From the Classroom

A new approach to improve technology commercialisation in university medical schools

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Abstract

US university-based technology transfer has grown exponentially since the passage of the Bayh–Dole Act in 1980. As a result, invention disclosures and technology commercialisation initiatives have significantly increased, creating the need for a standardised, qualitative method of screening proposals that might have commercial potential. Successful academic bioscience technology commercialisation is difficult at best because of early stage bioscience inventions, faulty concepts, long lead times, high risk technologies, and working with physicians and medical researchers who frequently have little or no interest in the commercialisation process. We describe an easy-to-use, standardised, web-based technology assessment instrument that was used to better evaluate bioscience invention disclosures at the University of Kansas School of Medicine Technology Transfer Office. After implementing the new system and eliminating backlogged invention disclosures, staff reported that they migrated from very qualitative discussions taking many months to more quantitative, fact-based evaluations and discussions focusing on commercial value. Consequently, they reported making quicker and improved Go-No-go decisions investing further resources in only those technologies with the highest potential for commercialisation. In addition, they improved inventor satisfaction and strengthened their relationships with physicians, inventors, and researchers.
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INTRODUCTION

Successful academic bioscience technology commercialisation is difficult at best because of early stage bioscience inventions, faulty

concepts, long lead times, high risk technologies, and working with physicians and medical researchers who frequently have little or no interest in the commercialisation process. Many universities with a small research base lack crucial mass to support technology transfer activities. In addition, because of the growing sophistication of technology transfer offices and the spiralling number of Invention Disclosures, there is a growing need for an 'idea vetting process' that is based on agreed upon clearly defined criteria, is quantitative as well as qualitative, has credibility with all stakeholders, enables investigators to initially evaluate the commercial feasibility and risk of their inventions, is user friendly, easily accessible, and requires less time. The University of Kansas Medical Center (KUMC) Technology Transfer Office needed to more quickly screen technologies, standardise their evaluation process, and find a diagnostic tool to better assess early stage invention disclosures.

During the fall of 2005, they began evaluating different diagnostic tools designed to improve licensing and commercialisation success and to speed the process of screening inventions and discoveries that had commercial potential. They chose to adopt VentureQuest's Invention Assessment tool[1] which uses a simple rating scale that minimises ambiguous answers. It creates objective, pragmatic feedback by identifying strengths and areas of vulnerability so the staff could develop more strategic approaches to reduce risk and achieve greater commercialisation success. The staff worked with a design from the company to customise the tool with the goal of improving their assessment process, reach consensus sooner, and identify high potential technologies to move forward.

This paper presents their problems, the steps they used to identify a new methodology to assess Invention Disclosures more quickly and uniformly, how the methodology was customised to fit their needs, the iterative design process used to reflect their organisational needs, how it changed relationships with their faculty inventors and its effect on the technology transfer staff.

THE PROBLEM

To have a more rigorous assessment process, and standardised evaluation criteria that aligned with their strategic goals and objectives, KUMC needed to:

1. have an ability to quickly screen many early stage bioscience technologies;
2. assess a backlog of 34 technologies; and
3. more comprehensively discuss their evaluations with medical researchers and physicians without discouraging their participation in the technology commercialisation process.

In addition, the KUMC's Technology Transfer Office intellectual property (IP) portfolios are comprised of groups of related patents representing a wide variety of technologies from medical devices to early stage new chemical entities. Typically, a portfolio consists of 2–4 or more articles of IP. However, in many cases new technologies are very early stage and, at first blush, appeared to be unrelated to other technologies. Early stage assessment helped to find commonalities among their technologies allowing grouping into portfolios of 2–4 or more articles of IP.

THE METHODOLOGY

KUMC Technology Transfer Office was sent a list of 70 carefully selected success characteristics representing the ideal attributes for a technology to be commercially successful. After several rounds of discussions with their technology managers, they selected 31 success characteristics that were most important to their strategy and to improve commercialisation efforts. Selected characteristics were organised into six different sections (displayed in Table 1).

