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THE CENTER FOR CONSTRUCTION
RESEARCH AND TRAINING

Resources for Technology Transfer in Construction: A *Roadmap* for Construction Safety & Health Researchers – from the *Laboratory* to the *Jobsite*

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Resources for Technology Transfer in Construction:
A *Roadmap* for Construction Safety & Health Researchers –
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Construction safety and health researchers are increasingly being required to think beyond the publication of their research findings to how their research results will be translated to action on construction sites. Technology transfer is one method to bridge the gap between research and practice, and critical for increasing the use of a research-based invention and ensuring it achieves its intended outcome. When a study is being conceptualized, the researcher should consider whether or not the research outcome will result in a new type of tool, a modification to an existing tool, a new product or process. If it will, then how they proceed and who they involve can have a direct impact on their technology transfer options.

For many safety and health researchers the steps involved in transferring a research concept (the technology) from the *laboratory* to the *jobsite* (the marketplace) is new territory, requiring them to consider timelines and approaches, as well as collect data and information that may not be integral to their research project. Even for those who have experience with technology transfer, it can be a complicated process. There are resources available to help safety and health researchers.

This document is part of an ongoing CPWR effort to provide construction safety and health researchers with information to help them understand and navigate the road to technology transfer.

Before You Begin Your Journey — *Do You Need to Make a Detour to Consider Tech Transfer?*

1. Will your research result in a new tool, a modification to an existing tool, a new product or process?
Check your university's policies on tech transfer and see what resources are available.

2. What is your research goal and who will benefit?
Consider the market for your research – what trade(s), types of projects, contractors, and workers are affected?
Many sources provide data online to estimate the market size.

3. How do you get your research-based invention into use on construction sites?
Some options include: partnering with a manufacturer, establishing a new venture (business), or open sourcing your design. Various sites are available to help develop a business plan.

1. Can My University Help?

Safety and health researchers do not have to become experts in the technology transfer process, patent law, business planning finance, marketing, and accounting to translate their *research* to *practice*. Most, if not all, universities and research institutions have policies and staff focused on intellectual property and technology transfer issues. These policies typically stipulate when the university should, or must, be notified if a research project is likely to result in the development of a new tool, modification to an existing tool, or a new method of performing a particular construction task. The timing of when information about a research-based invention is released and when other departments within a researcher's university or organization are brought into the process, and the decision whether to patent an invention or open source the design will influence whether or not a research-based invention ultimately reaches end users and achieves its intended outcome.

The staff responsible for enforcing IP and tech transfer policies have resources available to help the researcher-inventor understand the pros and cons of, and alternatives to, patenting their research-based invention. Increasingly, universities also have programs in place, and access to individuals with the expertise, to help researchers assess the market for their invention, develop the business case, and connect with potential manufacturers.

The following are examples of university technology transfer policies and available resources to help researcher-inventors move their technology to the marketplace:

Colorado State University

Colorado State University's Office of the Vice President of Research oversees and promotes research in its seven divisions. It provides resources for faculty & staff, including the CSU Research Foundation and the CSU Ventures, which "*provides all technology transfer and commercialization services for CSU faculty and researchers*." CSU's policies related to intellectual property are explained in Section J of the Academic Faculty and Administrative Professional Manual, and by the Office of Contracting Services.

CSU Ventures has expertise and resources to help connect faculty and researchers with investors and industry. Researchers are asked to submit an invention disclosure form before any public disclosure, even if the item is intended to be free, in order for CSU Ventures staff to assess appropriate next steps, such as patents or other agreements. If a patent is pursued, "*CSU innovators [researchers] are not responsible for* [the costs of the patent process]. *Typically, the company(ies) licensing the innovation will be responsible for the costs of obtaining a patent."*

CSU Ventures also provides assistance with marketing the invention, including helping to prepare non-confidential materials that can be used to find companies to license the invention and sponsor further research.

CSU Ventures may also recommend and provide support for creating a startup company. In addition to an online guide focused on starting a new company with university inventions, the office provides guidance and advice to develop a business plan, form connections with industry partners or investors, find student groups to perform initial market research and analysis, obtain legal rights, establish the company, find funding, and identify business talent.

Resources:

- Office of the Vice President of Research
  http://vpr.colostate.edu/pages/mainpage.htm
- Colorado State University Research Foundation
  http://www.csurf.org/
- CSU Ventures
  http://csuventures.org/
- Startup Guide: Successfully Starting a New Company with University Inventions
  http://csuventures.org/wp-content/uploads/2014/02/startupguide.pdf
- Academic Faculty and Administrative Professional Manual Section J: Rights and Responsibilities Related to Creative Works
  http://facultycouncil.colostate.edu/files/manual/sectionj.htm#j_3_1
- Contracting Services: Intellectual Property
  http://www.contracting.colostate.edu/FAQ-Intellectual-Property.aspx

Duke University

Duke University's Office of Research Support oversees administrative areas of research, including: grants, contracts, and compliance; funding opportunities; human subjects protection; export controls; and responsible conduct of research, which includes the University's policies on intellectual property and inventions, patents, and technology transfer. The office states, "*[t]he creation of knowledge in the service of society is at the core of the Duke mission. When new inventions and patentable technology arise during the course of ongoing University research activity, researchers have a responsibility to disclose these new technologies and inventions to the Office of Licensing and Ventures for evaluation and potential licensing."*

The office follows the "Policies Related to Research" in Appendix P of the Faculty Handbook, which includes: Policy on Inventions, Patents, and Technology Transfer; Duke University Policy on Intellectual Property Rights; Patent Agreement; University-Industry Guidelines; and Policy on Open Access to Research.

