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Directing the technology intelligence activity: An 'information needs' template for initiating the search

Clive Kerr*, Robert Phaal

Institute for Manufacturing, University of Cambridge, Cambridge CB3 OFS, UK

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Keywords: Technology intelligence Roadmapping Strategic planning Technology management	In technology-intensive sectors, strategic planning requires relevant and timely information about new/emer- ging technologies – this is a critical input. Therefore, technology intelligence activities should be directed to capture and deliver pertinent technological information. However, there is a distinct lack of tools for helping organizations to determine what constitutes useful/appropriate information for their needs. To address this issue, an 'information needs' template has been developed to support the process of eliciting and articulating meaningful search queries to guide those who will conduct and provide the necessary intelligence. The use of the template also acts as a means of priming the technology intelligence as it identifies and points to potentially useful sources of knowledge. It covers the spectrum of sources from leveraging internal information, through spanning organizational boundaries to access external sources across the specific industry and neighboring in- dustries, to more distant fields of knowledge. Additionally, the template has sections for distinguishing 'who to watch' versus 'who to talk to'. The deployment of the template can be integrated with roadmapping, using the roadmap landscape to feed hotspots/themes/gaps/white spaces into the template, which are then unpacked to determine the information needs of the organization.

1. Introduction

Strategy-making and planning is knowledge-intensive and requires organizations to have an appropriate level of foresight and understanding of market-, competition- and technology-specific factors. Acquiring such information about the changing business environment is an important input for strategic planning (Lozada and Calantone, 1996). In regards to information gathering, it requires an organization to proactively collect relevant data through mechanisms such as scanning the business landscape (Mietzner and Reger, 2009). Therefore, one of the key activities for the provision of information for strategic planning is 'technology intelligence'. Decision-makers inevitably have gaps in their knowledge relating to technologies and therefore have a critical need for the provision of relevant intelligence as an input to the planning process (Kerr et al., 2006). Technology intelligence is defined by Kerr et al. (2006) as the capture and delivery of information relating to technologies and it allows an organization to develop an awareness of both technological opportunities and threats, including making an assessment of the state-of-the-art and profiling related trends within a technology domain.

Within the field of technology and innovation management, there are numerous examples of approaches to technology intelligence and

these primarily take the form of industrial case studies (Arman and Foden, 2010; Lichtenthaler, 2003, 2004a, 2004b, 2007; Mortara et al., 2009a, 2010). In terms of actual tools, the literature is predominately orientated to data/text/document-mining (Lee et al., 2011, 2012; Porter, 2005; Porter and Newman, 2011; Veugelers et al., 2010; Yoon, 2008), with patents being an obvious source of intelligence (Park et al., 2013; Yoon and Kim, 2012). In regards to the specification or definition of information needs, Rohrbeck (2010) identifies that this issue is problematic, especially with the application of automated data-mining tools, which often lack any meaningful involvement with the decisionmakers/key stakeholders and leads to the production of information with "little internal acceptance". Lozada and Calantone (1996) highlight that "some wanted information is not received and some information received is not wanted". One of the unique tools-orientated papers is that of Mortara et al. (2009b) which looks at a broader range of tools (including people and infrastructure elements) in an attempt to generate a toolbox for technology intelligence. Perhaps, one of the most well-known tools is the 'technology radar'. This was originally developed by Rohrbeck et al. (2006) to help disseminate information by providing an overview of potential technologies and their relevance to an organization. It takes the form of a radar screen and reports the technologies against development phases, or maturity levels, across a

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^{*} Corresponding author at: Centre for Technology Management, Institute for Manufacturing, University of Cambridge, 17 Charles Babbage Road, Cambridge CB3 0FS, UK. *E-mail addresses:* civk2@cam.ac.uk (C. Kerr), rp108@eng.cam.ac.uk (R. Phaal).

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number of technological fields. The technology radar has been applied in a number of documented cases (Golovatchev et al., 2010; Schuh et al., 2011; Veugelers et al., 2010). Additionally, there are other variants of the concept such as the 'opportunity landscape' (Savioz and Blum, 2002). However, it must be noted that the tool-orientated literature appears to be limited to the mechanics of data collection/analysis, especially in regards to data-mining, and a specific form of application for information dissemination in regards to the technology radar. There is a lack of research on formalizing the link between technology intelligence and strategic planning. Additionally, there is an apparent absence of tools to direct the technology intelligence activity and help initiate the search processes by providing a guide to the data/ information needs of planners and decision-makers.

