



Strategizing information systems-enabled organizational transformation: A transdisciplinary review and new directions

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ABSTRACT

Twenty years after the promise of Information Systems enabling Organizational Transformation (IS-enabled OT), what have we learned? This paper reviews the literature in order to better understand this phenomenon. As specialists in IS, strategy and organizational studies, we analyze the discourse on OT found in the strategy, organizational theory and IS literature, and identify four structuring themes: organizational inertia, process, agency and performance. We apply the coding derived from these themes to a set of 62 empirical papers and discuss the results. Ten research avenues are then identified to show that IS-enabled OT is still a new frontier for strategic information systems research.

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1. Introduction

In the 1980s, the research theme of organizational transformation (OT) surfaced in organization studies with epic stories of radical changes (Tichy, 1983; Pettigrew, 1985). At that time, information systems were primarily used for automation, and were definitely not as prominent as they are today. What exactly is OT? To what extent have information systems contributed to OT? Twenty years ago, research in Strategic Information Systems began to explore this challenge (Scott Morton, 1991; Ciborra, 1992). Today, we may justifiably ask whether the academic literature has provided clear answers to these questions, and whether OT is still a new frontier for strategic information systems research. Naturally, Internet technologies and large-scale enterprise systems were not embedded in the economy when OT was born, but, if over the last 20 years useful frameworks have been proposed, OT should no longer be considered to be a new frontier. To determine whether it still is, we review the Information Systems (ISs), organization theory and strategy literature to identify gaps in the understanding of IS-enabled OT, and propose new research avenues. OT is generally understood as a process that engenders a qualitatively different organization. However, this definition alone provides neither a clear understanding of the phenomenon nor an actionable program for researchers and practitioners.

In 1991, the wave of OT was fuelled by the book edited by Scott Morton, which presented the first ideas and chapters on strategic alignment by Henderson and Venkatraman, as well as on IT-enabled business transformation by Venkatraman. Although the concepts were not defined in detail, over the years the IS discourse on OT has since had an important scholarly impact (cf. Table A1 in Appendix A). The early 1990s were a period when researchers began to show that information systems investments were not a magic bullet; rather, they required complementary organizational assets to develop IS value and productivity. Business Process Reengineering (BPR) fashion was strong (Wang, 2010). As a matter of fact, the following definition of BPR – “Any radical change in the way in which an organization performs its business activities” (dictionary.com in Wang, 2010) – applies perfectly to OT! However, whereas BPR at that time was a down-to-earth approach that used a

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rather simplistic method (Hammer and Champy, 1993), OT might have been too vast to understand, and thus lacked a credible alchemist and an actionable method to achieve transmutation (Land, 1996). At this point, can we provide a clearer theoretical and practical understanding of the knowledge of IS-enabled OT and what areas remain unexplored?

Pursuing this goal for the 20th anniversary of the *Journal of Strategic Information Systems* (JSIS) and the 20th anniversary of Scott-Morton's book is highly fitting for two main reasons. First, not only is there a persistent need to understand – that is, define, describe and theorize – the OT phenomenon, but the literature on OT has also grown and is now scattered throughout many journals covering several management disciplines. This pattern persists even when we limit our investigation to researching information systems and OT, as the diversity of journals illustrates. Second, the tools available on Science Direct show that JSIS has been publishing more on IS-enabled OT (cf. Appendix A) than has any other journal, regardless of its discipline. JSIS is among the top three IS journals in our selected set of empirical papers (cf. Section 4).

In the academic literature on strategy, organization studies and information systems, as well as in the consulting and practitioner press, the theme of OT is very important. In particular, information systems are considered to be a major asset for leveraging organizational transformation owing to the disruptive nature of IT innovations, the deep digitalization of business and their cross-organization and systemic effects, notwithstanding the amounts of investments in enterprise systems. However, we contend that the OT literature is fragmented; a more synthetic and all encompassing view is needed for a clearer research agenda on IS-enabled OT.

Because OT is a transdisciplinary phenomenon, we, as specialists in IS, strategy and organizational studies, have opted for a state-of-the-art approach. In the second part of this article we analyze the discourse on OT from a strategy, organization theory and IS perspective, and identify four structuring themes: organizational inertia, process, agency and performance. In the third part, we derive the coding from the analytical framework, and detail our selection methodology, before analyzing an empirical body of 62 journal papers in the fourth part. In the last part, we develop new avenues for research on IS-enabled OT from an analysis of the coding exercise.

2. Reviewing IS-enabled organizational transformation research: the need for a conceptual framework

To strategize IS-enabled OT, i.e., to identify the strengths and weaknesses of research on IS-enabled OT and to suggest avenues for further exploration, we need a conceptual framework that delineates key questions: What does OT mean, and why is it perceived as being necessary? How are IS-enabled OT risks and performance impacts considered and managed? How does an OT unfold? What do key stakeholders do during an OT? To design this conceptual framework, we present a general state of the art of the OT phenomenon.

2.1. The OT phenomenon and the “deep structure” question

The OT phenomenon has received many labels: radical change (Tushman and Romanelli, 1985; Tushman et al., 1986; Greenwood and Hinings, 1996), strategic change (Pettigrew, 1985), revolutionary change (Gersick, 1991), strategic renewal (Miles, 1997; Crossan and Berdrow, 2003), and organizational frame bending (Nadler and Tushman, 1989). Despite this diversity, the literature distinguishes two types of change: convergent change and deep structure change.

Convergent change, a term coined by Tushman and Romanelli (1985), is a change process occurring within a relatively stable structure. An example of convergent change is an organization that improves its efficiency and effectiveness without rethinking its business model or key processes.

The concept of convergent change dispels a lingering ambiguity in the OT literature surrounding the concepts of incremental change and radical change. The ambiguity stems from the fact that from an evolutionist point of view, radical change is ultimately a series of incremental changes, whereas convergent change is always incremental. Further, using the opposition of incremental change versus radical change to describe OT creates confusion, as we are then confounding two levels of analysis.

The first level characterizes the phenomenon: OT exists when the deep structure of the organization is transformed. In fact, Gersick (1991) introduces the image of deep structure, whose constraining effect she finds comparable to the paradigm of Kuhn (1970). Organizational transformation as a type of change thus contrasts with convergent change. The second level characterizes the conditions of organizational transformation, and it is here that the theories deviate. They agree on the nature of OT – transforming the deep structure of the organization – but diverge on the conditions of this transformation owing to their conception of the transformation of deep structure. It may be continuous or discontinuous, fast or slow, patchy or systemic, imported from the outside or created internally.

Three OT theories differ, based on the way they treat the deep structure question. First, evolutionism (Hannan and Freeman (1984), Burgelman (1991), Brown and Eisenhardt (1997), Plowman et al. (2007)) states that OT is continuous, slow and patchy – a type of organizational Darwinism. In contrast, punctuated equilibrium (Miller and Friesen (1980a, 1980b), Tushman and Romanelli (1985), Gersick (1991), Romanelli and Tushman (1994)) asserts that OT is discontinuous, fast and systemic. Institutionalism (DiMaggio and Powell (1983), Powell and DiMaggio (1991), Greenwood and Hinings (1996)) views OT as imported from the outside; it resembles a process of diffusion of a standard, which may be fast or slow, systemic or patchy. Nonetheless, institutionalism supports punctuated equilibrium. The same fault lines are found in the IS literature: evolutionism is represented by authors such as Orlikowski (1996), Ciborra (1992,1996), Ciborra and Lanzara

(1994), punctuated equilibrium by Sabherwal et al. (2001), Silva and Hirschheim (2007), and Lyytinen and Newman (2008) and institutionalism by Avgerou (2000), Butler (2003), Chatterjee et al. (2002), Gosain (2004), Teo et al. (2003), and Orlikowski and Barley (2001).

