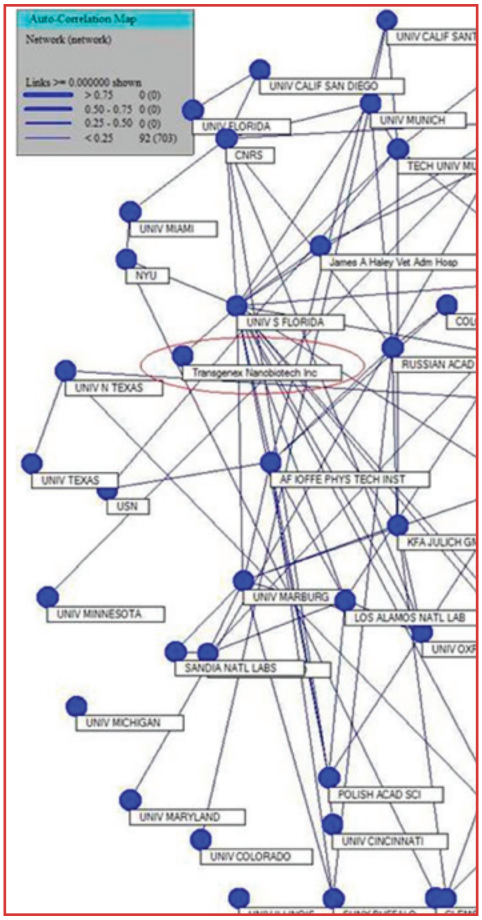
Corporate Experience

Tech Mining Success Stories

"Tech Mining is an essential tool for enabling open innovation," wrote Alan L. Porter in the Spring 2010 CIMS Technology Management Report. He detailed in that article how Tech Mining (1) can help managers in the biotech industry search research publications for answers to "who, what, when, and where?" questions.

Now, in the article below, Porter and his Search Technology, Inc., colleague Nils C. Newman cull the literature for examples of tech mining successes outside of strictly academic research. They illustrate the progress being made in applying tech mining more broadly, and also point toward applying these capabilities to the identification of potential technology innovation pathways (2).



We are convinced that technology managers can gain from better use of empirical intelligence to profile their research landscape.

Revisiting a Failed Technology

Our "classic" is the story of how the U.S. Army was able to ascertain that thin film ceramic technology had matured sufficiently to present opportunities to develop tank engine applications (1,3). This entailed two distinct Tech Mining stages:

1. Devising a suitable "key terms richness" innovation indicator to pick up the signal that this "loser" technology (previous R&D had returned poorly on investment) was now ripe.

2. Identifying a promising development partner from "out in left field"– in semiconductors rather than the conventional mechanical engineering world of automotive engineers.

The empirical results were vetted by the appropriate experts; senior management bought in; and a large-scale production process was implemented in Michigan.

Finding the Right SME Partners

Small and medium-sized enterprises (SMEs) are becoming increasingly active in the Open Innovation arena. SMEs perform an increasing share of R&D; many are innovation oriented; and they can focus on unique technical capabilities. However, finding the right partner to collaborate with—not just any partner—presents significant challenges. Typically there are a great many potential partners, but they have relatively small "footprints."

Ann Perry has described how Unilever's Technology Intelligence group meets this challenge (4). The UK consumer giant has developed techniques that draw together information from multiple sources. It then uses information analysis and visualization software tools to identify promising partners that have both a technical footprint (e.g., patents) and a commercial footprint (e.g., trade and business news compiled by Factiva). The appropriate R&D teams then refine the generated list and prepare a short list of leads worth following up.

Text mining software (in this case, VantagePoint) is needed to handle data from multiple sources. Perry illustrates Unilever's four-step process for hi-tech polymers:

1. Patent search (>1,000 records) yields >1,000 assignees.

(Cleaning this list is key to the process.)

2. Business search (>1,000 records) yields "who knows how many?" companies.

3. List comparison – identify companies in *both* lists.

4. The most promising companies are then profiled—29 candidates presented, of which 14 were identified as of further interest. (This number is easy for executives to digest for leads to pursue.)

Controlling the Pace of Innovation

A multinational company in the consumer products sector did not conduct much R&D itself, but saw tremendous value in keeping a hand on the innovation levers that affected its interests. To accomplish this, the company's Competitive Intelligence group devised the following strategy:

1. Translate company interests to "functions" (e.g., product temperature control).

See TECH MINING on Page 18

TECH MINING, from Page 17

2. Identify emerging technologies that could impact those functions.

3. Monitor universities performing R&D on those technologies; filter these research groups to identify those perceived as working on technology that could potentially alter the functions of interest.

