Technology Transfer's Twenty-Five Percent Rule

By Ashley J. Stevens and Kosuke Kato

1. Introduction

In their Decision in *Uniloc USA, Inc. and Uniloc Singapore Pty, Ltd. v. Microsoft Corporation*,[1] the Court of Appeal of the Federal Circuit decisively laid to rest one of licensing's most hallowed rules, the 25% Rule, also known as the *Goldscheider Principle,* which states that a Licensor should receive 25 percent and the Licensee should receive 75 percent of the pretax profits from sale of a Licensed Product. The Court said:

> *The admissibility of the bare 25% rule has never been squarely presented to this court. Nevertheless, this court has passively tolerated its use where its acceptability has not been the focus of the case.*
>
> *This court now holds as a matter of Federal Circuit law that the 25% rule of thumb is a fundamentally flawed tool for determining a baseline royalty rate in a hypothetical negotiation. Evidence relying on the 25% rule of thumb is thus inadmissible under Daubert and the Federal Rules of Evidence, because it fails to tie a reasonable royalty base to the facts of the case at issue.*

Mindful that nature abhors a vacuum, we wish to fill this gap by proposing a new 25% rule, technology transfer's 25% rule. Technology Transfer's 25% Rule states that:

> Technology transfer programs only succeed in commercializing twenty five percent of the invention disclosures they receive.

Like the Goldscheider Principle, our Principle is based on a series of empirical observations and analyses of institutional, national and programmatic studies of technology transfer programs around the world over many years.

In this article, we present these empirical observations and seek to identify the business factors that underlie them.

2. Licensing Success Rate in the U.S.

Licensing Success Rate ("LSR") is one of the fundamental measures of efficiency and effectiveness of a technology transfer office ("TTO"). We define LSR as:

LSR = Licenses and Options Granted / Invention Disclosures Received (1)

The Association of University Technology Managers ("AUTM") has carried out its Annual Licensing Activity Surveys ("ALAS") for the U.S. and Canada annually since 1993, when data was collected for 1991 and 1992. The specific data collected each year has varied, but has always included the fundamental measures of TTO operations—staffing, research funding, invention disclosures, patent applications filed and patents issued, licenses granted, start-ups created, and income received.

The data are a snapshot of the activity in that institution in that year. So, all the invention disclosures received in a given year are, by definition, new. However, the inventions licensed in that year will have different ages. Some new invention disclosures are licensed in the year they are received; others are several years old by the time they are licensed. Twenty-five year data from the University of California, which performs more research and licenses more technology than any other U.S. academic institution,[2] shows that only 10 percent of the inventions that will eventually be licensed are licensed in the first year after disclosure, with the peak licensing rate being 18 percent in the second year after disclosure. Fifty percent are licensed in just under four years from disclosure with the remaining 50 percent being licensed at steadily lower rates per year over the next twenty-one years. However, in a mature and successful academic technology transfer ecosystem, where invention disclosures rise steadily each year, this phenomenon means that the observed rate (*i.e.*, licenses granted that year divided by invention disclosures received that year) is actually lower than the actual licensing success rate (*i.e.*, the percentage of the invention disclosures received in that year that will eventually be licensed over the next 25 years). Most importantly, the rate is lower by a constant amount after the 25th year of the analysis (in this case). While it would be preferable to be able to analyze the licensing data by year of disclosure, it is simply not available, and we should not let the perfect be the enemy of the merely good.

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1. *Uniloc USA Inc. v. Microsoft Corp.*, No. 03-CV-0440 (Fed. Cir. Jan. 4, 2011).