Concerning IS enabled organizational transformation, Robey and Sahay (1996) argued in 1996 that empirical research has not distinguished these theories according to their interpretation capacity. Based on the results of our literature review, we contend that this is still true in 2012. Actually, this diversity reflects that of real situations. In some situations an evolutionist approach to transformation may be appropriate, whereas in others a more punctuated equilibrium approach may be the most fitting. This theoretical contingency necessitates the clarification of the conditions of validity of a given theory and a return to the very essence of the OT phenomenon.

2.2. How sticky is the deep structure?

If the organization were perfectly fluid and plastic, the question of transformation would not surface. It is organizational inertia that makes OT an important theoretical and practical problem. To understand the issues of OT, one must keep in mind the central paradox of organizing. Organizing means routinizing. Yet this action of routinization creates inertia by entrenching the organization, and causing patterns to become rigid. In this perspective, transforming implies overcoming organizational inertia to realign the organization with its environment. The question of the identification of forms of inertia and the evaluation of their degree of stickiness then arises.

The literature on OT identifies five categories of inertia (Hannan and Freeman, 1984; Tushman et al., 1986; Gersick, 1991; Rumelt, 1994; Hannan et al., 2002; Besson and Rowe, 2011). Table 1 below summarizes the literature and underlines that these categories of inertia are indeed present in the IS literature.

OT is a global phenomenon in which psychological, socio-cognitive, socio-technical, economic and political considerations intertwine. In terms of IS enabled OT research, the existence of organizational inertia raises the question of which dimensions should be considered, depending on the level of analysis retained: individual, group, organization or sector. At the individual or group level, psychological inertia can be considered a significant dimension, as Lewin argues (1951). In contrast, at the business or sector level, one can hypothesize that political, socio-technical and economic dimensions become determining.

2.3. Dealing with inertia: process, agency and performance

Inertia is the first level of analysis of OT in that it characterizes the degree of stickiness of the organization being transformed and defines the effort required to propel IS enabled OT. Nonetheless, this level of analysis is insufficient. One must consider a second level of analysis related to IS enabled OT: process and agency; however, we also explore a third level of analysis related to IS enabled OT performance. Indeed, traditionally, the IS strategy literature justifies information systems strategic alignment on business performance (Chan et al., 1997).

2.3.1. OT process

To capture the notion of the OT process, we examine two streams of thought found in the OT literature: organizational development (OD) represented by Lewin, and punctuated equilibrium (PE) put forth by Tushman and Romanelli. The combination of Lewin's (1951) three-phase model "Unfreeze–Move–Freeze" with the two-phase model of PE "Convergence–Upheaval" captures the following four phases of the OT process:

- In the uprooting phase, an organization casts aside its old form. This phase corresponds to the *Unfreeze* phase of Lewin and the *Upheaval* of the PE model.
- The exploration/construction phase of the new organization corresponds to Lewin's *Move* phase but has no equivalent in the PE model.
- The stabilization/institutionalization phase of the new organization corresponds to Lewin's *Freeze* phase and partly to the convergence phase of PE.
- The optimization phase has no equivalent in Lewin's model and corresponds to the convergence phase of PE.

This division into four phases allows us to position the OT theories and underline their pertinence in the field of IS-enabled OT. PE emphasizes the uprooting phase, ignoring the phases of exploration/construction and stabilization/institutionalization. Accordingly, IS-enabled OT is a revolutionary act of detachment. Conversely, evolutionism, with its concept of inertia, rejects the revolutionary uprooting phase. Evolutionists view organizations as transforming gradually, without interruption, as Orlikowski (1996) figuratively argues, citing Escher's pictures on metamorphosis. Thus, evolutionism focuses on the exploration/construction path of the new organization, and hence the importance placed on emergence. In this approach, IS-enabled OT is mainly an act of innovation involving exploration and local improvisation. Institutionalism concentrates on the exploration/construction phase of the norm at the institutional level; the uprooting and stabilization/institutionalization at the organizational level is a secondary concern. IS-enabled OT thus primarily consists of diffusion/appropriation of the new organizational norm.

Table 1
Organizational inertia dimensions.

Organizational inertia dimensions	Core notions	Conceptions of agent	Reference papers in the management literature	Reference papers in IS and related notions
Negative psychology inertia	Denial, fear of learning	Agents are overwhelmed by their negative emotions due to threat perception	Coch and French (1948), Lewin (1951), Samuelson and Zeckhauser (1988), French and Bell (1990), Ford and Ford (1994), Huy (1999)	Computer anxiety (Venkatesh, 2000; Hackbarth et al., 2003); Performance vs. Learning goal orientation (Yi and Hwang, 2003); Status quo bias (Kim and Kankanhalli, 2009); Polites and Karahanna, 2012)
Socio-cognitive inertia	Norms and values at the individual, group, organization, industry and society levels	Agents are embedded in institutions characterized by their stickiness due to norms and values re-enactment	Argyris and Schön (1978), Daft and Weick (1984), Goia and Poole (1984), Bartunek (1984); Bartunek and Mock (1987), Dutton and Duncan (1987), Barr et al. (1992), Fiol (2002)	Cultural inertia (Cooper, 1994)
Socio-technical inertia	Technological and socio-technical path dependencies	Agents are embedded in socio-technical systems that have their own dynamics, especially due to development time and internal consistency	Woodward (1965), Nelson and Winter (1982), Dosi (1982), Hannan and Freeman (1984)	Information infrastructure (Gestell, enframing (Ciborra and Hanseth 1998), Hanseth et al. (1996), Pipek and Wulf (2009)); Large-scale systems (Chae and Scott-Poole, 2005)
Economic Inertia	Economic path dependency	Agents are embedded in business models that have their own dynamics arising from resource reallocation between exploitation and exploration processes	Pfeffer and Salancik (1978), Nelson and Winter (1982), Arkes and Blumer (1985), March (1991), Burgelman (1991), Gilbert (2005)	Sunk costs and escalation of commitment (Keil et al., 1995, 2000); Infrastructure activity costs (Harter and Slaughter, 2003); Switching costs (Zhu et al., 2006; Ray et al., 2012) and benefits (Kim and Kankanhalli, 2009).
Political inertia	Vested interests and alliances	Agents are embedded in networks of vested interests that have their own dynamics, especially due to alliances rebuilding time	Burns (1961), Emerson (1962), Bacharach and Lawler (1980), Pfeffer (1981), Pettigrew (1985, 1987), Denis et al. (2001)	Markus and Pfeffer, 1983; Markus, 1983; Jasperson et al., 2005

2.3.2. OT agency

The treatment of the question of agency in the OT literature is polarized between the managerial stream and traditional academic approaches.

First, the managerial stream views the question of agency as a prime consideration. Two approaches stand out: organizational development (OD) and strategic change. In line with Lewin (1951), OD mainly emphasizes the actors that undergo the transformation (Beer and Walton, 1987; Porras and Silvers, 1991; Robertson et al., 1993; Weick and Quinn 1999; Ford et al., 2008), whereas strategic change centers on the actors that design and carry out the transformation (Child, 1972; Tichy 1983; Pettigrew 1985, 1987; Miles, 1997; Moss-Kanter et al., 1992). The same line of demarcation is found in the IS literature: papers such as Klaus and Blanton (2010), Kim and Kankanhalli (2009), and Avital et al. (2008) belong to the stream of OD, whereas those of Keen (1981), Bancroft (1992) and Lederer and Sethi (1996) represent the strategic change stream.

Second, the treatment of agency is the more traditional academic literature on OT, which falls into three categories: first, agency may be subsumed by the process, which is particularly the case in the institutionalist approach. Second, agency may be treated superficially by focusing on transformational leaders and innovation champions, which mirrors the literature of the strategic change stream. This trend is often seen among the advocates of PE. Third, studies may seek to demonstrate the existence of local emergence arising from interaction among the actors, as in the evolutionist perspective.

