

## EYES WIDE SHUT: TECHNOLOGY ENTREPRENEURSHIP, INERTIA AND THE IMPACT OF ORGANIZATIONAL FIELD TRANSPARENCY

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### ABSTRACT

Research has consistently linked organizational inertia to the failure of industry incumbents to prosper or even survive from periods of discontinuous change driven by technological entrepreneurship. Recent work has unbundled the structure of inertia into two key determinants; 'resource rigidities' and 'routine rigidities'. In this study, we elaborate our understanding of the conditions under which these two forms of inertia are likely to occur, by drawing on the notion of Organizational Field Transparency, central to Institutional Theory. We use four years of field data from two manufacturing cases and their 21 responses to discontinuous threats and opportunities. We show that as a manager's experience of their organizational field transparency varies (opaque, semi-transparent, transparent, semi-hazy or hazy) so does their sensitivity to discontinuous threats and opportunities, along with the legitimacy and intensity of resource and routine rigidities. We offer our findings as a novel conceptual progression with five two-part propositions, which also have implications for dealing with heterogeneity in entrepreneurship and innovation research.<sup>[1]</sup>

### INTRODUCTION

Discontinuous innovations (Christensen and Bower, 1996; Tushman and Anderson, 1986) re-shape the existing terms of economic exchange within established markets (Shane and Eckhardt, 2003) and are based upon entrepreneurial opportunities that require established firms to make non-linear internal adaptations relative to traditional trajectories of development (Christensen and Bower, 1996; Tushman and Anderson, 1986). A dominant research issue in studies dealing with the phenomena of discontinuous innovation, in both technology entrepreneurship (Garud and Karnøe, 2003) and corporate entrepreneurship (Burgelman, 1983) settings, has been organizational inertia. The presence of organisational inertia is observed when firms lack the capacity to internally change in response to or in advance of significant external change (Miller and Friesen, 1980; Tushman and Romanelli, 1985). Interest in inertia has been spurred by both the prevalence of industry incumbent failure (Christensen and Rosenbloom, 1995; Christensen, 1997) and the impact that such failure has on industry dynamics (Hannan and Freeman, 1977). The failure of industry incumbents to prosper from periods of discontinuous change has been identified in studies of punctuated equilibria (Tushman and Anderson, 1986), technological S-curves (Foster, 1986a and 1986b), population dynamics (Hannan and Freeman, 1977 and 1984; Wade, 1995 and 1996) and technological trajectories (Dosi, 1982). In particular, scholars have highlighted the inertia of organizational development as a key factor that disables managers from responding to the discontinuous threats or opportunities offered by the exploitation of new technologies and the novel recombination of existing technologies (Dewar and Dutton, 1986; Henderson and Clark, 1990; Tushman and O'Reilly, 1996). Moreover, organizational inertia appears to dictate trajectories of development even when explicit calls for change and technological entrepreneurship are made from within the firm (Johnson, 1988; Tripsas and Gavetti, 2000; Tushman and O'Reilly, 1996).

We continue this important research tradition to understand the phenomena of organizational inertia. Our point of departure is Gilbert's (2005) distinction between inertia as 'resource rigidities', the "failure to change resource investment patterns" (p741) and inertia as 'routine rigidities', the "failure to change the organizational processes that use those resource investments" (p741). By distinguishing these two determinants of inertia, Gilbert not only enhanced our understanding of the underlying phenomenon of organizational inertia but also explained a seemingly contradictory finding in the literature: that the perception of a discontinuous threat can act as a catalyst or constraint for a firm's

response to discontinuous change. This said, investigations into the conditions that underpin an industry's incumbents inertia have failed to distinguish between a firm's ability to perceive threats and/or opportunities in the face of discontinuous change. Recent developments in Institutional Theory provide an opportunity to better understand threat and opportunity perception. In particular, the central concept of Organizational Fields (DiMaggio and Powell, 1983; Scott and Meyer, 1983; Scott, 2001) and their perceived transparency (Dorado, 2005) allow us to delineate conditions under which we might expect managers' sensitivity to threats and/or opportunities to be high or low. Hence, this paper presents the results of an investigation into how the managerial experience of organizational field transparency influences (1) the perception of discontinuous threats and opportunities and (2) the different determinants of inertia. Drawing on observations from two longitudinal case studies that compare 21 responses to discontinuous opportunities and threats, our article elaborates current theoretical perspectives of organizational inertia as summarized in Figure 1. We show that variations in how managers experience their organizational field transparency leads to variations their ability to perceive discontinuous threats and opportunities and in turn to variations in both the prevalence and strength of routine and resource rigidities.

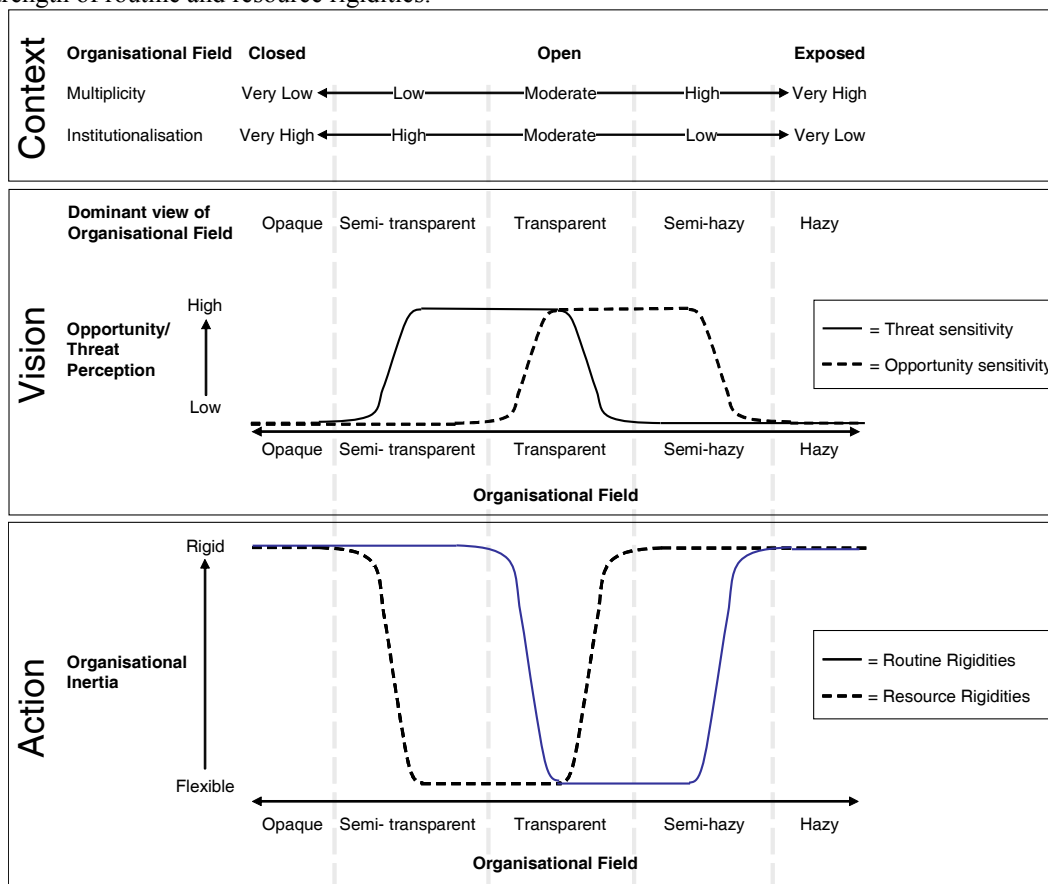


Figure 1. When managers have their eyes wide shut: unbundling the determinants of inertia to discontinuous innovation by elaborating the impact of organizational field transparency.

