LICENSING INTELLECTUAL PROPERTY: COMPUTER SOFTWARE IN THE BIOINFORMATICS INDUSTRY - A CASE STUDY

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[1] This case is not meant to depict an actual business situation, but rather to illustrate a typical business problem Please direct all inquiries to David Fehr, Southern New Hampshire University, School of Business, 2500 North River Road, Manchester, NH 03106-1045; 603-644-3197 (tel); 603-645-9737 (fax); d.fehr@snhu.edu (email). Working Papers are a series of manuscripts in their draft form, and reflect the view of the author, not Southern New Hampshire University or the Center for Financial Studies.

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BACKGROUND

In late spring, 2007, Harry Saltern was doing routine paperwork at his office at Weona Park Group, Inc. (WPG), a full service consulting firm in Batavia, Illinois. Just as he was about to take a break from his paper shuffling, he took a call from a local patent attorney, John Bonney, whom Saltern knew socially. Bonney had recently filed a patent application for a client, Jerome Banks (J.B.) Lehr, covering a highly technical computer algorithm that could be useful in various bioinformatics applications. Bonney's client, a computer engineer, would need assistance in determining the value and commercial viability of the invention and Bonney was hopeful that WPG could help. Saltern had recently worked on several projects involving the licensing of intellectual property, and agreed to take the next steps with J.B.

About nine months prior to this telephone call, Jerome Lehr was flying cross country from his job in the southwest to visit family in the northeast. At the time, he was working as a software engineer at a medical device company. Just after takeoff, he noticed that a bioinformatics trade magazine had been left in the seatback in front of him. As he thumbed through the magazine, he became fascinated with an article describing procedures to find the optimal match for a given protein or DNA sequence from very large databases of candidate matches. He learned that the so-called Smith-Waterman dynamic programming algorithm would find the optimal match, but was quite slow and not practical when working with databases with a large number of candidates (often running into the millions!). On the other hand, there were any number of heuristic algorithms, e.g., FASTA and BLAST, which purported to find a "close" match and also ran on standard computer systems very quickly. Given this trade-off between speed and accuracy, most practitioners choose to work with the heuristic procedures, often a variant of BLAST developed by the National Institute of Health.

Much to the dismay of his family, J.B. began to work on revising the Smith-Waterman algorithm to run quickly on a variety of computer processors. He was not thinking of commercial opportunities, but rather took his task as a personal challenge. For six months, he worked nights and weekends on the project, and finally perfected a "vectorization" approach to produce Smith-Waterman optimality with processing speeds comparable to the most popular heuristic methods. For conformation that his procedure was viable and relevant, he submitted his results to an academic journal for publication,

and his paper was published during the first quarter of 2007 after only one revision. At about the same time, J.B. moved to Batavia, Illinois, to take another software engineering job.

COMMERCIALIZATION – INITIAL STEPS

Having completed the development work on his vector algorithm and having received positive reinforcement with the journal publication, J.B. proceeded simultaneously in two directions:

(1) he hired attorney John Bonney to begin the patent prosecution process; and

(2) he approached the genetics department at Illinois Midlands University (IMU) to learn more about genetic screening and to discuss a collaboration.

After some preliminary research, Bonney recommended that J.B. file a U.S. patent application. Bonney prepared a draft to be submitted to the U.S. Patent and Trademark Office. To save money, J.B. proofread and revised the draft prior to the submission in March, 2007. Bonney estimated that, start to finish, the patent prosecution would take a full two to three years.

As luck would have it, a key faculty member, Darwin Miller, at IMU's genetics department was a well known expert in bioinformatics, specifically protein and DNA sequencing. In recent years, Professor Miller had developed a turnkey computer suite for searching that embedded the FASTA heuristic search algorithm. Initially the suite was licensed to a few commercial vendors on a non-exclusive basis, but recently had been made available to primarily academics and individual users via the internet. This internet version would not be appropriate for pharmaceutical companies, prominent genetics laboratories or the like because these entities could need to undertake thousands of searches per day and because of the proprietary nature of their databases and operations. Sequential processing on an individual basis would be cumbersome and the proprietary nature of the in-house databases could not be guaranteed with an internet application. Organizations of this type would require software installed on their own machines and maintained by their own technicians.

Miller was satisfied to have earned several hundred thousand dollars in license fees from the major vendors, and decided to concentrate on his academic work rather than pursue new commercial opportunities for his software. He simply provided the internet version as a service to the profession. Furthermore, the IMU technology transfer office did not have the resources to attempt to monetize any remaining commercial value in Miller's product.

Miller agreed to evaluate J.B.'s invention and replace his heuristic algorithm with this invention if it performed as advertised. Miller quickly verified the speed and accuracy of the new software and made it the search engine in his computer suite. While no license agreement was executed between J.B. and either Miller or IMU, Professor Miller was

anxious to continue to use the algorithm, and J.B. gave him permission to do so. Both sides understood that J.B. retained the right to prohibit Miller from using the algorithm in the future.

FORMULATING A STRATEGY

At his initial meeting with Lehr, the consultant, Saltern, found J.B. to be quite personable and anxious to explore commercial prospects for his invention. J.B. was most interested in "raising some cash to partially pay down my mortgage". J.B. was effective in providing background information to Saltern and next steps were agreed upon:

(1) Saltern would do some background work to educate himself on the bioinformatics field, would informally consult with several of his contacts in the bioinformatics industry, and would try to formulate an initial strategic plan;

(2) that both sides would think about the best way to structure financial participation for Saltern and WPG as payment for consulting services to be provided; and

(3) that Saltern had J.B.'s permission to speak with Professor Miller at IMU and to ask attorney Bonney to provide a copy of the filed patent.