The technology managers and members of KUMC's Advisory Board participated in prioritising each section by indicating which

Table 1: KUMC's 31 success characteristics for their invention assessment tool

Sections	Characteristics
Section 1: Inventor's Assessment	Researcher supports commercialisation Researcher has previous patents/copyrights Researcher has had numerous published peer-reviewed articles Researcher has work experience with commercial partners Researcher has experience in technology transfer Inventor has continuous research funding
Section 2: IP Protection and Strength	Strong probability of obtaining foreign IP rights Many barriers to engineering around the invention 100 per cent ownership and title No legal entanglements Limited existing competitive IP Likelihood of IP protection – patents Likelihood of IP protection – copyrights
Section 3: Product/Service Features	Invention is workable and feasible Strong technical differentiation No apparent technical obsolescence Multiple related product/service spin-offs No government regulation No additional R&D
Section 4: Market Characteristics	Recognised, established market Attractive growth potential of target market No competition High customer value proposition Sustainable competitive advantage
Section 5: Commercialisation Strategy	Many avenues for commercialisation Continuity of revenue flow Potential for high gross margin at competitive price
Section 6: Value to University of Kansas Medical Center	High potential for research funding High potential for licensing revenue Enhances KUMC's image/impact Known potential collaborators or licensees

sections were most important to the medical centre and, through greater emphasis, would improve their technology commercialisation initiatives and licensing success. Next, success characteristics in each section were prioritised, selecting those that strategically were of greatest importance to achieve their mission.

During the customisation process, a series of discussions resulted while trying to develop a consensus about what aspects of a technology were most important to support a technology's maturation toward commercialisation. This forced the staff to discuss success characteristics that were critically important to the medical centre so better decisions could be made about where to allocate their time, money and resources. The prioritisation process is an important strategic step that provides a balanced scorecard to evaluate and identify the most promising technology commercialisation opportunities that strategically fit the organisation's mission.

In the course of this process, the team struggled with the prioritisation and were forced to make important strategic decisions about their mission and methodology as well as focus on factors critical to their success. The Technology Transfer Office discovered that even seasoned professionals often had different views about strategy and commercialisation characteristics. It became quite evident that the technology transfer staff relied heavily on their previous experiences and training when assessing technologies for commercial potential.

Each had individual opinions about what was critical for commercial success as opposed to using standardised criteria that reflected their strategic mission.

When completed, the KUMC's Invention Assessment Tool facilitated a realistic and strategic focused evaluation of their 34 backlogged technologies. In the past, it was typical for researchers to focus on positive characteristics of their technology, ignoring the Achilles' heel of their inventions. However, using the online Invention Assessment Tool enabled them to quickly identify and discuss the weaker characteristics, which enabled them to improve their chances of successful commercialisation.

Table 1 shows the six sections and lists the 31 ideal characteristics that KUMC selected for their Invention Assessment Tool.

THE TOOL

The tool is designed with a nine-point rating scale assigning scores that range from unsatisfactory to excellent as shown in Figure 1. It includes a guide that defines each rating factor helping users to more objectively and accurately score each success characteristic.

The tool provided technology managers with immediate, pragmatic, and specific fact-based assessment. It is obvious that no technology, product, or service is perfect. However, KUMC's Invention Assessment Tool identifies areas of strength that represented key focus issues that researchers should concentrate on to enhance opportunities for commercialisation. Multiple staff assessed each technology using a customised rating scale for each characteristic. Once completed, they discussed variances in scores which allowed them to flush out different views and more quickly reach consensus.

RECENT RESULTS

In August 2006, the staff used the Invention Assessment Tool on 34 backlogged technologies in their patent portfolio. Each