2. W. Tucker, personal communication.

Figure 1. Average LSR For All U.S. Institutions, 1991-2010

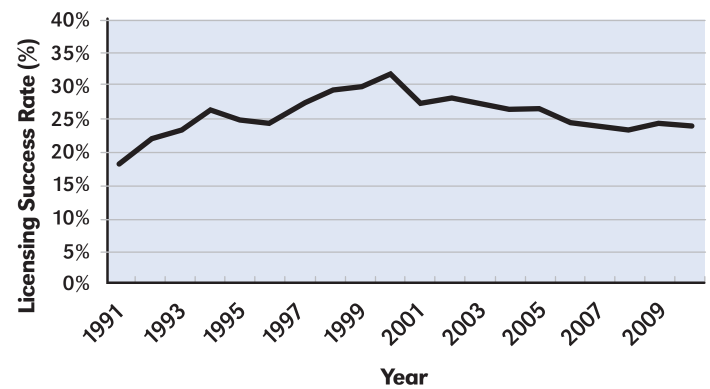


Figure 2a. Licensing Success Rate By Institution—1993

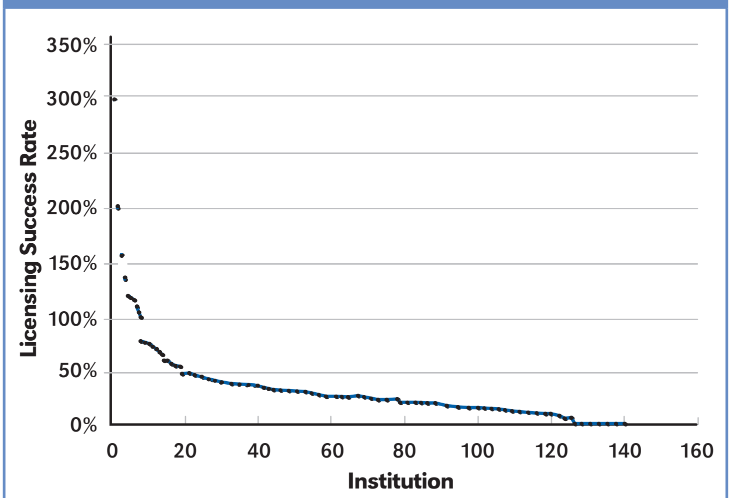
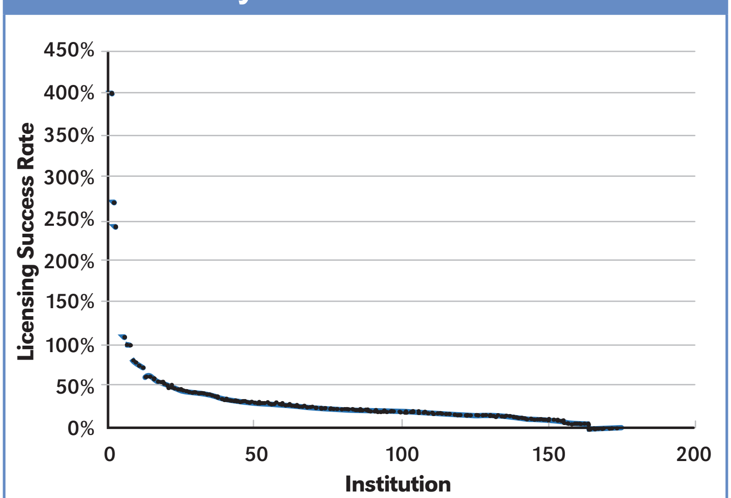


Figure 2b. Licensing Success Rate By Institution—2010



In Figure 1, we show the average LSR for all U.S. academic institutions since 1991. The LSR was 20.2 percent in 1991, peaked at 33.6 percent in 2000, and has since trended down to a range of ~25 percent. In 2010, the LSR was 26 percent.

However, at the individual institutional level, LSR's differ widely. Figure 2 shows the distribution of LSR from highest to lowest in 1993 and 2010. Here we see that, while the bulk of the LSR's of individual institutions cluster in a band of from 10-40 percent, averaging around 25 percent, there are a large number of outliers, both significantly above and below this range.