This treatment of the question of agency in the OT literature leads us to distinguish two levels of agency that interact but that have very different structural and dynamic characteristics. First, the governing agency (G-Agency) focuses on the design, planning and control of IS-enabled OT (Weill and Ross, 2004). This level of agency can be compared to the concept of IS Business Structure (Brown and Magill, 1994) and is characterized as either: (1) centralized, in which the literature refers uniquely to the leader of the transformation, i.e., the CEO or another charismatic person (head of a division or a unit, the CIO); (2) decentralized, whereby several people are involved in the design, planning and control of IS enabled OT via management and steering committees; or (3) hybrid. At the second level, the working agency (W-Agency) focuses on implementing and appropriating a transformation initiative. This level of agency may be: (1) planned; (2) emergent, in the sense that it is a priori unplanned characteristics that emerge from the interaction process among the actors; or (3) hybrid (Markus and Robey, 1988).

2.3.3. OT performance

The question of performance is not central to the OT literature; however, the theme of failure is not a coincidence, as it expresses the complexity of OT performance negatively. Consequently, it has become a central theme of the institutionalist research program (Amburgey et al., 1993; Hoffman, 1999), following the argument by Hannan and Freeman (1984) concerning the particular risk level of OT. This importance placed on failure – and hence the risk of IS-enabled OT – has a dual advantage. First, contrary to the other approaches toward performance, risk provides an ex ante evaluation. Second, risk draws attention to the quality of design of the IS-enabled transformation initiative (governance conditions of the transformation initiative, the makeup of the team in charge of the initiative, choice of consulting firms) and that of implementation (capacity to manage uncertainty and emergence during the transformation process in particular). Contrary to what institutionalism suggests, it is not inertia that causes the failure of OT, but rather poor evaluation of this inertia by the Top Management Team (TMT) and the resulting errors in design and conduct.

3. Research methodology

This section describes how we delineated the literature evaluated with our coding system. Examining the entire body of literature on IS-enabled OT would have been problematic because of the size of the set and the difficulty of ensuring its coherence. Therefore, we restricted the scope by limiting the investigation to empirically based research papers. Within this set, we chose articles where the topic of IS or IT-enabled OT was mentioned in the abstract, regardless of the specific objectives of the paper. Thus, this set excluded other subsets where authors linked OT to a particular IT fashion (Wang, 2010) or a typical enterprise system (Goebel et al., 2008), such as BPR and OT or ERP and OT, without referring explicitly to IS or information technology in the abstract. This ensured a consistent set based on the positioning that the authors of the selected papers adopted.

We first searched ABI Inform/Global, JSTOR, and Science Direct using the keywords “organizational transformation” OR “transformation of the firm” OR “business transformation” OR “radical change” OR “revolutionary transformation” OR “revolutionary change” OR “radical transformation” OR “disruptive transformation” OR “strategic transformation” AND “information systems” OR “information technology” in the title, abstract, or keywords. This selection of databases and type of Boolean search, restricted to parts of the text such as the abstract, are commonly practiced in literature reviews (Lacity et al., 2011; Alagheband et al., 2011). This search strategy is more inclusive, as it does not limit the search to a narrow set of journals a priori, and is more appropriate when a theme has been developed and applied in several disciplines. In addition, we performed a specific search with the same keywords in the title, abstract, or keywords on the website of Palgrave MacMillan, editor of the European Journal of Information Systems and the Journal of Information Technology. These two journals are considered to be among the best in the field by the Senior Scholars of the Association for Information Systems and have not been included in aforementioned databases since 2004. We performed the same search on the *Systèmes d'Information et Management* website, the leading French-speaking journal, which published a special issue on OT in 2011.

We then reviewed the articles and filtered them according to two criteria: (1) relevance to the topic of IT-enabled OT, and (2) empirically grounded research. With regard to the first criterion, we excluded papers that dealt with work

transformations, such as the evolution of work-leisure hours, when these evolutions were not based on organizational level measures but were taken at the societal level. We also excluded those studying trajectory changes in an industry. For instance, Vitari and Ravarini (2009) explain and predict the evolution of the content management systems segment of the software industry. Regarding its core activities and core assets, they show that this segment is undergoing a radical change due to open source software and the developing practice of providing services. While the change in terms of product is radical, the phenomenon of OT itself is not tackled. Including such an article would have led us, for consistency sake, to consider many other industrial economics articles that confused organization transformation and industry transformation. Finally, when using “radical change” as a keyword, we found many IS articles discussing how innovative or disruptive a new technology is with respect to other technologies in terms of features of computing capability (e.g., Sircar et al., 2001). Most of these papers are centered on IT capability. While they give organizational application examples and quotes from interviews, the theoretical argument regarding the radicalness of the technology relies on the feature’s novelty rather than on the change in structure it triggers. We therefore excluded them.

Concerning our second criterion, empirically grounded research, it can be difficult to assess whether an article has a sufficient empirical basis to be included in our review. We eliminated conceptual (e.g., Porra, 1999) and normative papers (e.g., Moreton, 1995), even if, as in the latter example, the authors illustrated their arguments with examples that did not surface through empirical data gathering methods. In other words, we excluded pure theory papers, opinion papers, and papers with only very preliminary results explaining their action research approach. Instead, we included: (1) those testing a model or theory, (2) those describing the phenomenon, and (3) those based on first or secondary data sources which were theory-building. The latter type is relevant even when using secondary sources, because it may help us see the phenomenon of IS-enabled transformation differently without being too dependent on researchers’ a priori views when secondary sources are collected using a systematic method such as a meta-analysis.

4. Results

This method resulted in a set of 62 papers that spanned the years 1995–2011 and published in 29 journals (Table 2). Interestingly, of the fairly large number of journals publishing such research, IS journals account for 44 papers. This shows a strong interest in this theme even if, as mentioned above, the theme of organizational transformation originated in organizational theory. It is worth mentioning that JSIS not only appears in the top three journals publishing papers meeting our criteria (cf. Table 2) (not surprisingly, they are IS journals), but it also leads in our Science Direct search for the keyword “organizational transformation” in full-text. This may be partially explained by the good reception of the book edited by its editor-in-chief (Galliers and Baets, 1998) at a time when interest in the topic was reaching its peak.

We continued the analysis as follows. First, we applied the coding derived from our synthetic view of the literature on the theme (cf. part 2 and Appendix B) to the papers in our database (Table 2).

We also analyzed the IT topics that emerged from our selection to clarify technological or functional trends and inform future research agendas (cf. Table 3). Of the 62 papers, 39 fit into one of the eight popular themes or IT fashions identified by Wang (2010) and their subsequent waves. If we consider supply chain management and health informatics to be more recent popular themes, we can add four and three papers, respectively. With the exception of Application Service Provider, all popular themes are represented in our database, and not surprisingly, BPR and Ecommerce (inclusive of the second wave) come first. Thus, the potential of IT for OT appears to be huge, but as Frank Land (1996) has warned, it is not sufficient. Other primary and secondary events and forces come into play to trigger an OT before it can become a success (Guillemette and Paré, 2011).

Currently, digital architectures and web technologies constitute new phenomena that IS research has hardly taken into account, namely, recursivity, scalability and flexibility (Tilson et al., 2010). In Section 5.6 we focus on the e-commerce and internet-related literature above (11 papers in italics in Table 3) to look for a specific discourse and then determine how it can inform the future.

