

Foremost, I wish to thank the Committee for the opportunity to participate in today's hearing. It is an honor to be provided an opportunity to discuss the proposed legislation provisionally referred to as 'Improving the Transfer of Federally Funded Research and Technology Act of 2013'.

I am Elizabeth Hart-Wells and I am assistant vice-president for research at Purdue University and associate director of the Burton D. Morgan Center for Entrepreneurship. With respect to intellectual property, I have worn a few relevant hats. I am an inventor on a patented technology resulting from my graduate research at Rice University, from which I earned my doctorate in chemistry. As a chemist, I have worked within a university spin-out, that was located in The Woodlands, Texas, as well as a large industrial chemical company principally based in the Midwest. At the National Academy of Sciences, and part of the Committee on Science, Engineering and Public Policy, I participated in science policy research initiatives in STEM education. I am also familiar with the hallowed halls of the U.S. House of Representatives, having been fortunate enough to earn a congressional fellowship sponsored by the American Chemical Society to participate in the American Association for the Advancement of Science's Science and Technology Policy Fellowships program. I am a registered patent practitioner with the United States Patent & Trademark Office and was with the law firm of Fulbright & Jaworski LLP, where I cut my teeth on patent prosecution, primarily working with universities and small businesses in the chemical and medical art fields.

Over the last decade of my career, I have been responsible for the management of university-generated intellectual property within the walls of academic research institutes, including the management of intellectual property for the Middle Atlantic Regional Center of Excellence for Biodefense and Emerging Infectious Diseases, a multi-party consortium of research institutes supported by the National Institute of Allergy and Infectious Diseases, led by the Center for Vaccine Development, University of Maryland School of Medicine. This brings me to today. With a team of dedicated Hoosiers and Boilermakers, I manage the Office of Technology Commercialization at the Purdue Research Foundation, one of the most comprehensive technology transfer programs among leading research universities in the United States. Services provided by our office support the economic development initiatives of Purdue University and execute on the university's mission as a public land-grant university. Over the last five years, our Office of Technology Commercialization has received and reviewed north of 1400 new invention and copyright disclosures, obtained nearly 500 issued Letters patents worldwide, granted commercial rights vis-a-vis over 400 licenses and options to license, which translates to over 600 Purdue technologies, to the private sector.

Founded in 1869 in West Lafayette, Indiana, as a land-grant university, Purdue serves the people of Indiana, the nation, and the world through education, research and engagement. Purdue educates over 75,000 students statewide each year and is home to a robust research enterprise of over \$650 million in research expenditures. Academically, Purdue's role as a major research institution is supported by top-ranking disciplines in pharmacy, business, engineering, and agriculture. It's also a place where those who seek an education come to make their ideas real — especially when those transformative discoveries lead to scientific, technological, social, or humanitarian impact.

The Committee is both aware and respectful of the critical role the American research enterprise plays in our Nation's competitiveness. Universities engage in fundamental research to grow our knowledge base, to advance understanding, and to encourage free-thinking in our next generations. Inherent to exploration of uncharted areas of inquiry is discovery. Discovery can and should lead to delivery; however, gaps in the path that connects discovery to delivery exist.

In my reading of its current draft, it is the filling of this gap that is, provincially defined, the subject of the proposed legislation.

Like many research universities, Purdue University is dedicated to linking the university's assets to entrepreneurship activities and societal economic growth. Innovation and collaboration at Purdue connect its students, faculty, and staff to a network of state, national, and global partners. These activities catalyze economic growth not only in Indiana, but in the nation and around the world.

An exemplar of such is the cross-discipline Certificate in Entrepreneurship and Innovation Program which affords interested Purdue undergraduate students - whether a future civil engineer, or math teacher, or crop farmer - an opportunity to earn an academic credential in entrepreneurship complementary to their major. The campus-wide certificate program deepens students' understanding of areas pertinent to entrepreneurship that will improve their chances of success in creating new business ventures. The competitive advantage a U.S.-education in STEM wrapped in an understanding of entrepreneurship and innovation offers great potential to positively affect our nation's competitiveness.

