



Annotated Bibliography I

Integrated Research Sub-Project (IRSP) I – The Role of Technology Companies in Promoting Surveillance Internationally

Innovation Process

by Brenda McPhail*

May 2009

Preamble

Great discoveries and improvements invariably involve the cooperation of many minds.

Alexander Graham Bell

When Integrated Research Sub-Project I (IRSP I) made its original call for annotated bibliographies, the project’s interest in innovation was framed in terms of “innovation dynamics” and technology transfer processes, focusing on the ways innovations in surveillance spread through society. A separate topic, “knowledge management,” was suggested in order to answer questions about, for example, the way new surveillance or security techniques or products might be conceived and developed. After some initial research it was determined that the knowledge management literature might not be the best place to find answers to the kinds of questions of interest to the project. After some re-thinking about where these questions might better be explored, it was determined that perhaps the very broad category of innovation literature might be the best source of material for them all.

In dividing the large topic of innovation, the logical approach seemed to be to remain aligned with the kinds of questions that the project group wanted answered in the original call, and so the topic was divided into two separate bibliographies, one on “innovation processes” which focuses primarily on literature related to organisation-level product and

* PhD Candidate, Faculty of Information Studies, University of Toronto, Ontario, Canada.



process development, and one on “innovation diffusion” which looks more broadly at ways innovations are transferred into society. This bibliography on innovation process joins its companion on innovation diffusion, and two other bibliographies commissioned by IRSP I, in an attempt to familiarize project members with bodies of literature identified as potentially useful at our May 2008 gathering.

Introduction

Few issues have been characterized by as much agreement among organizational researchers as the importance of innovation to organizational competitiveness and effectiveness.

Richard A. Wolfe

Wolfe’s quote seems an appropriate beginning to this annotated bibliography on innovation process primarily because it expresses what might be the only (almost) uncontested finding in an area of literature that is both broad and deep, spanning multiple disciplinary and theoretical perspectives. Scholars and practitioners in several areas of management studies, economics, engineering, and sociology, as well as some other areas of social science, have all studied and written on innovation processes. As might be expected from this range, perspectives vary widely not just in analyses and findings, but also fundamentally in terms of what innovation is, what is deemed worth studying, why studies are conducted, and who the target audiences might be.

As so frequently happens when attempting to focus on a particular concept in a well-studied area, it is not possible to extract one standard definition of ‘innovation’ from the literature. Instead, not unreasonably, authors devise or use those definitions which fit with their purposes. Thus we have a range of definitions as wide as the range of scholars who contribute them. There are some which are simple and direct, such as that used in Iwamura and Jog’s description of innovation in the financial securities industry, which state that an innovation is “a product perceived as new” (1991: 105). More often the definitions go beyond a pure product focus, and many draw on Schumpeter’s influential early work in looking at innovation as a process which creates “new combinations of resources” (Schumpeter 1934: 5). Another influential definition is that published in the Oslo Manual of the Organization for Economic Cooperation and Development (OECD), which defines innovation as “implemented technologically new products and processes and significant technological improvements in products and processes” (1997: 31). Further broadening the concept of innovation, Van de Ven proposes a definition of innovation as the “development and implementation of new ideas” in all kinds of areas, including administration, processes, and products, including technical ones (1986: 590). This linking of ideas and innovation is picked up by diverse authors (e.g. UK Department of Trade and Industry 1998; Kanter 2000). Silberstang and Hazy expand on this somewhat by suggesting that “innovation is more than the generation of new ideas; potentially viable ideas must be assessed and tested, then diffused, implemented,



evaluated, and sustained” (2008: 4). In economic terms, Shields and West state that “innovation can be understood and explained only if it lends competitive advantage and enhances the performance of firms (2000: 6), and this focus on enhanced competitiveness is, as the Wolfe quote with which this paper began claims, in much of the management- and economic-oriented literature on innovativeness (see, for example, Kickul & Gundry 2001; Council on Competitiveness 2005; Russell & Russell 1992; Becheikh, Landry & Amara 2006). The ‘change is good’ mentality that characterizes so much of the innovation literature is also contested, particularly by Suchman and Bishop, who suggest that “ ‘innovation’ can be understood as a construct activated in the service of what is, on closer inspection, a fundamentally conservative (in the sense of the reproduction of existing orders) project” (2000: 331).

