

## **Concept to Commercialization-Fostering Innovation Through University Resources**

**Niaz Latif, Mohammad Zahraee, Deborah Blades, Mont Handley  
Purdue University Northwest**

### Abstract

Purdue University Northwest established the Commercialization and Manufacturing Excellence Center (CMEC) in 2015. One of the purposes of this center is to foster innovation in the Northwest Indiana region through commercialization of innovative ideas and products. The objective of this paper is to describe how the university's physical and human resources can be leveraged to augment such commercialization center. CMEC provides several supports that are described in this paper. In addition, data on these activities with associated costs are provided. The supports are provided in the following areas: one-on-one counselling by Entrepreneur in Residence, Intellectual Property Legal Aid, Small Business Development Plan, Functional Prototype Development, Small Business Innovation Research grants submission, Pilot Manufacturing, and Product Commercialization. The paper also provides information on the nature of partnership with stakeholders, such as State Department of Workforce Development, organizations that are involved with regional economic development, relevant industry, professional societies/organizations, and media. One of the key activities include specific agreements between the University and the entrepreneurs so that both entities benefit through commercialization.

### Introduction

Purdue University Northwest (PNW) took the lead to become an engaged university to serve the community and help foster economic development in February 2015 with the establishment of the Commercialization and Manufacturing Excellence Center (CMEC). CMEC is an 18,000sq ft., newly renovated facility, designed to assist local entrepreneurs with the commercialization of new, innovative products. CMEC provides the necessary physical facility, equipment and machinery for functional prototype development, prototype testing, laboratory space to develop proof of concept (pilot) manufacturing, and classroom space to host entrepreneurship development training and workshops. CMEC has an entrepreneur-in-residence, who counsels entrepreneurs on business development and commercialization of their products.

Further, CMEC is uniquely outfitted to build proof of concept manufacturing facilities. These scaled pilot facilities provide innovators and their prospective investors and/or funders with capitalization costs, operating costs and rates of product flow. This and additionally gathered financial data are key indicators for success in entrepreneurial ventures.

In a report compiled by Dr. Bo Beaulieu<sup>1</sup> in 2015, economic development data within the Northwest Indiana counties shows a gap compared to the rest of the state. Data from the regional development report noted:

- 2001-2013 Northwest counties were issued patents at a rate of 1.6 per 10,000 jobs, while the remaining Indiana counties garnered 4 patents per 10,000 jobs
- Stage 1 (2-9 employees) establishments expanded by 85% while stage 2 (10-99 employees) establishments slipped by 4 percent between 2000 and 2011
- Unemployment rate gap between the region and the rest of the state began to close in 2010 and 2011, it increased in 2013. The unemployment in the region was 1.5 percent higher than the rest of the state by 2013.
- Manufacturing employment decreased by 6% in 2013 compared to 2008

In an effort to close the regional economic gap between Northwest Indiana and the rest of the state, CMEC is working to develop a culture of innovation and entrepreneurship, especially in the manufacturing sector within Northwest Indiana. It is anticipated that this innovation will result in new businesses, new direct jobs and ultimately regional economic development.

In order to create this culture of change within Northwest Indiana several support pieces have been put into place within the following areas: one-on-one counselling by Entrepreneur in Residence, Intellectual Property Legal Aid, Small Business Development Plan, Functional Prototype Development, Small Business Innovation Research grants submission, Pilot Manufacturing, and Product Commercialization. The paper also provides information on the nature of partnership with stakeholders, such as State Department of Workforce Development, organizations that are involved with regional economic development, relevant industry, professional societies/organizations, and media. This paper further describes the Northwest Indiana region and how CMEC is providing the support to accomplish its long term innovation goals.

### Northwest Indiana Region

The Northwest Indiana (NWI) region is bordered on the north by Lake Michigan and on the west by the city of Chicago and the state of Illinois, which provides an infrastructure that supports travel by interstate highway (area is known as the crossroads of America), rail, water, and air. With a region population of 846,678 almost 13% of the state's population is located in the Northwest region<sup>2</sup> (STATS Indiana, 2017). Additionally, Region 1 is the second largest contributor to Indiana's overall GDP, and Lake County in Region 1 is the second largest county in the state of Indiana (U.S. Census Bureau and the Indiana Business Research Center, 2016 data). Also according to the U.S. Census Bureau 2016 data<sup>3</sup>, the region is also socio-economically diverse with population estimates showing a demographic inclusive of 13.7% Hispanic and 16.7% African American. In 2015 the state of Indiana had a median annual income of \$50,532; however, the area served by this project had a median annual income of \$40,692 with nearly 21% of residents being classified as impoverished<sup>4</sup> (Small Area Income and Poverty Estimates, SAIPE, 2014).

The industrial base of the region is varied, but is known for its steel and durable goods manufacturing, which has been negatively impacted in recent decades due to foreign trade practices<sup>5</sup> (Why It Matters: Foreign trade impact on U.S. economy, NWI Times, 2016). According to Northwest Indiana economic development organization<sup>6</sup>, "... companies from around the world have chosen Northwest Indiana not only for its proximity to major markets and affordable commercial space, but also for its highly qualified workforce."