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First we examine the LSR's of individual institutions in 1993,[3] shown in Figure 2a. One hundred and forty institutions reported useable data, and the average LSR for all institutions was 25 percent. However, eight institutions had LSR's of 100 percent or higher, and a further eleven had LSR's of 50 percent or higher. Sixty-one institutions had LSR's between 15 percent and 35 percent, twelve institutions had an LSR of 10 percent or lower, while fourteen had an LSR of 0 percent—*i.e.*, they received some number of invention disclosures but licensed none of them. As a result of this wide distribution of LSR's, the standard deviation of LSR's between institutions was 37.6 percent.

3. There was considerable sensitivity about the rapidly rising levels of royalty income when the ALAS was initiated in 1993; and in the initial survey almost half the institutions asked that their data be kept confidential, and only 72 responses for 1991 and 1992 were disclosed publicly and are useable. The concerns about public perception appear to have dissipated by 1994, and 144 institutions allowed the individual data they reported in the 1993 ALAS to be disclosed publicly.

Table 1. Institutions With LSR's Above 100 In 1993 And 2010

Institution	Disclosures	Licenses	LSR
Institutions with LSR's of 100% or Higher—1993			
Institution	Disclosures	Licenses	LSR
Univ. of Massachusetts/Amherst	10	30	300%
Wistar Institute	10	20	200%
Univ. of Miami	16	25	156%
Woods Hole Oceanographic Inst.	3	4	133%
City of Hope National Medical Ctr.	11	13	118%
Syracuse University	12	14	117%
Oregon Health Sciences University	28	30	107%
Fox Chase Cancer Center	8	8	100%
Institutions with LSR's of 100% or Higher—2010			
Institution	Disclosures	Licenses	LSR
Wistar Inst.	4	16	400%
The Jackson Laboratory	10	27	270%
Montana State Univ.	22	53	241%
North Dakota State Univ.	49	94	192%
Univ. of Arkansas Fayetteville	34	64	188%
Univ. of New Hampshire	11	12	109%
New Mexico State Univ.	2	2	100%
Univ. of Oregon	30	30	100%

Table 2: Selected Institutional LSR Data, 2010

Institution	Disclosures	Licenses	LSR
Massachusetts Inst. of Technology (MIT)	521	96	18.4%
Univ. of California System	1,565	252	16.1%
Stanford Univ.	467	90	19.3%
Univ. of Wisconsin Madison/WARF	356	62	17.4%

Fast forwarding to the 2010 AUTM Survey, the picture is not significantly different, as shown in Figure 2b. One hundred seventy-three institutions provided useable data, and the average LSR across all institutions was 26 percent. Eight institutions had LSR's of 100 percent or higher, and a further twelve had LSR's of 50 percent or higher. Eighty-seven institutions had LSR's between 15 percent and 35 percent, fifteen institutions had an LSR of 10 percent or lower and seven had an LSR of 0 percent. The standard deviation of LSR between institutions was even higher than in 1993, 45.2 percent.

An LSR of over 100 percent means that an institution grants more licenses than it receives new invention disclosures in that year. There can be several explanations for this. One is that the institution has licensed a number of older invention disclosures that had not previously been licensed. Another, and more likely, explanation is that the institution has one or more inventions that are licensed non-exclusively, so that the same invention is licensed many times. Such inventions may be enabling, platform technologies that licensees build on to develop products, such as, say, the core Cohen-Boyer patents on genetic engineering licensed non-exclusively by Stanford to every biotechnology company in the 1980 and 1990. Another type of discovery that would be licensed non-exclusively multiple times would be research tools and targets for drug discovery.

Table 1 shows the institutions with LSR's of 100 percent or higher in 1993 and in 2010. One institution—the Wistar Institute in Philadelphia—appears on both lists.

Interestingly, as shown in Table 2, some institutions which are generally regarded as models of technology transfer efficiency, such as MIT, the University of California system, Stanford and WARF have LSR's that are significantly lower than the average LSR for all U.S. institutions of 26 percent.