"Defining an organization's actual intelligence needs, and doing so in a way that results in the production of intelligence that management feels compelled to act on", is according to Herring (1999) one of the most elusive of goals. As acknowledged by Citroen (2011), the 'information' perspective in strategy-making is largely neglected in the literature. A key question is: what information needs to be collected, analyzed and disseminated? (Kerr et al., 2006). Even though this question forms a fundamental and critical input for initiating the technology intelligence activity, it has not been adequately addressed by practical, yet theoretically robust, management tools. This aspect is termed the 'specification of information' by Mietzner and Reger (2009), who highlight the need for supportive linkages between the information gathering activities and strategic planning - especially at the beginning of the process where the definition of requirements is vital. From the domain of competitive intelligence (CI), there is the established KIT (Key Intelligence Topics) process which is used at the beginning of a CI program to help companies identify and prioritize the intelligence needs of senior managers (Herring, 1999). Underlying the KIT process is a series of open-ended and non-directive interviews conducted with the key decision-makers by CI specialists (Francis and Herring, 1999; Herring, 1999); the intelligence needs are then "synthesized by the interviewer over time as the interviews are completed" (Francis and Herring, 1999). Thus, the KIT process does require and rely upon a significant degree of both experience and competence by intelligence specialists. In adopting the KIT process from competitive intelligence across into the field of technology and innovation management for technology intelligence, the burden and reliance of specialist knowledge should be lowered. Additionally, there is the opportunity to enhance dialogue and allow the process to be more integrative by heightening the level of direct engagement between organizational stakeholders. To help address such issues, this paper reports on the development of a management tool which aims to support the specification of the information requirements from key stakeholders and thus direct the technology intelligence activity. The tool takes the form of a template, which can be deployed in workshops or team meetings, and its aim is the capture of the information needs relating to a given technology or technological domain. This can then be used to initiate the search processes through appropriate technology intelligence mechanisms and channels. The 'information needs' template provides a linking point between strategic planning and technology intelligence. To further formalize the link, the application of the template can be integrated with roadmapping – which is widely regarded as a key tool in strategic planning in technology-intensive sectors. This integration will be presented and the associated process considerations discussed. To demonstrate the use of the template, a 'real world' example is provided where the tool was tested with a group of industrial practitioners from a multinational energy company, highlighting the potential outputs that can be achieved.

2. Theoretical perspectives and practitioner considerations

The development of the 'information needs' template was informed by the theoretical lenses of: the 'use of knowledge as a resource' and the concept of 'search' in knowledge exploration from organizational learning. Additionally, to heighten the potential utility from applying the template and ensure the appropriateness of its deployment by industrial users, a psychosocial perspective was taken together with the implementation of several key principles for developing industrially relevant strategic technology management tools.

Dervin (1998) asserts that we "live in a world of gaps" and as a reality changes across a given space or timeframe then, for sensemaking, we should be concerned with the 'gappy' parts. Herring (1999) found that a company's intelligence gaps can be typically assigned against three basic categories:

- Strategic issues/decisions/actions e.g. likely future business environment; acquisition possibilities (Herring, 1999; Weiss, 2002).
- Early-warnings/perceived threats e.g. technological surprise, shifts and areas of possible breakthrough; deregulation; unexpected alliances, entry of a new/foreign competitor into the market or new classes of competitor (Aspinall, 2011; Ettorre, 1995; Herring, 1999; Weiss, 2002).
- Descriptions/characteristics/profiling of key players e.g. product benchmarking and changes in mix/offering; personnel changes at a competitor firm (Bartes, 2014; Ettorre, 1995; Herring, 1999; Weiss, 2002).

Such 'gaps' equates to 'white spaces' and results in leading questions being asked which can then be used to direct the technology intelligence activity by, in effect, setting the contextual frame and search parameters. The front-end of technology intelligence is concerned with the capture of information (Kerr et al., 2006) and where the search is orientated to finding, or unearthing, relevant information which can then be analyzed and disseminated to managers to inform their strategic planning activities. This view recognizes knowledge as a resource and that it provides a critical input to the planning process.

March's (1991) seminal paper on exploration and exploitation included the concept of 'search' under the exploration category. This concept is often referred to as knowledge exploration and/or knowledge search. In reference to technology intelligence, the activity can be regarded as a specific form of exploration or search since its purpose is aimed at gathering information orientated to technological opportunities (and threats). The sources of information to be searched can be local, for example internal to an organization, or distant, i.e. other industries (Kerr et al., 2006; Lin and Li, 2013; Miller et al., 2007). Thus, an effective search strategy must involve both sources. Local knowledge can be mined and trawled (Kerr et al., 2006). This local search presents a familiar space where existing combinations of knowledge are sought within organizational boundaries (Miller et al., 2007). It includes the perspectives of firm divisionalization, i.e. across both divisional and geographic boundaries, and intrafirm networks (Miller et al., 2007), e.g. the diversity which exists within supply chains or technological domains within the relevant industrial sector. In contrast, distant knowledge must be targeted and scanned (Kerr et al., 2006). This distant space is typically across competitive boundaries spanning through into other industries and so can leverage open innovation practices. Miller et al. (2007) highlights that "new combinations of distant knowledge may produce path-breaking innovations". Linked to the concepts of local and distant are the associated search variables of 'depth' and 'scope'. According to Katila and Ahuja (2002), search depth refers to the degree to which an organization revisits its prior knowledge and reuses its existing information; whereas search scope describes how widely a firm explores new sources. These elements have been encapsulated and embedded into the structure of the 'information needs' template.

To appropriately prime the searching of sources, there should be a specification (i.e. eliciting and understanding) of the information requirements for the intended recipients (e.g. management team/decision-makers). A needs-orientated perspective attempts to articulate Download English Version:

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