We divide the remainder of our article into four primary sections: a theoretical background, an overview of our research methodology, the results of our observations, and a discussion of our results. Our theoretical background is divided into three parts. Firstly, we provide an overview of the current understanding of organisational inertia, in conditions of discontinuous change. Secondly, we demonstrate how a manager's sensitivity to opportunities and threats depends upon their experience of organizational field transparency. Finally, we demonstrate a clear gap in knowledge by outlining how the notion of organizational field transparency can be used to elaborate our understanding of the determinants of inertia to discontinuous innovation. Our research methodology is best described as theory elaboration (Lee 1999; Lee, Mitchell and Sablinski, 1999); we employed a case study design, observing two manufactures over 4 years. Analyses of our observations are presented in two parts, the first overviews a within case analysis, the second presents the results of our cross case analysis and encapsulates our findings in formal propositions. Our discussion allows to assert how institutional theory may be used to offer significant conceptual progressions for investigations into organisational inertia and how it may be useful in general for scholars of technology and corporate entrepreneurship.

## THEORETICAL BACKGROUND

### Organisational Inertia.

Drawing from the two dominant schools of thought that seek to explain inter-firm differences - the resource-based (cf Wernfelt, 1984; Barney, 1986; 1991; 2001) and the-routine based (cf Nelson and Winter, 1982) views of the firm – scholars have looked towards resource utilization and persistent patterns of managerial behaviour to explain both technology entrepreneurship and underinvestment in discontinuous change within existing firms. For example, the theory of resource dependency (Pfeffer and Salancik, 1978), a critical resource-based contribution, is used to explain incumbent inertia by illustrating that a management team's freedom of action is limited by the necessity to satisfy the needs of those entities outside the firm that give it the resources<sup>[2]</sup> it needs to survive. The primary providers of a firm's resources are its customers and investors (Ansoff, 1965; Pfeffer and Salancik, 1978). As existing customers are unlikely to express a need for a discontinuous proposition (Leonard Barton, 1992; Leonard, 1995; Leonard and Rayport, 1997; Ahuja and Lampert, 2001; Ulwick, 2002) and as investors want to see fast returns on their investment (Burgelman and Sayles, 1986), resource dependencies are created that focus managers' attention and finances towards continuous improvement, creating an inertia against non-linear innovation (Pfeffer and Salancik, 1978; Burgelman and Sayles, 1986; Christensen, 1997). Alternatively, individuals and organizations "remember by doing" (Nelson and Winter, 1982, p99). They generate and follow routines - identifiable patterns of activity embodied in human assets and reinforced through repeated use and structural embeddedness (Nelson and Winter, 1982; Winter 1990). Whilst the notion of evolving routines offers a positive evolutionary perspective of the firm (Nelson and Winter, 1982; Langlois 1997; Feldman and Pentland, 2003), persistent compliance to routines often occurs because new information is not sought, which makes other types of behaviour inconceivable and allows embedded patterns of behaviour to become "taken for granted as 'the way we do things'." (Scott, 2001: 57). Embedded routines can create a dominant logic (Pralhalad and Bettis, 1986) and path dependence (Penrose, 1995; Tidd et al., 1997), as such, decision choices regarding the future that are not framed within the context of an organization's history are likely to be met with resistance (Walsh and Ungson, 1991).

Whilst some investigations into organisational inertia reveal that the perception of a discontinuous threat can motivate change (e.g., Huff, Huff and Thomas, 1992; Lant, Milliken and Batra, 1992; Bar and Huff, 1997), others claim that the perception of a discontinuous threat will lock managers into focusing on previously learned activities (e.g., Dutton and Jackson, 1987; Staw, Sandelands and Dutton, 1981; Hartman and Nelson, 1996). Rather than attempting to confirm or disconfirm these opposing views, Gilbert (2005) unites these contradictory findings by using the resource and routines-based views of the firm, strengthened by the notions of position reinvestment incentives (Arrow, 1962) and threat-motivated response (Staw, Sandelands, and Dutton, 1981) from economics and social-psychology respectively. His analysis reveals that despite the common use of Miller and Friesen's (1980) and Tushman and Romanelli's (1985) work to define inertia as a unitary construct, researchers have been inconsistent with how they measure the phenomena: "variables that measure a willingness to invest financial or attention-based resources have been confused with variables that measure change in "dominant logic" or change in operating routines." (Gilbert, 2005, p758). He shows that the threat of discontinuous innovation was seen as a catalyst to change by those who were measuring resource commitments and the driver of inertia by those who measured changes in routines. This analytical delineation allowed Gilbert to demonstrate that managers face two determinants of inertia, resource rigidities, the "failure to change resource investment patterns" (Gilbert, 2005, p741) and routine rigidities, the "failure to change the organizational processes that use those resource investments" (ibid, p741).

The reason the two determinants of inertia move in different directions is that their underlying causal mechanisms are different. Gilbert (2005) investigated the resource and routine rigidities in four incumbent US newspaper firms that faced the discontinuous threat posed by digital on-line media publications. He demonstrates that the perception of a discontinuous threat can enable managers in incumbent firms to legitimately challenge resource dependencies and overcome resource rigidities. However, it is the firms embedded routines that simultaneously prevent managers from responding to such threats, in fact, his findings illustrate that a discontinuous threat is likely intensify routine rigidities. This unique analysis reveals that under conditions of discontinuous change, resource and routine rigidities will have a differing impact on organizational development.

Whilst Gilbert's contribution to our understanding of inertia is to be commended, it must be noted that it was developed, in large, using a skewed population of managers. His investigation is mostly focused on mature firms, and managers who had perceived the threat of a discontinuous innovation but were practically blind to its opportunities. This unit of analysis fails to consider the nature of inertia in organizations whose managers are more opportunity-aware or those in which both

opportunities and threats remain hidden. In sum, we applaud Gilbert's work - his determinants of inertia represent a milestone in clarity on the subject - however, we believe that the limited scope of his analysis is not adequately reflected by the boundary conditions of his conclusions.