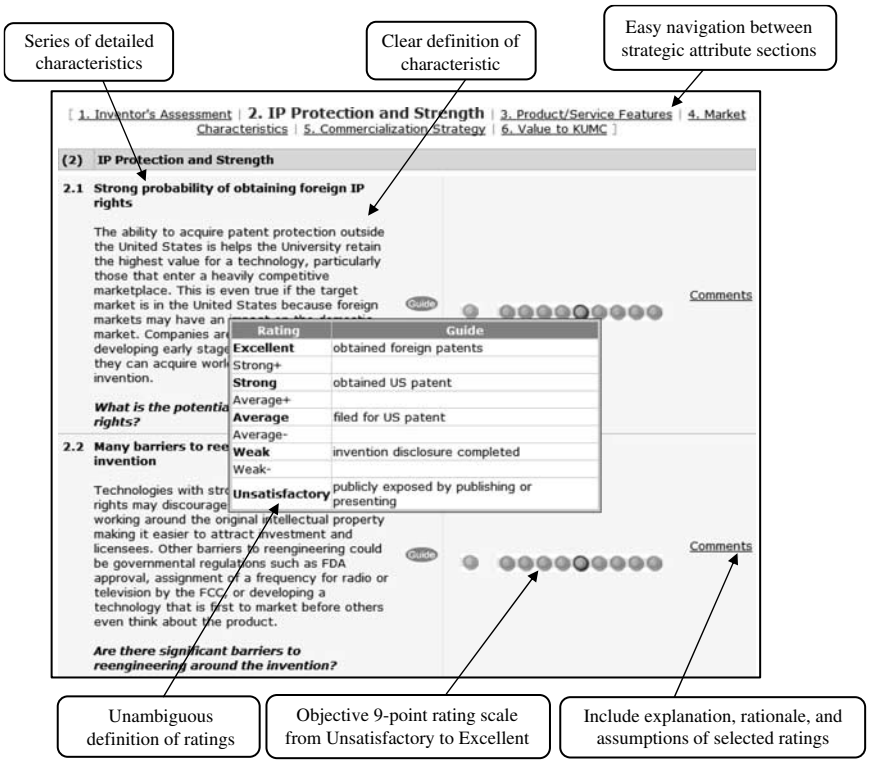

Figure 1: Example VentureQuest assessment tool with scoring guide

technology was rated by several IP professionals whenever possible. The rating spread between technology managers was noted as well as the rationale managers used for each rating. Effort was made to develop a consensus on ratings. Often these discussions identified new features of the technology and differing views on problem issues. The resulting discussions and scoring system clearly identified the areas of greatest strength and areas of weakness that must be addressed if the technology is moved forward.

Physicians and medical researchers were brought into staff discussions to provide insights as to important considerations in identifying target markets, further developing the technology, and strategies for commercialisation. The spectrum of issues considered is often an eye-opening experience for inventors, particularly those with an entrepreneurial bent. This tool allows the staff to set better priorities for future development efforts as well as contributed ideas for marketing and commercialisation.

Table 2 provides a sampling of technologies recently reviewed, their ratings and examples of strengths/weaknesses. Staff commented that after rating the 31 characteristics in the tool, a wide range of scores resulted when comparing portfolios. In this example, one of their major weaknesses found in the assessment tool was *Section 3*: *Product/Service Features*. This occurred for two reasons: (1) many bioscience technologies work in the lab but are difficult for the market to accept due to high manufacturing costs and production complexities and (2) government approvals take large amounts of time and resources with no guarantee that approvals will be granted. The Surface Resonance technology is a prime example. While the technology shows much promise in the laboratory, much work remained to demonstrate the utility of system, many hurdles existed concerning delivery, and, as a therapeutic, and the technology faces the long and expensive timeline of government regulatory approval. Consequently, it scored high in IP but scored low in the Product/Services Features assessment.

Another area that received low scores was *Section 6*: *Value to KUMC*. Many bioscience technologies require large R&D investments and have high commercialisation costs. Research funding is not always available to fully maturate a technology. If there are no known potential licensees or the technology has low potential for substantial licensing revenue, the value to KUMC is minimal.

Before using this assessment tool, technology transfer managers mainly considered a technology's strengths and weaknesses and then made qualitative decisions about its commercial potential. They spent hours in discussions but had difficulty deciding whether to invest additional resources or decline the technology. As a result, many technologies sat idle in their portfolios.

Now the staff reported that they migrated from very qualitative discussions to more quantitative and fact-based discussions focusing on commercial value to KUMC. They make better Go-No-go decisions investing in only

Table 2: Example KUMC's technologies, ratings, and characteristics

	Rating*	Strength	Weakness
Protein folding	69.7	Intellectual property	Value to KUMC
Surface resonance	67.2	Intellectual property	Product/service features
Chalk training system	33.6	Product/service features	Commercialisation strategy
Grip force measurement	55.2	Intellectual property	Value to KUMC
Superficial mechanical barrier	44.5	Market characteristics	Product/service features
Three dimensional crystal	66.3	Inventor's assessment	Product/service features

*75+equals high potential portfolio; 50–74.9 equals good potential but improvements in selected areas are needed; and 49.5 equals need to evaluate maximum potential for improvement in multiple areas or abandon.

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those technologies with the highest potential for commercialisation.

