in MISQ, ISR, and JAIS (1990-2008)

Table 5 and radar chart in Figure 3 illustrate different conceptualizations of IT for each of the journals, as well as their superposition (displayed again in Figure 4).

	MISQ		JAIS		ISR		Total	
Cluster	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Nominal View	25	29.8	15	27.3	18	31.6	58	29.6
Computational View	5	6.0	9	16.4	6	10.5	20	10.2
Tool View	22	26.2	10	18.2	21	36.8	53	27.0
Proxy View	22	26.2	14	25.5	9	15.8	45	23.0
Ensemble View	10	11.9	7	12.7	3	5.3	20	10.2
Total	84	100	55	100	57	100	196	100

Table 5 Classification of Articles by Conceptualization of IT among three journals

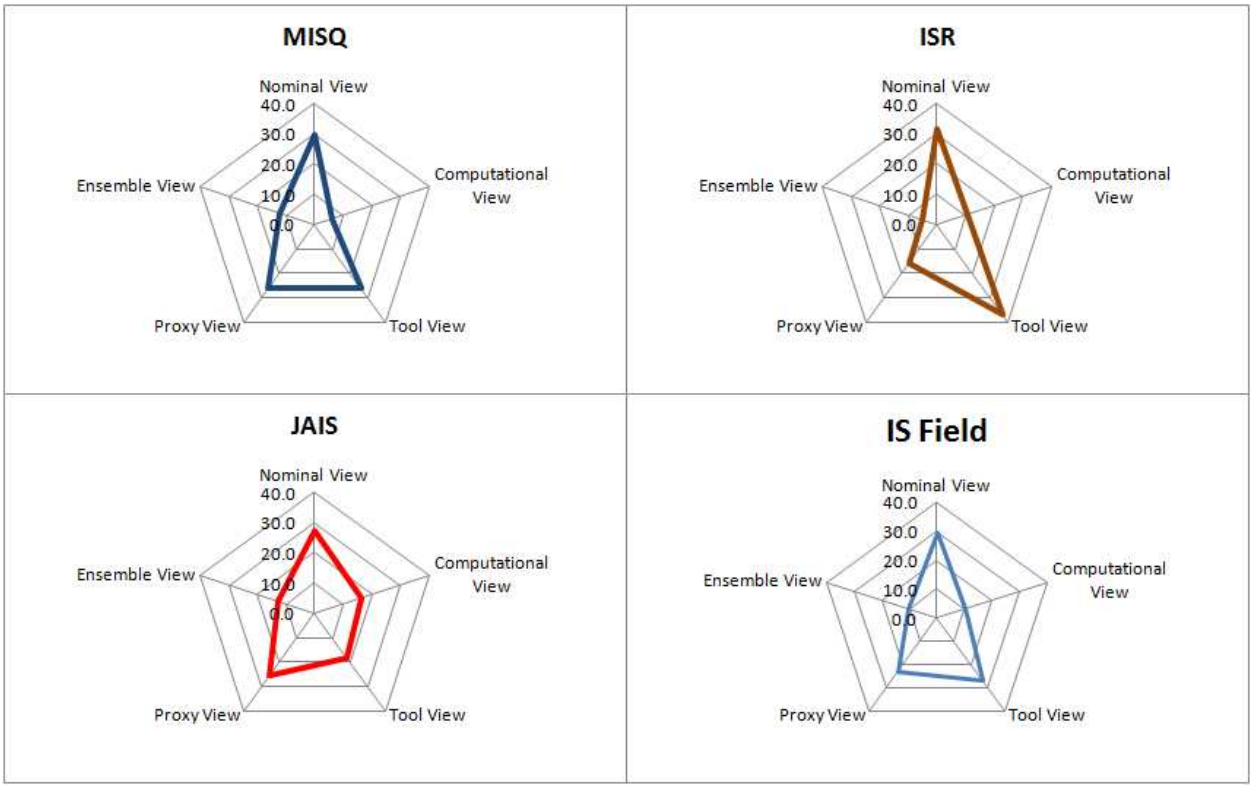

Figure 3 Percentage of Views for Each Journal and the Field

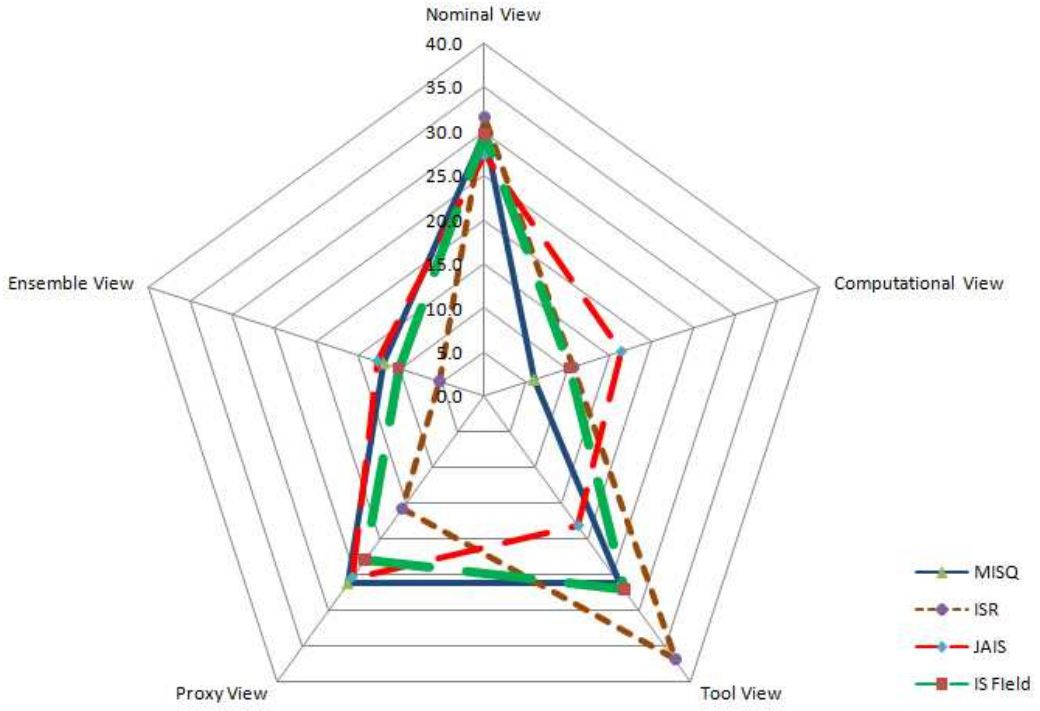

Figure 4 Percentage of Views among the Journals – Superposition

As shown in Figure 4, some variation can be observed among different journals. For example, the percentage of articles with ensemble view in ISR seems strikingly low (i.e. 3.6%). This, however, can be reconciled with Orlikowski and Iacono's observations in which they found the same measure to be less than 2% in 7 years of ISR. If there hadn't been for a special ISR issue which peaked the ensemble percentage to 28% in 1996, we probably would have seen comparable results between the original study and ours. It is interesting to see that among these journals, JAIS retains the highest percentage (12.7%) of articles with Ensemble view (greater than 11.9% of MISQ, and 5.3% of ISR), and the lowest percentage (27.3%) of articles with Nominal view (29.8% of MISQ, and 31.6 of ISR). In this sense, JAIS shows the best compliance with Orlikowski and Iacono's recommendation on deeper engagement with IT. In general, the variations among journals can be attributed to several factors including the editorial policies of each journal. Nevertheless, these discrepancies should be treated with caution as the relatively short time-period and small size of our set of articles threatens the robustness of the individual journal percentages. For example, the relatively high percentage (29.8%) of articles with nominal view in MISQ can be partly explained by a recent MISQ special issue on Information Systems Offshoring whose articles are typically not concerned with technology per se and correspond to the nominal view.

DISCUSSION

Overall, the above results do not depict a remarkable progress in terms of the field's engagement with IT artifact. In this section, we enumerate a number of potential venues for improving the status-quo. In particular, we highlight the needs for (a) defining the concept of IT artifact in a clearer and more encompassing fashion, (b) paying more attention to materiality of IT, and (c) mindfully revising the institutional barriers to theorizing about IT artifact.

