

The future of technology transfer

Universities and other non-profit research institutions play a vital role in the US innovation economy, and are key to institutions realising value from their discoveries. But as both technology and the IP landscape grow increasingly complex, they face steep challenges

By Pamela Cox

Consistent with their missions, US non-profit institutions transfer knowledge through teaching, publication and service. The Bayh-Dole Act permits institutions with federal funding to retain the title to inventions developed with such funds, making IP licensing an additional method of knowledge transfer. In the nearly 40 years since the act was passed, research-intensive non-profit institutions have established technology transfer offices (TTOs) charged with implementing this approach by protecting, marketing and transferring innovations created at the institution.

Technology transfer and the TTOs leading the process have been widely recognised as key drivers of economic growth and national competitiveness, which benefit the public through new products that improve quality of life. Yet the technology transfer process has often been poorly understood and supported. The success of TTOs has been evaluated using a variety of factors, often conflicting, such as faculty service and revenue generation. On top of that, the definition of 'technology transfer' and the responsibilities of TTOs have expanded over the years, from basic patent licensing to stewardship of a complex technology transfer ecosystem, which includes promoting start-ups, entrepreneurship, industry collaborations, investing in and managing technology development while taking some of the risk out of institutional engagement.

Given the backdrop of these varying priorities for technology transfer and the expanding remit of TTOs, where do we go from here? What does the future of technology transfer look like? And what changes should be made to ensure a robust and successful ecosystem?

With those questions in mind I asked a panel of national experts and thought leaders in technology transfer – including Katharine Ku from Stanford University, Lesley Millar-Nicholson from the Massachusetts Institute of Technology (MIT), Mayo Clinic Ventures' Andrew Danielsen and Claire Driscoll from the National Institutes of Health (NIH) – to weigh in on some of the hot-button issues facing TTOs.

Q: What is your vision of what technology transfer should look like five years from now? How does it compare with what you believe it actually will look like?

Katharine Ku (KK): Within five years, I hope that more companies will realise that institutions are a trove of potential intellectual property and that institutions – perhaps the federal funding agencies or other funding organisations – will put more money into translational funding for early-stage intellectual property. Most of our intellectual property is insufficiently developed for companies to take on without further maturation, but it can still lead to crucial technological advances. With respect to discoveries in the life sciences sector, institutions can mature their intellectual property by carrying out more translational research, including drug discovery, medicinal chemistry and building broader expertise (eg, good manufacturing practices capability and regulatory understanding). I would really love to see institutions develop a better and closer relationship with the high-tech big company sector; currently it is very hard to license to them, although recent litigation wins for institutions may encourage these companies to pay more attention to TTO licensing opportunities.

Many institutions are establishing funds to further mature inventions but these are relatively small. Institutions are trying to do many things – start-ups, industry collaborations and research funding, and entrepreneurship – and I think this increased scope of responsibilities will continue into the future.

Andrew Danielsen (AD): Our vision at Mayo is that TTOs should strive to become income-generating centres for their institutions. Much like the external partners with whom we work, we feel that TTOs should focus on profitability and sound business principles. This approach can serve many goals, including to:

- promote the efficient use of resources (eg, personnel and external counsel);
- develop a culture that is compatible with external partners (eg, deadline driven, accountable and market aware);
- help to make TTOs self-sustaining and thus sufficiently independent to allow for effective decision making;
- benefit the institution by returning net income to support other priority areas; and
- benefit taxpayers through the more efficient development of new inventions.

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Profitability is easy to wish for and hard to achieve but with the right structures, people and leadership support it should be attainable over time. Ours is a long-term business and the cycle from licence to income is seldom fast. However, if the correct processes are followed it is possible for a TTO to generate income to support itself and return profits to the institution.

One worthwhile goal is an approach and structure that supports and empowers TTOs to make difficult business decisions and to be creative and proactive in deal making, with the net result of income generation. We do see a change in the current TTO environment, with a shift towards tools, people, structures and resources that promote creative deal making in order to maximise value back to the institution. We see this trend continuing as institutions become aware of what can be achieved.

Lesley Millar-Nicholson (LMN): My wish list for what technology transfer might look like in five years' time would include administrators with a much better understanding of the function of technology transfer beyond simply as a place where patents are filed, companies license intellectual property and, if lucky, revenue is generated. The true cost of technology transfer should be understood and the piecemeal approach to funding be broken down. I hope that the reticence of parties to acknowledge that it takes significant funding (whether for patents, people or other resources) to invest for the long term and manage for the even longer term will vanish – perhaps through formal, legal contracts with parties who do truly invest in the research. The administrative aspects of TTOs should be elevated and better understood – it would be great for us to be able to hire more smart people who can dig deep into the weeds of compliance and corporate sponsorship issues, investigating new ways to do business and to tell our story better. Often the licensing aspect is the high-profile part and we are failing to showcase the entire community, which diminishes the value proposition for technology transfer.