Within the scope of the topic ‘innovation process’ there are a number of different approaches to studying the ways in which innovations happen. As Adams and colleagues note, “the innovation process is complex, comprising a myriad of events and activities some of which can be identified as a sequence and some of which occur concurrently, and it is clearly possible that innovation processes will differ to some degree, across organizations and even within organizations on a project-by-project basis” (Adams, Bessant & Phelps 2006: 36). Furthermore, “the capacity of organizations to innovate is determined by multiple factors that relate both to their own internal organization and to their market environment (38). Faced with the complexity of the topic and the diversity of approaches to it, selecting and subsequently organising the literature used for this bibliography was challenging. It seemed appropriate to turn to the questions laid out in the original call for papers to supply both selection criteria and organizational structure; thus, the remainder of this review will be divided into sections corresponding to the questions for which IRSP I researchers developed as priorities for the project in this area. As a caveat, it is worth cautioning that not all questions are well (or directly) addressed by the selected papers, nor were studies found that specifically discuss the process of developing surveillance or security innovations. However, those places where questions remain provide opportunities for project researchers to fill the gaps, while the dearth of research in the area of surveillance and security technologies and processes suggests that the work IRSP I proposes to do is likely to make a needed contribution.

What business processes are involved in the design of a new surveillance technique? What should co-investigators and collaborators read in order to understand how new products are conceived, designed and produced?

New surveillance techniques might involve new products, new organisational processes, or both. This section of the bibliography encompasses literature which talks generally about the ways in which different kinds of organisations, in different industries including at one end of the scale, manufacturing and construction, and at the other end, securities and financial product innovations, attempt to encourage, develop, and implement innovations. Moving from authors who discuss the innovation process in general terms to



those who look more narrowly at specific processes in particular industries, and then broadening again to take in issues of policy and politics in the innovation process, this section of the paper will introduce a selection of articles that focus, to some degree, on features of the business process of innovation.

A useful introduction to organizational innovation processes is Richard Wolfe's (1994) review and critique of research undertaken in management studies. He provides a good conceptual review of innovation literature published from the 1940s to the early 1990s, providing a solid base on which to build with more recent work and highlighting important early work in the area. Wolfe claims that despite "broad interest and a vast literature" (1994: 405) innovative behaviour remains poorly understood. In an attempt to build a more cumulative knowledge base from which to improve that understanding, he summarizes and organizes the literature he covers into three research streams: innovation diffusion, determinants of organizational innovativeness, and organizational innovation processes. He notes their points of overlap, and then uses his assessment of the reasons much of the innovation research remains inconclusive to develop some strategies for conducting future research. Much of the challenge in studying innovation is due, Wolfe asserts, to the "complex, context-sensitive, nature of the phenomenon itself. Innovation cannot be understood without careful attention to the personal, organizational, technological, and environmental contexts within which it takes place (Wolfe 1994: 406; see also Tornatzky and Fleischer: 1990).

Andrew Van de Ven published a number of much-cited studies in the 1980s and 90s, and remains prominent in the field. A useful article to orient IRSP I researchers to ways in which management scholars have studied innovation processes is his "Managing the process of organizational innovation" (1995). Van de Ven begins by describing Roger's classic innovation model, which focuses on innovation processes at the individual level. Rogers' model portrays the process of innovation over time as a linear sequence of three basic stages, beginning with the invention of an idea (which comes from a recognition of needs or problems and basic or applied research), through its development, production and testing into a concrete device or program, and culminating in its diffusion to and adoption by users" (271). Van de Ven then extends that model to the level of the organisation based on a number of empirical studies performed as part of the Minnesota Innovation Research Program (MIRP).

The MIRP framework "defines the process of innovation development with five core concepts which were used to observe how innovative *ideas* are developed and implemented by *people*, who engage in *transactions* (or relationships) with others and make the adaptations needed to achieve desired *outcomes* within changing institutional and organizational *contexts*" (Van de Ven 1995: 274, emphasis in original). Van de Ven reports on six interrelated process elements that are neither linear nor simple but rather "unfold in a partially cumulative progression of multiple paths of activities" (1995: 275). They include:



1. The innovation process consists of an accretion of numerous events performed by many different people over an extended period of time
2. Concentrated actions to allocate resources and initiate innovation development are triggered by “shocks” (not mere persuasion) produced by direct personal confrontations with needs or problems
3. Once innovation development work begins, the process does not unfold in a simple linear sequence of stages and substages. Instead, it proliferates into complex bundles of innovation ideas and divergent paths of activities by different organizational units
4. Setbacks are frequently encountered and serve as either breaking points, when the innovation is rejected, or learning opportunities, when the innovation is “reinvented”
5. Innovation receptiveness, learning and adoption speed are facilitated when the innovation is initially developed within the user organization, and they are inhibited when end uses are provided no opportunities to reinvent (or modify) innovations that were initially developed elsewhere”
6. Management cannot ensure innovation success, but can influence its odds (Van de Ven 1995: 275).

One of the strengths of Van de Ven’s work is the stress he places on the complexity of organisations as social systems and subjects of study (1995: 278). His categorization of the innovation process begins with Rogers’ linear model but ends with a recursive and reflexive framework that suggests multiple points of entry for researchers wishing to study innovations within organisations

Recognizing the complexity of organisations means, of course, that innovation processes in different settings are likely to vary. It seems potentially useful to provide examples of the ways in which authors who look at specific industry sectors, such as manufacturing, and at both product and process innovations, approach their subject. Where possible, since each area tends to be inhabited by a substantial literature in its own right, articles which review others in their field have been chosen to provide IRSP I researchers with simple access to that wider body of literature if the topic is one which matches their need. And while much of the management literature, particularly, is approached quantitatively, it seemed valuable to also find and discuss examples of studies that take a qualitative approach.