5. Discussion and recommendations

Beyond descriptive aspects, the overall results of the coding show a number of gaps that prompt various comments. We have thus identified ten avenues for research on Strategic Information System(s) couched in the form of recommendations. Each comment and recommendation (R) is derived from the set of papers identified in Table 2 and from our interpretation of their discourse based on the conceptual framework. For the first five sections, this interpretation rests on the coding. The sixth section is based on more general speculations found in these 11 internet-related papers on the questioning of their digital architecture properties relative to the (lack of) identification in these papers of the mechanisms that connect changes in IT and its capabilities for OT.

5.1. Organizational Transformation is a process, not a teleological model of diffusion

To present the results of the coding, we ranked the papers, first, according to whether the OT process was present and whether effects occurred at corresponding phases; second, we ranked by the name of the journal in decreasing order of

Table 2

Coding results of the selected papers.

Authors,journal, year	Paper#	Title	Process	Inertia	G-Agency	W-Agency	Perfor-mance	Theory
Cooper MISQ 2000	1.	Information technology development creativity: a case study of attempted radical change	N	SC,P	C	P	RF	O (Creativity theory)
Cooper et al. MISQ 2000	2.	Data Warehousing Supports Corporate Strategy at First American Corporation	N	ST, P	C	P	P, CA	N
Roepke et al. MISQ 2000	3.	Aligning the IT human resource with business vision: the leadership initiative at 3M	N	SC	H (federal model)	P	CA (CBV)	O (RBV)
Lyytinen and Rose MISQ 2003	4.	The disruptive nature of information technology innovations : the case of internet computing in systems development organizations	N	N	N	N	P	O (Disruptive innovation)
Barua et al. MISQ 2004	5.	An empirical investigation of net-enabled business value.	N	N	N	N	P,CA	O(RBV)
Mithas et al. MISQ 2011	6.	How information management capability influences firm performance	N	N	N	N	CA	O(RBV)
Nan MISQ 2011	7.	Capturing bottom-up information technology use processes: a complex adaptive systems model	N	SC	N	E	N	O (Complex Adaptive Systems)
Sarker and Lee JSIS 1999	8.	IT-enabled organizational transformation: a case study of BPR failure at TELECO	N	NP,SC,ST, E, P	H (CEO, Consultants and a group of influential users)	P	P, RF (focus on failure)	N
Crowston and Myers JSIS 2004	9.	Information technology and the transformation of industries: three research perspectives	N	I	N	N	N	N
JSIS2006 Gregor et al.	10.	The transformational dimension in the realization of business value from information technology	N	N	N	N	P,MV	N
Abraham and Junglas JSIS 2011	11.	From cacophony to harmony: A case study about the IS implementation process as an opportunity for organizational transformation at Sentara Healthcare	N	NP,SC, ST, E, P	C (a coalition for acquisition and then a coalition for implementation)	P (a "project" organization is described to steer transformation)	P, CA	O(OD)
Hock-Hai et al. JMIS 1997	12.	Organizational transformation using electronic data interchange: The Case of TradeNet in Singapore	N	SC	H (steering committee)	N	P	N
Clemons and Hann JMIS 1999	13.	RosenbluthInternational : strategic transformation of a successful enterprise	N	NP,P, SC	C	P	RF	O
Tillquist JMIS 2000	14.	Institutional bridging: How conceptions of IT-enabled change shape the planning process	N	I	c(TMT and consultants)	N	P, CA	O (Social Rules System)
Zhu et al. JMIS 2004	15.	Information technology payoff in e-business environments: An international perspective on value creation of e-business in the financial	N	ST, SC, E	N	N	P,CA	O(RBV)

Table 2 (continued)

Authors, journal, year	Paper#	Title	Process	Inertia	G-Agency	W-Agency	Perfor-mance	Theory
Ash and Burn EJIS 2003	16.	services industry Assessing the benefits from e- business transformation through effective enterprise management	N	N	N	P	P	N
Hackbarth and Kettinger EJIS 2004	17.	Strategic aspirations for net-enabled business	N	SC-ST	C: Leapfrogging power cases	P	N	E (DC)
Fiedler et al. EJIS 1995	18.	An empirical study of information technology enabled business process redesign and corporate competitive strategy	N	N	D:Incrementalism cases P: Centers on IS-business planning integration	P	N	O(BT)
Watson et al. I&M 2002	19.	The benefits of data warehousing: why some organizations realize exceptional payoffs	N	I + suggestion on ST	C	P	P, CA	N
Kamal IJIM 2011	20.	The case of EAI facilitating knowledge management integration in local government domain	N	N	N	N	N	N
Karsten JOCEC 1999	21.	Relationship between organizational form and organizational memory: an investigation in a professional service organization	N	I	D then C then D (G- agency is unstable)	E	N	N
Yang et al. JCIS 2007	22.	The Organizational transformation of securities brokerage firms under electronic commerce environment	N	NP, SC	C	N	P,CA	N
Holden et al. IJIE 2011	23.	That's nice, but what does IT do? Evaluating the impact of bar coded medication administration by measuring changes in the process of care	N	N	N	N	P (output measurement is the core of this article)	O
Whittington et al. OS 1999	24.	Change and complementarities in the new competitive landscape : a European panel study, 1992-1996	N	I	N	N	P	I more about the diffusion of new forms of organizing N
Ojiako and Maguire IMDS 2008	25.	Success criteria for systems led transformation: Managerial implications for global operations management	N	N	N	P	P	
Levy and Powell IJTM 2008	26.	Small firm transformation through IS	N	SC,P	N	P	P	O (BT)
Elliot I&I 2006	27.	Technology-enabled innovation, industry transformation and the emergence of ambient organizations	N	N	N	E	N	N
Yuhn and Park AEJ 2010	28.	Information technology, organizational transformation and productivity growth: An examination of the brynjolfsson-hitt proposition	N	I (lag)	N	N	CA (TPF)	O (RBV)
Li BJM 2001	29.	The internet and the deconstruction of the integrated banking model	N	SC,ST	N	P	N	N
Paper et al. TQM	30.	Managing radical transformation at	N	N	C (CIO + President)	P	N	N

Table 2 (continued)

Authors, journal, year	Paper#	Title	Process	Inertia	G-Agency	W-Agency	Performance	Theory
2003 <i>Agrawal and Haleem JGFSM 2005</i>	31.	FannieMae: a holistic paradigm A cross-impact analysis of the external situation and culture on factors of IT-enabled business transformation	N	C	N	N	N	O (BT)
<i>Carbone and de Martino MPM 2003</i>	32.	The changing role of ports in supply-chain management: an empirical analysis	N	N	Inbound: C	N	P	N
<i>Yin and Chen TST 2008</i>	33.	IT organizational transformation, knowledge integration, and IT assimilation: A case study	N (use of a four stages ebusiness development model)	N	Outbound: D C (the relationship CEO/CIO and TMT/CIO) with a touch of D (description of steering committee)	P	P	N
<i>Sayer JIT 1998</i>	34.	Denying the technology: middle management resistance in business process re-engineering	U	P	C	E	RF (focus on failure)	N
<i>Wastell and al. JIT 2007</i>	35.	The rise of the phoenix: methodological innovation as a discourse of renewal	UC	I	H (an initiative of the IS Head in a stream of top-down initiatives coming from the UK government)	H BPR participative approach	CA	O(OD revisited)
<i>Cunningham and Finnegan JIT 2004</i>	36.	Process improvement programs and information systems: a cross-case analysis of impact	C	N	H	H	P, CA	N
<i>Lyytinen et al. JIT 2009</i>	37.	Institutionalizing enterprise resource planning in the Saudi steel industry: a punctuated socio-technical analysis	T (Implementation process analysis with events, but no OT effects)	ST	H	H	P	I & PE (PE is applied at the project level)
<i>FossoWamba and Chatfield EJIS 2009</i>	38.	A contingency model for creating value from RFID supply chain network projects in logistics and manufacturing environments	Environmental (U)phaval& second order learning (C)	I	C (President of the TPL orchestrates)	P	P	O (BT)
<i>Mangan and Kelly EJIS 2009</i>	39.	Information systems and the allure of organisational integration: a cautionary tale from the Irish financial services sector	U (failed) which then provoked a change(R)	SC,E	C, with team controlled by credit union members	E (a new governance linked to institutional entrepreneurship)	CA, then RF (agency related)	I(IE)
<i>Tan and Pan EJIS 2003</i>	40.	Managing e-transformation in the public sector: an e-government study of the Inland Revenue Authority of Singapore (IRAS)	6 phases applicative focus on stabilization (R)	I	N	P	P	N
<i>Wei et al. EJIS 2005</i>	41.	Understanding misalignment and cascading change of ERP implementation: a stage view of process analysis	4 phases focus on (C) and (R)	SC, ST	C (TMT imposes a schedule, but has to accept deep changes in project phase)	E "perceptions change" "many of the tech-caused effects cannot be anticipated"	P	E
<i>Monod SIM 1998</i>	42.	Transformation d'entreprise et développement des systèmes d'information: le cas IBM	C	P,NP, ST	N	H (planned then emergence through prototyping)	P	O (contingency theory)