As well, I would like technology transfer to have developed professionally so that it can be a source of exceptional career experience for graduates and for individuals able to bring business and corporate experience to the table. I believe that it should be a

more respected denizen of the university and corporate engagement world, with a clearer understanding of the ways in which we can achieve great things if expectations are aligned and policies used to delineate different interests based on principled arguments. With the current drive for more corporate funding for institutions, there is a fear that it is the TTOs themselves which could create hurdles to achieving this new world order. I hope that there will be more IP management products on the market to help all TTOs, whatever their size, to manage their portfolios. Currently there are too few good options available and everyone seems to have a different answer or else decides to build their own. We should not hide behind laws or regulations which we do not understand to avoid dealing with new ways to do business. Rather, we should make informed decisions, with clear rationales, and ensure that we have good counsel assisting us.

Not on my wish list but perhaps what will be in place, I expect that Bayh-Dole will still be going – perhaps strengthened but certainly not diminished. Patent trolls will still exist but the 'technology transfer as troll' argument should have diminished. In addition, there may be more models of regional technology transfer being tested by various states. I would expect to see more student entrepreneurship managed by TTOs, while more business development activity generally will be brought under the TTO umbrella – or else the TTO function will be renamed as something more business-development focused. In addition, I think there will be more conflicts to manage and also more complex collaborations with industry, as well as more corporate venture capital partners looking for investments with an institution's start-ups and trying to link corporate engagement to investment opportunities.

Institutions' prime mission of teaching, research and service is unlikely to change. Their additional role of economic development (acknowledged and celebrated by some) will also remain strong. In addition, I think that more TTOs will take on broader functions of technology transfer (ie, business development activities in general). This already appears to be a growing trend and I think it will become inevitable as institutions struggle to fund TTOs and search for other ways to source funding, government grants and other not-for-profit partnerships (consortia).

I think institutions will continue to dabble in different models for technology transfer as they try to reduce risk and financial costs, with some taking on more management of student intellectual property. There will likely be more activity around exploring not-for-profit foundations or other mechanisms to shift risk out of the institution while maintaining a related technology transfer function. As well as this, I think we will see more funding models from the government for proof of concept, further development, small business innovation research and small business technology transfer programme type models. Research funding might diminish but the drive to keep and grow jobs in the United States could well lead to new start-up stage funding opportunities.

Claire Driscoll (CD): Five years from now I would hope to see better resourced (mainly financial) technology transfer with a more diverse set of professionals (ie, in terms of skill sets, work experience and educational

Katharine Ku

Katharine Ku is executive director of the Office of Technology Licensing at Stanford University, which is responsible for licensing various state-of-the-art university technologies and industry sponsored research agreements. In addition, she was vice president, business development at Protein Design Labs, Inc and worked at Monsanto and Sigma Chemical as a research scientist. Ms Ku is currently an *ad hoc* member of the National Institutes of Health National Centre for Advancing Translational Sciences and the Biomedical Engineering Society's industry advisory board. She has served on the Certified Licensing Professionals' board of governors, the Biotechnology Innovation Organisation's board and the Licensing Executive Society's board of trustees. Ms Ku was president of the Association of University Technology Managers from 1988-1990.



credentials) who can provide a wide array of services to the academic community. Our offices need to be staffed appropriately and to have adequate funding in place to ensure that we can afford to file on or keep prosecuting patent applications for promising inventions, utilise top-notch IT systems, access global patent and specialised industry databases for deals, commercialisation or valuation, allow for both professional development activities (eg, attending conferences and educational coursework for technology transfer professionals) and the establishment of various funds and incubators, and engage in economic development activities. It is challenging for TTOs to attract or retain the kind of employees we all desperately need (notably those with dual graduate degrees in science and another field, such as law or business, or individuals with industry experience) given the relatively low salaries currently being offered, even at the top TTOs. Few TTOs cover their own costs and I do not see this changing in the near term. Institutions must at least partially fund their TTOs from their operating budgets, as they do any other core function, and leaders must be patient – it can take a decade or two for even a top academic TTO to transform itself into a revenue-generating entity. Our profession is becoming better understood – technology transfer is a hot career these days. Many business development, project management, legal, financial and administrative best practices from industry and other sectors have been incorporated into TTOs and over time fewer of these workplaces will have the look and feel of a stuffy academic administrative office with dated furniture (and staffed by folks from other academic departments who just happened to express an interest in the field). Instead these well-run, highly productive TTOs will transform and the TTOs themselves will have the polished look and high-energy vibe of start-up companies.