The Office of Licensing and Ventures (OLV) is "*the licensing and new venture creation arm of Duke University and the Duke University Medical Center. It's where Duke innovations meet industrial, entrepreneurial, legal and investment markets to create the partnerships necessary to create value and benefit society."* The OLV requests the researcher submit an Invention Disclosure Form "*preferably, at least three months before disclosing your idea to the public*." Following this disclosure, the office will assess the invention to determine next steps, which could be submitting a patent, waiting for additional data, or marketing without protection.

Based on the assessment, the OLV may begin to protect the intellectual property through the patent process. "*Duke will pay the costs incurred by this process with the goal of recovering that investment from licensing revenue."* The office also can provide support in marketing, preparing non-confidential materials, or becoming a start-up company.

Duke's Innovation & Entrepreneurship Initiative (I&E) contains resources for students, faculty, alumni and parents, and entrepreneurs "*to put ideas into action."* I&E offers resources on campus, online, and in the area for all stages of entrepreneurship, from exploring ideas to launching a new venture. Among the resources available are the Duke Entrepreneurship Manual, an online guide for starting and growing a new business venture, and the Duke Law Start-Up Ventures Clinic, which "*provides legal advice and assistance to seed and early stage entrepreneurial ventures that have not yet raised significant amounts of outside capital. The clinic assists clients in a wide variety of legal matters including formation, intellectual property protection, commercialization strategies and operational issue."*

I&E has an Innovation to Impact (I2I) program, whose staff provides support in developing a business plan from the early stages. The I2I program taps into Duke's contacts to provide teams with mentors, expert advisors, crowdfunding support, and access to an invitation-only investor forum. The program also offers a third-party intellectual property assessment and a third-party marketing evaluation "*on the size of the identified market(s), potential for growth, and competitive dynamics."* Business Model Workshops are also offered to help teams create and refine their business plans.

Resources:

- Office of Research Support: Inventions, Patents, and Technology Transfer
  https://ors.duke.edu/orsmanual/inventions-patents-and-technology-transfer
- Office of Licensing Ventures
  https://olv.duke.edu/
- Innovation & Entrepreneurship Initiative (I&E)
  https://entrepreneurship.duke.edu/
- I&E's Innovation to Impact Program
  https://entrepreneurship.duke.edu/innovation-to-impact-program/
- Faculty Handbook Appendix P: Policies Related to Research
  http://provost.duke.edu/wp-content/uploads/FHB_App_P.pdf
- Policy on Inventions, Patents, and Technology Transfer
  https://s3.amazonaws.com/olv-website-static/doc/policy_on_inventions.pdf
- Duke Law: Start-Up Ventures Clinic
  http://law.duke.edu/startupventures/
- The Duke Entrepreneurship Manual: A Resource for Entrepreneurs
  http://www.dukeven.com/

Georgia Institute of Technology

The Georgia Tech Research Corporation (GTRC) is the "*contracting entity for all sponsored research activities at Georgia Tech and licenses all intellectual property (patents, software, trade secrets, etc.) created at Georgia Tech*." The intellectual property policy is defined in Section 5.4 of the Faculty Handbook.

The Office of Industry Engagement is part of the GTRC and contains three groups: Innovation Commercialization and Translational Research (ICTR), Industry Collaborations and Affiliated Licenses (ICAL), and International Contracts and Technology Transfer (ICTT). "*These offices promote partnerships with industry, government, and non-profits; help transform Georgia Tech's breakthrough technologies into products; and spur economic development throughout Georgia and beyond. Together, these groups make Industry Engagement a one-stop shop for anyone interested in pursuing strategic collaborations through sponsored research, international research, licensing, and new venture agreements."*

The Office of Industry Engagement helps "*evaluate promising technologies, market Georgia Tech innovations to industry, negotiate licensing agreements, and maintain relationships with industry partners."* The process begins with disclosing the invention to the office through their online system, Web Disclosure, at least two days before any public disclosure. After a search for prior art ("*the body of knowledge that already exists on a subject")*, a licensing associate from the office works with the innovator to explore the potential for commercialization using their Commercialization Roadmap and to evaluate next steps, such as pursuing a patent, which, if chosen, must be filed within one year of public disclosure. Once the invention is protected, the office can assist with marketing the innovation by creating a marketing strategy executing agreements, and licensing to the industry.

The Office of Industry Engagement developed the Georgia Tech Integrated Program for Startups (GT:IPS®), which is an online training program to help faculty, staff, and student entrepreneurs begin the process of creating a startup company. The curriculum includes: developing a business plan, constructing a management team, a patent primer, legal aspects of agreements, and use of campus resources. Those who successfully complete the program can receive a GT:IPS® license, which is designed to help streamline the start-up process and is accepted by "*attorneys representing Georgia Tech startups, and… by a large spectrum of investors and future business partners of our licensees."*

Resources:

- Georgia Tech Research Corporation
  http://www.gtrc.gatech.edu/
- Faculty Handbook Section 5.4 Intellectual Property Policy
  http://www.policylibrary.gatech.edu/faculty-handbook/5.4-intellectual-property-policy
- Office of Industry Engagement
  http://industry.gatech.edu/

- Technology Commercialization
  http://industry.gatech.edu/researchers/tech-commercialization/
- Forms & Agreements for Researchers
  http://industry.gatech.edu/researchers/forms/
- Georgia Tech Integrated Program for Startups (GT:IPS®)
  http://industry.gatech.edu/researchers/startups/

Harvard University

Harvard's Office of Technology Development (OTD) is "*responsible for managing Harvard's intellectual property assets for the public good"* by facilitating technology transfer. The Statement of Policy in Regard to Intellectual Property includes Harvard's policy on inventions and patents, copyrights, and royalty sharing.