### **Organisational field transparency and sensitivity to discontinuous opportunities and threats.**

Institutional Theory is used to explain the nexus between social pressures and management action. Although the institutional perspective is most famously used to explain the isomorphism (similarity) and stability of organizational arrangements (DiMaggio and Powell, 1983; Zucker, 1977), it also provides a recognized platform from which to account for organizational change (Ehrenfeld; 2002; Dougherty, 1994; Greenwood and Hinings, 1996; Lawrence, Winn and Jennings, 2001; Meyer, 1982; Oliver, 1991). Institutional theory is therefore a useful perspective to explain why, if entrepreneurial opportunities and threats exist prior to their discovery (Shane and Eckhardt, 2003), not all managers are equally capable of discovering them, or indeed acting to exploit or mitigate their potential.

A primary unit of analysis in institutional research is the organizational field, a unit which comprises of the enterprises and actors that, in general, constitute the recognized area of institutional life (DiMaggio and Powell, 1983). Organizational fields only exist to the extent that they are institutionally defined, in that a mutual awareness of roles and responsibilities has emerged between groups of participants involved in a common enterprise (DiMaggio and Powell, 1983, p148). Organisational fields can therefore be described in terms of webs of "...values, norms, rules, beliefs, and taken for granted assumptions, that are at least partially of [the actors] own making" (Barley and Tolbert, 1997, p93). An emerging institutionalized organizational field will simultaneously enable and constrain the activities of the managers involved, limiting the opportunities and threats that they perceive and to which they respond. Hence, organisational fields and the processes of institutionalization are important to the topic of technology entrepreneurship as they increase the probability of certain types of behaviour, to a greater or lesser degree, by setting bounds on rationality and restricting the opportunities and alternatives that actors see. As completely bounded rationality is rare (Barley and Tolbert, 1997; Zucker, 1977), institutionalization can instead be seen as a variable: "... the greater the degree of institutionalization, the greater the conformity of cultural understandings, the greater the degree of maintenance [of the existing status quo] without direct social control, and the greater the resistance to change..." (Zucker, 1977, p742). Hence, not only does the institutional perspective enable a better understanding of the process by which patterns of action develop, gain embeddedness and even become taken for granted as correct (Meyer, Boli and Thomas, 1987, p13) but it responds to the growing rejection of theories that place the desire for efficiency as the key driver of decision-making. In fact, institutionalists reject propositions that attribute variations in formal structures to purely rational insights regarding technical and environmental conditions (Scott, 2001).

This perspective demonstrates why actors who seek to deliver non-linear adaptations will be confounded by highly institutionalized organizational fields (DiMaggio 1988; Barley and Tolbert 1997) and the resultant power structures held by political elites (Lukes, 1974). As the more highly institutionalized a social system becomes, the more patterns of behaviour become entrenched in everyday life and remain unchallenged (Zucker, 1977). In sum, the accumulated acceptance of norms generates a momentum that harnesses the inputs and actions of distributed managers.

Organisational fields can be conceptualized as having a varying degree of constituent multiplicity (Oliver, 1991). The degree of multiplicity experienced by managers refers to the extent to which managers are tightly coupled to their organizational field and insulated from ideas practiced in other sectors and, conversely, the extent to which they are uncoupled from their the recognized area of institutional life and exposed to and receptive of the routines, customs and resources of other fields (Greenwood and Hinings 1996: 1023; Whittington 1992; Seo and Creed, 2002). Managers who experience a high degree of multiplicity will be exposed to a large number of institutional referents, some of which will overlap and compliment and others that will conflict. "Conflicting pressures preclude organizational conformity to the institutional environment in its entirety..." (Oliver, 1991, p 163), in fact, "social forces do not so much smother managerial agency as enable it." (Whittington, 1992:707). Hence, institutionalists also demonstrate that in fields where managers are open to the tension between conflicting institutional structures, change can be mustered and new arrangements developed by actively exploiting divergence (Giddens 1991; Seo and Creed, 2002; Whittington, 1992).

Dorado (2005) utilises the constructs of institutionalisation and multiplicity to theorize that a manager's ability to perceive opportunities and threats and their capacity to mobilize resources to exploit them is dependent upon organizational field transparency. She demonstrates that the transparency of opportunities (and by default threats) within a field varies with managers exposure to multiplicity and with the field's degree of institutionalization. She asserts that organizational fields can

be experienced in one of three dominant forms (p394). Organisational fields can be *'opaque'* in which the field is closed, highly isolated and/or highly institutionalized, where opportunities and threats will appear almost absent and the ability to access resources to support them will be almost impossible. Organisational fields can also be *'transparent'*, in which the field is experienced as open, with several institutional referents in a substantially institutionalized context, where opportunities and threats will appear plentiful and where actors will be able both to define new institutional arrangements and to gain support to respond to them. Finally, managers can experience their organisational field as *'hazy'*. Such fields managers are exposed to extreme multiplicity, they perceive their field as highly unpredictable and highly complex; moreover, opportunities and threats are likely to be out of grasp of managers who will be hard pressed to make sense of and/or bring order to their problematic environment. Institutional Theory can, therefore, be used to demonstrate that potentially discontinuous innovations can be regarded as objective opportunities and threats within organizational fields, the transparency of which are dependent upon managerial experience of institutionalization and multiplicity.

#### **Elaboration of the impact of organizational field transparency on the determinants of inertia.**

There is a persistent failure in the literature to link organisational inertia and discontinuous innovation with insights from institutional theory. For example, an appraisal of Gilbert's (2005) ground-breaking study, through Dorado's (2005) lens of organisational field transparency, allows us to see that the managers he observed were exposed to high levels of institutionalization and were insensitive to the opportunities posed by discontinuous change but sensitive to the threats. Hence, Gilbert's analysis unbundled the determinants of inertia in a context where managers' experience of their organizational field appeared to lie somewhere between opaque and transparent - perhaps within a 'semi-transparent' intermediary field. We assert therefore that it is necessary to conduct a broader analysis of organizational inertia across the full spectrum of the organizational field transparency.

Moreover, although institutionalists directly link institutional entrepreneurship with two parallel conditions - (1) where managers are exposed to the creative tension generated when individuals witness practices and resources from other fields and (2) to levels of institutionalization that are both flexible enough to be challenged but rigid enough to facilitate means-ends calculations regarding change - they fail to directly explore inertia with the subject discontinuous innovation. Although Dorado's (2005) theorising can be used to explore the impact of three forms of organisational field transparency, she offers no operationalisation of these constructs and is yet to explore the space between each of these primary experiences.

In conclusion, our understanding of incumbent inertia can be refined by answering the following research question: how does the experience of organizational field transparency influence (1) the perception of discontinuous threats and opportunities and (2) the different determinants of inertia?