(a) Need for revising the definition of IT artifact

There is obviously different opinions within the IS community on whether IT artifact should be the center of our scholarly focus or not (Benbasat and Zmud, 2003; Agarwal and Lucas, 2005). However, regardless of which viewpoint we subscribe to, it seems necessary to have a clear and agreed-upon definition of the IT artifact concept. Not having a clear definition could have potential adverse implications for the field. For example, without such clarity, reviewers and editors would decide on relevance/irrelevance of a manuscript based on their own interpretations of the concept. For being published in a top IS journal, normally a paper needs the approval of a number of different individual scholars and should conform to their –often different- interpretation of "legitimate" IS research. Hence, such ambiguity may indirectly compel IS researchers to pick more conservative topics, and deprive the field from novel ideas (Whinston and Geng, 2004).

The relatively mediocre level of inter-rater agreement (Cohen's kappa = .56) in the first round of our coding process could signal more general inconsistencies in understanding and interpreting the concept of IT artifact. Historically, the term IT artifact itself has not been very commonly used in the field; "*When I first heard about the IS identity crisis/domain controversy, my question was "Are Decision Support Systems IT artifacts?*" (Power, 2003, p. 540). Extant commentaries have also raised questions about the definition of IT artifact and have called for adornment of the term (Alter, 2003a) or better refinement of its meaning (Wu and Saunders, 2003). However, the ambiguity seems to be still present. Just as an example, consider one important question that came up during our coding process: can IT standards, IT strategies, or IT management techniques in general, be considered as IT artifacts or not? We briefly examine this question in the next paragraph.

Orlikowski and Iacono define IT artifact as "*those bundles of material and cultural properties packaged in some socially recognizable form such as hardware and/or software*" (p. 1). The definition seems quite equivocal about whether management processes or techniques can be IT artifacts or not. However, as Alter (2003b) also states, the way the term IT artifact is used throughout the paper is "*less like 'bundles of material and cultural properties' and more like hardware and software*" (p. 614). In particular, Orlikowski and Iacono cite Beath and Orlikowski (1994) as an article in the "Nominal" category because it is about a systems development methodology (Information Engineering) and do not make references to particular technologies. Hence, a literal reading of Orlikowski and Iacono will probably result in a negative answer to the aforementioned question about counting IT management techniques as artifacts. This being said, there are also elements in Orlikowski and Iacono's text which seems to be against this assertion; when Orlikowski and Iacono talk about technology as "Diffusion" view, they explicitly declare "techniques" as a class of IT artifacts:

"*Here, the critical aspect of technology is the rate with which particular* ***IT artifacts (hardware, software, techniques)*** *become spread across social systems and the extent to which they become integrated into operational activities*" (p. 124, emphasis added).

By this the authors seem to be referring to studies that examine diffusion of innovations like object oriented programming method (e.g. Fichman and Kemerer, 1993). If we accept this interpretation, then there seems to be a possibility to count IT management techniques as IT artifacts.

The above example shows one of the ambiguities in the definition and implies a relatively narrow scope for the concept that pushes many influential IS articles into the "nominal" category. These would include several studies on IT outsourcing/offshoring, online auctions, IT Strategy/Governance, and knowledge management. Hence, a large portion (25% in Orlikowski and Iacono, and 30% in ours) of research published in A+ IS journals will be portrayed as irrelevant to the main topic of the field. While further discussion of the issue (e.g. whether this is detrimental to the institutional identity of IS field or not) lies outside the scope of this manuscript, one suggestion would be adopting more comprehensive definitions of IT artifact, such as the one used in design science:

"*constructs (vocabulary and symbols), models (abstractions and representations), methods (algorithms and practices), and instantiations (implemented and prototype systems)*" (Hevner et al., 2004, p. 77).

Such definition will encompass studies that deal with methods (e.g. Marakas and Elam, 1998), models (e.g. Weber and Zheng, 2007), and constructs (e.g. Bodart et al., 2001), as well as the more major category of instantiations (i.e. information systems).

(b) Need for theories that enact the materiality of IT artifacts

IT has penetrated into virtually every task of modern organizations. Even in spite of recent economic concerns, businesses still continue to invest heavily in IT; worldwide IT spending is expected to grow 6% in 2009 and reach a total of US$3.6 trillion (Gartner Group, 2009). Likewise, over the last couple of decades business academia has tended to constantly increase its engagement with the notion of technology in management and organization research. As supporting evidence, Figure 5 charts the ever-growing percentage of organization research articles that contain the terms "technology" or "technological" in their citation or abstracts (extracted from ABI/Inform database of scholarly journals).