Specifically, the Committee requested comment on innovative practices employed by Purdue University to develop federally funded research projects. It is my hope that the Committee finds the Purdue Trask Fund and, particularly, the innovative programs its supports, which I will detail below, as responsive.

I. Verne A. and Ramoth H. Trask Venture Fund

In 1973, the estate of Verne and Ramoth Trask of Indianapolis, Indiana, both dedicated and generous Purdue University alumni, was bequeathed to Purdue University and the Purdue Research Foundation. A year prior, Mrs. Trask wrote, "...I gather that Purdue has funds and procedures for funding research, and has procedures and policies for contracting with private industry to use research results...I gather also that there is a gap between the research activities and these commercial exploitation activities where development funds would be welcome and useful. I also gather that there are some research results which may be worth developing for the welfare of Purdue and the general public but which do not attract commercial sponsors. It is my idea that a Trask endowment fund might be used to **fill this gap** and to fund development of such ideas." (emphasis added). The Trask's gift established one of the first university-affiliated gap funding mechanisms dedicated specifically to university technology commercialization, and set Purdue on course to make a tangible effort to filling the gaps that connect discovery to delivery.

The gift was substantial - perhaps not by today's university giving standards but certainly given the era - and its impact in supporting initiatives that translate and develop research results into products and services for the benefit of the public is 'priceless'. Today, that visionary Trask Fund seeds proof-of-concept awards that assist Purdue researchers in furthering the commercial potential of Purdue technologies.

Two specific programs created to execute in on Mrs. Trask's idea of filling the gap are directed to (i) developing technologies within the university, to advance development and increase attractiveness for partnering with industry and probability of technology transfer; and (ii) to developing technologies within new ventures, to advance development and, by consequence, increase the new venture's competitiveness and technological and economic impact.

A. Trask Innovation Fund

Technology development awards are made through the Trask Innovation Fund (TIF). The competitively-awarded funds are made to eligible Purdue technologies and inventors of up to \$50,000 to support a translational or development project that aims to prove the concept of the Purdue technology – hence, Purdue's proof-of-concept program. Awards are determined under the advisement of the TIF Advisory Council, a public-private amalgam critical to informed deployment of the TIF funds that meet the proof-of-concept objective. Advisory Council members include representatives from the local and national business communities, as well as Purdue University, including the Office of the Vice President for Research, Purdue Faculty, and Purdue Research Foundation. Successful projects may seek up to three phases of funding, but the projects must be completed within a six-month period.

Importantly, the TIF does not support basic research projects but rather demonstrative development with a commercially relevant endpoint. Examples of types of development work include reducing an invention to practice, providing critical commercial relevant data such as a comparison to an industrial ‘gold’ standard, or developing working prototypes. All projects must make the technology more commercially marketable. Effectively, the results aim to inform a decision by the Purdue Office of Technology Commercialization to proceed, or not, with continued investments – whether indirect or direct. Any royalty income derived from a subsequent license to the TIF-supported technology must be used to repay the TIF award back into the Trask Venture Fund, in full but without administrative fees.

Important to sustainability, repayment is a requisite of the Trask Venture Fund, the four-decade implementation of which served up a solvency that has insulated Purdue’s technology commercialization efforts from the ebbs and flows of the acute financial climate and ensured its lack of dependence on future third-party contributions.

In the last 5 years, 48 Purdue technologies have been competitively awarded development funding, and of those 35% have resulted from sponsorship by the U.S. taxpayers. Over the time of the Trask Venture Fund proof-of-concept awards, roughly thirty-five years, federally funded Purdue technologies that were supplemented with such awards had about a 40% increased licensing rate than those federally funded Purdue technologies that were not supplemented with such proof-of-concept awards.