This new methodology made their commercialisation process more efficient and objective by helping them:

1. assess only those success characteristics critical to achieving strategic goals and objectives;
2. make quicker and earlier commercialisation assessments which document the reasons for not moving a technology forward;
3. reduce assessment time per technology by up to 80 per cent;
4. eliminate 34 backlogged technologies in less than two months;
5. use ratings and comments to capture the subjective (or gut feelings about the technology) into a more objective assessment and rationale;
6. have better, more business-focused and highly interactive discussions with inventors;
7. focus discussions on convergences and/or divergences in ratings. The points of divergence led to more critical thinking and discussions about a technology's various strengths, weaknesses, and potentials;
8. took the 'heat' off their office because the strong decision-making methodology in the tool supported their decisions;
9. have higher levels of confidence in their decisions and the effectiveness of KUMC's commercialisation process;
10. allocate scarce commercialisation resources on the most promising technologies.

In summary, this decision methodology effectively engages physicians and medical researchers in interactive and more productive discussions sharing ratings and in-depth reports from the Invention Assessment Tool. It creates a new commercialisation language used by technology managers with inventors throughout the commercialisation process. The tool uses an instrument and process that resembles the peer review process familiar to bioscientists and physicians. Ratings highlight characteristics that need to be improved and/or maturated in order to move the technology forward. Such discussions enlighten the inventor about the vulnerabilities of their technology, which may necessitate a redesign/rework of critical technology elements, a different market approach, or spend time to improve commercial potential and attract a commercial partner. It also sparked ideas on potential new avenues of work and funding.

The staff feels that researchers are now more motivated to improve their technology's commercial potential. They appreciate the breadth of assessment and the thought that has gone into the technology transfer staff's decisions giving them more credibility. Lastly, they stated this new assessment tool has improved morale since they spend less time working with technologies they know will never go. They have developed a better appreciation for the bioscience technology commercialisation process causing them to think about commercialising technologies in a new and improved way. Additionally, they are processing invention disclosures and making Go-No-go decisions in a timelier manner. They no longer are asked, 'What has happened to that invention form I filled out months ago?'

Several staff commented that since the Invention Assessment Tool came from an 'outside' source, it has brought in a more objective process and gave their technology managers more credibility. Now, they feel physicians and medical researchers are more willing to accept their evaluations based on a third party's invention assessment tool versus using the 'old guard method' to evaluate their inventions.

Overall, the Invention Assessment Tool has strengthened the relationship between the Technology Transfer Office and physicians, inventors, and researchers by improving the visibility and credibility of KUMC's Technology Transfer Office. They are better able to quickly weed out the 'chaff from

the wheat' and spend more time on commercialising those technologies that have a high chance of commercialisation. Using this improved assessment process has contributed to excitement in the office and increased feelings of job satisfaction.

NEXT STEPS

Since KUMC finished analysing a backlog of 34 technologies early fall 2007, it is too early to predict whether they were able to increase the volume of their invention disclosures and licensing revenue. Therefore, further study is warranted. However, in the longer term, the staff felt that this improvement will result in concentrating their resources in a more efficient manner thereby increasing their licensing revenue and success in commercialising their technologies.

CONCLUSION

Technology Transfer Offices manage the use of their university research results for the public benefit by providing patenting, licensing, and other commercialisation support to faculty and researchers. To improve their current decision-making processes and methodologies, they should evaluate current tools and techniques and consider adopting online assessment tools to improve their commercialisation results. To date, technology transfer managers have few reliable tools to guide their decision-making process of determining when and which technologies are likely to be a commercial success. Instead a backlog of Invention Disclosures, disgruntled faculty and researches, and wasted hours of endless discussions resulting in less than optimal qualitative Go-No-go decisions is common. Consequently, customised online quantitative screening tools, like the one used here, are being applied increasingly in both industry and academia. In addition, they are being used by consultants and investors looking for a better way to more efficiently vet proposals, deals and speed up deal flow.[2]

The process we describe is easily adoptable by other university and industry technology transfer offices. It has the potential to streamline current processes and improve commercialisation results using success characteristics that reflect an organisation's strategic mission and focus. Our experience using a diagnostic technology assessment tool to predict bioscience commercial feasibility leads us to the following conclusions:

1. The methodology and software is easy to adopt and use.
2. The technique enables inventors to quickly learn and better understand the feasibility assessment process resulting in accelerated idea development and maturation.
3. Using online assessment tools creates a standard evaluation language and criteria.
4. The methodology improves inventor satisfaction, communication, and commercialisation results.
5. Customised success characteristics quickly focus technology managers on the strategic objectives of the organisation.

Notes

1. VentureQuest Ltd, LLC (www.venturequestltd.com) specialises in improving technology commercialisation results in universities, national federal laboratories, and high-growth companies.
2. Entrepreneurial Standards Forum (www.es2f.org) strives to improve the interface between investors and entrepreneurs.

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