The OTD has business development experts to help faculty explore the potential of the research. A Report of Innovation, which is the first step, is used by the office to evaluate the innovation and the potential for patenting and commercialization. Patent and licensing specialists are available to help the researcher protect their intellectual property. OTD's "*team will take the lead in securing intellectual property assets and handling all legal and administrative expenses associated with patent filing and prosecution."*

A team of business experts are available to provide support and guidance through the commercialization process. Using a network of industry contacts, OTD manages the technology transfer and licensing process, including creating partnerships and negotiating agreements. The office will also evaluate whether or not creating a startup company is a better approach, and can "*provide the knowledge, support, and business contacts to help launch your new venture with every possible advantage.*" OTD has published a startup guide to help aspiring entrepreneurs begin considering a new business venture, from the startup process to presenting to investors.

Harvard offers a number of other entrepreneurship programs, centers, and resources, such as the Technology and Entrepreneurship Center at Harvard (TECH). TECH, part of the Harvard School of Engineering and Applied Sciences, offers information on writing a business plan and financing for a new venture. Additionally, it sponsors Harvard's annual membership in the National Collegiate Inventors and Innovators Alliance (NCIIA), which provides students and faculty access to NCIIA's resources. The Harvard Innovation Lab (i-lab) also offers courses, workshops, advising, and seminars geared toward entrepreneurship.

Resources:

- Office of Technology Development
  http://otd.harvard.edu/
- Statement of Policy in Regard to Intellectual Property
  http://otd.harvard.edu/index.php?/faculty-inventors/resources/policies-and-procedures/statement-of-policy-in-regard-to-intellectual-property/

- Material Transfer Agreements
  http://otd.harvard.edu/faculty-inventors/resources/material-transfer-agreements/
- Startup Guide: An entrepreneur's guide for Harvard University faculty, graduate students, and postdoctoral fellows
  http://otd.harvard.edu/upload/files/OTD_Startup_Guide.pdf
- Technology and Entrepreneurship at Harvard
  http://tech.seas.harvard.edu/
- Harvard Innovation Lab
  https://i-lab.harvard.edu/

Northeastern University

Northeastern University's position on intellectual property is explained on its government relations page and in the Faculty Handbook: "*According to the patent and copyright policies…, the university owns all intellectual property created with the use of substantial university resources."*

"Research at Northeastern University" supports research "*by conducting outreach to funding agencies and corporate foundation sponsors, and developing partnerships with academic/clinical/industry collaborators that increase the scope and impact of Northeastern University research and graduate education."* The Center for Research Innovation is part of the translational process and provides *"provides a pathway for identifying and developing those discoveries that have the greatest commercial potential."*

The Center for Research Innovation (CRI) helps researchers interested in translating their innovations or inventions into marketable solutions by providing support in their market assessment, creating connections within the Northeastern community, managing the technology transfer process, identifying funding programs, and business development services. CRI developed the Innovator's Toolkit to house all information related to intellectual property, including the Invention Disclosure Form.

After the Invention Disclosure Form is filled out, the researcher's invention is evaluated for its commercialization value and patentability. If the University pursues a patent, it is at no cost to the researchers (inventors). After the evaluation, CRI can also help with business development – creating a spinout company, licensing, or other engagement with an industry partner. Among CRI's resources for inventors is IDEA, a student-created and run program that provides "*student, faculty, and alumni ventures with coaching, connection to resources, and funding with the end goal of developing self-sustaining and investment-ready ventures."* IDEA supports ventures through: coaches, mentors, a business development guide, partnership opportunities, access to funding possibilities and an investor network, and information on legal and accounting issues.

Additionally, CRI has a pilot funding program, Tech2Venture, to "*identify and engage seasoned entrepreneurs in the commercialization of Northeastern's most promising technologies."* A researcher needs at least five years of related experience to be considered for the program, which

"*includes a market assessment with a high level summary of the opportunity, including the competition, target entry markets and potential target acquirers/investors; an option for a "one-size fits all" license is executed with additional IP included under this agreement, at the CRI's discretion. In addition, the CRI commits a $20K forgivable, convertible note to the project to help fast-track commercialization."*

Resources:

- Intellectual Property Information
  http://www.northeastern.edu/governmentrelations/public_policy/intellectual_property_info.html
- Faculty Handbook: Patent and Copyright
  http://www.northeastern.edu/facultyhandbook/pdfs/patent-copyright.pdf
- Research at Northeastern University
  http://www.northeastern.edu/research/
- Center for Research and Innovation
  http://www.northeastern.edu/research/cri/about/
- Innovator's Toolkit
  http://www.northeastern.edu/research/cri/inventors/innovators-toolkit/
- IDEA
  http://www.northeastern.edu/idea/
- Tech2Venture
  http://www.northeastern.edu/research/cri/resources/tech2venture/

Rutgers, The State University of New Jersey

The Office of Research Commercialization (ORC), formerly the Office of Technology Commercialization, serves "*a critical role as liaison between Rutgers administration, faculty, staff and the private sector"* which includes "*managing university intellectual property, evaluating and marketing inventions, drafting and negotiating licenses and other agreements, developing and supporting new start-up companies and facilitating partnerships with companies worldwide."*

Under the terms of Rutgers' Patent Policy, faculty researchers must disclose inventions to the University through a form or online portal through the ORC. ORC then will perform a search of prior art and determine next steps. If appropriate, the office will begin the patent process. ORC also performs market research, and assists with marketing, negotiating licensing agreements, and creating industry partnerships.