Purdue continues to explore new ways to leverage this funding for targeted industrial partnerships, in exchange for contributions by the industrial partner, such as matching funds, in-kind product development or business advisement services. Further, also being explored is a fellowship award associated with one or more of the students involved in performing the proof-of-concept work that bears the name of the industrial partner. This fall, the TIF will pilot this next generation of proof-of-concept funding in the area of agriculture with the Agricultural Alumni Seed Improvement Association, Inc., a non-profit organization located in Romney, Indiana that develops and releases high performance popcorn hybrids, many of which contain Purdue genetics.

B. Emerging Innovations Fund

The Purdue Emerging Innovations Fund (EIF) is an evergreen fund that is seeded annually by the Trask Venture Fund. New ventures eligible for the seed funding through the EIF are either developing a Purdue technology or have a principal place of business in the Purdue Technology Centers located throughout the State of Indiana. The EIF funds are awarded to the new venture to support technology translation and development as well as corporate development.

Synergistic to education, the EIF serves as an experiential learning opportunity for Purdue graduate and undergraduate students. Purdue students receive 3-course credit hours through the Krannert School of Management to undertake diligence reviews of the EIF applicants, perform an in-depth business analysis and present findings to the EIF Economic Advisory Board which includes a recommendation for funding, or not. Students from any discipline meeting minimum requirements may apply and if selected, throughout the semester, inure the benefit of interactions with the entrepreneurs and the Economic Advisory Board, who are each active investors, financial advisors, bankers or venture capitalist.

Funding decisions are made in consultation with the Economic Advisory Board, and transacted as convertible debt. Amounts invested may be up to \$150,000 and are performance-based.

After three years in earnest of enabling investments, the Emerging Innovations Fund has invested into six new ventures, four of whom have received more than \$2 million in follow-on dilutive or non-dilutive funding and account for 13 new jobs in the State of Indiana. Purdue will track these value-inflections for the next several years to establish a multiplier on its overall investments. At that time will the data be sufficient to draw material conclusions.

II. Other Purdue University Innovative Practices that Support Technology Transfer and Development

In the last several months, the Office of Technology Commercialization has unveiled new procedures and policy implementations to accelerate the quantity of technologies transferring out of the university, whether owned by Purdue University or not. Purdue students who create an invention in the performance of coursework, such as a design project for an engineering course, own those inventions. Purdue inventors who have contributed Purdue-owned intellectual property may elect an 'as is' license contract to establish a new venture based on the invention to which she or he contributed. Purdue-owned intellectual property will be reviewed and assessed by the Purdue Research Foundation on a 6-month timeline, ending in a go/no go decision.

Of particular note, Purdue is now offering recipients of SBIR and STTR grants aimed at developing a Purdue technology, a cash-free first option to license the Purdue technology provided at least 30% of the total award is performed at Purdue University. This express first-option allows STTR and SBIR recipients to competitively leverage Purdue technology, provides a mechanism to support the commercialization of Purdue technologies and supports speed and transparency in the licensing of Purdue technologies. A copy of the relevant contract is provided as 'Supplemental Material Exhibit A'.

Turning to related but different and no less important initiatives in support of increasing the impact of Purdue technologies to the benefit of the community, Purdue has evolved its business advisement services inward.

Previously focused primarily as a service to Purdue Research Park tenants, business advisement and ancillary resources to support small businesses and their growth have recently been positioned inside Purdue's Burton D. Morgan Center for Entrepreneurship. Coined the Purdue Foundry, it will support the development and sustainability of new businesses that are incubating within the university research enterprise by offering grant writing support for STTR and SBIR grants, mentoring, business plan support by specialized staff, and access to the University Development Office's network.

Based on the summary of innovative practices employed at Purdue University, it is no surprise that Purdue University supports and encourages the Committee's sincere consideration of the Improving the Transfer of Federally Funded Research and Technology Act of 2013.