How does that compare with what I believe will actually happen? Same old, same old. Some of the big players might be able to expand their TTO operations because of a robust royalty stream from a blockbuster licensed product or perhaps as the result of a large corporate or charitable donation in support of entrepreneurial activities. However, I believe that most top-tier research institutions will continue to mop up the majority of available funds and execute a proportionally larger number of deals – whether this is securing NIH grant funds or corporate funds for collaborative research endeavours. Smaller, less well-known TTOs – particularly those in geographic regions that are not innovative hubs or which do not see a lot of commercial activity – may continue to struggle. These smaller TTOs may need to partner with each other, as well as with regional or state economic development agencies to create viable regional operations with a wide range of technologies available for licensing, alongside the necessary expertise and commercialisation experience. Creating and nurturing vibrant innovation ecosystems is the future and the regions that are able to do this will flourish and prosper. Academic TTOs are only one piece, albeit a critical one, of that complex ecosystem.

Q: What roles do you see for faculty entrepreneurs and start-ups in your future vision? If different than today, what forces will drive the changes?

AD: I see them playing a key role in most cases. The trend in industry is to look for heavily de-risked technologies (ie, the post-clinical experience) and therefore start-ups play a key role in moving a technology to that stage of development. Most institutions have neither the expertise nor the resources to move a technology to clinical testing – and therefore a start-up can play a critical role. Once developed through a start-up, the technology can be sold to a large company and brought to market. This outlook and approach is entirely driven by large companies shifting to de-risked assets.

One key point is that these start-ups must be sufficiently capitalised and have, or soon acquire, experienced management in order to secure additional funding and continue to progress. We believe that a heavy reliance on so-called ‘garage start-ups’ does not serve the institution or the entrepreneur well. Too often we see under-capitalised start-ups fail due to simple mistakes by inexperienced management – this can kill an otherwise great technology and prevent it from making it to market and benefiting society.

So, start-ups and entrepreneurs play a key role, with the caveat that we must do everything we can to ensure that the start-up has the capital and management it needs to create the best odds of success possible.

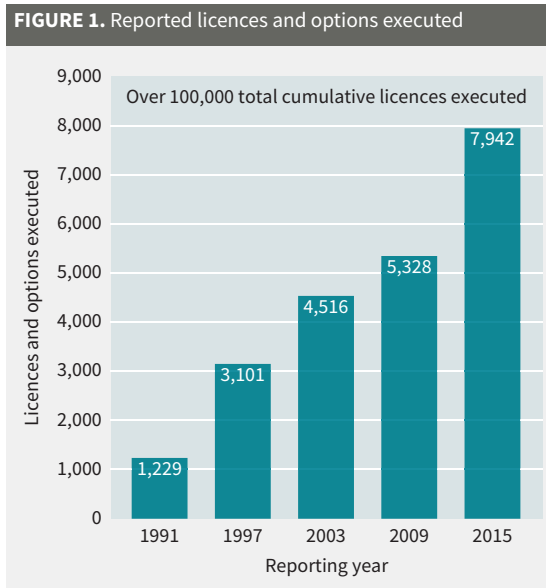
KK: In the Silicon Valley ecosystem, entrepreneurship and start-ups are commonplace and will continue to be so. I do not think this will change in five years, although there might be an acceleration of start-ups.

CD: Effectively balancing and managing both individual and institutional conflicts of interest will continue to be key for faculty entrepreneurs and for institutions, which will also have to find adequate funding for promising early-stage projects. Another vexing problem is how to best manage the temptation to create many new start-ups (great press for the institution and the TTO with the bonus of local job creation) when in many cases a straight licensing deal with an existing, non-local company would have been the better choice to ensure future successful sales of a product or service, as well as a future royalty stream for the TTO. At the NIH, faculty who are interested in engaging in significant entrepreneurial activities cannot do so while employed by the federal government (we have strict conflict of interest rules). Starting a company, serving on a board of directors or even working in a part-time capacity for a private sector company is not permitted. The NIH cannot spin out companies or take an equity stake in companies. Rather it operates like most academic TTOs