One review, focusing on innovation in the manufacturing sector, comes from Becheikh, Landry and Amara (2006). These authors perform a systematic literature review of studies in the manufacturing sector to attempt to determine what innovation is and what determines its development in manufacturing firms (644). In the papers reviewed, they look at the ways in which “the variable ‘innovation’ was approached and measured by the authors,” and “identify the main explanatory variables which determine the innovative behavior and capacity of the firms” (645). They separate these variables into internal and external (contextual) determinants of innovation. Forty internal determinants are



identified, which they then divide into seven main categories, including those related to general firm characteristics, global strategies, activity structures, control activities, organizational culture, top management, and functional assets and strategies (652). In the contextual category, 20 identified variables are grouped into six categories relating to industry, geographical region, networking relations with other actors, knowledge and technology acquisition, government/public sector policies, and the surrounding (national) culture (656).

Krishnan and Ulrich have a broader scope in their review of product development. They look at research design and development in marketing, operations management, and engineering design with the explicit intent of providing researchers with a good introduction to the range of product development research across multiple disciplines. Product development is defined in their work as “the transformation of a market opportunity and a set of assumptions about product technology into a product available for sale” (Krishnan & Ulrich 2001: 1). Their focus is on literature that studies decision-making around product development in individual firms, and observe that while the actual processes might differ from firm to firm based on a variety of factors including culture, the decision points are often fairly consistent: what will be made? what technology will be adopted? where will it be assembled? who will work on it? who will lead?... (3). They collected their literature based on citation statistics and expert evaluation and focused on a core group of 200 papers. Their comprehensive and clear descriptions of the multiple stages of product development, which they position as a “deliberate business process involving hundreds of decisions” (1), may usefully inform research into surveillance or security product development from a different perspective.

Adams, Bessant and Phelps (2006) look at the innovation process from a different angle. Just as there are numerous types of innovation processes, there are also a variety of ways in which researchers and practitioners have attempted to measure the results of innovation efforts. Adams and colleagues conduct their systematic review of innovation measurement literature by collecting work based on the recommendations of a panel of 100 experts on the topic within the fields of innovation management and organizational behaviour. They discuss 181 articles, asking the question, “what are the measures that have been used, and to what extent do they adequately populate and dimensionalize a comprehensive analytic framework?” (23) The framework to which they refer is one they have developed inductively based on their review of innovation models, and includes seven categories: inputs, knowledge management, strategy, organization and culture, portfolio management, project management and commercialization. The idea of measuring innovation in itself may or not be of interest to members of IRSP 1. However, this paper is useful for the ways in which it mines the extensive literature to determine commonly studied stages of innovation management within organizations, and then discusses each. In isolating what has been measured, the authors also highlight those steps towards innovation deemed significant within organisations, while revealing the “breadth and variety of elements of innovation management” (Adams, Bessant & Phelps 2006: 39). In a trend seen more commonly in the management literature on innovation



than other disciplines' contributions, the authors conclude both by pointing to gaps in the literature for academics and also suggesting possible pragmatic uses for their findings by managers.

Iwamura and Jog discuss a different kind of product innovation, in a very different industry, the financial services and securities industry (1991). They approach the innovation process from a comparative perspective, seeking to determine the factors that differ between innovating and non-innovating firms. Based on a survey of corporate finance vice presidents and CEOs from 43 Canadian, American, British and Japanese investment houses, they come to the conclusion that those companies identified as innovative (by themselves and by peers) share a number of common characteristics. In general, innovative firms are larger and (claim to) have well-defined strategies to focus their business. They communicate more internally, at all levels of the organisation, and externally, with customers. And, most significantly, innovative firms put considerable effort into managing the idea generation process, actively monitoring internal and external idea sources, soliciting ideas from all levels of the firm, providing specific budget allocations, and assigning dedicated people or groups to develop new ideas (114).