Saltern's discussion with Miller was quite productive. Miller confirmed that he was using the invention in his web-based searching suite and wanted to continue to do so. He also pointed out that an "energetic" researcher could probably replicate the invention from the public domain information in J.B.'s published paper, but that it would likely be more efficient for an interested user to license the algorithm from J.B. Miller estimated that the invention would have an estimated shelf life of approximately five years before superior techniques would become available. Further, Miller was confident that IMU would not be interested in licensing the invention and taking over patent prosecution and commercialization. While some academic technology transfer offices agree to license 3rd party inventions that "enable" in-house technology, this approach was well beyond the scope of IMU's activities. Miller suggested an approach for J.B. similar to his own approach several years ago with his computer suite: forget about the online or subscriber approach, at least initially, and attempt to license the invention to major bioinformatics computer system vendors (at about $50,000 per vendor) on a non-exclusive basis. These major vendors would then re-market the technology to the large pharmaceutical firms and laboratories via their turnkey programs.

Miller also mentioned that he had recently received a cease and desist letter from an online vendor claiming that Miller's new search algorithm, i.e. J.B.'s invention, was covered by an already issued patent and that Miller did not have permission to practice the patent. Miller reported that the IMU legal staff opined that this claim of patent protection had no merit, and to disregard the letter. Not surprisingly, J.B. received a similar letter and, after discussions with Professor Miller, also disregarded it.

Saltern's contacts in the industry were several large end-users of bioinformatics software, i.e., major pharmaceutical firms and for-profit laboratories. Saltern asked his contacts about the type of due diligence they would undertake prior to licensing technology. Issues included:

(1) What is the level of patent coverage, including patenting domain viz. prior art?

(2) Is the invention an incremental contribution or a significant conceptual breakthrough?

(3) Are the improvements provided material? Do the speed and optimality improvements provide high value added?

(4) Are the benefits of this invention transitory? Are "next generation" algorithms developed regularly?

Saltern also learned that the major end-users spend many million dollars on computer hardware (e.g., processors and so-called sequencers to manage the large databases). Software vendors typically position their software as a substitute for expensive hardware. They argue that end-users should be ready to spend "short money" on software to improve processing speeds in addition to or as opposed to upgrading often quite expensive hardware.

During the discussions, it also became clear to Saltern that the end-users he surveyed would not be interested in licensing the invention directly. These organizations did not want to create a business to sublicense the technology to others and no internal executive would deal with the in-house bureaucratic and administrative steps to license such a small scale, i.e., $50,000, product. This information was consistent with Professor Miller's recommendation to license to software vendors, not end-users.

Almost as a throw away comment, one of the contacts mentioned the European firm, DNAseq, which she believed may be using J.B.'s algorithm in an online, sequential processing mode. Saltern quickly determined that DNAseq was the firm that had sent the cease and desist orders to J.B. and Miller.

Saltern now began to think about a marketing strategy. It would also be necessary to negotiate a consulting agreement between WPG and J.B. Saltern decided to commit an additional day or so to formulate an initial strategy and to structure a fee schedule for WPG. By mid-summer, Saltern sent an email to Lehr recommending:

(1) that J.B. attempt to license his algorithm on a non-exclusive basis to bioinformatics computer vendors as simply an insert to their existing programs to improve processing speed and optimality. The vendors could then expect to increase their lease charges for their software. They could emphasize to clients that the algorithm provides what many thought was unattainable – "fast" Smith-Waterman that is accessible without spending large money and/or requiring

expensive, specialized hardware. This marketing approach would require that key bioinformatics vendors be identified and that marketing materials be developed in anticipation of making sales calls;

(2) that WPG's financial participation might be a royalty based on some percentage of future sales. Saltern was sure that J.B. did not have the cash necessary to compensate WPG on a per diem basis. Saltern also pointed out that WPG was not in a position to contribute cash to the project, so if for example, J.B. asked Saltern to travel to assist with sales calls, WPG would expect that J.B. would provide funds for the travel and that these expenditures would be expenses that would be deducted from sales before computing royalties; and

(3) that it will be crucial to take advantage of Professor Miller's goodwill and reputation since neither J.B. nor WPG would likely be credible in passing initial screens with bioinformatics specialists.

J.B. emailed that he wanted to meet to discuss (1) and (2) above. Related to (3), J.B. had decided that he would like to formally license the invention to IMU for some notional dollar amount (never to be received by J.B.) and then take that amount as a charitable deduction on his income taxes.

Saltern was certain, based on conversations with Professor Miller and his general business judgment, that the IMU license idea was a non-starter and a weak business approach. Saltern suggested that J.B. talk with his tax advisor (assuming he had one!) about this charitable deal. He also reminded J.B. that considerable time and fees would be involved in negotiating a license agreement and that a fairness valuation (again fees) would likely be needed to establish the size of any charitable deduction. Furthermore, Saltern was confident that IMU would never execute a license agreement and that J.B. would run the risk of alienating Professor Miller, a key cog in the marketing strategy.

A few days later Saltern got a call from J.B. alerting Saltern that he was going on vacation, but wanted to meet later in the summer. It was clear to Saltern that his response regarding the IMU license was not what J.B. wanted to hear. The understanding was that J.B., upon his return from vacation, would telephone Saltern to set up a working meeting.

EPILOGUE

J.B. never called.