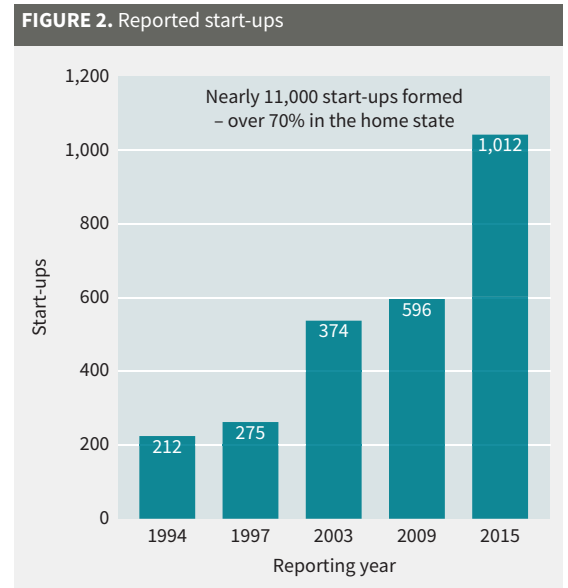
Andrew Danielsen

Andrew Danielsen is vice chair of licensing at Mayo Clinic Ventures, where he has worked since 2002; he oversees the licensing, technology development, as well as the office's business development functions. Collectively, these groups work to identify, develop and commercialise Mayo Clinic intellectual property. Before joining the office, Mr Danielsen conducted research at the Mayo Clinic, where he worked to identify therapeutic targets in breast and ovarian cancer.

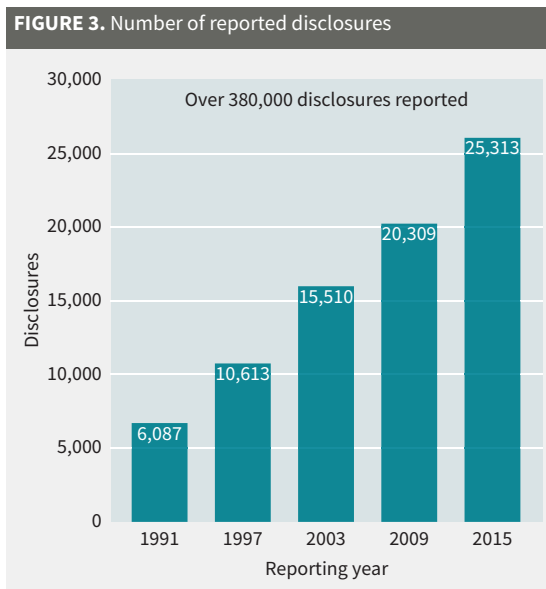




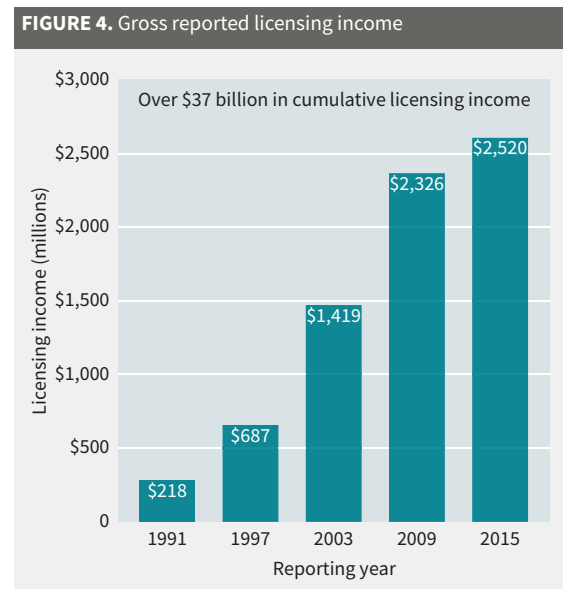
Source: AUTM's 2015 US licensing survey



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did 20 years ago and like many smaller TTOs still do today – this way of doing business puts us at a big disadvantage compared to academic TTOs.

LMN: The expectation that institutions play a key role in the economic growth of states and regions, and that an institution's research is always early stage and needs help to be transferred means that a growing group of institutional entrepreneurs will emerge over time. More post-docs will be involved, as well as a more sophisticated entrepreneur group as faculty become more attuned to the environment and more active in venture capital groups. There will likely be an increase in venture capital-related activities, as well as a rise in conflict management issues – whether as a result of consulting agreements with start-ups or student involvement in

faculty start-ups. In addition, federal labs will start to take on a more active role in launching start-ups; the lean start-up model will be further developed.