New Ventures and Entrepreneurship (NVE) is a section of ORC that assists with creating start-up companies and provides resources. Among the resources available offered through NVE are the Start-Up Action Guide for Faculty and The CASTLE, or Connecting, Advising, and Serving Tomorrow's Leaders in Entrepreneurship, which provides events related to entrepreneurship and other assistance. NVE also provides researcher-inventors with online connections to other

resources at Rutgers –educational programs, facilities and services, legal services, and student groups – and in New Jersey.

In addition, the Rutgers School of Law, Newark provides legal advice and assistance in its Intellectual Property Law Clinic, and the Center for Innovative Ventures of Emerging Technologies (CIVET) provides support with commercialization and forming partnerships. One of CIVET's programs is its Innovation Sounding Board, which reviews an idea, provides feedback, and offers additional next steps and contacts to all Rutgers students, faculty, and alumni. CIVET also offers seminars and innovation summits.

Resources:

- Patent Policy
  http://orc.rutgers.edu/sites/otc.rutgers.edu/files/downloads/patentpolicy.pdf
- Office of Research Commercialization (ORC)
  http://orc.rutgers.edu/
- Office of Research Commercialization: General Information for Faculty
  http://orc.rutgers.edu/faculty#invention
- ORC: New Ventures and Entrepreneurship
  http://orc.rutgers.edu/NVE
- Rutgers Start-up Action Guide for Faculty
  https://orc.rutgers.edu/sites/orc.rutgers.edu/files/downloads/express_startups/Rutgers%20startup%20action%20guide.pdf
- Center for Innovative Ventures of Emerging Technologies
  http://civet.rutgers.edu/about-us.php

University of California, Berkeley

University of California, Berkeley has a number of centers and "*programs that are deeply integrated into the research, educational and service programs of the University to help incubate, accelerate and expand tech transfer and our pipeline of start-ups.*"

One of these centers is the Office of Intellectual Property & Industry Research Alliances (IPIRA), which was "*created to establish and maintain multifaceted relationships with private companies, and thereby enhance the research enterprise of the Berkeley campus. These relationships include sponsored research collaborations and intellectual property commercialization (sometimes referred to as technology transfer).*" IPIRA consists of the Office of Technology Licensing (OTL), which handles commercialization, material transfer agreements, and entrepreneurialism, and the Industry Alliances Office that negotiates research agreements with private industry.

Intellectual property policies for UCB can be found through both the Office of the President and IPIRA. *"Employees of the University have an obligation to disclose their inventions in writing to the Office of Technology Licensing"* through an Invention Disclosure Form (IDF). OTL requests early notice, after the invention has been created, but before public disclosure. An IDF helps

determine how the University will proceed with intellectual property, such as patenting and licensing.

IPIRA has licensing professionals available to help with the commercialization of an invention. Non-confidential marketing materials are developed and disseminated to gauge commercial interest, and the IPIRA reaches out to its network of industry contacts as well as the researcher's contacts to find potential licensees to translate research to a marketable solution.

SkyDeck | Berkeley is one of many programs available at Berkeley to help create a startup company. If the research team has a business model, a technology or product, and at least one member affiliated with UC Berkeley, they can apply for SkyDeck. The acceleration program provides support, services, and resources to startups including venture advisors, legal advisors, and workshops. "*SkyDeck has proven that an in-house public university accelerator program is critical in the development of an innovation pipeline that cultivates top ideas into successful businesses.*"

Another program, Berkeley Innovators, aims to connect researcher-entrepreneurs to alumni, friends, investors, partners, and the industry. This network contributes to commercializing Berkeley technologies by, for example, providing researchers with mentors. Berkeley Innovators connects with the IPIRA and OTL to help create partnerships and launch companies.

Resources:

- Office of Intellectual Property & Industry Research Alliances
  http://ipira.berkeley.edu/
- UC Intellectual Property Policy
  http://www.ucop.edu/research-policy-analysis-coordination/policies-guidance/intellectual-property-ex/index.html
- UC Patent Policy
  http://ipira.berkeley.edu/uc-patent-policy
- UC Copyright Policy
  http://ipira.berkeley.edu/uc-copyright-policy
- University Licensing Guidelines
  http://patron.ucop.edu/ottmemos/docs/ott00-05a.html
- Office of Technology Licensing
  http://ipira.berkeley.edu/office-technology-licensing
- Berkeley Research: Innovation/Entrepreneurship
  http://vcresearch.berkeley.edu/innovation
- SkyDeck | Berkeley
  http://skydeck.berkeley.edu/
- Berkeley Innovators
  https://innovators.berkeley.edu/

University of California, San Francisco

The Office of Innovation, Technology & Alliances (ITA) follow the University of California's policies related to intellectual property, and facilitates "*translation of UCSF research and innovations for societal benefit,"* by providing help with marketing research innovations, forming industry partnerships, and providing entrepreneurial assistance.