4. Track their patent activity and the related business activity—especially investment of venture capital for start-ups.

5. For those start-ups that demonstrate functionally relevant advances in performance, step in via buyout or other means at the second round of funding to gain control of the most promising companies.

6. After gaining control of the key intellectual property, decide when and if to pursue commercial development.

Again, note the use of multiple data types in the above process. In this variant of "not so open" innovation, the focus is on linking academic research to SMEs and tracking progress. Furthermore, the "success" criterion is not restricted to eventual commercialization of a new product or process; rather, it is controlling the innovation process to best advantage.

Tech mining made a critical contribution to reorienting the project in a highly successful direction.

The Less Obvious Partner

Well-known patent analyst Tony Trippe (tony@trippe.com) related how a *Fortune 50* company he advised applied patent analysis to alter its product development partnering plans (1, pp.241-2). The company was developing a product to improve sleep. It had identified three companies as the major players in the sleep adjustment marketplace.

However, one team member suggested they analyze the "sleep" patent space before proceeding. They used Aureka software (now offered by Thomson Reuters) to locate relevant worldwide patents based on a combined keyword and patent classification code search on a range of sleep adjustment parameters. They then presented a text-clustering map that showed a concentration of R&D on circadian rhythms, especially pertinent to their product under development.

Surprise! None of the three market leaders owned the IP they were representing. Instead, several smaller companies that were unknown to their company held the essential IP.

The team decided that rather than partner with a larger company, their better prospect was to explore partnering with one of these smaller technical leaders, because their own company brought the needed marketing and branding muscle. In this way, Tech Mining made a critical contribution to reorienting the project in a highly successful direction.

Gap Analysis at Georgia Institute of Technology

Georgia Tech wanted to determine whether to develop a new center of excellence in an area of artificial intelligence (AI) that was being applied in national defense. The vice-president for strategic planning needed to ascertain what complex of skills was needed for the proposed center to succeed, and how we rated on those skills.

Tech Mining helped by first mapping the ten pertinent sub-topics that contribute importantly to this defense AI application. (Note that our VP did not request such a "map" -- he had never seen such a representation.) Tech Mining then helped identify active Georgia Tech researchers in those subtopics – i.e., an internal research capability profile (5). The profile suggested weakness in two critical AI areas for this venture.

Next, that research profile was presented to a group of Georgia Tech research managers and AI researchers for review. These experts refined the empirical results by identifying an active Georgia Tech Research Institute group who were highly able, but rarely published because they primarily did defense contract work. The Institute plan was still left with a gap in one of the two AI areas.

At that point, profiling of the research domain outside of the university helped identify potential sources of that expertise. Such expertise could be tapped by recruiting new gradu-

See TECH MINING, on Page 19

TECH MINING, from Page 18

ates or faculty from universities with prominent research centers working the gap area. Alternatively, expertise could be accessed by forming a collaborative relationship with such research centers.

Another option considered was to rethink the proposed center of excellence more narrowly to better match the current Georgia Tech strengths.

Note that this case combines several stages: identifying critical technical capabilities; assessing one's own strengths and weaknesses; assessing external players; and choosing the best path to pursue. Although the questions asked by the VP in this case involved setting R&D priorities, other important decisions were involved. These included evaluating other academic research enterprises and assessing the potential for R&D funding in the target area. So this study actually addressed a mix of issues in the management-of-technology field. And it allowed Georgia Tech to decide how best to position its new center.

This can pay off in anticipating future tech innovation pathways.

Profiling an Organization's R&D Strengths

The National University of Colombia (its biggest public university) recently published a 364-page volume describing its science-policy-related capabilities (6). The project to generate this report applied Tech Mining techniques, among others, to sum up the university's intellectual capital pertaining to the design and assessment of Science, Technology and Innovation ("ST&I") policy.

This exercise to identify and summarize these ST&I research and assessment capabilities led to reflection on how well the university could manage these capabilities. This resulted in guidelines for faculty and students on how best to mobilize resources across the university to learn and apply these skills.

The effort also pointed out ways to relate the National University's ST&I policy strengths to the needs of external organizations. This is helping to strengthen links between the University and various state and industry actors, as well as to increase the academic community's awareness of this intellectual capital resource.

Innovation Pathways Are Next

We are convinced that technology managers can gain from better (i.e., stronger) use of empirical intelligence to profile their research landscape. Tech Mining of R&D literature, patent and business intelligence can provide such empirical intelligence to the point, and in time, to make a difference.

This, in turn, can pay off in anticipating future tech innovation pathways, specifically to identify the best opportunities and identify issues that need to be resolved (7).

We are now in the process of developing the data analytics necessary to exploit this opportunity. We plan to present on this subject at the first Global Tech Mining Conference, Sept 13-14 in Atlanta, Georgia. For details, visit the conference website at www.gtmconference.org.

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