Q: What role will corporate partners play? Will that lead to more deals or differently structured deals?

LMN: There seems to be growing interest in how to engage corporate partners in start-ups, from the basic match making between an institution's start-ups and potential corporate partners going on now to more sophisticated models of laying the groundwork for having corporate partners become strategic investors early on in the process via a mechanism enabled by institutions. Institutions will have become far more

comfortable with issues such as private business use and will use these as opportunities for strategic engagement and not as an excuse to avoid strategic engagement by key strategic partners. There will always be differences in industry engagement styles based on the type of technology – closer collaborations in the pharma or life sciences sectors may be more likely than in computing and software industries.

CD: Institutions seem to be entering bigger, longer-term deals with larger entities after moving away from such arrangements for the last two decades – does anyone remember the controversial 10-year Scripps Research Institute and Sandoz Pharmaceuticals Corp deal of the early 1990s? One change compared to the late 1980s and early 1990s in the life sciences sector is that some of these partners are philanthropic organisations (eg, the Gates Foundation and the Parker Institute), though big pharma is still the biggest player. Pfizer Inc's Centre for Therapeutic Innovation has struck deals with several institutions in three states, with an emphasis on doing deals with multiple institutions in biotech regional hubs such as Boston, New York, San Diego and San Francisco. Institutions are now being asked to partner with other institutions to form consortia rather than to engage one-on-one with these new deep-pocketed funders.

AD: Corporate partners will likely continue to play a key role when it comes to acquiring start-ups and late-stage technologies and taking them through the final trials or to market. These last stages of development are expensive and require a wide range of expertise; corporate partners are generally the only groups that can accomplish this critical work.

In the current environment more deals would come from more and better start-ups or programmes to move technologies to the clinical testing stage. In addition to this approach, we have seen corporate partners show interest in co-development partnerships with institutions in certain areas (eg, biopharma, big data and artificial intelligence, as well as some segments of the device market). These partnerships can be highly effective and greatly benefit both partners. Institutions can drive more of these partnerships by committing resources (personnel and funds). The key to these partnerships (as in all aspects of business and indeed life) is to find compatible partners with shared values and objectives, which can build trust in one another. We have developed many such partnerships and they have been of great value, providing an outlet for creative solutions to unmet medical needs, educating our staff on product development or establishing a source of income to support other initiatives and new friendships.

KK: Corporate partners are essential but we also need to define 'partners'. Are they commercialisation partners or research partners? I do not think that licensing deals will be structured differently unless institutions give in to corporate demands for lower royalties, fully paid licenses and fewer diligence requirements. Corporate research agreements will likely look similar but the IP terms may be more in the industry's favour.

Q: Do you envision changes to the fundamental structure of technology transfer transactions?

Lesley Millar-Nicholson

Lesley Millar-Nicholson has been director of the technology licensing office at the Massachusetts Institute of Technology (MIT) since July 2016, where she leads a team of 42 professional staff managing the intellectual assets and technology transfer process for MIT's inventions. Before arriving in Cambridge MA, Ms Millar-Nicholson had served for 10 years as director of the Office of Technology Management at the University of Illinois, Urbana/Champaign. She is the 2017 president of the board of governors of the Certified Licensing Professionals and an active member of the Association of University Technology Managers and the Licensing Executives Society.



AD: We do not. In general, we feel that the standard agreement structures have worked well and that the marketplace will always find the range of value exchange that is acceptable to both parties. We do not believe in the trend for one-size-fits-all agreement templates (with the exception of a few technology areas, such as research tools). We feel that each technology should be evaluated and the value determined through negotiation based on industry comparables and generally accepted ranges. We feel that this is a key value-add for a TTO – assessing and capturing the fair value of an invention for the institution.

The fundamental structure of transactions (intellectual property in exchange for some combination of upfront payments, milestones, equity or royalties) has worked well over time.

KK: I do not envision the fundamental structure of transactions changing; after all, a licence must still have certain components. We may do more fully paid licences or annual payments – but we already consider these where appropriate. I think and hope that TTOs will grow in their sophistication and understanding of the different industry sectors and how to work with them.