Under the policy, "*UCSF inventor[s] have an obligation to report any inventions that arise as a result of… work using UCSF facilities, funds or equipment*." In order to protect patent rights, it is important fill out the appropriate Technology Disclosure Form before any public disclosure. After submitting the form, ITA evaluates the innovation to determine next steps for commercialization and intellectual property protection. Based on its evaluation, ITA may decide to release property rights to the inventor, or provide assistance to license the new technology by reaching out to a variety of contacts, develop public announcements, publicize the technology with non-confidential materials, and explore and facilitate industry partnerships. If a patent is necessary, ITA works with outside patent counsel and assumes all costs.

UCSF also provides support for those who want to create a startup through ITA's Entrepreneurship Center. The Center offers experiential classes for students, faculty, and staff with no business background. A mentorship/advisor program is also available to provide aspiring entrepreneurs with advice and support from other entrepreneurs, venture capitalists, attorneys, and other experts. The Entrepreneurship Center also provides opportunities to learn about business, refine a business plan, network, and receive other advice.

Resources:

- Innovation, Technology & Alliances: Policies
  http://ita.ucsf.edu/researchers/policies
- School of Medicine: Patents and Intellectual Property Policies
  http://policies.medschool.ucsf.edu/patents-and-intellectual-property-management
- UCSF Innovation, Technology & Alliances
  http://ita.ucsf.edu/
- Entrepreneurship Center
  https://ita.ucsf.edu/entrepreneurship-center

University of Iowa

The University of Iowa Research Foundation (UIRF) works with the University researchers to commercialize research innovations through licensing, patenting, and forming new ventures. UIRF encourages researchers to contact them as soon as there is an idea, but requires a formal invention disclosure well in advance of any public disclosure. The Intellectual Property Policy states that UIRF owns most IP that comes out of University Research, and as such UIRF will pay all costs for applying for a patent, manage the patenting process, and negotiate licensing agreements.

After the invention is disclosed to UIRF, the staff evaluates the invention based on the technology, prior art, market analysis and business risk. They also conduct a commercialization analysis, which includes needs, costs, and ease of use. UIRF assists with marketing by creating a one-page marketing document on the technology to reach out to potential industry partners, and by negotiating and executing any agreements with potential partners. The Foundation may also negotiate licensing agreements.

The UIVentures program "*assists university inventors in creating new ventures based on their research. The program provides education and mentoring to advance entrepreneurs and emerging growth companies by linking them with the capital, talent and other critical resources needed for success."* UIVentures works closely with UIRF to help with the patent and licensing processes. If a decision is made to pursue a new venture, the researcher must license the IP from the University.

The John Pappajohn Entrepreneurial Center (JPEC) is an additional source of help for University researchers. The Center provides entrepreneurial support through educational opportunities, business competitions, consulting, and special events. Venture School, for example, is a six-week program "*to accelerate the startup process while increasing your chance for success."* Similarly, the Six-Week Start-Up Training Program focuses on the step-by-step process for developing and growing a new venture. JPEC sponsors a number of competitions for the UI community and the general public to win awards to fund a venture. The Center also offers business consulting by teams of business students and an advisor, speaker series and conferences, and monthly "Lunch and Learn" workshops sponsored by the Small Business Development Center and JPEC.

The University of Iowa offers other centers to help with new ventures. UIResearch Park leases working space and access to research facilities to startups, and offers a business incubation program. UIProtoLabs "*is a multi-facility prototyping resource at the University of Iowa open to faculty, students and staff, startups, businesses, and the general public… UIProtoLabs will cover the costs of labor for University-affiliated projects that have commercialization or economic development potential. All participants are responsible for covering the materials costs associated with their prototypes."*

Resources:

- Operations Manual Chapter 30: University of Iowa Intellectual Property Policy
  http://www.uiowa.edu/~our/opmanual/v/30.htm
- University of Iowa Research Foundation
  https://research.uiowa.edu/uirf/
- UIVentures
  http://uiventures.uiowa.edu/
- John Pappajohn Entrepreneurial Center

- UIResearch Park
  http://researchpark.uiowa.edu/
- UIProtoLabs
  http://uiprotolabs.uiowa.edu/

University of Massachusetts Lowell

The University of Massachusetts Lowell's Intellectual Property (IP) Policy states: "*The University will own any Intellectual Property… that is made, discovered, or created by any Covered Individual who makes significant use of University resources"* and also any IP "*that is made, discovered, or created by a Covered Individual who is specifically hired or commissioned by the University for that purpose."*

The University Office of Commercial Ventures and Intellectual Property (CVIP) facilitates technology transfer and "*is responsible for the protection and commercialization of intellectual property at UMass Lowell."* It offers "Faculty Resources," including a Guide for Inventors that lays out the initial steps for filing an Invention Disclosure Form, doing a search of prior art, and conducting an initial evaluation of the invention for marketability, commercialization, and patents. CVIP works with outside patent counsel and manages the patent process. A decision to file a patent application is generally made within 90 days of when CVIP receives the disclosure form.

CVIP also provides assistance with marketing and commercialization, including: assessing the market and identifying the competition, creating non-confidential marketing materials, contacting potential industry partners, and drafting, negotiating, and executing licensing agreements.

UMass Lowell encourages entrepreneurship through its Center for Innovation and Entrepreneurship's New Venture Initiative (NVI). The NVI "*partners with UMass Lowell students, faculty, researchers and alumni as well as its strong external network to identify and develop a compelling business plan, strong management team and solid financial backing to launch an independent commercial venture"* based on "*inventions, discoveries, products or services that were developed in whole or in part at UMass Lowell."* NVI offers resources for aspiring entrepreneurs including a mentorship team, market research and analysis, business model development, and networking.