(continued on next page)

Table 2 (continued)

Authors, journal, year	Paper#	Title	Process	Inertia	G-Agency	W-Agency	Perfor-mance	Theory
Michaux and Geffroy SIM 2011	43.	Les transformations liées au CRM: une meta-synthèse au prisme de la théorie de la structuration	C (the notion of recursivity accounts for C stage issues quite well)	ST (Recursivity concerns sociotechnical system dynamics)	N	H	N	E
Guillemette and Paré SIM 2011	44.	La dynamique de transformation de la direction des systèmes d'information	U,C	P (Preserving the autonomy of each activity (SOCICA case) and limited to the execution of services) E (cost control)	H (Responsibilities are shared in both cases; in addition, the evolution of governing agency plays a rôle in OT (CALIXA case))	N	CA	PE
Robey and Sahay ISR 1996	45.	Transforming work through information technology: A comparative case study of geographic information systems in county government	C,R	ST, SC, P, E	Case 1 H	Case 1 E	P, RF Case 1 – success/case 2 failure	E
Orlikowski ISR 1996	46.	Improvising organizational transformation over time: A situated change perspective	C,R	N	Case 2 C N	Case 2 P E (improvisation, micro-practice)	N	E
Jarvenpaa and Ives IJEC 1996	47.	Introducing transformational information technologies: the case of the world wide web technology	U	ST, NP, P	D	E	P	PE
Silva and Hirschheim MISQ 2007	48.	Fighting against windmills: strategic information systems and organizational deep structure	U	SC,ST,P	C + external resources	P	P (time) ,CA(image)	PE
Noble JSIS 1995	49.	Implementation strategies for office systems	UC	NP, SC, ST, P	C	H (influencing role of powerful users) P + bottom up	N	O(a mixture of PE and I)
Chatfield and Bjorn-Andersen JMIS 1997	50.	The impact of IOS-enabled business change on business outcomes : transformation of the value chain of Japan Airlines	T	N	C + execution bottom up	P + bottom up	CA, P	N
Fernandez al. JOCEC 2010	51.	Uneasy alliances tradition and ICT transformation in the value chain	U	NP, SC, ST, E, P	C	E	N	O (Acculturation theory)
Berg IJMI 2001	52.	Implementing information systems in health care organizations: myths and challenges	C (an OD approach of constructing)	NP, ST, SC, E, P	H with a strong push from the TMT	H – A dialectic of planned change and emergence H (participative approach)	P,RF(Focus on failure)	O(OD)
Kawalek and Wastell JGIM 2005	53.	Pursuing radical transformation in information age government: case studies using the SPRINT methodology	C	I	H	H (participative approach)	P, RF	N(the failure of OD to deliver OT without a crisis)
McKeown and Philip IJIM 2003	54.	Business transformation, information technology and competitive strategies: learning to fly	U	SC	N	N	CA(profit)	O (BT)
Nikula et al. IST2010	55.	Empirical validation of the Classic Change Curve on a software technology change project	U,R (the S curve)	NP,SC	N	P	P	N
Sabherwal et al.	56.	The dynamics of alignment: Insights	U,C,R	SC, ST	Divfin: D, C, H	Divfin: N (Laissez	N	PE

Table 2 (continued)

Authors,journal, year	Paper#	Title	Process	Inertia	G-Agency	W-Agency	Perfor-mance	Theory
<i>OS 2001</i>		from a punctuated equilibrium model				faire) Energy: P Lease: E		
<i>Ciborra OS 1996</i>	57.	The platform organization : recombining strategies, structures, and surprises	U,C	SC	Energy: C, D,C,C Lease: C,H,D H	E	CA	E
<i>Boudreau and Robey OS 2005</i>	58.	Enacting integrated information technology: A human agency perspective	C et R	NP,ST. SC	N	E	N	O (Emirbayer and Mische)
<i>Lacity et al. EMJ 2004</i>	59.	Commercializing the back office at lloyds of london: outsourcing and strategic partnerships revisited	T	SC	N	N	P	N
<i>Philip and McKeown EMJ 2004</i>	60.	Business transformation and organizational culture: The role of competency, IS and TQM	U,C,R	SC, ST	C (a new CEO)	P	P	E
<i>McLean and Tyson ABFH 2006</i>	61.	Standard costs, standard costing and the introduction of scientific management and new technology into the Post-Second world war Sunderland shipbuilding industry	T	SC,ST	C (Finance and Managing Director)	P	CA	N
<i>Kim et al. GIQ2007</i>	62.	IT-enabled transformation in the public sector: A case study on e-government in South Korea	Adaptation and infusion (C); routinization (R) N: 33 U:14 C:17 R:10	SC N:16 SC:28 ST:19 P:15	H (consultants review and design the process) N:25 C:26 D:8 H:14 Once a case presents C,D or H it is counted as such. Not mutually exclusive	H: first planned, then emergent with infusion N:19 P:24 E:13 H:9	N N:17 P:33 MV:1 CA:19	O (Cooper &Zmud 6 stages model) N:24 E:7 PE:5 I:3
			T:4	NP:11 E:8 I:10			RF:9	O:24 including 5 RBV and 5 BT
Total: 62 papers			77	107	73	65	73	63

Table 3
Popular IT themes and corresponding references in our selection.

Themes (Wang)	ASP	BPR	CRM	<i>E-commerce</i>	Group-ware	KM	Data-warehouse	ERP
Second wave	SaaS Cloud			<i>E-government</i> <i>E-business</i> <i>Internet computing</i>		PLM	Business Intelligence	EAI
Papers references (Table 2)		8, 11, 14, 18, 30, 34, 35, 36, 52, 53	2 ^a , 13 ^a , 19 ^a , 42, 43, 48	4, 13 ^a , 16, 17, 22, 27, 29, 40, 47, 50, 62	46	1, 21, 33, 45	2 ^a , 19 ^a	20, 37, 39, 41, 58
Total number of papers	0	10	6	11	1	4	2	5

^a Papers appearing in two columns.

frequency, beginning with the IS journals (non-IS journals are listed in italics). If no phase of upheaval (U), construction (C), or routinization (R) was discernible, we coded the paper as “not relevant” (N). In a few cases, process was coded (T) because time and events were present, but the phase was less evident. To be noted is that the authors themselves did not name these phases that way; the coding is the product of our interpretation. The table of results shows that 33 papers did not take the OT process into account; only 47% of the papers (29) did. This proportion is similar between the IS-related and non IS-related journals. MISQ, JSIS, JMIS, and EJIS have published many of these papers. One difficulty in the coding was that the authors' identification of stages was not considered sufficient to code a paper as exhibiting C, U, or R (cf. Appendix B). The effects had to be shown in the text to be coded accordingly. What we mean by phases is distinct; it is a practice that develops and is not necessarily present in a stage model.