The proposed legislation would promote continued progress by university and small businesses in achieving the STTR's stated goals as envisioned in pilot form under Title II of The Small Business Research and Development Enhancement Act of 1992. The goals of the proposed legislation superimpose on its predecessor, as it too emphasizes, albeit subtly, the benefits to the nation of technology innovation and the ability of small businesses to translate federally funded research results into new products and services.

In this spirit, the proposed legislation currently recites a stated outcome of the proposed awards, both generally and implicit in the criteria, is the marketplace. While a necessary means, the Committee may consider coming full circle and expressly reciting the intended benefactors of the program, the public, as the proposed programs endpoint. It is undisputed that the Committee intends the American people – from whose pockets these funds flow - to benefit from its investments in research and development through partnerships between university and small businesses. Making such intent explicit in the proposed legislation would seem appropriate.

Further, research universities often view sponsors of research as benefactors of such research, contractually. Such concept introduced in an explicit manner to this proposed legislation is consistent with the practice of research universities today, for other sponsors of research and likely would make clear the foundation from which the outcomes and metrics of any funded innovative programs are measured.

The importance of the positive impact of federally funded research and development is such that the proposed legislation may better articulate the objective if technology transfer strategies were assessed on increased impact rather than scale. Talking to a university employee, 'scale' tends to take our minds to more or bigger campus buildings. While increased infrastructure may indeed be an effective technology transfer strategy that receives a proposed award, embracing impact-driven strategies of all types offer creative license to the agency and

prospective awardees to arrive at strategies that are customizable, by geographic region, socioeconomic context, industry target market, and the like.

Such creative license turns the focus to measurable metrics, which when measured will drive the outcomes of the proposed program. I wish to applaud the Committee's proposed scope of possible evaluation metrics currently included in the proposed legislation. As well-documented, informed decision-making requires robust and objective data analysis and, until recently, the area of technology transfer and commercialization has too long ignored its importance. There is a very good reason: it's difficult and likely requires longitudinal examination. Similar to the patient analysis of R&D investments for impact, data collected in determining effective technology transfer strategies also requires us to be patient analyzers.

Fortunately, material attention is being paid by several organizations to better assess the breadth and depth of technology transfer contributions to regional and national technological, economic and societal impact. To cite just one, the Association of Public and Land-Grant Universities recently published its' Commission on Innovation, Competiveness and Economic Prosperity New Metric User Guide, which was the culmination of four years of work by numerous individuals. Appropriately noted as a living document, this guide offers a good start in scoping out what activities and outcomes to monitor for accurate and objective assessment of the full breadth of impact university technology transfer provides to the nation.

While no one metric will likely ever be sufficient, a compilation of myriad data along the lines of those in the proposed legislation, in which several options are provided, is also a good start. I would caution the confidential nature of some of those options to small businesses may ultimately render them underdisclosed. Aggregation in a central database, across all awardees despite agency sponsor, in a manner that borrows from the common practice employed in clinical research to render anonymous origins of data may ensure increased quality of data and, thus, robustly informed decision-making in the future.

In closing, I wish to express my grateful thanks to the Committee for the opportunity to participate today and for your leadership, commitment, and partnership on this important topic of technology transfer of federally funded research and development.

EXHIBIT A

Purdue Express Option to License for SBIR/STTR Recipients



SBIR/STTR EXPRESS OPTION AGREEMENT

This Option Agreement (“**Agreement**”) is effective as of the date of the SBA Award (defined below) (“**Effective Date**”) and is made by and between the PURDUE RESEARCH FOUNDATION, a statutory body corporate formed and existing under the Indiana Foundation or Holding Companies Act of 1921, with offices located at 1281 Win Hentschel Blvd., West Lafayette, Indiana (“**PRF**”) and _____, a _____ **corporation / limited liability company / other organization** (“**Optionee**”).

BACKGROUND

PRF owns valuable technology generally known as “**TITLE**” (PRF Ref. No.: **XXXXXX**) (“**Invention(s)**”), **which** is/are the subject of the patents and/or patent applications, described in Schedule A (the “**Optioned Patent(s)**”).