3. Licensing Success Rate Outside the U.S.

A number of countries conduct surveys of technology transfer, though only Canada, whose survey is conducted by AUTM in conjunction with AUTM's U.S. survey, has as long a history as the U.S. Furthermore, many countries do not have AUTM's tradition of institutional transparency and only publish consolidated data, so there is not the wealth of data on

Figure 3. Licensing Success Rate For U.S., Australia, and Canada, 1991—2009

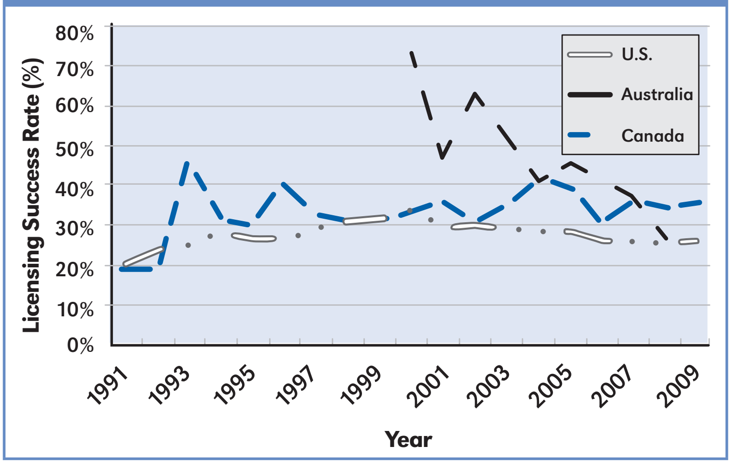
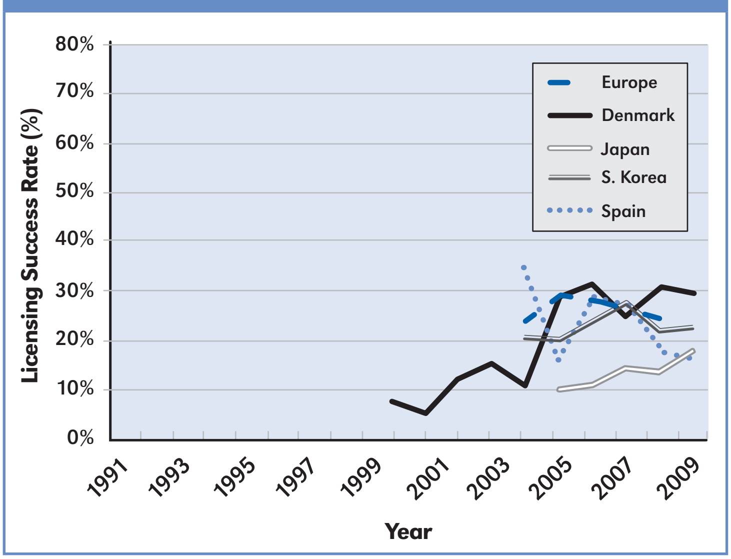


Figure 4. Licensing Success Rate For Europe, Denmark, Japan, Spain and South Korea, 2000—2009



individual institutions over 20 years that the AUTM ALAS provides.

Figures 3 and 4 present the limited international data that is available. Figure 3 shows that Canadian experience mirrors that of the U.S., though Canadian institutions have achieved an LSR which has consistently been 5-10 percent higher than that in the U.S. Australia started with a very high LSR—over 70 percent—but has steadily trended down and is now below the Canadian rate and close to the U.S. rate.

Figure 4 shows that Denmark, which changed its laws in 2000 to give ownership of academic inventions to the university replacing the "Professors' Privilege"[4] system, essentially creating a technology transfer system from scratch, started with a LSR of less than 10 percent, but has steadily increased and now has an LSR of 30 percent. Similarly, Japan, which also created a technology transfer system from scratch in 2004 when the national universities were privatized,[5] started with an LSR of 10.4 percent, but has since climbed to 18.4 percent. South Korea, which has the second highest level of technology transfer activity globally after the U.S. has consistently had an LSR in the low 20 percent range. The pan-European data from ASTP have consistently been in the high 20-30 percent range. Spain has followed a similar path as Australia, starting out with a rate over 30 percent and trending steadily downward.