### **RESEARCH METHODOLOGY**

As the aim of this investigation was to offer a sharper conception of how and why organizational inertia inhibits the pursuit of discontinuous innovation, the methodology developed and employed is best described as theory elaboration (Lee 1999; Lee Mitchell and Sablinski, 1999), using a case study design (Yin, 1984; Eisenhardt, 1986; Silverman, 2000).

#### **Case Selection**

Case selection criteria were developed based upon theoretical distinctions (Glaser and Straus, 1967; Eisenhardt, 1989; Silverman, 1999). It was decided to select one established, small-medium sized manufacturer and one established, large manufacture, both in possession of a broad portfolio of core and non-core products. Both cases were to be average performers in their industries, although a prior track record for innovative capacity was preferable. It was also determined that both cases must have recently ignited a renewed focus on technology entrepreneurship.

A list of potential firms was provided by the IST directorate of the European Commission and two were deemed appropriate to be observed over a 4 year period. In addition, both had recently lost a core product to an overlooked discontinuous threat which was at the root of their renewed efforts to restore success. To protect the confidentiality of the cases, we present them as Case A (the small manufacturer) and Case B (the large manufacturer) and disguise or omit the explicit sources of their threats and opportunities.

#### **Data sources**

In total, ninety managers took part in our research, from which a core group of 14 managers were consistently and regularly involved. The participants formed two broad groups: the first was 'executive managers', with responsibility for vision and strategy and who were answerable to shareholders and influential stakeholders, the second was 'operational managers', which consisted of those who drove the firm's action-producing processes. Data were collected from primary and

secondary sources. Primary data were gathered from both executive and operational managers, via interviews and both formal and informal observations – formal observations included within-case and cross-case workshops and guided business tours; informal observations included ‘water-cooler conversations’, ‘hallway chats’ and ‘fly-on-the-wall’ meetings. Secondary data were collected in the form of archival documents, which included internal reports, internal memorandums, news reports and industry statistics. In total, we gathered data from 10 workshops (each taking 1-3 days, within single case or cross-case settings, attended by cross functional, multi-level senior staff), 8 guided tours, 5 ‘fly on wall’ meetings, industry monitoring (2001-2005), 20 interviews (face to face and telephone - recorded and transcribed), and 198 archival documents (plus email conversations).

#### **Primary data collection areas**

To conduct our investigation we used guidance from institutional theory and the literature on innovation and entrepreneurship - this paper reports on the insights gained from our longitudinal monitoring and analysis of each cases’ new product/service development effort, process innovation and entrepreneurial business model activities. Hence, we monitored the two chief determinants of a manager’s experience of organizational field transparency: their perceived degree of institutionalization (Zucker, 1977) and their perceived level of constituent multiplicity (Oliver, 1991). In parallel, we monitored variance in sensitivity to discontinuous opportunities and threats and variance in the cases’ resource and routine rigidities when innovating. Synthesis of these observations has generated insights regarding the relationship that multiplicity and institutionalization have with the capacity of managers to identify and deliver discontinuous innovation and the organizational inertia that inhibits it.

To operationalise an assessment of managers perception of ‘institutionalization’ we turned to descriptions made by Zucker (1977), Hannan and Freeman (1989), DiMaggio and Powell (1983) and Oliver (1991). Likewise, we turned to the work of Greenwood and Hinings (1996, p1023), Whittington (1992), Seo and Creed, (2002) when operationalizing our assessments of each case study’s level of multiplicity. Without sight of an end result, a statement of outcome resulting from a potential or missed threat or opportunity would be speculative at best. Therefore we report on the analysis of 21 products/projects, all of which were responding to or being impacted by discontinuous change, from which statements of outcome could be made at the time of writing of this paper. Sensitivity to discontinuous threats was recorded as such when participants referred to the negative effect of market changes, new market entrants or new technologies within their organizational fields. Similarly, sensitivity to discontinuous opportunities was recorded as such when participants referred to the positive effect of market changes, new technologies or the potential to introduce new market entrants within their organizational field. We adopted Gilbert’s (2005) assessment protocol to observe resource and routine rigidities

#### **Data analysis process**

Data were collected from both cases A and B over the same four year period. Instead of offering an analysis of convenient, linear, periodic time blocks, we present an analysis clustered around events or periods of stark operational changes in each case study site (Lawrence, Winn, and Jennings (2001, p626), a practice also supported by Clark (1985). We first collected historical data to contextualize the initial conditions of each case study (Dyer and Wilkins, 1991; Eisenhardt, 1989) and the subsequent data were codified into event-driven or operational phases within each firm. To better understand the data within each phase, we adopted coding and structuring of data, enfolding of literature, within and cross-case comparisons, eliciting confirming and disconfirming information and the generation a replication logic as recommended by Eisenhardt (1986), Glaser and Straus (1967), Miles and Huberman (1994) and Yin (1994). Two key forms of validity were employed: (1) communicative validity and (2) pragmatic validity (Sandberg, 2005). Consequently, the data sets were also analysed by a second party who was related to but not completely involved in the research program. Their coding results either directly replicated and confirmed the segmentations and clusters revealed by the primary author or they offered an initially disconfirming perspective that was used to refine and/or re-clarify the findings presented in this paper.

## **RESULTS**

We first collected historical data to contextualize the initial conditions of each case study (Dyer and Wilkins, 1991; Eisenhardt, 1989). The subsequent four years of data on each case’s process and business model innovations and new product/service development outputs were codified into case specific event-driven phases (Lawrence, Winn, and Jennings, 2001). Case A’s and B’s data were clustered into five and four further phases respectively, neither cases’ segmentation of linear time progression mapped onto the other. In this section, we present our analysis of the longitudinal data in two main parts. In the first part, we outline the ‘story’ of each case and present how managers experienced their organizational field transparency, how their sensitivity to discontinuous opportunities

and threats varied throughout the study, and the prevalence of resource and routine rigidities (Figure 2, towards the end of this section, presents a supportive data summary). In the second part, we present the results of our cross case analysis. We note here that managers in both cases experienced their organisational field in each of the forms that Dorado (2005) predicts (opaque, transparent and hazy) and our evidence strongly suggests the existence of at least two intermediary fields ('semi-transparent', between opaque and transparent, and 'semi-hazy', between transparent and hazy). We encapsulate our findings in formal propositions.