ARTICLE 1. TERMS OF OPTION

1.1 Subject to the terms and conditions of this Agreement, PRF hereby grants to Optionee during the Term (defined below) an exclusive first right to enter into negotiation with PRF to obtain an exclusive, royalty-bearing license to the Licensed Patents [**in the following fields of use: _____**] (the “**Option**”). The Option (and any license resulting from the Option) is limited to PRF’s presently licensable interest in the Inventions and Licensed Patents.

1.2 All rights in this Agreement are solely for the purpose of (i) developing technology described in the Optioned Patents using funding received by Optionee in collaboration with Purdue University and in performance of an award from a Phase I Small Business Innovation Research (“**SBIR**”) or Small Business Technology Transfer (“**STTR**”) program within an agency of the U.S. Government (“**SBA Award**”), in which the performance of at least 30% of the direct costs of the SBA Award is performed under appropriate contract between Optionee and Purdue University, in the Purdue laboratory of [**PI NAME**], and (ii) evaluating the Optioned Patent(s) for potential licensing to Optionee by PRF. No rights are granted to Optionee to sell, offer to sale, export, distribute or otherwise commercially exploit the Optioned Patent(s) without the express prior written permission of PRF.

1.3 (a) No cash fee is owed to PRF by Optionee during the Term; and

(b) In consideration for the rights granted hereunder, Optionee agrees to provide PRF with (i) on or before the Effective Date, a copy of the relevant grant application that led to the SBA Award and current business plan; and (ii) a detailed progress report against the statement of work in the SBA Award due at both the midpoint and conclusion of the SBA Award, including data and results generated in the performance of the statement of work.

1.4 Optionee may exercise the Option before the expiration of the Term by providing (a) a written statement of its intention and ability to develop licensed products for public use as soon as practicable, and (b) submission to PRF of a business plan reasonably acceptable to PRF inclusive of a current capitalization table of Optionee.

1.5 Upon exercise of the Option in accordance with Section 1.3 and for a reasonable period not to exceed ninety (90) days (or such longer period as the parties may agree), PRF and Optionee agree to negotiate in good faith to establish the terms of a license agreement (the “**License Agreement**”). The License Agreement shall be in PRF’s standard form, and will contain terms and conditions customary to patent and technology licenses

normally granted by PRF, including without limitation: a defined licensed field; terms consistent with the provisions of U.S. law applicable to intellectual property funded in whole or in part by the U.S. Government; a reservation of the rights to practice and to grant other not-for-profit organizations the right to practice the Inventions and Optioned Patents for research, teaching and other incidental research and educational purposes; license fees that may include an ownership interest in Optionee; royalty payments; milestone payments; reimbursement of expenses including but not limited accrued patent expenses; commercially reasonable due diligence obligations for the development and commercialization of the Optioned Patents, the right of PRF to terminate the license for failure to meet specified due diligence milestones; liability limitations; warranty disclaimers consistent with an "as is" license; and indemnity and insurance provisions in favor of PRF, Purdue University and, if and as applicable, co-owners of the Optioned Patent(s).

1.6 This Agreement and the Option shall expire upon the earlier of: (a) the expiration of the SBA Award, or (b) any earlier termination of the SBA Award (the "**Term**"). However, if Optionee exercises the Option within the Term, this Agreement will expire at the end of a ninety (90) day negotiation period or upon execution of the License Agreement, whichever first occurs.

1.7 During the Term, PRF may afford Optionee a reasonable opportunity to provide input into material patent prosecution matters corresponding to the Optioned Patent(s). Notwithstanding the foregoing, at all times, PRF shall retain sole authority for decisions regarding protection of the Inventions including without limitation scope, breadth, prosecution and maintenance of the Licensed Patents.