Like Iwamura and Jog, Rob Shields and Kevin West (2000) write about innovation in a particular industry—in their case, the construction industry, and specifically, construction for high-tech silicon manufacturing 'clean rooms' in the Ottawa area. Unlike the previous studies, which are quantitative, Shields and West take a qualitative, ethnographic approach to their subject, which they argue is necessary to fill gaps in more quantitative approaches and to counter the more economic and product-oriented focus of much of the innovation literature generally (6). They follow the intense and complicated network of relationships and interactions between clients, contractors, subcontractors, and suppliers who work to build a clean room structure which was required to meet very rigid technical specifications, yet had to be completed on a tight six-month timeline to meet the client's business needs. Their primary interest is "the human and organizational interactions which characterize social processes on the high technology construction sites" (4). In the course of the project, Shields and West document and explore a variety of process innovations (novel approaches to supply chain, dependence management, and procurement processes (4)) that develop 'on the fly' between various parties. Key factors facilitating this innovative activity were risk- and information-sharing based on developing trust as a result of ongoing negotiations, and the authors position these factors in terms of the "sophisticated human and social factors which mediate transactions along the network" (7). Despite their construction industry focus, Shields and West's call for "a detailed and rigorous ethnographic approach that is able to capture the intricacies of the networks in the industry" (6) is one that might also reverberate with New Transparency researchers interested in the complex processes surrounding the development and implementation of surveillance and security techniques and technologies.

Hommels, Peters and Bijker provide an STS perspective on the development and management of technological innovations, with the specific goal of discussing research



approaches that might inform policy makers and making. STS over the past 20 years has studied technological innovation within technical, economic, social, cultural and political contexts (1088). In this article, the authors compare two methods of studying innovation processes, strategic niche management (SNM) and PROTEE, and compare them in terms of the ways they conceive the relations between innovation and context (1093). While SNM “rests on the assumption that technology and its context can be (temporarily) separated” to allow radical innovations to be nurtured in ‘niche’ environments before wide scale implementation, the PROTEE approach opposes this idea (1093). The PROTEE approach involves an iterative learning process, requiring an innovator to engage with detailed questions and probes about her or his work during creation, development and implementation of the innovation; it: “deliberately tries to make an innovation vulnerable by confronting it as much and soon as possible with the real world” (1093). Hommels, Peters and Bijker note that each may be appropriate for fostering different kinds of innovation in different setting. In addition to providing a critical description of two concrete methods for studying technological innovations, the overt policy focus may be of interest to NewT researchers, as the authors address how insights into successful technological innovations can help predict the potential success or failure of new ones, and “how these insights can be effectively translated into tools for technology policy making” (1088).

Martin and Scott (2000) also approach the topic of innovation processes from an overt policy focus, but as economists, their focus is on market success or failure of innovations. They seek to identify discrete points in the innovation process at which public policy interventions or supports might make successful innovation more likely. The authors introduce their paper with a discussion of Joseph Schumpeter’s influential work. Schumpeter put forward two influential but contradictory theories of economic theories of innovation. First, in *The Theory of Economic Development* (1934), he posited that innovation would most often emerge from small and medium-sized firms entering the marketplace and displacing incumbents by putting forward new and innovative ideas and products in order to take over market share. Later, in his 1942 text *Capitalism, Socialism, and Democracy*, he argued the opposite, and suggested that technological progress was most likely to come from large established firms with well-funded research laboratories, and the capital to finance risky ventures.

Modern economic literature continues to debate these two rather contradictory positions, but, Martin and Scott suggest, one thing the resulting literature agrees upon is the fact that whatever the ideal conditions in the market might be for promoting innovation, a market system generally will never encourage sufficient innovation to reach an optimal level from a societal point of view (438). They argue from this point that public policy to encourage private sector innovation is desirable, and further, that policy can be informed by economic analysis that takes into account specific features of the industry and economic environment at the time. The paper goes on to categorize typical types of innovations in types of industries and suggests appropriate policy instruments to encourage innovation in each; what is most interesting from a NewT research perspective



is the link this kind of research provides between internal organizational innovation processes and societal interest in ensuring that these processes result in successful innovation development and eventually, diffusion. While innovation is presented uncritically here as an unquestioned societal benefit, this approach might also be used to inform a more nuanced approach to surveillance innovations which questions their societal benefits and the appropriateness of public sector intervention or regulation of innovation processes in the industry.

How might combinations of new and existing knowledge produce specific innovations in technology, which then become accepted into practice?

Although it was decided early in the process of developing the IRSP I annotated bibliographies that the field of knowledge management (KM) generally was unlikely to answer all of the questions identified as significant for the group, a subset of that literature holds promise for helping to determine the ways in which new and existing knowledge might contribute to organizational innovations in products or processes. Consequently, the following section of the bibliography provides examples of ways in which people writing in the field of KM have specifically linked it to innovation processes. This is followed by a selection of studies which take more general management approaches to the topic.

Within the discourse of knowledge management, knowledge “is considered as a potential key competitive advantage, by helping to increase innovation within the organization” (McAdam 2000: 233). McAdam “focuses on the role of knowledge management in sustaining and enhancing innovation in organizations” and also attempts “to establish a knowledge management model within which the principals of innovation can be incorporated” (233). His qualitative study uses a grounded theory approach and “social constructivist workshops” (237) with managers from 25 different organizations, chosen based on a preliminary survey which assessed, among other things, the organizations’ involvement with knowledge management. Participants collectively came to understandings of four different categories linking knowledge management and innovation: knowledge construction, embodiment, dissemination and use (237). McAdam says his aim is to show the ways in which KM can be a “catalyst” for increasing innovation (233). What’s potentially more interesting to NewT researchers is the focus on social construction of knowledge within a more management-focused framework than is generally the case, and a useful review of the literature linking knowledge management to innovation processes. The framework he develops highlights the ways that knowledge construction, dissemination, embodiment and use can serve as innovation drivers within organizational tactics and structures, while acknowledging that knowledge is something that happens between people and as a result of specific situations, and that innovation, therefore, happens that way too.