**Case A**

Our analysis revealed that Case A was heavily dominated by the actions and beliefs of its executive management team and that the firm had undergone five definable event-driven phases or periods. Twelve of Case A's products/projects were included within the analysis presented in this paper, each product/project is typical of those analysed during the investigation. Table 1 provides an overview of our analysis of Case A's historical context and its five event driven phases:

Variable	Organisational Field Transparency	Threat Sensitivity	Opportunity Sensitivity	Resource Rigidities	Routine Rigidities
<b>Observation</b>					
<b>Historic context</b>	Opaque	Low	Low	High	High
<b>Phase 1</b>	Semi-Transparent	High	Low	Low	High
<b>Phase 2</b>	Hazy	Low	Low	High	High
<b>Phase 3</b>	Semi-Hazy	Low	High	High	Low
<b>Phase 4</b>	Transparent	High	High	Low	Low
<b>Phase 5</b>	DISRUPTED	-	-	-	-

Table 1. An overview of Case A's historical context its five event driven phases.

> *Historical Context: Blinkered and Disrupted* - The business was eleven years old having been initially established by an American firm as a world-leading, technologically entrepreneurial manufacturer and core supplier. For the three years before our interaction, Case A had operated independently from its founding parent organization following a management buy-out. However, despite its innovative origins, both executive and operational managers had increasingly focused on better serving their parent organization's needs with variations of the same core products hence, even with independence, Case A continued on a path to becoming a highly institutionalized commodities provider. On meeting the management team for the first time, they demonstrated inflexibility to unfamiliar streams of business and were rarely subjected to conflicting expectations due to a lack of interaction with unfamiliar actors or organizations. In fact, in the few months preceding our first meeting the case had been displaced from a sector of one of its core markets.

> *Phase 1: Threat Perception Dominates* - It was how executive managers in Case A responded to their lost market that provided the first definable event-driven phase of the case study - this was best described as 'Threat Perception Dominates'. A need to protect existing products and a need for new revenue streams had emerged and in response the executive management team, particularly the Director General, set out to broaden their networks and to challenge their firm's well established modes of working. Exposure to new information gave executive managers a better view of potential threats and mitigating these threats soon topped their agenda. However, new information did not translate into any change of action for operational managers.

> *Phase 2: Information Overload* -The term 'Information Overload' best describes the second event-driven phase of data collection. As the potential of threats were communicated to all senior operational managers, the acknowledgement that more business could be lost increased; hence executive managers now explicitly tasked themselves with identifying new opportunities for new revenue streams. However, more exposure to new networks and actors created high levels of uncertainty at the top of the firm. The information overload experienced by the executive management combined with their dominance over corporate culture and the actions of employees resulted in uncertainly rippling throughout the business.

> *Phase 3: Opportunity Perception Dominates* - Case A entered its third definable phase - 'Opportunity Perception Dominates' - as executive management began to make more sense of new information and new contacts. The beginning of this phase witnessed executive managers working to consolidate their insights and attempting to communicate their findings with operational management. Despite the fact that operational managers now felt increasingly exposed to uncertainty, the communication exercise enhanced executive managers' understanding, which helped to further clarify emergent opportunities. However, the new business ventures that now appropriated priority executive management attention novel technical opportunities, particularly those in new and unfamiliar markets. In fact, responding to discontinuous threats had stopped to feature on the managers' agenda.

> *Phase 4: Open Minded and Disrupting* - The fourth definable phase of data collection witnessed Case A moving into an operational mode best described as ‘Open Minded and Disrupting’. The executive management team had adopted processes to normalize the act of identifying and assimilating new information from new and varied sources. A large part of the normalization process was the adoption of new management tools, including a portfolio management and ideas management process, which better enabled the executive managers to see, validate and pursue both discontinuous threats and opportunities. Although operational managers' understanding continued to lag, especially regarding the threats they were facing, they were increasingly developing a more comprehensive view of their firm's operating context and its broader potential.

> *Phase 5: Disrupted* - The word ‘Disrupted’ best describes Case A's final definable event driven phase. The experience of the preceding four years had generated an executive management prediction that low-cost Chinese manufactures may take their core market within three to five years. This insight had provided the primary driver for the pioneering launch of a small series of high potential discontinuous new business ventures in the previous two phases. However, the managers' prediction proved to be optimistic: during the final months of our observations Case A's largest customer of its core product category terminated its custom in favour of low-cost manufacturers in China. Managers at all levels of the firm were therefore under-prepared for this discontinuous change. Moreover, their new business ventures were not yet substantial enough to compensate for such a loss of revenue or redundancy of staff and the firm was closed, segmented and its hardware and IP were sold. Products A2 and A3 are now manufactured and sold by another firm and both are beginning to show the early signs of generating market disruption.

**Case B**

Our analysis of Case B's data is divided into four definable event-driven phases, throughout which the case was not dominated by the actions and beliefs of either one of its executive or operational management groups. The primary influence over the dominant modes of working and the firm's aggregate experience of organizational field transparency shifted between the two groups. Nine of Case B's products/projects were included within the analysis presented in this paper, each product/project is typical of those analysed during the investigation. Table 2 provides an overview of our analysis of Case B's historical context and its four event driven phases:

<b>Variable</b>	Organisational Field	Threat Sensitivity	Opportunity Sensitivity	Resource Rigidities	Routine Rigidities
<b>Observation</b>	Transparency				
<b>Historic context</b>	Opaque	Low	Low	High	High
<b>Phase 1</b>	Hazy	Low	Low	High	High
<b>Phase 2</b>	Semi-Hazy	Low	High	High	Low
<b>Phase 3</b>	Transparent	High	High	Low	Low
<b>Phase 4</b>	Semi-Transparent	High	Low	Low	High

Table 2. An overview of Case B's historical context its four event driven phases.

> *Historical Context: Blinkered and Disrupted* - When we initiated our data collection, like Case A, Case B could be best described as ‘Blinkered and Disrupted’. The firm had a high-tech, entrepreneurial history, it had been a global pioneer of a number of the sectors in which it operated and was still a dominant force in these now highly mature niche industries. However, for the six years preceding the initiation of this research, Case B had become an increasingly regimented, rigid firm that had focused its operation within mature, well established markets. For the last four years, priority was given to using its extensive but highly familiar network of suppliers and customers to focus upon driving efficiencies and incremental improvements from their 'cash cow' offerings. Past success had blinded both operational and executive management to the threats posed to their existing products and opportunities for new revenue streams in unfamiliar markets and opportunities to use technologies that would be considered peripheral. In the year before our observations began, Case B had suffered significant job losses when it lost a major contract to a competitor in what was described by a divisional R&D director as a “significant unforeseen disruption.”

> *Phase 1: Information Overload and Sense-making* - The first phase of data collection was defined by the impact of the managerial effort initiated to address the loss of a major section of Case B's business as mentioned above. This phase witnessed significant changes in strategy and management action and created a series of structural changes with deinstitutionalizing effects and was characterized by managers having to cope with massive ‘Information Overload and Sense-making’. Senior managers at all levels became motivated to increase their and their team's levels of interaction with wider networks of actors. Operational managers were able to absorb many of these changes by using experimental approaches to rapidly making sense of their changing business environment; such

improvisational action was seen to initiate organizational redesign via the identification of numerous discontinuous opportunities. Conversely, the increased exposure to multiple and conflicting alternative practices and expectations was experienced as acutely uncomfortable by the executive management, who reported massive information overload and high levels of confusion. The combination of these perspectives resulted in opportunities being overlooked or ignored, moreover, the vulnerability of Case B's existing core products remained a difficult issue to consider or accept.