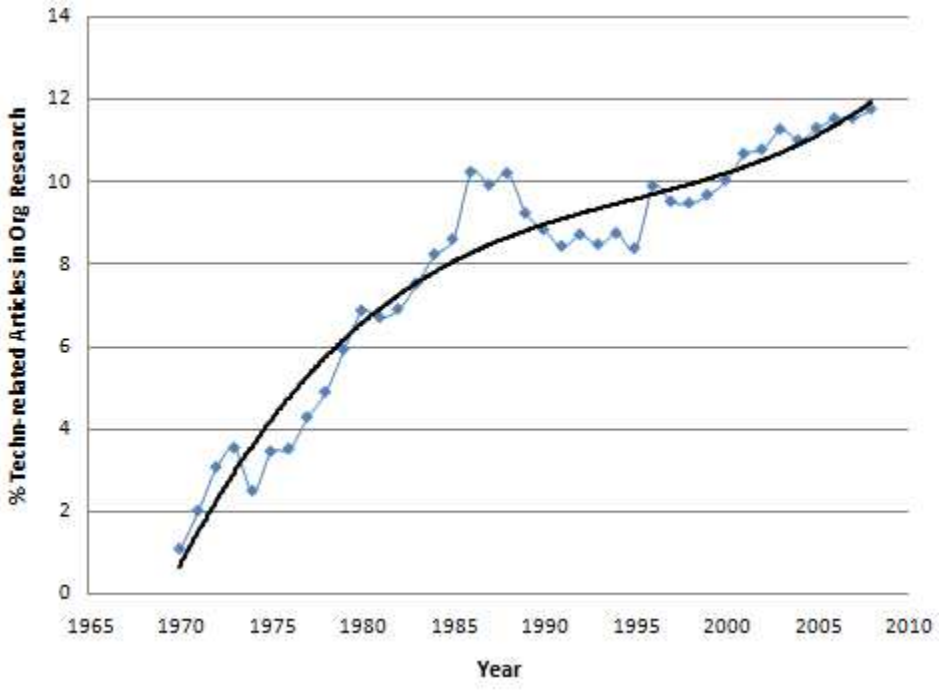

Figure 5 Percentage of Technology Related Articles in Organization Research (1970-2008)

However, regardless of such growing attention to technology in research and practice, there still seems to be a paucity of profound theories conceptualizing the multi-faceted nature of technology and addressing its relationship with organizational phenomena. This under-theorization can be attributed to the historical "victory" of environment-oriented theories in the

reference disciplines such as organization research (Zamutto et al., 2007). Some examples of these theories are institutional theory (DiMaggio and Powel, 1983), resource dependence theory (Pfeffer and Salancik, 1978), and population ecology (Hannan and Freeman, 1977), which eventually resulted in fading-out of theories that were taking technology as a determinant factor, e.g. structural contingency theory (Woodward , 1965).

The situation looks even direr if one looks for theories that take into account the "material properties" and inherent flexibilities of IT artifacts. As pointed out by Leonardi and Barley (2008), even the most influential studies that portray an ensemble view of technology (e.g. Barley, 1986), focus mainly on social practices and to some extent overlook the material/physical features of technologies. While these studies acknowledge the social construction of a technology's meanings and applications, they pay less attention to the possible physical modifications of technology during use, and to the outcomes that cannot be entirely explained by social processes and should be attributed to certain material properties of the technology. This might not always be a substantial phenomenon for traditional artifacts, however, unique characteristics of a typical IT artifact like high degree of malleability and customizability both intensifies the need and brings about an opportunity for IS scholars to develop theories that put more emphasis on the material features of technology, and those constraints and "affordances" (Zamutto et al., 2007) that stem from these features.