When looking at the methods used, primarily case studies, we could assume that they are also highly process-oriented. This is far from being the general case. First of all, many papers develop discourse concerning the transformation, before and after. This has typically been the case in several papers using the resource-based view or testing the complementarity hypothesis. Second, many case studies rely on stage models, assuming that OT follows a teleological model of diffusion. However, the mechanisms that explain the changes in stages and how events and actions unfold remain unknown. With the exception of one paper (Kim et al., 2007), the stages referred to are not related to OT process phases in the sense of this paper. Fundamentally, *IS research should describe and conceptualize the process of transformation when studying such a phenomenon (Recommendation 1: R1)*. This is not to say that researchers must apply a particular model or theory. Descriptive accounts are welcome. However, we contend that certain issues (e.g., type of managerial actions and stakeholder behaviors) differ in their effectiveness, depending on the phase considered. Thus, the knowledge of: (1) the way the process has been intentionally designed and executed, possibly within different phases, and (2) the way researchers interpret it is important, providing that these phases are not seen as rules but as formative contexts (Ciborra and Lanzara, 1994) for types of changes that offer theoretical and practical expectations.

Fundamentally, when scholars consider the process, whether there is upheaval or not is both a matter of what can be observed and that of personal theoretical choice. Radical improvements can be achieved through incremental changes (Jarvenpaa and Ives, 1996; Galliers, 1998). More importantly, the literature seldom looks at constructing and at routinizing. It is all the more worrying that these phases are independent of the process theory used for OT. *There is an important need to examine the construction and the routinization phases and their contingencies (R2)*. Naturally, examining the construction phase raises the problem of access to the field when the core of the transformation is explored while the organization may still be perceived by its key stakeholders as being under threat or tension, and when the usual reflex is to increase centralized control and limit experimentation (Gilbert, 2005). Regarding the routinization phase, it would be important to consider distinguishing two very different sub-phases: stabilizing and routine optimization. When exploration slows down after new attractive practices have been discovered, the first goal should be to stabilize the practices and inform stakeholders that new, efficiency increasing routines are being put in place. This issue is important, because an organization cannot refine its routines without knowing what they are.

5.2. Organizational inertia and path-dependencies

Apart from a few papers in the first subset, we also note that those that described at least part of the OT process (thus belonging to the second subset) are richer in terms of inertia and agency. We take this as an indication that our proposed conceptual framework is meaningful. An alternative could have been to limit the investigation to the 29, but we would have lost a few good papers. In both, the second subset (16 out of 29) and the whole sample (28 out of 62), socio-cognitive inertia is predominant. Regarding socio-technical inertia, negative psychology and political and economic inertia are not observed and analyzed as often. Sarker and Lee (1999) and Abraham and Junglas (2011) give a rich description of the various forms of inertia identified above.

The literature examined differs from the general literature on change because of the question of inertia. Specifically, it does not reproduce the discourse on resistance to change that traditionally has allotted significant weight to users and their motivations. Socio-cognitive inertia is certainly present, but socio-technical inertia plays an important role that, although well addressed, deserves even more attention (Lyytinen and Newman, 2008). Even more than in general models of change,

studies on IS-enabled OT must integrate socio-technical inertia because the scope of the changes adds to its weight. Nonetheless, we are surprised that given such changes, economic inertia has not been explored more often. Given the findings on the important role of IT fashions, IS specialists are well-positioned to describe socio-technical inertia, *but they must pay more attention to all dimensions of inertia, particularly economic ones, in their analyses of transformation (R3)*.

In addition, there is both a need to understand how the organizational inertia dimensions interact over time and which conditions or forces can break path dependencies created by organizational inertia. In fact, in the 25 papers that we examined we saw that multiple dimensions play a role, but their interrelationships are not theorized, nor is their cumulative role theorized, except for those taking a punctuated equilibrium approach. To account for the trajectory of the transformation, it may be important to *examine and reveal the path-dependencies that develop, and how the organizational inertia that these path-dependencies create can be overcome under certain conditions in an organizational transformation initiative (R4)*.

5.3. Agencies: governing agency as a black box

We decided to code G-Agency on the basis of IS structure. IS structure does not subsume agency, but it signals its role, function, and influence quite effectively. As a result, for the G-Agency, we took into account signs about the roles of the CEO (Abraham and Junglas, 2011), some steering committees or influential user groups (Noble, 1995), consultants, or any other accounts involving the top management teams. Results refer more often to a centralized governing agency than to a hybrid, and rarely to a decentralized governing agency (cf. Table 2). However, based on our coding of the 62 articles, apart from some exceptions, very little has been said about governing agency, which, when it appears is mostly very schematic, if not hidden. G-Agency is very often a black box in the OT accounts ($N = 25$).

For the W-Agency, most authors are more specific and refer explicitly to some sort of participative approach and emergence (cf. Appendix B). The structurationist IS literature, such as Adaptive Structuration theory (DeSanctis and Poole, 1994) and its latest Giddensian developments (Jones and Karsten, 2008), has put considerable weight on the human agency side, i.e., on the possibility to do otherwise and to show how emergence occurs in the supposedly most restrictive contexts, such as ERP system implementation and use. Some studies show the details of working agency (Boudreau and Robey, 2005; Orlikowski, 1996). Yet, the two sides of agency have rarely been treated with the same depth and care. *IS researchers should devote more attention to governing agency when studying organizational transformation from the working agency point of view (R5)*.

5.4. Performance: understanding risk and causes of failure

As in the OT general literature, performance is not a core theme in the IS-enabled OT literature. When it is referred to, the project perspective remains dominant (cf. Table 2). The competitive advantage perspective on performance is also referenced (19 papers), but it serves to legitimize IS-enabled OT more than to develop an articulated discourse on performance. The transformational value work by Gregor et al. (2006) is one of the few papers providing an analysis of OT from a market value viewpoint. This can be explained by the fact that the relationship between market value creation and IS-enabled OT is a more recent research theme introduced in IS in the 2000s (Dehning et al., 2003). As in the general OT literature, failure is an important theme; nine papers deal with failure risk. Clemons and Hann (1999) describe and analyze an original case study in which the CEO of a travel agency considers the risk of his firm and his personal risk when facing transformation risk. In particular, Mangan and Kelly (2009) show how failure risk led to the termination of an initial infrastructure project and to an unexpected transformation of the G-Agency. The hard fact of failure is also used to question the conditions of success. For instance, some authors note that a centralized G-Agency combined with a planned W-Agency is conducive to failure (Robey and Sahay, 1996). However, others note that a participative W-Agency is less able to trigger successful transformation (Kawalek and Wastell, 2005), which supports the idea that OD is an incremental change approach unable to trigger radical changes. These interpretations of failure suggest contradictory actions.

The fact that failure risk is taken into account in some papers and that failure stories are part of our data set clearly shows that the literature has matured since Land's criticism (1996). However, beyond a few accounts of failure cases, failure should be an important avenue of research for two main reasons.