> *Phase 2: Opportunity Perception Dominates* - The second event-driven phase, best described as 'Opportunity Perception Dominates', is characterized by the normalization of higher levels of interaction with unfamiliar actors and networks and the ability to utilize the multiple conflicting expectations and insights that were consequently exerted on the firm. In this phase, the development of more institutionalized processes and relationships began to improve the sense-making of managers at all levels and opportunities, especially those in new and unfamiliar markets, now seemed abundant. Operational managers had developed an innovation process that accounted for newly emerging institutional contexts, including an innovation team and a more formal but expansive 'ideas pipeline', which allowed them to make new forms of means, ends and means-ends calculations that improved their sensitivity to opportunities and threats. Although the executive managements' exposure to information overload was rapidly decreasing, they were still suffering the shock of change. Hence they were now open to making sense of and embracing new opportunities for new revenue streams but remained very cautious of innovation output that involved, as the Finance Director stated, "messing around with proven products."

> *Phase 3: Open Minded and Seeding Disruption* - Case B moved into its third definable phase, best described as 'Open Minded and Seeding Disruption', when new innovation routines were accepted and embraced by executive management. Managers at all levels reported that they were able to see the vulnerabilities of their core products and also the opportunities for driving discontinuous change in both familiar and unfamiliar markets. This phase was epitomized by the belief that there was a clear strength in the tension between the challenging information that was being received from outside actors and the new institutional structure of the firm.

> *Phase 4: Loss of Insight - Threat Perception Dominates* - The final phase of our observations was characterized by a 'Loss of Insight and the Domination of Threat Perception'. This phase began when a number of key operational managers left the firm in rapid succession. These managers were reported to leave because of retirement or to work for unsanctioned spin-offs, where they could exploit the knowledge that they had gained from confronting a turbulent period and driving the emergence of new ventures. Although the executive managers still felt they understood the challenges and opportunities that the firm faced, the remaining less experienced operational managers were not as well connected to important outside groups. Consequently, a more formalized and rigid innovation process emerged to compensate for the decrease in interaction with external networks. This focused the firm on reacting to discontinuous threats whilst reducing managers' sensitivity to opportunities.

### Cross case analysis and formal propositions

When responding to the perceived need for technological entrepreneurship, the leaders of Case A reacted more cautiously than the leaders of Case B. In Case B, all executive and senior operational managers were tasked with establishing new networks and challenging ingrained assumptions, whereas in the Case A, responsibilities for such activities were exclusively those of the most senior managers in the firm. Consequently, the managerial experience of organizational field transparency varied significantly between the cases throughout our investigation, as did the pattern and locus of influence within each firm. However, comparisons of Tables 1 and 2 reveal that the dominant experience of field transparency engendered comparable conditions within both firms, with respect to managerial sensitivity to discontinuous threats and opportunities, and the inertia caused by routine and resource rigidities. Moreover, deeper cross-case analyses revealed that it was the managerial sensitivity to discontinuous opportunities and threats that determined the strength and legitimacy of routine and resource rigidities. We encapsulate these findings in the following five two-part propositions:

*Opaque Organizational Fields:* Analyses of data gathered from the initial conditions of our investigation revealed that managers within cases A and B displayed a deep-set acceptance of norms, which had harnessed and focused action and maintained an opaque experience of organizational field transparency. This was observed to have a powerful dampener on managerial sensitivity to both discontinuous threats and opportunities. Moreover, it seems that it was this lack of visible opportunities and threats that underpinned the persistence of powerful resource and routine rigidities. These conditions are summarized in our first proposition:

#### *Proposition 1:*

(a) Managers who experience their organizational field as opaque will have a lack of sensitivity to

changes in their organizational field which results in their failure to identify and respond to (i) discontinuous threats, and (ii) discontinuous opportunities.

(b) Managers with a low sensitivity to discontinuous opportunities and threats, caused by organizational fields experienced as opaque, will face both: (i) powerful routine rigidities, and (ii) powerful resource rigidities.

*Semi-transparent Organizational Fields:* The management teams of both cases A and B experienced their organizational fields as semi-transparent at different points in time during our observations: Case A early on and Case B towards the end of the study. Yet, in both cases, when managers experienced their organizational field as semi-transparent, they were focused upon driving efficiency and understanding and responding to discontinuous threats, whilst simultaneously displaying a limited managerial sensitivity to discontinuous opportunities. Moreover, when managers are able to see discontinuous threats but not discontinuous opportunities, they were enabled to tackle their resource rigidities but their action remained trapped by routine rigidities. These conditions are summarized in our second proposition:

*Proposition 2:*

(a) Managers who experience their organizational field as semi-transparent will be (i) sensitive to changes in their organizational field which expose discontinuous threats, and (ii) insensitive to changes in their organizational field which expose discontinuous opportunities.

(b) Managers with a low sensitivity to discontinuous opportunities and a high sensitivity to discontinuous threats will be able to overcome resource rigidities but routine rigidities will continue to constrain action.

*Transparent Organizational Fields:* We observed that managers who reported experiencing their organizational fields as transparent, were able to see both discontinuous threats and discontinuous opportunities. Moreover, managers who were able to see both discontinuous opportunities and threats were observed tackling both their resource and routine rigidities - although success was very much still dependent upon generating enough organizational momentum to support their insights. These conditions are summarized in our third proposition:

*Proposition 3:*

(a) Managers who experience their organizational field as transparent will be sensitive to changes in their organizational field that expose (i) discontinuous threats, and (ii) discontinuous opportunities.

(b) Managers with a high sensitivity to discontinuous opportunities threats will be able to overcome both resource rigidities and routine rigidities, if they can create enough organizational momentum to support the change.

*Semi-Hazy Organizational Fields:* In semi-hazy organizational fields, managers' awareness of discontinuous opportunities, especially those in unfamiliar markets, is high, yet a multitude of new referents combined with a reduction in institutionalization blinds them from discontinuous threats closer to home. Moreover, in such an environment routine rigidities are challenged, often illicitly, and especially for new market explorations, but resource dependencies take effect due the lack of definitive means-ends calculations, including resource rigidities. These conditions are summarized in our fourth proposition:

*Proposition 4:*

(a) Managers who experience their organizational field as semi-hazy will be (i) sensitive to changes in their organizational field which expose discontinuous opportunities, and (ii) insensitive to changes in their organizational field which expose discontinuous threats.

(b) Managers in a semi-hazy field, with a high sensitivity to discontinuous opportunities and a low sensitivity to discontinuous threats, will be able to overcome routine rigidities but resource rigidities will continue in the absence of comprehensive sense-making.

