Innovation, Entrepreneurship, and Translational Research

A Guide for NSF EPSCoR Jurisdictions to Implement Innovation, Entrepreneurship, and Translational Research Workshops

Based on Concepts Developed at NSF EPSCoR Workshops:

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Introduction

A two-part series of workshops was held in 2015/2016 for NSF EPSCoR jurisdictions that were designed to help accelerate the translation of innovation-based research into products and services that benefit society. Participating jurisdictions believed that the series was valuable for both learning about best practices and improving communication and collaboration among stakeholders as well as other jurisdictions. This document provides the necessary steps, tools, processes, and resources that will allow non-participating jurisdictions to view the output of the workshops and utilize the tools to conduct their own assessments, and develop analyses and action plans.

## STEP 1: Formation of the Team

The ideal team should consist of no less than four and no more than seven people with *diverse* skill sets and backgrounds across the following professions:

- Academic research inventors
- Founders of technology-based start-up companies
- Research administrators
- Technology transfer administrators
- Economic development directors
- Industry partners and trade representatives
- Entrepreneurial program directors
- Founders of tech-based companies
- Angel and venture capital groups

It is recommended that the team be comprised of no more than 50% university members. Diversity outside the university is important as research-based ideas move through the innovation continuum, out of the university and into business development activities. The continuum is illustrated below:

Innovation Continuum

Ideas ➡ Research Innovation ➡ Technology Commercialization ➡ Entrepreneurship ➡ Business Development
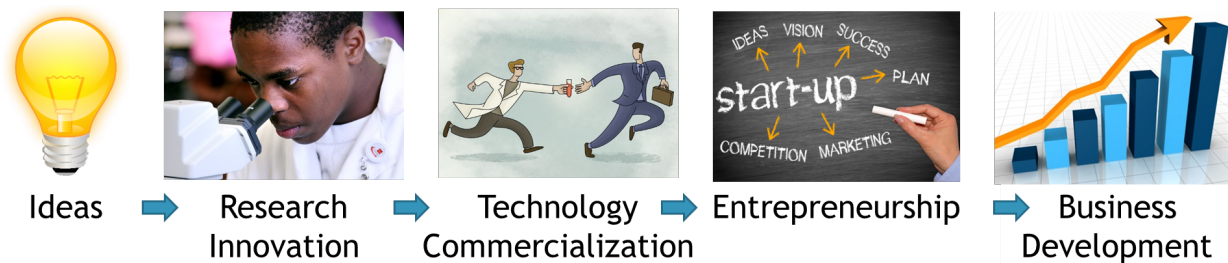
STEP 2: Jurisdiction Assessment

After the team is formed, members should begin working on a jurisdictional self-assessment of the current assets that contribute to research innovation, technology commercialization, entrepreneurship, and business development. Although the assessment questionnaire is comprehensive, the vast majority of the questions have been designed to be filled out easily via a numerical ranking or yes/no response. A link to the questionnaire ("*Assessment Questionnaire* ") can be found on http://sdepscor.org/resources/**nsf-innovation-workshop**/.

The questionnaire helps jurisdictions better understand the resources that can be leveraged to develop and implement processes for accelerating research-based innovation. The questionnaire starts with a visual representation of the state so that assets can be visually mapped. The example on the website has an outline of South Dakota. Replace it with an outline of your state and then map the assets per the instructions.

When filling out the questionnaire, it is suggested that:

- All factual data be divided up among the team members based on areas of expertise, knowledge, and/or interest. This includes the visual representation of the various assets across the state.
- All yes/no questions and ranking data should be filled out individually by every team member.

Once surveys are complete, one of the team members should consolidate the factual data, and ideally, provide the attendees with the range of responses to the ranking questions because each member has a different level of knowledge and perception of the topics. This provides a great starting point for conversations among the team to come to a consensus on the current situation before any additional work is done.

Additional information necessary to complete the survey can be obtained by reviewing regional economic reports, scanning the Internet, and obtaining input from local leaders of public, private, academic, and non-profit entities in your region. The following page contains a list of potential data sources:

EVALUATION AREAS	SOURCE	WEB SITE
Statewide research and innovation statistics	NSF Science and Engineering Indicators	http://www.nsf.gov/statistics/seind14/index.cfm/state-data
	NSF Science and Engineering State Profiles	http://www.nsf.gov/statistics/states/
Four-Year Colleges & Universities	US News and World Report rankings	www.usnews.com/education
	National Science Foundation	https://ncsesdata.nsf.gov/webcaspar/
	Chronicle of Higher Education	www.chronicle.com
	National Association of College and University Business Officers	www.nacubo.org
	Association of University Technology Managers	www.autm.org
Spending	Federal R&D spending	www.rand.org/pubs/monograph_reports/MR1824.html
	Private R&D	www.saibooks.com
Venture Capital	Moneytree survey	www.pwcmoneytree.com
Angel/VC Firms	Local print media	www.bizjournals.com www.crain.com www.angelcapitalassociation.org
Foundation Giving	The Foundation Center	www.foundationcenter.org
Government Programs	Small Business Administration	www.sba.gov
Tax Burden, Business Costs	Moody's	www.economy.com
	The Tax Foundation	www.taxfoundation.org
Clusters	Harvard	http://www.isc.hbs.edu/about-michael-porter/affiliated-organizations-institutions/Pages/us-cluster-mapping-project.aspx
SBIR Grants	SBA	https://www.sbir.gov

STEP 3: Review of Best Practices

Once complete, the assessment will allow the team to determine gaps in the assets, and a review of best practices will help identify potential ways that those gaps can be bridged. At the first workshop, several organizations presented examples of best practices where ideas and processes were effectively implemented for moving innovation from the lab into the marketplace. These included:

- Developing effective partnerships between universities and industry
- Technology commercialization
- Importance of entrepreneurship
- Importance of new venture development and support
- State economic development best practices

All of these presentations ("*Workshop 1 Presentation Materials*) can be found at http://sdepscor.org/resources/**nsf-innovation-workshop**/.