First, failure should be considered a learning enigma, a sign that something has gone wrong during an OT. Perhaps the design was flawed, the leadership was wrong, or an unexpected event derailed the whole project. There are many causes of failure in something as complex as an OT (Lyytinen and Newman, 2008). What do we know about these causes? For instance, the managerial press and the consultants argue that an OT initiative cannot succeed without the support of the TMT. Does this mean that all TMT members should be aligned on the goals and means of the OT initiative? This is a very strong hypothesis, suggesting that a consensus must exist within the TMT. What happens if there is no consensus either at the outset of the OT or during its implementation? What happens if there are strategic divergences among the TMT, and the usual executive-suite politics that play out? We need to know more not just about the dynamics of failure, but also about the situations surrounding it (Lyytinen and Hirschheim, 1987; Keil, 1995). A contingent approach to failure should be very useful for depicting the whole range of possibilities and identifying situational patterns. Further, the literature does not tackle the most effective tactic (for instance, process sequences, organization of the G-Agency and the W-Agency, and their interaction) to achieve OT in a given situation. These issues of tactical nature are particularly important for OT research. Single or double

case studies are not sufficient for answering this question. *A large sample of OT initiatives is necessary to identify OT causes of failure typology (R6).*

The second reason that failure should be researched is that discourse on failure should be considered risk awareness discourse. There is a consensus that OT is risky due to its size, depth and length, but research is only beginning to grasp this issue (Mola et al., 2011). *Understanding the nature of the risk of IS-enabled OT is certainly a very promising research avenue (R7).* It could also be very useful for business. Ex-post project performance is necessary for control, while ex-ante assessment of risk is extremely useful for investment decisions in IS-enabled OT initiatives, as well as for design decisions about these initiatives.

5.5. The role of theories and methods in IS-enabled organizational transformations

The number of papers referring to the usual theories of OT (evolutionism, punctuated equilibrium and institutionalism) is very limited (14, including one referring to two theories), and evolutionism remains the dominant theory (cf. Table 2). The most striking result is the number of papers without any theoretical references (24) and those referring to non usual theories (24). Given the scant use of transformation theories, *the recommendation we can make is to build IS research upon the usual OT theories more (R8).* This underuse can be explained by the fact that the phenomenon of change is inherently complex and must be described, and hence, the recourse to the case study methodology. Indeed, while five papers are based on surveys with questionnaires, one uses simulation, three conduct a field study, two are historical studies, two apply action research, and the large majority performs one or multiple case studies. Only one did a meta-analysis and was devoted to CRM (Michaux and Geffroy-Maronnat, 2011). Given the obvious importance of qualitative research, it is surprising to see no papers published in well-regarded journals, such as Information and Organization, Information Systems Journal, or Journal of the AIS, in our final list. This is certainly attributable to the method which restricts the analysis to papers using the aforementioned keywords in the title, abstract, or keywords of the paper. For instance, had we searched in the full text, Information and Organization (Titled Accounting, Management and Information Technologies before 2000) would have been ranked second in the Science Direct search behind JSIS.

However, the use of the case study does not preclude the use of a theory to explain the phenomenon (Lyytinen and Newman, 2008). It must simply be adapted and pertinent for an actionable problem (Robey and Sahay, 1996). For instance, let us take the case of institutionalism. There is a paradox: in organization theory, institutionalism is quite prominent in the literature on transformation. However, in the context we studied, it is rarely used. Could this be because the systems literature rejects institutionalism? Gosain (2004), Lapointe and Rivard (2007), Lyytinen and Newman (2008) and many others (cf. Section 2.1) would argue to the contrary. Indeed, IS researchers turn to institutionalism to explain why change is so difficult in general, and why information technologies do not always have a major impact. The IS literature is greatly characterized by the dependence of structures and by their incorporation in information systems (Chae and Scott-Poole, 2005). This applies to all projects, even to ones with no a priori transformational goal. In contrast, when IS specialists specifically examine transformation, this goal paradoxically mitigates the problem of dependence of structures and institutions. This difficulty is indeed rarely analyzed – as if the magic reference to transformation would get rid of the problem. Research on transformation implies the evaluation of the initiative(s) in an institutional context incorporating all of its dimensions. Successful change can then be envisioned.

5.6. Digital-architectures-enabled organizational transformation

In this last section we focus on the e-commerce and Internet-related literature dealing with OT (cf. column 5 in Table 3). Being “different animals” (Tilson et al., 2010), how do digital architectures modify the trajectory of organizational transformation? The question is essential for the future of research on IS-enabled OT because theories of OT developed during the 1980s and should be considered “pre-Internet theories of transformation.” Punctuated equilibrium (PE), for example, which remains the dominant theory for OT in general, rests on the hypothesis of very strong inertia of the deep structure, which only a revolutionary approach to transformation could overcome. If digital architectures, owing to their characteristics, erode this organizational inertia by reducing deep structure stickiness, then an evolutionist type of approach to transformation should prevail over PE. Such an approach to transformation should, in turn, affect the role of IT function managers in organizations with a digital architecture backbone.

To inform this question, we use a multidimensional concept of inertia, focusing on the three dimensions directly influenced by digital architectures: socio-technical (modularity, scalability, interoperability, etc.), economic (amount of investments required, organizing conditions of the value chain, treatment of sunk costs, etc.) and political (number of actors involved, conditions of their involvement, power relationships, etc.).

Concerning the socio-technical dimension of inertia, only a few papers among the Internet-related literature that were examined (cf. column 5 in Table 3) underline that new digital architectures are more flexible and scalable than pre-Internet ones (Lyytinen and Rose, 2003; Tan and Pan, 2003). These sociotechnical trends – including recursivity as illustrated by mashups and Service Oriented Architectures – are real for young organizations (Hanseth and Lyytinen, 2011). However the issues still seem debatable, given the difficulties observed in interoperating different standards for older organizations (Bidan et al., 2012). The question of socio-technical inertia has therefore not been definitively resolved, even if the hypothesis of the trend toward reduction of this inertia putatively dominates within the IS community.

With the exception of Jarvenpaa and Ives (1996), the examined Internet-related literature often overlooks the question of the economic and political conditions of the transformation. For example, much of the literature examined above (cf. Table

3), shows that Internet technologies: (1) may affect the number and diversity of mobilizable stakeholders (Li, 2001; Tan and Pan, 2003), and (2) can engender new business models (Li, 2001) and new organizations for value creation and sharing (Elliot, 2006). Yet, the economic and political conditions of the transformation of these organizations are not clearly defined in the literature. In addition, the issues of intellectual property rights and the amounts of economic investments and risk in these digital architectures are becoming increasingly important, but they are barely covered in the literature (Tilson et al., 2010). This leads us to formulate the following recommendation: *Assessing the degree of organizational inertia induced by new digital architectures constitutes a promising research avenue for IS-enabled OT (R9)*, especially if one keeps in mind the distinction between the issue of architecture socio-technical flexibility and the issue of its transformative power, which requires the other dimensions of inertia to be considered, especially the economic and political dimensions.

Another promising avenue of research to explore concerns the role of IS managers in organizations with digital architectures as backbones. In such organizations, these function heads must apply new skills (Lyytinen and Rose, 2003) and new leadership modes which challenge the IS department and require profound adaptation (Jarvenpaa and Ives, 1996). At the same time, processes such as electronic voting and decision-making are evolving with the Web, expanding the possibilities for governing agency, while potential upheavals may increase with social networks.

Thus, reflecting on how governing agency and the transformation process can be changed by these technologies remains to be addressed. Based on the arguments above, we can elaborate on this theme. If digital architectures reinforce organizational inertia, especially at the level of economic and political inertia, as we have suggested, the revolutionary path will remain an alternative, and may require that the political power of the IS function be strengthened. This has evident and important implications for governing agency. Indeed, IS has always been a transformational object from its beginning. Due to its systemic properties, to the digitization of architectures and to its recognized pervasiveness in organizations, IS is more and more instrumentalized by the TMT. However, we do not know a lot about this strategizing activity at the top. Who is involved in this IS-enabled OT strategizing effort in companies (Armstrong and Sambamurthy, 1999; Besson and Rowe, 2001)? In which organizational configurations are these strategizing activities carried on? What is the content of this strategy dialogue? Therefore, *research should investigate the evolving role of governing agency, including the CIO and the IS function, in the chartering, design, implementation and monitoring of digital architectures (R10)*.