Resources:
- Office of Commercial Ventures and Intellectual Property
  http://www.uml.edu/research/cvip/
- Guide for Inventors
  http://www.uml.edu/Research/cvip/Faculty-Assistance/inventors-guide.aspx
- Intellectual Property Policy
  http://media.umassp.edu/massedu/policy/IntellecPropertyUML.pdf

- Center for Innovation and Entrepreneurship
  http://www.uml.edu/Innovation-Entrepreneurship/
- New Venture Initiative
  http://www.uml.edu/Innovation-Entrepreneurship/New-Venture-Initiative/default.aspx

University of Puerto Rico

The Office of Intellectual Property and Commercialization is part of the Vice Presidency for Research and Technology at the University of Puerto Rico. The office aims "*[t]o protect the intellectual property developed at the University of Puerto Rico, facilitate transfer of the University's innovative technologies for public use, and interact with industry to commercialize discoveries made by the University while generating income and adhering to the University's mission."*

The University's patent and commercialization process begins with disclosure of the invention to the Office of Intellectual Property. This office then evaluates the innovation and decides whether to pursue a patent and commercialization.

The University is also part of the Puerto Rico Science and Technology Trust, which is a non-profit created to link government, universities, and industry to promote technology transfer and commercialization.

Resources:

- The Office of the Vice President for Research and Technology
  http://acweb.upr.edu/vpit/index.html
- Policies and Forms
  http://acweb.upr.edu/vpit/economicd/eco_forms.html
- Office of Intellectual Property and Commercialization
  http://acweb.upr.edu/vpit/economicd/eco_develop.html
- Patent and Commercialization Process
  http://acweb.upr.edu/vpit/economicd/eco_docs/patentprocess.pdf
- Industry Relations
  http://acweb.upr.edu/vpit/industry/assoc.html

Washington University in St. Louis

Washington University's (WUSTL) intellectual property (IP) policy states that "*all intellectual property… shall be owned by the University if significant University resources were used or if it is created pursuant to a research project funded through corporate, federal or other external sponsors administered by the University,"* with a few exceptions (e.g., IP *"developed without a significant use of University resources and without corporate, federal or other external sponsorship; "All rights in artistic, literary and scholarly intellectual property, such as scholarly books, articles, and other publications …"; "All copyright in papers, theses and dissertations written as a student…"*).

The Office of Technology Management (OTM) handles the technology transfer process. Once a researcher files an Invention Disclosure Form, OTM evaluates the disclosure for next steps. If OTM decides to pursue a patent, it will consult with an outside patent attorney. The office also works to license the innovation through a variety of agreements, such as an evaluation & option agreement (a time-limited preview), non-exclusive agreements, or an exclusive license agreement. To streamline the process, the University has developed a Quick Start License and a Quick Start License User Guide.

There are also University sponsored events and educational opportunities available to help researchers with technology transfer, including FastTrac® TechVentures™. This program offers help with business planning, as well as courses, a faculty seminar series, a technology transfer workshop, and an OTM trainee program.

The office can also provide support and assistance in beginning a start-up. WUSTL houses the Skandalaris Center for Interdisciplinary Innovation and Entrepreneurship, which offers classes, outreach events, and business plan competitions. IdeaBounce® is the gateway for all Skandalaris programs and includes a mechanism that facilitates the sharing and pitching of ideas, asking for and finding help, and creating connections. The Center also offers a Skills Series, a free monthly session on topics related to entrepreneurship. The Olin Cup Competition is a business plan competition open to teams that have at least one University student, alumnus, or faculty or staff member. The competition provides teams with opportunities to present a business plan and gain feedback from investors and judges. Winners receive awards to help fund their ventures.

Resources:

- Intellectual Property & Research Policies
  http://wustl.edu/policies/intellectual.html
- Office of Technology Management
  http://research.wustl.edu/Offices_Committees/otm/Pages/OTM.aspx
- Quick Start License
  http://research.wustl.edu/Offices_Committees/OTM/faculty/Pages/QuickStartLicense.aspx
- Skandalaris Center for Interdisciplinary Innovation and Entrepreneurship
  http://sc.wustl.edu/Pages/default.aspx

Yale University

The Yale Office of Cooperative Research (OCR) "*is charged with negotiating the contracts governing the development, allocation and commercialization of existing and prospective intellectual property rights"* to "*foster commercial investment in the development of inventions and discoveries flowing from the faculty research at Yale for the benefit of society."*

OCR suggests disclosing a new invention to them promptly using a form available online or through email. Yale owns, with some exceptions, intellectual property that results from research conducted at the University. The assessment of the invention includes searching for prior art and analyzing the market and competition. OCR may pursue a patent, and if so, manages and

finances the process. Next, the "*staff will identify candidate companies that have the expertise, resources, and business networks to bring the technology to market. This may involve partnering with an existing company or forming a startup."* If a startup is chosen, OCR helps with planning, creating, and funding the venture. The office can also form industry relationships and execute licensing agreements.

The Yale Entrepreneurial Institute (YEI) offers programs, funding, events, and other resources to help students and faculty start new ventures. YEI and ORC offer startup support through program such as the Faculty Venture Creation Program and the Technology Commercialization Program. The Faculty Venture Creation Program may provide researcher-entrepreneurs with a small financial award, a mentor, workshops, and networking opportunities to help create a startup. The Technology Commercialization Program partners faculty innovators with graduate and professional school students "*to identify a market, build a business plan and accelerate the company into a viable commercial entity, all with the dedicated help of a program that offers skilled mentors and an experienced support staff."* Additionally, YEI's handbook on entrepreneurship contains information on relevant, programs, organizations, and resources for launching, working on, helping, and accelerating a startup.