Additional best practices include:

- NSF Engineering Research Center Best Practices Manual, Industrial Innovation and Collaboration
- Science Business Innovation Board's "Making Industry/University Partnerships Work – Lessons from Successful Collaborations"
- Association of University Technology Managers (AUTM) global technology portal
- Concept Foundation Site Guide for Tech Transfer Managers
- *Technology Transfer Tactics* "Best Practices Compendium"
- Market testing of new product/business ideas and business models
- 2015 Global Best Practices Report on Incubation and Acceleration: Key Trends and Analysis of the 2015 Incubation (published by Unitus Seed Fund):
- *Technology Transfer Tactics* "Startup Accelerator Best Practices: Speed the Launch of Sustainable Businesses":
- SSTI's "Trends in Tech-Based Economic Development (2013)":
- Kauffman Foundation entrepreneurial resources: http://www.kauffman.org/
- Angel Capital Association: http://www.angelcapitalassociation.org/
- Small Business Administration: https://www.sba.gov/.

STEP 4: Set an Objective

Based on the self-assessment and review of best practices, the team should now set an objective that they want to achieve. Examples of objectives include:

- Increase the amount of start-up companies based on university innovation
- Increase communications between researchers and industry
- Change university culture to one that embraces technology commercialization
- Increase the number of SBIR/STTR awards to university researchers
- Build an entrepreneurial culture on campus
- Make it easier for researchers to engage in technology commercialization
- Better integrate the business school in technology commercialization efforts
- Create a mentor network for accelerating technology commercialization
- Increase collaboration among major research universities in the region
- Establish a university-based venture fund
- Work with the state to make it easier/more attractive for starting new businesses
- Establish a state-wide business plan competition for students
- Establish a university technology-based business plan competition
- Implement the business model canvas process in entrepreneurial education programs
- Engage outside business experts in the invention disclosure/assessment process

STEP 5: Strengths, Weaknesses, Opportunities, & Threats (SWOT) Analysis

Once the objective is set, the team should conduct a separate SWOT analysis for *each* of the asset areas (research innovation, technology commercialization, entrepreneurship, and new venture business development) *relative to achieving that specific objective*. A presentation given on how to conduct a SWOT analysis was presented at the first workshop can be found in the workshop 1 presentation materials referenced above (an Internet search on "how to conduct a SWOT analysis" will generate several useful links). A blank PowerPoint template for conducting the analysis ("*Blank SWOT Template")* can be found at http://sdepscor.org/resources/**nsf-innovation-workshop**/.

	Helpful to achieving the objective	**Harmful** to achieving the objective
Internal to the organization(s)	**Strengths**	**Weaknesses**
External to the organization(s)	**Opportunities**	**Threats**

Once the SWOT analyses have been completed for each of the asset areas, the team should prioritize the top one or two strengths, weaknesses, opportunities and strengths for each of the asset areas and consolidate them into one overarching SWOT analysis. Examples of completed SWOT analyses for participating jurisdictions ("*SWOT Analyses from Workshop 1*") that includes both the detailed and consolidated SWOT worksheets can also be found at the above-referenced link.

At this point, the team can develop strategies for maximizing strengths, minimizing weaknesses, taking advantage of opportunities, and mitigating threats as they seek to achieve the stated objective. These will also help in formulating action plans.

STEP 6: Action Plan

An action plan should now be developed for the objective utilizing the strategies that emerged from the SWOT analysis (an Internet search on "how to develop an action plan" will also yield several useful links). A blank Word template for developing the action plan ("*Blank Action Plan template*") can be found at http://sdepscor.org/resources/**nsf-innovation-workshop**/.

Before developing action plans, it may be worth viewing example action plans developed at the workshop ("*State Action Plans from Workshop 2*") can be found at the same above-referenced link to see if any other jurisdictions are trying to achieve similar

objectives and what methods they are using. It may provide additional knowledge sources or collaboration opportunities for your jurisdiction.

At a minimum, the action plan should contain the following items:

- Action items: these should be focused on specific activities to be accomplished
- Responsible party(s): the driver/champion for this action should be identified by name
- Resources: this can include any supporting people or organizations necessary to achieve the action, as well as non-human resources required (funds, facilities, etc.)
- Outcomes desired: these should be realistic, specific, and measurable
- Timeframe: identify when the action should be complete

Additional presentation materials at the second workshop ("*Workshop 2 Presentation Materials*") can be found at http://sdepscor.org/resources/**nsf-innovation-workshop**/.

STEP 7: Implement the Action Plan

A committed and motivated team can influence whether the action plan will be successful or not. The support of all stakeholders is essential for the team's success, so constant socialization and communication with the stakeholders as the milestones are achieved is critical.