This brief overview indicates that international experience has been similar to that in the U.S., with a sustainable LSR being in the 20-30 percent level; new programs seem to start lower and trend steadily up. One of the reasons that countries which create technology transfer programs from scratch start with such a low LSR is because of the observation above that few inventions are licensed in the year they are received. In addition, newly hired staff gain experience.

4. Why are LSR's so Low and Diverse?

These data raise several interesting questions:

1. Why is the average LSR so low?
2. Why is there such a disparity between institutions?
3. Why do some highly regarded institutions have relatively low LSR's?

In the remainder of this article, we seek to answer these questions.

4.1. Approach

The variability in LSR's between individual academic institutions is both dramatic and intriguing.

4. In the "Professors' Privilege system, the individual professors are free to own the inventions they create (and chose to pay to patent). Historically, in most countries other than the U.S. and U.K., the Professors' Privilege was the preferred model for ownership and management of academic inventions. As the success of the U.S.' and U.K.'s adoption of institutional ownership in the 1980's started to become appreciated, other countries started to convert to institutional ownership.

5. Certain universities had set up private corporations to handle technology transfer in 1999, but the universities could not hold patents until 2004 when their status changed to private corporations.

We developed several hypotheses that might explain these data and then sought data which would let us test our hypotheses.

Two hypotheses which we were able to test using data independent of the AUTM ALAS are:

1. That TTO's are insufficiently discriminating and accept too many invention disclosures into their systems; and
2. That academic technologies are too embryonic and early stage.

4.2. Hypothesis 1: Are TTO's Too Indiscriminating?

TTO's serve the entire faculty at an institution and generally seek to encourage the broadest level of invention disclosure flow. Usually no invention disclosure is rejected; rather all are taken into the system and evaluated. A relatively low cost provisional patent application is filed on a large percentage of invention disclosures—typically around 60 percent—and the TTO uses the year's breathing room that a provisional filing provides to evaluate the invention and see whether it is likely to be licensable.

This approach results in many invention disclosures being taken into the system for only a year that are not subsequently protected and hence are not available for licensing, thereby depressing the LSR. Our first hypothesis is therefore that more selective programs should achieve a higher LSR.

One opportunity to test this hypothesis is to examine Research Corporation Technologies in Tucson, Arizona ("RCT"). RCT was created in 1986 in response to the Tax Reform Act of 1986[6] and took over the invention management activities of Research Corporation ("RC").[7] RC was the primary vehicle for academic technology commercialization in the U.S. prior to the passage of the Bayh-Dole Act, after which the majority of academic institutions established their own TTO's. RC would pay all the costs of patenting and licensing an invention and would retain 42.5 percent of any subsequent income.

In 1986, RCT still had relationships with a large number of institutions even though by then many had started to establish their own TTO's in response to the passage of Bayh-Dole, and RCT continued to accept and take assignment of inventions from them on a national and, indeed, an international basis. RCT had agreements with around 550 institutions during this period, and a team of four regionally-based representatives to maintain contacts with these institutions and identify their most licensable technologies. As shown in Table 3, from 1992 to 2009, RCT was highly selective and accepted just two hundred twenty-eight inventions, an average of only 12.67 annually. However, it succeeded in licensing only sixty-six of the two hundred twenty-eight, an LSR of 29 percent.[8]

Table 3. RCT's Licensing Success Rate, 1992—2009

Projects Accepted	228
Licensed	66
Licensing Success Rate	28.9%

While it can certainly be argued that there may be adverse selection at work—TTO's keeping the low hanging fruit and only sending inventions to RCT that they had not been able to license themselves—the results are nonetheless indicative. Selecting only twelve to thirteen inventions a year from this many institutions indicates a high degree of selectivity, but despite this selectivity, RCT's LSR was virtually identical to the overall U.S. average LSR, which was 28% over this same period.