LMN: I hope that simple, non-exclusive licences will become fast, non-negotiable frameworks where TTOs can create templates for each technology type, put them on a digital platform, make them available with easy diligence checks and then be able to execute them quickly and effectively. I think there are certain types of technology (eg, life sciences) where the structure is likely to become increasingly complex – but that is okay. Technology is complex and risk has to be mitigated. I believe that industry would like to see institutions sharing more of the risk in certain collaborations – perhaps this is possible at the research stage when we are actually doing the work, but the risk must shift to the entity taking it forward at the development and commercialisation stages. If people have a better understanding of the real issues with private business use for their institutions and discover that they can actually (within a *de minimis* threshold) provide pre-negotiated terms for some strategic partners (criteria on who qualifies for that category must be clear to all parties) – then perhaps we will see more of these types of transaction. Some institutions have big issues with this, others none.

CD: No, I do not predict changes to the fundamental structure of technology transfer transactions. We seem

to be a community that embraces change incrementally, which is ironic given that our clients are innovators. In many cases, the slow pace of introducing new ways to do business within our own TTOs has not been due to a lack of willingness to try new things, but rather because of a lack of funding, or legal and policy barriers.

Q: How has the changing legal landscape affected your vision (eg, post-grant reviews, enforcement of an institution's patent rights by licensees requiring joinder of the institution and ownership disputes)?

CD: Patent applications, particularly those that describe biotech or life sciences inventions, cost more to file and prosecute, while at the same time these same inventions are less valuable in the marketplace due to inherent post-issuance uncertainties over patent validity. We are filing on fewer biotech inventions. Earlier-stage collaborative research deals of longer duration which leverage our scientists' expertise and the unique capabilities of both our institution and our industry partner, as opposed to traditional licensing deals, are becoming more common.

LMN: This all depends on an institution's appetite for risk. State institutions have a different risk profile to companies and also enjoy protections unavailable to private entities (eg, sovereign immunity). If we are going to enter the game (eg, patenting, licensing or adding value) then we need to be able to address these issues clearly and consistently.

KK: I think institutions will be less willing to litigate because many of our patents can be challenged on so many different grounds. It is increasingly difficult to obtain broad patents – the costs keep rising and while the issued claims continue to narrow. Institutions will have to be more judicious about what they file on because of budget and US Patent and Trademark Office constraints. This will affect the relationship with inventors who still believe that broad patent protection is possible.

AD: These points have not affected our vision. They are important aspects to consider and negotiate towards the optimal position for the institution. We have not encountered much activity in post-grant reviews, so we have little experience in this area to share, other than that it has not been common for us. We have standard

agreement language which we can accept with regard to the enforcement of patent rights by licensees.

Q: What are the most negotiated provisions in your licence transactions? Are they likely to continue to be the same ones in the future?

AD: The most negotiated provisions continue to be monetary terms, improvements language and occasionally indemnification and representations and warranties. We do not see this changing in the future. The terms are of course always the first and toughest negotiation; again, we feel this is the primary value which can be added on by a TTO. We have acceptable language and limits for our indemnification, representations and warranties, which are well tested and from which we will not deviate, as they protect the institution. This is another key way in which a TTO adds value – completing agreements that protect the institution financially to the fullest extent possible.

LMN: For licences of all kinds the most negotiated provisions tend to concern enforcement (especially if there are multiple exclusive fields), equity (eg, the definition of 'fully diluted', anti-dilution provisions, information requirements and participation rights), exit or change of control fees and march-in or reservation of rights in platform technologies and fields (this occurs less frequently – but when it is an issue, it is usually big).

For life-science technology licences the definitions of the licensed product and service (eg, covered versus enabled) and how considerations (from royalties to sub-licence income to milestones) relate to each category of product are frequently an issue. In addition, there can be disagreement over royalty terms (when more than one licensed product is defined), improvements, know-how rights, carve-outs for sub-licence income (typically, the R&D exception) and control of the affiliate and sub-licence rights.

CD: The scope of the licence and the fields of use usually take a lot of negotiation. As do the type of licence, the financial terms, the definitions (particularly for 'earned royalties' and 'net sales') use of or incorporation of improvements or derivations, diligence and compliance, sub-licensing terms, liability and indemnification, arbitration and termination provisions.

I do not expect this to change in the future for big licences – 80% or more of our time will continue to be spent discussing and working through the same set of key licence provisions. For small licences we will continue to become more efficient – using pre-set licence terms and standardised term sheets, as well as express licences.

KK: Financials are the most often negotiated provisions (eg, earned royalties, issue fees, royalty bases, royalty stacking, combination products, equity amount and purchase rights and change of control fees).