6. Conclusion

Through this review, we have identified ten avenues for research, and can therefore conclude that organizational transformation is still a new frontier for strategic information systems research. We trust that this first literature review will stimulate other researchers to go further because it provides: (a) a clearer understanding of what OT is like and how IT is related to it, and (b) new research avenues. While organizational change is a very general category that appears in the top 30 terms in “organization and information technology” research, OT does not (Sidorova et al., 2008) appear even in the top 100 terms. We hope this paper will help change this by focusing more on the conditions and paths to IS-enabled organizational transformation.

Capitalizing on a theme is of paramount importance for research advances. Naturally, being the first on this theme, this review of the literature is limited. But we consider that for a first comprehensive review our coding is sufficient to account for the limited richness of the IS-enabled OT empirical literature. Nevertheless, in future research, due to the importance of governing agency in understanding OT (Schwarz and Hirschheim, 2003) its coding should be developed to open up the black box. Also worth noting is the way we selected what we considered to be a manageable sample, eliminating some works that were potentially related to the phenomenon in question. In future, the method could be started anew by expanding on well-chosen topics, such as BPR, Enterprise Systems, Web X.O, or knowledge management, which have been identified as IT fashions. These are not its only components, but they are part of the transformation phenomenon.

A somewhat unexpected result of our review is that in many cases, researchers do not have a clear view of the issues at stake, and even when they have a theory, they usually lack a broad and encompassing analytical framework for the phenomenon under study. Therefore, we believe that the renewal of IS-enabled OT research entails a specific theoretical effort.

In this respect, and beyond the ten avenues for research identified in the course of our review, if we consider that OT is a process through which an organization (e.g., a system of routines) is re-aligned with its environment, one theoretical issue particularly needs to be explored. While it is recognized that this process of re-alignment is difficult and risky due to organizational inertia, there is a bias in the general OT literature toward negative psychology inertia (e.g., employees resistance mainly) and socio-cognitive inertia. Socio-technical inertia and economic inertia are underestimated, if not overlooked, in the general OT literature. IS-enabled OT research should become a major contributor to rebalance the general OT theory towards a much more systemic, socio-technical and economical approach to the OT phenomenon.

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Appendix A. Searches on main works and journals on the theme

Table A1. Most cited references on Google Scholar when searching “organizational transformation” or “transformation of the firm” or “business transformation”.

References	Number of cites (August 2011)	Discipline SI	Discipline strategy/ organizational theory	MIT author
Henderson and Venkatraman (1993)	1832	X		X
Brynjolfsson and Hitt (2000)	1512	X		X
Scott-Morton (1991)	1164	X		X
Orlikowski (1996)	1097	X		X
Venkatraman (1994)	909	X		X
Pettigrew (1987)	881		X	
Romanelli and Tushman (1994)	744		X	

Most important journals for the theme on Science Direct.

Science Direct provides interesting tools for listing journals and corresponding years of publication according to specific searches. For example, if we consider the term “organizational transformation” (which remains by far the most often encountered in all our searches) both in focus (abstract, title, or keyword) and in the full text after “radical change,” which is not retained here because it is less specific, these tables tend to demonstrate that JSIS ranks first among all journals on SCIENCE DIRECT.

When searching title-abs-key (“organizational”PRE/0“transformation”) with expert search on Science Direct, we find the following list in the first six journals (others have two or fewer articles):

- The Journal of Strategic Information Systems (6)
- European Management Journal (5)
- International Journal of Project Management (4)
- The Leadership Quarterly (3)
- Management Accounting Research (3)
- Scandinavian Journal of Management (3)

When searching text (“organizational”PRE/0“transformation”) with expert search on Science Direct, we find the following list of journals (others have nine or fewer articles):

- Long Range Planning (49)
- Organizational Dynamics (41)
- The Journal of Strategic Information Systems (40)
- European Management Journal (37)
- The Leadership Quarterly (37)
- Scandinavian Journal of Management (23)
- Information & Management (16)
- International Journal of Information Management (14)
- Accounting, Management and Information Technologies (12)
- Journal of International Management (12)
- Omega (12)
- Research Policy (12)
- Futures (11)
- Journal of Management (11)
- Journal of Professional Nursing (11)
- Technovation (11)
- International Journal of Production Economics (10)
- International Journal of Project Management (10)
- The Journal of Academic Librarianship (10)
- The Power of Collaborative Leadership (9)

Appendix B. Analytical category coding

Codes	Definitions	Major coding issues
<i>Organizational inertia</i>		
N – Not relevant	Inertia is not referred to	It is important to note that, with respect to organizational inertia, we only retained a dimension in the coding when it played a role in the analysis provided by the authors, and not when it was simply mentioned as a potential issue
NP – Negative Psychology	See Table 1	
SC – Sociocognitive	See Table 1	
ST – Sociotechnical	See Table 1	
E – Economic	See Table 1	
P – Political	See Table 1	
I – Inertia	Inertia is referred to, but not in a specific form, such as NP, SC, ST, E, P, I	
<i>Process</i>		
N – Not relevant	No reference to the OT process is made	The distinction between phase 3 and phase 4 is not made explicitly in the OT literature, and the boundary between stabilization, institutionalization, and optimization is difficult to evaluate. Therefore, we decided to group phases 3 and 4 together
U – Uprooting phase	See Section 2.3.1	
C – Exploration/construction phase	See Section 2.3.1	
R – Routinization phase	See Section 2.3.1; phase 3 + phase 4	
T – Time	Process is referred to but not clearly specified for a transformation analysis. Time and events are mentioned.	
<i>Agency</i>		
N – Not relevant	No reference to the OT agency is made	Governing agency often approached with IS structure (cf. Section 5)
GA – Governing agency	See Section 2.3.2	
C – Centralized		Planned and emergent are exclusive categories. The working agency is coded planned when implementation occurs as the execution of a plan with no reference to improvisation, learning, or bottom-up suggestions for reorientation. Likewise, the working agency is coded as emergent when it refers to improvisation, learning, or bottom-up suggestions for reorientation. When it explicitly refers to a form of creative interaction between planning and implementing, it is coded as hybrid
D – Decentralized		
H – Hybrid		
WA – Working agency	See Section 2.3.2	
P – Planned		
E – Emergent		
H – Hybrid		
<i>Performance</i>		
N – Not relevant	There are no references to OT performance	(1) It is difficult for the actors to perceive the degree of risk. It may be present but not described by the researchers, in which case we cannot evaluate it. The other categories are most often a treatment imposed by the researcher on the phenomenon
P – Project	OT performance refers to the usual suspects: lead time, budget, quality, time to market, work satisfaction	
MV – Market value	OT performance refers to approaches such as MVA, EVA, ROE, market-to-book value, Tobin's Q, CAR	(2) The performance categories P, MV, CA, and RI are not a priori mutually exclusive
CA – Competitive advantage	OT performance refers to approaches such as Factors Total Productivity, RBV, and Dynamic capabilities	
RF – Risk of failure	Actors are aware of OT failure risks and use this knowledge to understand, design, or carry out the OT initiative	(3) The CA category is particularly prominent, and we sometimes clarify it

(continued on next page)

Appendix B. (continued)

Codes	Definitions	Major coding issues
<i>Theories</i>		
N – Not relevant		The “other” category includes, for example, the Resource-Based View (RBV) or Venkatraman’s IT-enabled business transformation model (1994). This model is not an OT theory per se, but it has been particularly influential. We note O (BT) when this is the case
E – Evolutionism		
PE – Punctuated equilibrium		
I – Institutionalism		
O – Other	Refers to a theory different from E, PE, or I	

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