Basadur and Gelade (2006) develop a practitioner-oriented framework that integrates



knowledge management and organizational learning with organizational creativity and innovation, focusing on both the apprehension and utilization of knowledge in the pursuit of organizational effectiveness: “The purpose of this paper is to show how knowledge management, and creativity and innovation, fit together” (46). They note that among consulting companies, KM is synonymous with knowledge sharing (47); but that it takes more than acquiring and sharing knowledge to support innovation processes, it also takes ways to use the information effectively. They propose a four stage model of the innovation process, in which the first stage is acquiring and generating new information, and monitoring trends, opportunities and problems. The second stage involves conceptualizing new ideas, the third requires the development and refinement of new solutions, and the final stage is implementation (49). The authors provide a series of simple examples based on their consulting practice to demonstrate the way things might work, or not work, at each stage of the innovation process. Based on this model, their framework seeks to allow organisations to: “(1) detect errors and implement changes to restore or improve routines; (2) make sense of sudden unexpected events and crises and convert them into opportunities for innovation; and (3) anticipate and seek out new information, and emerging opportunities to develop new products, services, and routines” (46).

Knowledge Management as a field has a strong pragmatic focus, often producing prescriptions for tools and techniques to be applied within organisations. Lemon and Sahota (2004) attempt to nuance the KM approach somewhat by suggesting that individual organizational cultures are “bundles” of knowledge repositories, and that the characteristics of a specific culture will strongly affect the ways in which any processes or tools might be taken up or rejected. The authors use interview data from a research and development environment in the telecommunications industry, and develop a tool for "auditing, intervening, changing and maintaining knowledge repositories" (483). They argue that by basing their tools on a study of key cultural dimensions, derived from their conversations with R&D managers, that they are able to account for key factors affecting innovation including team make up, cognitive and leadership styles, time scales and creativity, scanning and broadening the innovative base of a group, home/remote working, office layout, level of social interaction, and measures of success (489).

Another attempt to determine the factors which contribute to successful innovations is made by Jansen, Van Den Bosch and Volberda (2006), who focus on the differences between two types of innovation, exploratory and exploitative, and examine internal and external factors to affecting these types of innovation. Coming from a strategic management perspective rather than one of KM, their focus is at the level of organizational units and formal and informal coordination mechanisms within those units (1662). “Exploratory innovation” is defined as developing new knowledge, products and services for new customers, and “exploitative innovation” builds on existing knowledge and products for existing customers (1661). They hypothesize that the internal factors of centralization, formalization, and connectedness, and the external factors of dynamism and competitiveness in the market will affect these two types of innovation differently. A



key finding of potential interest to NewT researchers is that, while types of overall organizational structures did not have the anticipated effect on the different types of innovation, “dense social relations within units are an effective coordination mechanism that yields multiple benefits” (1670) for both types of innovation, with informal connectedness showing more effects than formal. The authors note that “although our study provides new insights into organizational antecedents and consequences of exploratory and exploitative innovation, it does not address how unit managers are triggered to change levels of exploratory and exploitative innovation. In depth studies to better understand how change efforts are initiated would be helpful (1671).

A more subtle attempt to study social relations in organisations and their link to innovation processes is made by Rosabeth Moss Kanter (2000). Kanter, currently the Ernest L. Arbuckle Professor of Business Administration at Harvard, has written a number of influential works on innovation which might be of interest to project members. In this paper, she describes innovation as consisting of “a set of tasks carried out at the micro-level by individuals and groups of individuals within an organization” (167) and seeks to explore the ways these are facilitated or inhibited by the macro-level conditions within and without the wider organisation. Four major innovation tasks are discussed: (1) idea generation; (2) coalition building; (3) idea realization; and (4) transfer or diffusion (167). The author concludes that a dynamic model of innovation is needed which connects the major tasks in the innovation process to those structural arrangements and social patterns which facilitate each (169).

What possible innovations are ruled out or silenced? At what bureaucratic level does this “weeding out” process occur?

The final section of this annotated bibliography is the one addressed least directly in the innovation process literature. In an attempt to provide sources which approach, if not encompass, IRSP I’s key questions, literature has been selected relating to leadership (the potential site of control and power to encourage or silence innovation) and organizational culture (which affects whose ideas get heard and how it happens). Two papers which address the issue of silencing questions –not questions about specific innovations, but rather questions about the nature of innovation itself as both a process and a societal value--conclude the section.