4.3. Hypothesis 2: Are Academic Technologies Too Early Stage?

The old academic paradigm of "Publish or Perish" still holds true, even though in commercialization terms it frequently results in "Publish and Perish." An academic only gets credit for being the first to discover something—even dead heats will be adjudicated via the "Submitted on—" footnote in a publication—so once a discovery has been completed, the professor will focus single-mindedly on rapid publication. Even if the professor engages with the TTO and submits an invention disclosure before publication, this frequently results in weak IP—a patent application with a single example of the application of the discovery will not receive as broad claims as one

6. PL 99-514, 100 Stat. 2085, enacted October 22, 1986.

7. Research Corporation was established in 1912 by Edward Cottrell , a professor of chemistry at the University of California San Francisco, who had invented the electrostatic precipitator to remove the pollution emitted by the zinc smelters that ringed San Francisco Bay. Cottrell decided that the commercialization of his invention should be carried out outside the university and set up RC, at the time only the second foundation to be set up in the U.S., with the assistance of the Smithsonian Institution. The proceeds from Cottrell's precipitator provided the operating funds for RC, which would accept inventions from academic inventors, pay all the costs of patenting and commercializing their inventions and return a large part of the income to the academic institution.

8. John Perchorwicz, Personal communication.

with three examples, for instance. It also results in a patent clock being started that ticks inexorably and increasingly expensively and which cannot be turned back. Frequently, the initial publication and patent filings don't have data on the feasibility of applying the discovery in a commercial context—the proof of concept—and this is only obtained subsequently, if at all. Patent applications therefore frequently reach their first major triage point, the decision over which national phase applications to file which comes at 30 months after the initial patent filing, before there is good supporting data.

Another issue is that the vast majority of funding sources available to academics are to advance basic scientific knowledge and not to apply that knowledge in a practical context. A grant proposal to identify a key protein involved in the etiology of a disease will likely attract a favorable score; a subsequent grant proposal to take that protein, develop a high throughput screen to look for molecules that inhibit the protein and then to use the assay to screen a 200,000 compound library will almost surely be deemed obvious and boring and will receive an unfundable score; yet it is the results of the latter set of experiments that will create commercial interest.

This dilemma is being solved through the emergence of funding for translational research studies. A number of these have been philanthropically funded, *e.g.*:

- The Deshpande Center at MIT;[9]
- The von Liebig Center at University of California San Diego;[10]
- The Wallace H. Coulter Foundation's Translational Research Partnerships in Biomedical Engineering with ten universities with biomedical engineering departments;[11]

while a number have been funded through state science and technology centers, *e.g*:

- The Massachusetts Technology Transfer Center;[13]
- The Edison Technology Centers, Ohio;[113]
- The Ben Franklin Technology Partners Centers of Excellence, Pennsylvania.[14]

These programs provide funding for proof of concept studies and assist professors in identifying appropriate initial commercial opportunities for their technologies and in writing initial business plans.

The von Liebig Centers and Deshpande were established in 2001 and 2002 respectively, with endowments of $10 million and $20 million respectively.

The Kauffman Foundation funded a study of the von Liebig and Deshpande programs in 2008[15] and found the outcomes shown in Table 4.

The two programs had invested in sixty-four and sixty-six projects respectively. Deshpande invested almost twice as much per project as von Liebig, perhaps reflecting its larger endowment. However, von Liebig had 50 percent more commercializations—an LSR of 30.3 percent, versus Deshpande's 17.2 percent. The LSR for the two programs combined was 23.8 percent, lower than the overall AUTM average of 27.5 percent for this period.