Resources:

- Yale University Patent Policy
  http://ocr.yale.edu/faculty/policies/yale-university-patent-policy
- Office of Cooperative Research
  http://ocr.yale.edu/
- Faculty Frequently Asked Questions
  http://ocr.yale.edu/faculty/frequently-asked-questions
- Faculty Venture Creation Program
  http://ocr.yale.edu/faculty/startup-support/faculty-venture-creation-program
- Technology Commercialization Program
  http://yei.yale.edu/tcp
- Entrepreneurship @ Yale Handbook
  http://yei.yale.edu/sites/default/files/imce/FinalYEIHandbook20142015opt.pdf

2. What's the Market for My Research-Based Invention?

Understanding the potential market for a research-based solution will help a researcher decide on the best technology transfer approach. If the market is relatively small or the invention is one that could be easily replicated by end-users, the researcher may decide to open source the design so that anyone can produce the research-based invention. If the market is large, the researcher might be able to attract a manufacturer to take over the production and marketing of the invention, or the researcher in consultation with his/her university or research institution might decide to patent the invention and pursue licensing arrangements with manufacturers or establish a new venture.

To determine if there is a viable market for the research-based invention, information will be needed on the size of the market for the invention and potential demand: the number of potential buyers (contractors) and users (workers); the types of projects where the device would be used and the outlook for this type of work; and how many devices contractors are likely to purchase. In addition to the resources available through the researcher's university or research institution, a researcher may also be able to find this type of information in trade publications and government reports and filings, or by conducting surveys or interviews of potential end-users.

The following are questions to consider when estimating the size of the market for an invention and examples of non-university/research institution sources for this information.

On what type(s) of construction project(s) (e.g., highway, residential, nonresidential, etc.) does the hazard that will be addressed by the research-based invention occur?

Examples of sources of information for construction activity and projections:

- **Dodge Market Research and Intelligence** develops data and issues reports on construction trends at the national level and for individual markets for a fee, including an annual forecast of construction activity by sector and region (http://construction.com/market_research/default.asp). Some of this information is made available publicly in press releases and articles by searching on FW dodge construction forecasts.
- American Institute of Architects' semi-annual **Census of Construction Forecast** is "a survey of the nation's leading construction forecasters" (http://www.aia.org/practicing/economics/).
- **FMI's Construction Outlook** is prepared annually with quarterly updates (http://www.fminet.com/resources). Some of the data is for a fee and some is available publicly in press releases and articles by searching on FMI Construction Outlook.
- The National Association of Home Builders **"Housing Data"** section of their website contains information from surveys of home builders on the housing market and trends (http://www.nahb.org/page.aspx/landing/sectionID=113).
- U.S. Small Business Administration resources: **"Understand Your Market"** explains how to conduct market research and discusses sources of market and industry data (https://www.sba.gov/content/do-your-market-research), and **"Business Data & Statistics"** provides links to additional sources of data for target markets (https://www.sba.gov/content/general-business-statistics).

Which trade(s) are exposed to the hazard (e.g., roofers, sheet metal workers, bricklayers, etc.)?

Examples of sources of information on tasks performed by different trades and their top safety and health risks:

- **CPWR's Construction Chart Book**, includes information and charts on labor force characteristics (race, age, unionization, gender, income, etc.) and hazards, occupational diseases, and fatal and nonfatal injuries facing construction workers, including information at the trade/occupational level. The data and charts are updated as new information becomes available (http://www.cpwr.com/publications/construction-chart-book).
- The U.S. Department of Laborer's Bureau of Labor Statistics **Occupational Outlook Handbook** provides information on each of the construction occupations, including, for example: a description of the work, the work environment, and employment projections (http://www.bls.gov/ooh/construction-and-extraction/home.htm). This site also has a direct link, by occupation, to **O*Net**, which provides additional details by occupation, including, for example, the tools and technology used, abilities (trunk strength, etc.), and work activities (http://www.onetonline.org/find/).

What types of contractors (residential, specialty trade – roofer, sheet metal, plumbing, etc.) employ the workers exposed to the hazard?

Examples of sources of information on contractors and their employees by construction sector:

- **CPWR's Construction Chart Book**, includes data and charts with information on industry characteristics (number of establishments, employer status and number of employees, construction revenues and the sector generating the revenues, and the demographics of the business owner). This information and related charts are updated as new information becomes available (http://www.cpwr.com/publications/construction-chart-book).
- The **U.S. Department of Commerce**, a primary source for information contained in CPWR's Construction Chart Book, produces data series and reports that contain more detailed information, which may be needed for the market assessment. The "Industry Statistics Portal" provides a quick look at the resources available by industry (http://www.census.gov/econ/census/data/), including:
  - The **Economic Census**, which is conducted every five years (2007, 2012, etc.), includes detailed information on the construction industry by sector, geography, types of employer, and their employees – information that is needed to establish the size of a particular sector within the construction industry and trends. The website provides examples of how to use this data to identify business markets and in the development of a business plan (http://www.census.gov/econ/census/).
  - The **Survey of Business Owners**, which is conducted every five years, provides information "for businesses and business owners by gender, ethnicity, race, and veteran status" (http://www.census.gov/econ/sbo/).
  - **County Business Patterns** contains industry data (number of establishments and employment by construction sector) as of March of each year broken down by state and metropolitan area (http://www.census.gov/econ/cbp/index.html).