Leadership is studied at a variety of different levels in the literature, from work-group leadership to the echelons of upper-management. Silberstang and Hazy attempt the former, describing the ways leaders emerge within groups, and how “innovative action and communication results from this emergence” (1). Their paper focuses on public sector organizations, and uses complexity science ideas to “provide a new way of thinking about what leadership means in this context and how it can be utilized to foster the kind of innovation that will be necessary to effectively deal with the wave of issues



that will emerge over the next half century” (2). They argue that by looking at the group as the level of analysis, it is possible to directly access leadership as it emerges, while allowing “insight into the dispersal of authority, power and decision-making” (2). Their concept of leadership suggests that it “involves an ordering of human interactions as they play out over time within the nested environments in which they occur” (4), a perspective which provides an interesting contrast to the “great man archetype” which is more common in the management literature.

Hoffman and Hegarty (1993) posit that “top managers often seek to influence or champion strategic innovations” (540), so they chose to study the degree to which various executive traits affect influence on both product and administrative innovations. They work within the literature on strategic management and organisation theory to conceptualize managerial influence as “a function of managerial, organizational, and environmental (e.g. culture) variables” (550) and then attempt to describe relationships between specific executive characteristics and their influence on innovation within organizations. Using a somewhat reductionist view of culture based on the value dimensions of power distance, uncertainty avoidance, individualism and masculinity (552), the authors suggest that innovation decision processes may differ among cultures because their values may be associated with different kinds of innovative activities and different modes of decision-making (553). In this formally-structured study, four hypotheses are posed regarding the ways in which executive characteristics will affect product and administrative innovation after organizational and environmental variables are taken into account (554). Those characteristics of executives deemed to affect their influence on innovation are expertise, access to key resources, capacity and ability to conduct environmental scanning and planning activities. Data was taken from a large multinational study on strategic management, using a sample of 361 top managers from 97 manufacturing business units in nine western industrialized nations (559). Hoffman and Hegarty found that expertise was found to be highly important for those championing innovation to have significant influence on the process, while it was found that influence processes tended to be different depending on whether product or administrative innovation was being undertaken.

Smith (2007) looks at yet a higher hierarchical level in seeking to determine who might influence innovation processes and how they do so. He begins with the assumption that organisations may resist innovation, particularly radical innovation, because it leads to change, challenging the way things are done and possibly who does them (95). One way in which innovations are able to make it past the factors promoting organizational resistance, he suggests, is through the efforts of key individuals who facilitate the innovation process. While earlier literature has examined the roles of technological gatekeeper, product champion, and sponsor/coach, he proposes another role, the “godfather”. In three case studies of highly significant and much-studied innovations—Sony’s Walkman, British Motor Company’s Mini, and the Clearblue home pregnancy test—Smith describes the way in which, in each case, the innovation was supported by a key figure at a very high organizational level. Unlike technical gatekeepers or product



champions studied previously, who are often middle managers or staff with particular technical expertise, a godfather is in a strategic position to make sure the innovation is developed. Smith suggests that the godfather can provide four key things: vision, credibility, protection, and access to resources (101). In connection to the provision of credibility and protection in particular, Smith notes that there is a political dimension to the innovation process that is all too often left unremarked in the literature. In the cases he describes, political dynamics in the organisations meant that these innovations would, in fact, have been unlikely to proceed, never mind succeed, without the backing of an influential and respected senior figure behind them, working overtly, and Smith suggests, covertly and behind the scenes (102).

Turning to innovative cultures more generally, Dombrowski *et al.* (2007) assert that "organizational culture is an important determinant of sustained innovativeness and financial performance" (190). "Organizational culture" they state, "is reflected in the stories the members of the organization tell, the mottoes they espouse, the behaviors they reward in the long and short term, their marketing efforts, the management's approach to relationships, the values they evaluate, and the alliances they create" (191). Culture is difficult to study comprehensively from the outside, and very difficult for organisations to change, even when they recognize the need to do so. Dombrowski and colleagues claim that a precedent to changing cultures is to understand the elements of organisational cultures generally (191). They reviewed the literature around organisational cultures to derive elements of innovative cultures, and then conducted interviews with participants from 30 American and European companies in an exploratory multiple case study research design to determine the extent to which those characteristics were present, recognizing that elements that work in one place may conflict with those from another since innovativeness can follow many paths. They found eight elements of innovative organisations were present in over 80% of the studied organisations: innovative mission and vision statements (which must be 'lived' rather than just written) (193); democratic, lateral communication (193-4); safe spaces where mistakes can be made (194); flexibility (allowing knowledge transfer across internal boundaries) (195); boundary spanning (allowing collaboration outside organisational boundaries) (196); collaboration (among employees of all levels) (197); incentive schemes (monetary and non-monetary, aligned with cultural values) (198); and leadership (drawing particularly on the "champion" model) (199). While conceding that "innovative cultures are organisation-specific and differ from one organisation to another" (200), Dombrowski *et al.* conclude that the eight cultural elements they identify are important preconditions for innovativeness.