While at first blush this may look as if the trans-

Table 4. von Liebig Center And Deshpande Center Outcomes

	Von Liebig	Deshpande	Combined
Annual Investment	$1.2 mm	$1.7 mm	
Projects Funded	66	64	
Average Investment	$42k	$109k	
Licenses	4	1	
Start-Ups	16	10	
Total Capital Raised	$71 mm	$88.7 mm	
Average per Start-Up	$4.4 mm	$8.9 mm	
Leverage	105x	81x	
LSR			
Licenses	6.1%	1.6%	3.8%
Start-Ups	24.2%	15.6%	20.0%
Overall	30.3%	17.2%	23.8%

9. *http://web.mit.edu/deshpandecenter/*

10. *http://www.vonliebig.ucsd.edu*

11. *http://www.whcf.org/partnership-award/overview*

12. *http://www.mattcenter.org/*

13. *http://www.development.ohio.gov/Technology/edison/tiedc.htm*

14. *http://benfranklin.org/*

15. Gulbranson, C.A., and D.B. Audretsch. 2008. Proof of Concept Centers: Accelerating the Commercialization of University Innovation, Ewing Marion Kauffman Foundation; available at *http://sites.kauffman.org/pdf/poc_centers_01242008.pdf.*

lational research funding had no impact, there is a significant difference in the type of commercializations that occurred. 83.8 percent of commercializations were via start-ups, as opposed to licenses to existing companies. By contrast, the overall rate of commercialization via start-ups reported to AUTM is 15 percent, so translational research programs result in start-ups at five to six times the rate as with academic inventions that had not received translational research funding.

Second, the start-ups raised significant amounts of investment—an average of $4.4 million per start-up for von Liebig, one hundred five times the average translational research funding awarded by the Center, and $8.9 million for start-ups emerging from the Deshpande Program, eighty-one times the average translational research funding per project.

The Coulter program is four years younger than either of these programs. It was launched in 2006 and provided $500,000 to each of ten universities[16] in its first year and $1.0 million per university for the next four years, for a total of $4.58 million per school and $45.8 million for the program.

The five year outcome results of the program are shown in Table 5.[17]

Two hundred projects were funded between the ten institutions. Total funding was $46 million, an average of $230,000 per project, more than double the average Deshpande funding and six times the average von Liebig funding. Sixty-six start-ups resulted, together with twenty-eight licenses to existing companies, for a total of ninety-four commercializations and resulting in an LSR of 47.0 percent, with 70 percent of the licenses being to start-ups. As with von Liebig and Deshpande, the start-ups raised significant funding. Thirty-eight had raised $294 million of venture capital, an average of $7.74 million, close to the average funding VC raised by Deshpande spin-outs and almost double the average VC funding raised by von Liebig spin-outs, but a lower multiple of the translational research funding made since per project funding of the Coulter program was over five times von Liebig funding and more than double Deshpande funding. Twenty-one of the start-ups were still at seed stage and thus far had only raised slightly less than the translational research funding the programs had invested in the technology.

The Coulter program appears therefore to be significantly more successful than the Deshpande and von Liebig Centers, achieving a remarkable LSR of 47 percent, but, as with Deshpande and von Liebig, generating a substantial percentage of its commercializations via start-ups, which in turn raised substantial amounts of venture capital.

5. Discussion

In 1978 as policy discussions about Bayh-Dole were gathering steam, research showed that the U.S. Government had achieved an LSR of only 4 percent. As has been widely reported, the Government had succeeded in licensing just 4 percent of the twenty eight thousand patents it owned. The 25-30 percent LSR that seems to be the "natural" level achieved by modern TTO's is therefore a six to seven fold improvement over the pre-Bayh-Dole system, an enormous leap forward. However, it is still low and a cause of ongoing tension between faculty and TTO staff. Viewed the other way, 70-75 percent of the time, TTO's fail to find a licensee for an invention

Table 5. Outcomes Of Coulter Foundation's Translational Research Partnerships In Biomedical Engineering
(All amounts in $ million; audited results after year 4)

	Number	Amount ($ mm)	Average ($ mm)	Leverage
Projects Funded	200	$46	$0.23	
Start-Ups				
VC Funded	38	$294	$7.74	33.6x
Seed Stage	28	$5	$0.18	0.8x
Total Start-Ups	66	$299	$4.53	4.5x
Licensed to Industry	28			
Total	94			
LSR	47.0%			
Gov't Follow-on Funding		$150		
Animal Model/First in Human Model	150+			

16. Boston University, Case Western Reserve University, Drexel University, Duke University, Georgia Tech/Emory University, Stanford University, University of Michigan, University of Virginia, University of Washington, Seattle, University of Wisconsin.