1.8 Optionee agrees not to identify PRF or Purdue University or any employee or student or agent thereof in any solicitation relating to the Invention(s), Optioned Patent(s), or this Agreement absent the prior written consent of PRF. Nothing in this Agreement shall be construed as an endorsement by PRF or Purdue University, or its personnel, of Optionee or any of its product or services; Optionee shall refrain from representing to the contrary in any and all manners whatsoever. Optionee shall indemnify, defend and hold harmless PRF, Purdue University, and the State of Indiana and each of their respective current and future regents, directors, trustees, officers, faculty, medical and professional staff, employees, students, trainees, and agents, and their respective successors, heirs, and assigns against any claim, liability, cost, damage, deficiency, loss, expense or obligation attributable in any party directly or indirectly to a breach of the prohibition stated in this Section 1.8.

ARTICLE 2: MISCELLANEOUS

2.1 This Agreement may not be amended, nor may any right or remedy of either party be waived, unless the amendment or waiver is in writing and signed by a duly authorized representative of each party.

2.2 Notices and invoices under this Agreement shall be in writing and shall be delivered by electronic mail and certified mail return receipt requested. Notices shall be addressed to a party at the address specified on the signature page, or at such other place or places as shall from time to time be specified in a notice similarly given. All notices shall be effective upon receipt.

2.3 PRF and Optionee are not (and nothing in this Agreement may be construed to constitute them as) partners, joint venturers, agents, representatives or employees of the other, nor is there any status or relationship between them other than that of independent contractors. No party has any responsibility or liability for the actions of the other party except as specifically provided in this Agreement. No party has any right or authority to bind or obligate the other party in any manner or make any representation or warranty on the other party's behalf.

2.4 This Agreement, including without limitation the Option shall not be assigned.

2.5 This Agreement is made and construed in accordance with the laws of the State of Indiana without regard to choice of law issues. Each party consents to the jurisdiction of the Circuit Court of Tippecanoe County, Indiana for any suit against the other party relating to this Agreement, and agrees to file any such suit in that court.

2.6 This Agreement does not confer any license, right or other permission on Optionee to any research, development, rights, data, results, material, information, intellectual property not expressly and specifically stated in this Agreement. There are no contracts, understandings, conditions, warranties or representations, oral

or written, express or implied, with reference to the subject matter of this Agreement that are not merged in this Agreement.

2.7 This Agreement may be executed in any number of counterparts, each of which shall be an original, and all of which shall together constitute one agreement. This Agreement may be signed and delivered, or a signature may be transmitted or communicated, by means of facsimile or other electronic transmission (such as a Portable Document Format (PDF) copy of an original signature).

The parties have caused this Agreement to be executed by their duly authorized representatives, under seal.

[OPTIONEE]

PURDUE RESEARCH FOUNDATION

By: _____

By: _____

Name: _____

Name: _____

Title: _____

Title: _____

Date: _____

Date: _____

Attn: _____
Email: _____

Purdue Research Foundation
Office of Technology Commercialization
1281 Win Hentschel Blvd.
West Lafayette, Indiana 47906-4182
Attn.: OTC Director
Email: otcip@prf.org

PRF Docket:

SCHEDULE A

<i>Invention:</i>	(PRFXXXX)	
<i>Patent Info:</i>	Application Number: Application Title : Filing Date:	
<i>Inventors:</i>	<u>Name:</u>	<u>Employer when invention was made:</u>
<p>* <i>Third Party Funding</i> <input type="checkbox"/> <i>Yes</i> <input type="checkbox"/> <i>No</i></p> <p><i>If yes, provide funding entity and contract no.:</i></p> <p>* The U.S. Government retains certain rights in the Invention, and the Option is subject in all respects to U.S. law applicable to intellectual property funded in whole or in part by the U.S. Government.</p>		

REMARKS BEFORE THE COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY SUBCOMMITTEE ON RESEARCH AND TECHNOLOGY OF THE U.S.
HOUSE OF REPRESENTATIVES
22 JULY 2013