Another approach to studying organisational cultures is that of Russell and Russell (1992), who study organizational norms towards innovation. Norms are defined as "implicit rules of behavior that define appropriate and inappropriate actions" (6) and the authors claim that "in the entrepreneurial organization, culturally-derived norms and beliefs are likely to establish a setting where innovation is an accepted and appropriate response to organizational problems (6). In their opinion, the innovation process itself is



motivated and directed primarily by the values, beliefs and norms of the organization's culture" (7). In a very quantitative examination of a subjective concept, Russell and Russell examine four hypotheses and conclude that innovation-related norms and decentralization are "significant independent correlates of effective entrepreneurial strategy" (12). Although one might question the ways in which the authors operationalize the concepts of norms and culture, their general conclusion seems of potential interest for NewT researchers. They note that, while there is a large body of literature attempting to define the "prototypical" innovative firm, their findings suggest that more attention needs to be focused on informal influences that shape and direct entrepreneurial behavior in organizations (14).

Lucy Suchman, writing alone (2002) and with her colleague Libby Bishop (2000), has a distinctive and critical perspective on innovation as a concept and process. While the vast majority of the innovation literature discussed within this bibliography (and in the innovation process literature more broadly) represents innovation as an unqualified benefit to organisations and often, more generally, to society, Suchman suggests that another perspective is possible:

Our observations of new technology, work redesign, and organizational change initiatives indicate that "innovation" in these contexts requires analysis not simply as a process that takes place (or does not), but as a highly politicized construct taken up by specific actors and made to work in particular ways. At least within the United States, and to some extent within Western economies more generally, innovation is accepted without question to be a positive good. In a semiotics of bipolarized, differently valued opposites, "innovation" is the preferred alternative to "stagnation" or "resistance to change." This means that framing agendas under the rubric of innovation and change is inevitably a strategic move, appropriating the positive value of the term for whatever the agenda to be pursued in its name might involve (Suchman 2002, 14; see also Suchman & Bishop 2000: 331).

For NewT researchers, working in the intensely political and politicized area of surveillance technologies, techniques and processes, Suchman's work provides a valuable (and likely familiar) lens through which to view the work previously discussed.

Conclusion

Richard Wolfe, whose words began this bibliography, also provides a fitting end. His warnings about the state of the innovation literature in 1994 hold largely true in 2009: "Initial conceptualizations in innovation studies were heavily rationalistic as researchers adopted orientations which were deterministic and objective" although there are signs of movement towards approaches that are "more voluntaristic, subjective, and political" (Wolfe 1994: 416). As Shields and West note, "economic concerns have guided much of the current research" and "the excessive concern with the implementation and adoption of



new technologies has led to the neglect of the social and human factors which mediate the take-up of organizational systems of innovation” (2000: 6). There is considerable scope for NewT researchers to make significant contributions; in fact, to draw on Wolfe one last time, multi-disciplinary teams approaching the same innovation and organisation or set of organisations from multiple perspectives might well provide the best approach to add “insight and depth” to innovation research (421).

References

- Adams, R., J. Bessant & R. Phelps (2006). ‘Innovation management measurement: A review’, *International Journal of Management Reviews* 8:1 (21-47).
- Allen, T.J. (1974). *Managing the Flow of Technology: Transfer and the Dissemination of Technological Information within the R & D Organisation*. Cambridge, MA: MIT Press.
- Basadur, M. & G.A. Gelade (2006). ‘The role of knowledge management in the innovation process’, *Creativity and Innovation Management* 15(1): 45-62.
- Becheikh, N., R. Landry & N. Amara. (2006). ‘Lessons from innovation empirical studies in the manufacturing sector: A systematic review of the literature from 1993-2003’, *Technovation* 26: 644-664.
- Chakrabarti, A.K. (1974). ‘The role of champion in product innovation’, *California Management Review* 17(2): 58-62.
- Council on Competitiveness (2005). *Innovate America: National innovation initiative summit and report*. Retrieved Feb. 2, 2009 from http://www.compete.org/images/uploads/File/PDF%20Files/NII_Innovate_America.pdf.
- Dombrowski, C., J.Y. Kim, K. Desouza, A. Brazanza, S. Papagari, P. Baloh & S. Jha (2007). ‘Elements of innovative cultures’, *Knowledge and Process Management* 14(3): 190-202.
- DTI (1998). ‘An audience with innovation: Innovation in management’, London: Department of Trade and Industry.
- Frohman, A.L. (1978). ‘The performance of innovation: managerial roles’, *California Management Review* 20(3): 5-12.
- Frost, P.J. & C.P. Egri (1991). ‘The political process of innovation’, In: Cummings, L.L. & B.M. Staw (eds.), *Research in Organisational Behaviour*, vol. 13. Greenwich, CT: JAI Press: 229-295.