17. Elias Caro, Wallace H. Coulter Foundation, Personal Communication, February 2012.

disclosure they receive, causing frustration with the disclosing professor who has gone to the effort of submitting the invention disclosure and obviously believes it inventions has value.

We suspect, but were not able to obtain data to test, that the primary reason for the low overall LSR is that, in general, academic invention is driven by technology push—new scientific discoveries that allow something to be done today that couldn't be done yesterday. Innovation, however, is driven by market pull—what people want to buy. We suspect, but were unable to test the hypothesis, that it is in the process of matching market pull with academic technology push that so many academic inventions fall by the wayside. Many academic inventions are just so far ahead of their time that there is insufficient market interest in them in their first year or two, when key decisions have to be made, to justify continued investment of TTO funds in their development.

However, we were able to test the next truism of academic inventions, that they are embryonic, unproven and highly risky. The Wallace H. Coulter Foundation's Translational Biomedical Research Partnerships is the gold standard of translational research programs. The Foundation has invested more money in academic translational research than any other entity and has spent more effort on evaluating the results of their program, and has shown that with properly managed translational research funding it is possible to significantly increase the licensing success rate.

However, the low overall licensing success rate is one of the great enigmas and complications of technology transfer. It is one of the reasons that TTO's are constantly exhorted to do better by everyone from government to the Kauffman Foundation to university leadership. However, what is not clear is whether there are any ways that it can be significantly improved without substantial investment—in translational research funding, in legal fees and in TTO staffing. However, another of the dichotomies of technology transfer is that its unique business model:

- Extremely long lead times from invention to revenues;
- Low licensing success rate, so that the investment in patenting 75 percent of all inventions is written off;
- Distribution of upwards of 75 percent of revenues to inventors and for investment in additional research, with only 25 percent or so being retained to offset operating and legal expenses;
- Limited patent lifetime;

results in most technology transfer programs showing a deficit on their operations. Abram *at al.*[18] found that in 2006, 52 percent of U.S. technology transfer programs had higher combined operating and legal expenses than the gross licensing revenues they brought in, and that only 16 percent of U.S. technology transfer programs retained enough of the license income they generated to cover their operating and legal expenses.

This unfavorable business model means that it is frequently difficult to persuade institutions to invest further in improving their technology transfer operations. One of the noteworthy findings of the 2009 and 2010 ALAS reports[19] is that while most aspects of U.S. technology transfer activities continue to grow steadily, the key measures of institutional investment in technology transfer—staffing and both gross and net patent budgets—have been flat at best.

Scott Shane, the A. Malachi Mixon III Professor of Entrepreneurial Studies at Case Western Reserve University, who has studied academic technology transfer extensively, wrote a thoughtful Op-Ed piece about the role of technology transfer in the national innovation ecosystem, and the desire of government to stimulate and enhance the technology transfer system in *Business Week* in February 2012.[20] Shane discussed the issues surrounding commercialization of academic research and concluded:

When thinking about the commercialization of academic research, policymakers have succumbed to the false logic that if something is good, they just need to boost the incentives to get more of it. But additional incentives to commercialize won't make academics better at inventing, they will merely lead universities to push out more marginal inventions, and motivate researchers to shift away from doing basic research and engage in undesirable behavior. Upping the incentives for more university technology commercialization is poor public policy.

This paper supports Shane's conclusions; increasing the success rate is likely to be an extremely complex and difficult task. ■

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18. "How U.S. Academic Licensing Offices are Tasked and Motivated—Is it all About the Money?," Irene Abrams, Grace Leung and Ashley J. Stevens, *Research Management Review*, Vol. 17.1, Fall/Winter 2009.

19. The recently released 2011 ALAS showed very similar results.

20. "*Stop Pushing Universities to License More Inventions*," Scott Shane, *Business Week*, February 29, 2012.