Others include:

- definitions for 'net sales' and what is excluded;
- licensed patents, including continuations-in-part and valid claims, as well as fields of use;
- terms of exclusivity;
- diligence (milestones in general) and termination –

Claire Driscoll

Claire Driscoll is the director of the technology transfer office at the National Human Genome Research Institute (NHGRI) at the National Institutes of Health. She has served as director of NHGRI's technology transfer office since 2002. Currently, Ms Driscoll is responsible for the overall oversight of the institute's intramural patent and licensing portfolio and her office handles the negotiation of a wide range of transactional agreements; she also advises staff on technology transfer policy and related matters. Ms Driscoll is an active volunteer member on several Association of University Technology Managers, Licensing Executives Society (LES) International and LES US and Canada committees. She is the co-founder and co-organiser of the Women in Licensing DC group.



- what happens if the licensee misses a milestone;
- sub-licensing – how many tiers and what licensees should pay; and
- representation and warranties, liability, indemnification and insurance requirements

I know that this mostly covers everything but I think that this will continue to be the case in the future. If anything, negotiations are getting tougher.

Q: Reflecting on past licence transactions, what might you have done differently if you knew then what you know now?

KK: You never know what will create a problem in the future. My experience is that it is not usually what you were worried about at the time of the licence negotiation that causes an issue, so I would not spend so much time worrying about the financial licence terms, for example, or even other clauses, as I think we often do. As we learn from situations, we modify the agreements to reflect our current thinking, therefore we try to do now what we would do differently in retrospect. We always make the best decision we can given the current known facts, along with the unknown and uncertain future of how most of our licences will turn out. I still believe that concluding as many agreements as possible and planting as many seeds as we can is the way to carry out the most effective technology transfers.

That being said, perhaps I would terminate licences rather than allow them to linger based on the unrealistic hope that the licensee will get their act together.

LMN: Provisions related to compliance, financial reporting, payment plans for patent costs and the impact on the post-licence side of our function is often a belated afterthought and can cause internal administrative issues.

AD: We feel pretty good about where we are as an office and the agreements that we make. This is likely due to how long we have been in business (since the 1980s) and the learning and processes passed down to us from our predecessors. We always pay close attention to indemnification, representations and warranties and do not deviate from language that we are comfortable with – this has served us well in the infrequent but painful instances when it has been needed. We have learned that while in negotiations you win some and you lose some, you should always stay flexible and creative in trying to get to deal terms that secure fair value for the institution and not just do a deal for the sake of it. Be a tough but fair negotiator; always strive to be sufficiently flexible to get a deal completed but do not do a deal for less than fair value.

CD: We might have gone for simpler financial terms and lower or more realistic royalty rates in draft term sheets. We need better valuation estimates and more accurate data on the commercialisation potential for technologies before we enter into licence negotiations – academic TTOs often rely heavily on staff experience or use only previously executed licences as a benchmark rather than data-driven calculations. Here at NIH, many of our licences, particularly those involving non-exclusive biological materials, are carried out in lieu of outright

sales since most academic entities and all federal agencies cannot sell materials they own – we need to make these so-called ‘little’ licences for non-patented materials cheap, simple and fast to execute. Too often we have seen a potential licensee walk away after receiving what they feel to be unrealistic initial financial terms or due to what they see is a lack of urgency on the part of the academic TTO to get the deal done.

Q: Do you see the TTOs’ positions on key issues changing as part of your future vision – ideal or actual? If so, what forces will drive these changes?

KK: If a blockbuster royalty becomes unlikely as the law or the breadth of patents changes (eg, it is rare that a therapeutic will be sold within 20 years of filing), some institutions may end up thinking that the costs are not worth the effort. I think that economics will drive how they function in the future. The pressures on institutions to do any of the following – do more translational research, give companies a good deal or launch more start-ups – will drive change. Institutions are going to have to be clear about how intellectual property fits into their overall mission and long-term strategy. Intellectual property is an investment and the only ownable output of research.

LMN: Our vision is guided by the overarching vision of the institution. Without its support (financial and philosophical) we have little to go on. The expectation is that we will be able to meet the needs of an increasingly entrepreneurial faculty and ensure their interests in start-ups, in relation to acceptance of corporate funding. We will help to facilitate the institution’s desire to find new ways to engage corporate sponsors and to think creatively about deal structures.

“Institutions are going to have to be clear about how intellectual property fits into their overall mission and long-term strategy. Intellectual property is an investment and the only ownable output of research”

AD: We feel that we have a pretty streamlined office and process. Of course, there is always room to improve and we are always looking to innovate and adopt the best practices of others. However, this will likely be at the margins and the core of our approach will remain.

Q: Where will future TTO funding come from?