3. How Do I Develop a Business Plan?

If a researcher does not have access to help with developing a business plan from their university or research institution, then the U.S. Small Business Administration (SBA) is a good starting point. The SBA has a variety of resources available including:

- Access to business expertise through their **Small Business Development Centers.** These Centers are located throughout the country and provide "aspiring and current small business owners a variety of free business consulting and low-cost training services including: business plan development, manufacturing assistance, financial packaging and lending assistance, exporting and importing support, disaster recovery assistance, procurement and contracting aid, market research help, 8(a) program support, and healthcare guidance." These Centers are located throughout the country. The location and contact information can be found at https://www.sba.gov/tools/local-assistance/sbdc.
- Questions to consider if a researcher is considering starting a **new venture** (https://www.sba.gov/content/20-questions-before-starting-business)
- Instructions and guidance for **developing a business plan** (https://www.sba.gov/writing-business-plan)
- Information on developing a **marketing strategy** (https://www.sba.gov/content/marketing-sales-management)
- Steps for developing **financial projections** (https://www.sba.gov/content/financial-projections), and information on sources and types of business **loans and venture capital** (https://www.sba.gov/category/navigation-structure/starting-managing-business/starting-business/loans-grants-funding).
- The SBA's Office of Capital Access' mission is "to help make capital available through banks and other lending partners to small business" including help with the 7(a) Loan Program. The **7(a) Loan Program** is a loan guarantee program through the SBA for start-up and existing small businesses (https://www.sba.gov/offices/headquarters/oca).

4. Where Can I Learn More About Technology Transfer?

The idea for developing a *roadmap* for moving technology -- inventions – out into the market place is not new. There are several different approaches and studies that have explored the key steps, the types of information required, and potential challenges and barriers, including:

Methods & Approaches:

- The Lean StartUp Methodology http://theleanstartup.com/principles
  - Blank, S. (2013). Why the Lean Start-Up Changes Everything. Harvard Business Review, 91(5), pp. 63- 72. https://hbr.org/2013/05/why-the-lean-start-up-changes-everything
- Stage-Gate® - Your Roadmap for New Product Development http://www.prod-dev.com/stage-gate.php
  - Cooper, R.G (2011). Winning At New Products: Creating Value Through Innovation (4th Ed.).

- Cooper, R.G. (2001). Winning at New Products: Accelerating the Process from Idea to Launch (3rd Ed.).

- Jolly, V. K (1997). Commercializing New Technologies: from Mind to Market Place. Harvard Business Press http://books.google.com/books/about/Commercializing_New_Technologies.html?id=wxCjNljWdZoC
- The Road to Technology Transfer, Fuentek, http://www.fuentek.com/techtransfer-process-infographic.php, http://www.fuentek.com/

Articles & Guides:

- Kotha, R., Kim, P.H., Alexy, O. (2014). Turn Your Science Into A Business. Harvard Business Review, November 2014, pp. 106-114. https://hbr.org/2014/11/turn-your-science-into-a-business
- Flagg, J.L., Lockett, M. (2010). The Need to Knowledge Model: A Roadmap to Successful Outputs for NIDRR Grantees. http://ktdrr.org/ktlibrary/articles_pubs/ncddrwork/focus/focus28/Focus28.pdf
- DeSimmone, J., Mitchell, L. (2010). Facilitating the commercialization of university innovation: The Carolina express license agreement. Kauffman Foundation. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1585447
- Debackere K, Veugelers R. (2005). The role of academic technology transfer organizations in improving industry science links. Research Policy 34(3), pp. 321-342. http://www.sciencedirect.com/science/article/pii/S0048733305000168
- Powers, J.B. (2003). Commercializing Academic Research: Resource Effects on Performance of University Technology Transfer. The Journal of Higher Education, Volume 74(1), pp. 26-50 http://muse.jhu.edu/journals/jhe/summary/v074/74.1powers.html
- Technology Planning for Business Competitiveness: a Guide to Developing Technology Roadmaps. Emerging Industries, Occasional Paper, Competitive Australia, 2001 http://www.technologyforge.net/enma/6020/6020Lectures/TechnologyRoadmapping/ENMA291TRReferences/TechnologyRoadmapping.pdf
- Carayannis, E., Alexander, J. (1998). Achieving success and managing failure in technology transfer and commercialization: Lessons learned from U.S. government R&D laboratories. Doctoral dissertation, The George Washington University. International Journal of Technology Management 17(3/4). http://uni-klu.ac.at/wiho/downloads/CARAYANNIS_TECH_TRANSFER_IJTM.pdf

CPWR Resources:

- Intellectual Property Patent & Licensing Guide for Construction Safety & Health Researchers and Inventors, CPWR, 2014 http://www.cpwr.com/whats-new/intellectual-property-patent-licensing-guide-construction-safety-health-researchers

- Best Practices for Health and Safety Technology Transfer in Construction, CPWR Symposium Report, 2013 http://www.cpwr.com/sites/default/files/research/cpwr-report-102412.pdf
- Technology Transfer Innovation and Successful Diffusion in the Construction Industry, http://www.cpwr.com/sites/default/files/research/TechTransferandDiffusionbackgroundpiece.pdf
- Research Dissemination: Technology Transfer, CPWR, http://www.cpwr.com/research/research-dissemination-projects#techtrans

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