*Hazy Organizational Fields:* A hazy experience of organizational field transparency was observed to have a powerful dampener on managerial sensitivity to both discontinuous threats and opportunities, and in the absence of better alternatives, managers maintain familiar patterns of behaviour and resources investment patterns. These conditions are summarized in our fifth proposition:

*Proposition 5:*

(a) Managers who experience their organizational field as hazy, will have a lack of sensitivity to (i) discontinuous threats, and (ii) discontinuous opportunities.

(b) Managers with a low sensitivity to discontinuous opportunities and threats, caused by organization fields experienced as hazy, will revert to familiar patterns of action, in the absence of obviously better alternatives, and will consequently face both (i) powerful routine rigidities, and (ii) powerful resource rigidities.

TECHNOLOGY AND INNOVATION

Case	Event driven phase	Evidence of Organisational Field Transparency	Example Project/Product Reference	Type of Product/Project				
				1	2	3	4	4
A	HC	<b>Opaque:</b> "We had bought-out the operations and were so focused on maximizing our links and profits to our mother company that we doubled our efforts at aligning our processes and improving efficiency and didn't really stop to think about what was going on in the world outside, looking back, I guess it was sort of naive..." [Director General]	Product A1 [no decisions led to the product being disrupted]	x				
	1	<b>Semi-Transparent:</b> "For the first time we are talking to new groups of people and we're scared... it's become obvious to us that losing these [Product A1] customers is the sign of things to come. But what can we do? Our whole company is set up to operate in a particular way... the very processes that distinguished us from the rest are now starting to strangle us... we can see it, but how we'll communicate this to change on our shop floor I don't know..." [Head of R&D]	Project A1 [project initiated to mitigate disruptive threat then terminated as incongruent with business]		x(i)		x(ii)	
			Competitor Product A1 [no prior knowledge and no prior attempt to look outside traditional markets led to no action]					x
	2	<b>Hazy:</b> "... we used a number of methods to show our [OM] guys the extent of the threats that we face [in our major product areas]... after they came to terms with what this meant, they've addressed our cost cutting and stream lining with a real passion... we've [the EM] been focused on looking around the world for new opportunities... but there's so much information and so many areas where we could contribute that its hard to know where to start... we spend more time than ever challenging our processes and trying to make sense of unfamiliar markets. Sure, its exciting but how do you know where to make the gamble - risk is a major issue right now." [General Manager]	Project A2 [Project established following advice from their network then suspended as it was not seen as core activity]		x(i)		x(ii)	
			Project A3 [Project established following identification of new technological potential]			x		
	3	<b>Semi-Hazy:</b> "My instinct is to tell you that we're talking to more people than ever, but in reality, we're probably talking to just as many, only now more information makes sense... it's been a sharp learning curve for us [the EM] but we've changed the way we work and can now see that the world should be our oyster... my big problem is still challenging the way things are done on the shop floor." [Director General]	Project A2.1 [clandestine decision taken by executive managers to advance Project A2]		x			
			Project A3.1 [decision taken to advance Project A3]		x			
			Project A4 [clandestine decision taken by CEO to resurrect a personal project]		x			
			Project A5 [clandestine decision taken by CEO to resurrect a personal project]		x(i)		x(ii)	
	4	<b>Transparent:</b> "The boss had got a little out of control... he was trying to change everything... now we've adapted our old [new product development] process to incorporate some of his new thinking it makes sense - we get it... they've [the EM] used these portfolio maps to explain why we need to address our bias towards improving [our core product categories]... and we now have a pipeline which has speeded things up and tells us where to go for good info." [Day-shift Manager]	Product A2 [decision taken to develop Project 2.1 into a pre exploitable offering]		x			
		Product A3 [decision taken to develop Project 4 into a pre exploitable offering]		x				
		Product A6 [decision taken to exist core product industry]			x			
B	HC	<b>Opaque:</b> "... we were just getting on with things like we had done for years... we'd got used to being the best and to being very secretive about what we did... I'd occasionally visit with outsiders, but it was often at my own cost..." [Senior Engineer]	Product B1 [decisions taken to improve product beyond customer demand led to it being disrupted by a simpler offering]	x				
	1	<b>Hazy:</b> "To conclude, our business is in a high state of flux... we not only have to better understand our customers but also our potential customers... we have to understand what's going on at the periphery... it may challenge many of our accepted wisdoms... but we cannot take decisions lightly... we must make great efforts to make sense of our fast changing environment" [Memo to all OM and EM from top EM]	Product B2 [Product nearly disrupted by aggressive supplier, saved by last minute negotiation]	x				
			Project B1 [Project established following insight into a market need then suspended as it was not seen as core activity]		x(i)		x(ii)	
	2	<b>Semi-hazy:</b> "Since we set up this new innovation team, we've stopped talking about new developments to just anyone, now we make sure we talk to the right people... we've put some really useful processes in place to help give shape to new ideas and to make selection easier... I just wish that 'upstairs' [the executive managers] would be more prepared to accept what we say and give us some more resources" [Head of Innovation Team]	Project B2 [launched to address performance over-supply issues]			x		
			Product B3(a and b) [the continuous improvement of Product B3 left it vulnerable to a low-end disruption]	x				
			Project B3 [the established to leverage value from a new market using an under-utilised but proven technology' later 'frozen' to perception of risk]		x(i)		x(ii)	
	3	<b>Transparent:</b> "... the use of a portfolio management approach by our new innovation team has helped us formalize our decision making process which in turn has given us more confidence... we've stopped constantly seeking more advice to make sense of the chaos we've faced... It really feel like this business is back in action..." [Dep CEO]	Product B4 [Case B's network allowed the firm to capitalise of regulatory changes before they were formally announced]			x		
			Project B3.1 [the re-launch of Project B3 due to a better understanding of the process of discontinuous innovation]		x			
	4	<b>Semi-transparent:</b> "We've lost the head of our innovation team, and quite a number of the gang who've been pushing the innovation agenda at our level... off to pursue pastures new... I don't know about the others here but I feel a bit lost. ... we've created a more formal ideas pipeline for decision making but it feels like we're missing something... perhaps even narrowed our focus" [Senior Technologist]	Product B5 [new managers raised doubts about new markets - stalling product launch]			x		

Key: 1 = a product owned by the case that was disrupted/significantly impacted by a missed opportunity/threat. / 2 = a live project - initiated to develop and exploit a discontinuous opportunity / 3 = a live project - initiated to mitigate a discontinuous threat. / 4 = a terminated or 'frozen' project - originally initiated to develop (or mitigate) a discontinuous opportunity (or threat). / 5 = a product with discontinuous potential that was missed or overlooked by the case - now exploited by a competitor. / (i) / (ii) = (i) indicates initiatives initial position within the phase and (ii) its eventual position. / EM = Executive management; OM = Operational Management

Figure 2. A within case analysis data summary.