CD: I do not envision any big changes in this area – our main sources of funding will continue to be institutional funds plus royalty streams, collaborative research and sponsored research funding, along with the occasional consortium or big company deal.

LMN: To be successful (and by this I mean adding value and serving the faculty and students), the technology

Action plan



The panellists paint a picture of a future for technology transfer which is both expansive and challenging. They see the boundaries of technology transfer continuing to expand and non-profit institutions playing an ever-broadening role in the pipeline of getting early-stage technologies to the market, improving quality of life and driving economic competitiveness. The benefits that technology transfer offices (TTOs) provide come with real costs. To achieve their expectations, institutions will need to invest in the resources – both human and financial – as well as policies and regulations which may be lagging.

- Non-profit institutional leadership should

embrace and invest in the expanded role of the TTO that faculty entrepreneurs, the business community and society at large see for non-profit institutions in the technology transfer arena.

- Policies and regulations should align with the new and expanding models of TTOs as a means of achieving the institutional mission of disseminating knowledge for the public benefit.
- Increased public and private financial support for IP protection, highly trained personnel and translational development of embryonic technology are needed to make the vision of a robust and successful technology transfer offices ecosystem a reality.

transfer cost is simply a cost of doing business and should be built into the financial operating fabric of every institution.

AD: We strongly believe that a TTO should strive to be an income generator for the institution. If this can be achieved, there are numerous positive effects for multiple parties. Of course, achieving net income is easier said than done, but we believe that if a TTO is structured for this goal and is actively working to that end, the institution is much more likely to support it until it can do so.

KK: I am sceptical that future funding will come from royalties. I think it will have to come from the institution's central funds.

Q: What are your thoughts on how to bring about the changes that would need to occur to transition the current model of technology transfer into your ideal vision?

KK: The leadership of institutions must really understand technology transfer, its complexities in an institution environment and the difficulty of translating early-stage innovations into real products. The leadership has to be realistic in terms of economic returns and see technology transfer as a public service part of the institution's mission, regardless of its ability to generate revenue.

AD: For this to happen, there would need to be a willingness by senior leadership at the institution to support and empower the TTO to create the appropriate structures and to make the tough decisions necessary to produce a net-income generating office. This would include:

- recruiting and retaining employees with the experience and mindset to generate income;
- allowing those employees to make decisions on patent filings and other expenses, deal terms, creative agreements and other matters that focus on income generation; and

- create an environment where the expectations are for proactive deal making.

CD: We need to become more comfortable with facilitating the movement of faculty, experts and even TTO staff from the academic, non-profit or public sector to the private sector and back again. This cultural shift is already occurring – new types of faculty appointments, entrepreneur-in-residence programmes, hiring of industry experts by TTOs and hiring by industry of academic technology transfer experts to help with alliance management is happening but more needs to be done, particularly with regard to modifying institutional policies so that employee contracts and conflict of interest rules allow for more fluidity for faculty and professional staff. TTO leaders need to become more invested in lobbying for necessary legislative and policy changes by volunteering with professional organisations which are taking up the mantle for the entire technology transfer community. Leadership has to allow for experimentation and risk-taking by the TTO (with no punishments if some endeavours fail) – engagement with non-traditional partners, use of new deal structures and atypical terms (particularly with regard to the financial aspects), development of various consortia, hiring of outside experts. Decide what to measure (eg, what defines 'success' for your TTO at your institution) and then use analytics and careful post-deal and post-new initiative analyses by all stakeholders to decide which initiatives, programmes and processes should stay and which should be binned. TTOs can be so forward looking, resource light and busy that we do not always take the time to do a deep dive into our own data or to conduct in-depth discussions with key people in order discover what lessons have been learned and then take the time and energy to implement some of these critical measures.

Q: What are your thoughts on how to bring about the changes that would need to occur to transition the current model of technology transfer into your ideal vision?

LMN: High-level recognition of all aspects of added value (and compliance with the federal government) that the TTO function provides will be needed before things can change. This should be accompanied by greater transparency about the true cost of doing this business and an acknowledgement that this is an investment for the long term. It is crucial to understand that every institution is unique, fashioned by different geographical locations, faculty, brand and reputation, quality of research, regional and state histories to contend with (or utilise), and that therefore trying to become the next Stanford or MIT will not work. However, working out what makes a successful system generally and then working on each individual piece and building it with an understanding of what is in your local environment and what is not, has a higher chance of leading to success. iam

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Special thanks to Julie M Watson, special counsel at Marshall Gerstein, for her invaluable discourse regarding this article