(c) Need for mindfully revising the institutional challenges to theorizing

Our results indicated that although Orlikowski and Iacono's call for theorizing about IT artifact and employing richer conceptualizations have been around for almost 10 years, the field hasn't witnessed much improvement in these regards. The roots of this problem can be traced to more macro-level factors. In a broad sense, one can posit that IS as an academic field is currently deprived of any novel theories –be it about IT artifact per se or any other IT specific phenomena. As a matter of fact, some scholars consider Technology Acceptance Model (TAM) as "*the only well-recognized theory in IS*" (Benbasat and Barki, 2007, p. 212). This ill-fated situation can be attributed to several supposedly malfunctioning elements in our field, e.g. (a) heavily relying on the mechanistically adopted theories from reference disciplines (Grover et al, 2008), i.e. researchers prefer to borrow a well-developed theory, "tweak" it and apply it to an IT phenomenon, than to follow a risky business of theorizing. (b) the structure of IS doctoral programs, which by emphasizing on "theory-based" research, in a sense discourages novel out-of-the-box ideas and suggest that "all research must start with an existing theory and make a small addition to it" (Goodhue, 2007, p. 221). (c) prominence of the "culture of rejection" (Straub, 2008) among top IS journals which tend to give the upper hand to rigor (as opposed to relevance) and "focus on technical issues rather than to relish fundamental ideas", and (d) lengthy journal review processes and reviewers who tend to see themselves as gatekeepers of the field (as opposed to what Saunders (2005) call "diamond-cutters"). This too could increase the risk of any avant-garde research effort for creating novel theories of technology. All these challenges portray a dismal road ahead for potential theorizers. It is mainly up to senior scholars of the field and mainstream journal editors to revisit and address these supposedly vicious dynamics.

CONCLUDING REMARKS

The manuscript was a first step towards building better conceptualizations and theories with regard to IT artifact. It reported on a re-examination of Orlikowski and Iacono's study applied to a set of recent IS publication. Given the inherent dynamism and volatility in a relatively young and applied field like IS, providing updates on earlier models/classifications has value in the field. Example of such revisit/updates include Pare et al.'s (2008) re-examining of Markus and Robey (1988), Delone and McLean's (2003) ten-year update on their 1992 IS success model, and Barki et al.'s (1993) update of their 1988 keyword classification scheme.

Despite its contributions, this paper has at least two limitations. First, there could be a possible bias in both our data and Orlikowski and Iacono's. Both of the studies use samples from North American stream of IS research. Given the general image of European IS research as emphasizing relevance to practice, we speculate that if the study is replicated on a European journal, there would be more promising results with regard to the presence of ensemble views of IT artifact. Actor Network Theory (Latour, 1992) provides a good platform for theorizing about the social interactions of human with technology. We ran a simple search for the term "Actor Network" in the European Journal of Information Systems (EJIS), MISQ, ISR, and JAIS abstracts. There were 26 results in the first journal, and only 2 results in the latter 3 journals combined. Although this is not conclusive by any means, but to some extent backs up our speculation about the better state of IT conceptualization in the European IS stream of research. Generally, inclusion of more IS outlets and extending the timeframe of our study would yield a more robust and comprehensive image of the field. A second limitation stems from the subjective

nature of the coding process. Nevertheless, we tried to minimize this subjectivity by following a systematic review process and demanding a complete agreement of two or three coders on each single paper.

Our results revealed that comparing to the 1990-1999 period, IS field has NOT gone through a dramatic change with regard to the conceptualization of IT artifact. An exception could be the computational view of IT which receives considerably less attention than before, and the use of perception-based measures of technology which has been drastically increased. But what matters most is that still there is virtually no IT in 29.6% of IT research, and only 10.2% of articles embrace an ensemble view of IT. Among the three journals surveyed in this study, JAIS discloses a relatively more promising profile by having the highest percentage of articles in Ensemble view and the lowest in Nominal view.

Our final point here is to once again echo Orlikowski and Iacono's call for not treating IT artifact in IS research as taken-for-granted, but theorizing about an IT artifact which (a) posses certain computational and cultural attributes, (b) is embedded in certain social/institutional/cultural context, (c) is subject to sensemaking (Weick, 1990) of individuals, and (d) is employed by users to carry out certain tasks. Of course, to achieve such an aim, it will be imperative that IS researchers agree upon an unambiguous and encompassing definition of the IT artifact concept.

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