## DISCUSSION

This paper presents an important variation in managerial behaviour and implications for theory that have hitherto not been explored or described within the literature regarding discontinuous innovation, organisational inertia, entrepreneurship and institutional theory. Moreover, should further research allow us to prove our propositions to be generalisable, our findings will have immediate implications for technology entrepreneurs and those responsible for driving their firm's innovation effort. Specifically, our research serves to modify the existing understanding of organizational inertia via findings that are both consistent and inconsistent with extant literature. We do not reject the recent developments in the field, such as those proposed by Gilbert (2005), instead we provide boundary conditions or a set of situations to which such work is more applicable. We contend that prior research fails to deal adequately with the experience of organizational field transparency, specifically the mechanisms of multiplicity and institutionalization. By initiating research to bridge this gap, we can build on world-class research by more precisely defining a broader categorization of contexts in which managers will find themselves in the face of discontinuous opportunities and threats. Specifically, the conceptual approach developed in this paper combines the traditional perspectives from the theory of resource dependence, the growing support for the notion of a routine-based view of the firm and the well established foundations of institutional theory to provide a more complete explanation of organizational inertia in the context of discontinuous change. Using a longitudinal approach, the characteristics and prevalence of organizational inertia have been shown to vary directly with the degree of organizational field transparency experienced by the managers involved. We show that the degree of multiplicity and institutionalization experienced within a firm influences managers' experience of organizational field transparency. The degree of organizational field transparency can therefore be categorized into at least five dominant forms, all of which were shown to affect resource rigidities and routine rigidities - the two key determinants of inertia - to different extents. To this end we have delivered a novel conceptual progression that is both descriptively more valid and explanatorily more informing. In sum, our efforts to advance understand of incumbent inertia have produced a conceptual progression that has allowed us to generate propositions not exposed by previous conceptualizations. We suggest that these create a more informed basis for future empirical research and must now be thoroughly tested.

Furthermore, our analyses revealed that the managers' experience of organizational field transparency varied throughout our investigation. Although the stories of both cases are different and although neither progressed in exactly the same fashion, there was a similarity in the reaction of both cases when moving from their initially highly institutionalized states. The organizational field transparency experienced by managers in both cases was observed to quickly swing from opaque to hazy and then to migrate, through a period of sense-making, into a more transparent position. Yet it is unlikely that managers in either case were interacting with more, or more diverse, institutional constituents in their hazy phase than they were when they reported their fields as transparent. Instead, managers in the latter phase were simply more capable of dealing with conflicting and diverse information. Thus, our assessments of organisational field transparency do not translate into objective measures of formal institutional structures or constituent multiplicity, in terms of the physical size and diversity of the managers networks. Instead, our analysis of organisational fields within the cases reflects the very personal nature of organisational field transparency, reflecting the strength of the subjective measures that were employed in this study. Therefore, whilst we suspect that managers can create information overload and hazy organizational fields with unbearably large and overly diverse, suboptimal networks, they can also suffer similar strains purely on the basis of being unfamiliar with exposing themselves to conflicting expectations and alternatives for the first time. Moreover, the importance of sense-making activities in the progression from hazy to transparent organizational fields provides further support for Weick's (2005) contention that managerial sense-making practices are an integral enabler of experimental activities resulting in organizational redesign. Our case studies demonstrate that sense-making in non-institutionalised fields can help to increase sensitivity to discontinuous opportunities and to overcome resource rigidities that constrain the pursuit of discontinuous technological entrepreneurship.

Resource and access constraints prevented us from exploring the full richness of the managers involved in the study beyond that of their formal and occasional informal business activities. It may have proved useful to consider their positions within and relations to external structures stretching beyond the case study sites (Wittington, 1992). However, in a bid to not entirely overlook the complexity and diversity of the different actors involved in the case studies, we divided the participants from each case study site into two core groups – executive and operational managers. Whilst we touched upon how these groups influenced (or dominated as in Case A) their firms' aggregate organisational field transparency, we believe that further analysis of this distinction will help to further

refine our above contributions. Moreover, further studies may eventually be able to help better understand the emergence of an organisationally dominant experience of organisational field transparency - in particular, which managerial views are more influential, at what times in the organisation's life cycle and in which industries

Finally, we would like to acknowledge an element of luck in our study. We clearly found ourselves in the 'right place at the right time' with the 'right cases studies,' in that they both suffered significant change and both displayed significant resilience during this time. Therefore, we accept that our insights may be difficult to replicate in the future with such a small sample of firms.

## CONCLUSION

This paper set out to sharpen the conception of how and why organizational inertia inhibits the pursuit of discontinuous innovation, in an attempt to offering a more informed basis for future empirical research. Specifically it investigated how the managerial experience organizational field transparency influences (1) the perception of discontinuous threats and opportunities and (2) the different determinants of inertia. To this end, managers in opaque organisational fields were observed to consistently fail to respond to discontinuous opportunities and threats, and they were bound by intense levels of both resource and routine rigidities - the two key determinants of inertia. In semi-transparent fields, discontinuous opportunities remained mostly over looked, yet the threat of potential discontinuities became more apparent; this helped managers to overcome resource rigidities although inertia remained through routine rigidities. The experience of an organizational field as transparent allowed managers to overcome both determinants of organizational inertia as they could better perceive and understand the threats and opportunities of potential discontinuities. In semi-hazy organizational fields, managers' exposure to a multitude of new referents enabled them to be highly aware of discontinuous opportunities in unfamiliar markets but blinded them from discontinuous threats closer to home. In this semi-hazy condition managers were able to tackle routine rigidities, especially for new market explorations, but resource rigidities maintained the inertia of the organization. Organizational fields experienced as hazy were experienced as highly uncertain; managers' concentration on sense-making inhibited the perception of threats and opportunities and maintained organizational inertia.

This paper encapsulates its findings as new testable propositions hitherto unexposed by previous conceptualizations. Therefore, we contend that our investigation offers a novel conceptual progression that is both descriptively more valid and explanatorily more informing, in that it offers a better fit with reality as we know it to be. This more informed basis for future empirical research must now be thoroughly tested. Finally, this paper creates a call for more scholarly attention to be given to the influence of organisational field transparency; in particular we espouse its potential value as a tool for dealing with heterogeneity in entrepreneurship and innovation research.

## NOTES

[1] This research presented in this paper would not have been possible without the initial support of Disrupt-it Project (a €3million project co-funded by the Information Society Technologies Commission under the 5th Framework Program of the European Union).

[2] Although resources are often defined as including stocks of knowledge, skills, financial assets, physical assets, human capital and other tangible and intangible factors (Wernerfelt, 1984; Amit and Shoemaker, 1993), our primary consideration is given here to financial and attention-based resources.

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