Hoffman, R.C. & W.H. Hegarty (1993). 'Top management influence on innovations: Effects of executive characteristics and social culture', *Journal of Management* 19(3): 549-574.

Hommels, A. P. Peters & W. Bijker (2007). 'Techno therapy or nurtured niches? Technology studies and the evaluation of radical innovations', *Research Policy* 26: 1088-1099.

Howell, J.M. & C.A. Higgins (1990). 'Champions of technological innovation.' *Administrative Science Quarterly* 35: 317-341.

Iwamura, A. & V.M. Jog (1991). 'Innovators, organization structure and management of the innovation process in the securities industry.' *Journal of Product Innovation Management* 8: 104-116.

Jansen, J.J.P, F.A.J. Van Den Bosch & H.W. Volberda (2006). 'Exploratory innovation, exploitative innovation, and performance: Effects of organizational antecedents and environmental moderators.' *Management Science* 52(11): 1661-1674.

Kanter, R.M. (2000). 'When a thousand flowers bloom: Structural, collective and social conditions for innovation in organization.' In *Entrepreneurship: the social science view*, ed. R. Swedberg, Oxford UP: 167-210.

Kickul, J. & L.K. Gundry (2001). 'Breaking through boundaries for organizational innovation: new managerial roles and practices in e-commerce firms.' *Journal of Management* 27: 347-361.

Krishnan, V. & K.T. Ulrich (2001). 'Product development decisions: A review of the literature.' *Management Science* 47(1): 12200 words.

Lemon, M. & P.S. Sahota (2004). 'Organizational culture as a knowledge repository for increased innovative capacity.' *Technovation* 24: 483-498.

Maidique, M.A. (1980). 'Entrepreneurs, champions and technological innovation.' *Sloan Management Review* Winter: 59-76.

Martin, S. & J.T. Scott (2000). 'The nature of innovation market failure and the design of public support for private innovation.' *Research Policy* 29: 437-447.

McAdam, R. (2000). 'Knowledge Management as a Catalyst for Innovation within Organizations: A Qualitative Study.' *Knowledge and Process Management* 7(4): 233-241.

OECD (1997). Proposed guidelines for collecting and interpreting technological



innovation data: Oslo Manual. (2nd ed.). Paris: OECD.

Pavlidis, Ioannis (2001). 'Urban surveillance systems: From the laboratory to the commercial world.' *Proceedings of the IEEE* 89 (10): 1478-1497.

Poole, M.S. & A.H. Van de Ven (2004). *Handbook of organizational change and innovation*. Oxford: Oxford UP.

Roberts, E.B. & A.R. Fusfield (1981). 'Staffing the innovative technology-based organisation.' *Sloan Management Review*. Spring: 19-33.

Rogers, E.M. [1962](2003). *Diffusion of Innovations* (5th ed.). New York: The Free Press.

Rogers, E. & F. Shoemaker (1971). *Communication of innovations: a cross-cultural approach*. New York: Free Press.

Russell, R.D. & C.J. Russell (1992). 'An examination of the effects of organizational norms, organizational structure, and environmental uncertainty on entrepreneurial strategy.' *Journal of Management* 18(4): 639-57.

Schumpeter, J. (1934). *The theory of economic development*. Cambridge, MA: Harvard.

Schumpeter, J. (1942). *Capitalism, socialism and democracy*. New York: Harper & Row.

Shields, R. & K. West (2000). Innovation in Clean Room Construction: Cooperation between Firms. Working Paper, Innovation Management Research Unit. Retrieved March 17, 2009 from <http://www.carleton.ca/innovation/cleanrooms.pdf>.

Silberstang, J & J.K. Hazy. (2008). 'Toward a Micro-Enactment Theory of Leadership and the Emergence of Innovation.' *The Innovation Journal: The Public Sector Innovation Journal*, 13(3): article 5. Retrieved Mar. 14, 2009 from <http://www.innovation.cc/>.

Smith, D.J. (2007). 'The politics of innovation: Why innovations need a godfather.' *Technovation* 27: 95-104.

Suchman, L. & L. Bishop (2000). 'Problematizing 'Innovation' as a critical project.' *Technology Analysis and Strategic Management* 12(3): 327-333.

Suchman, L. (2002). 'Practice-based design of information systems: notes from the hyperdeveloped world.' *The Information Society* 18: 139-144.

Tornatzky, L.G. & M. Fleischer (1990). *The Process of Technological Innovation*. Lexington, MA: Lexington Books.

Van de Ven, A.H. (1995). 'Managing the process of organizational innovation.' In G.P.



Huber and W.H. Glick, eds. *Organizational Change and Redesign*. Oxford UP: 269-294.

Wolfe, R.A. (1994). 'Organizational innovation: Review, critique and suggested research directions.' *Journal of Management Studies* 31(3): 405-431.