This has been a topic of concern for our border neighbor, Illinois. As there has been a recent influx of companies moving to NWI from Illinois to take advantage of a favorable tax, labor and operating climate compared to the bordering state of Illinois<sup>7</sup> (WGN-TV, The Border War: How Illinois is losing out to surrounding states, June 2017).

Three major institutions of higher education are located in Region 1, Purdue University Northwest (PNW), with two campus locations, in Lake and LaPorte Counties, Indiana University Northwest (IUN), and Valparaiso University (VU). Eight other 2 and 4 year colleges are also located in the region. These institutions offer credentials at Certificates, Associates (AS degree), Baccalaureate (BS degree) and/or Master's (MS degree) levels.

#### Commercialization Support Services

To address the economic disparity between NWI Region 1 and the rest of the state, CMEC is engaged for the following activities,

- Foster innovative ideas products, impacting manufacturing in the region of Northwest Indiana;
- Commercialize products by providing prototyping services;
- Provide Intellectual Property Legal Aid, including some funding for prior art searches, provisional patent applications and utility patent applications;
- Expose participants to the SBIR Grant program, provide assistance in developing grant applications, preparing them for submission and training them to properly report to the granting authority;
- Teach participants the lean principals of entrepreneurship, the essentials of small business management, and the language of finance and investors; and,
- Develop road maps for participants to scale automated production facilities that will be economically competitive.

CMEC has a full-time Entrepreneur-in-Residence who counsels and coordinates the following activities for entrepreneurs.

- Concept Viability: The client is advised to make a conceptual prototype, draft an executive summary of the business plan. PNW/CMEC Entrepreneur in Residence/Assoc. Dir. undertakes a preliminary technical, market, and competitive assessment of innovation.

- Entrepreneurial Viability: The client is advised to present at 1 Million Cups, the PNW Big Sell, or take Lean Start-up training. Such presentation allows to demonstrate communicating their innovation, deliver a business pitch to potential investors
- Intellectual Property Viability: A meeting between the client and patent attorney is arranged to determine, a) if the product/idea novel or innovative, b) If there any probability that the product is protectable through a U.S. Patent, c) If the product different from what already exists in the market
- Customer Viability: The client is asked to Survey 100 potential customers and request their feedback on the design, proposed price and usefulness of innovation. Based on the client provided report, regulatory, economic and legal strengths and weaknesses are identified. Discern what differentiates the innovation from competing products.
- Product Viability: Client is assigned a PNW/CMEC Design and Development Technician, Senior Undergraduate or graduate student and/or a faculty member to help with producing a functional prototype. The functional prototype is presented to CMEC advisory board for consideration of seed funding either through CMEC or SBIR grant. Such seed fund will provide support for provisional patent (if needed) , pilot manufacturing, help with SBIR grant proposals
- Commercial Manufacturing Viability: Manufacturing analysis will examine existing production methods or engineer new manufacturing processes for the product. SBIR Phase II (or other means) will provide the means to prove commercial production viability.

Commercialization activities at CMEC are currently supported through gift or foundation funding. The Center was established through State and private support and facilitates pilot manufacturing, prototype development and creating the co-working spaces. Additional resources have also been available to support initiatives related to commercialization of ideas and products. The funding support to entrepreneurs are on a selective basis based on a review process. Review of projects for CMEC sponsorship of projects commercialization requires the followings, 1) Market survey report of 100 potential customers, 2) Evidence of uniqueness, or a competitive advantage over competing products, 3) A functional prototype design or plan, 4) A viable Business Plan or an Executive Summary, 5) Evidence of patentability/copyright etc. (if available), and 6) Evidence of initial marketing/selling of the product (if available).

Once a project is approved as a sponsored project, following activities are pursued by CMEC; 1) Sign SAFE agreement between CMEC and Client, 2) Develop/Improve functional prototype (if needed), 3) Prior Art Search, Provisional or Utility Patent application (if needed), 4) Development of SBIR grant application, 5) Pilot manufacturing to validate commercial production viability and scalability, 6) Present the product to prospective investors/customers

### Partners and Stakeholders

The partners and Stakeholders include private, state, local workforce agencies and other stakeholders with their specific commitments. The following partners have committed to providing specific support: small business development center, law firm with intellectual

property specialization, PNW College of Technology faculty and students, Purdue University's Manufacturing Extension Partnership (MEP), State Department of Workforce Development, relevant industry, regional economic development group and professional engineering societies.

Small Business Development Center (SBDC) and MEP offers entrepreneurs one-on-one business consulting, financing research and provides educational workshops and events. SBDC and Center for Workforce Innovation (CWI) also provide market data and acts as a service referral source for prospective clients. Services provided include one-on-one consulting, strategic planning, market research and loan assistance. The industrial commission provides mentorship through membership and help with venture funding and commercially scale a manufacturing process. The law firm with extensive patent experience provides legal support for patenting of innovative products and ideas.

The College of Technology faculty members and students are engaged in design, analysis, making prototype and testing including modeling and simulation of product and process. In addition, industry partners are involved in giving assistance with design problem and help optimize manufacturing process.

The economic development group are engaged in mentoring start-ups and small manufacturers. They also advocate for state equity crowdfunding platform for manufacturing ventures, provide consulting/counseling to manufacturers on incentive programs for relocation and expansion.

Commercialization activities during 2016-2018

Commercialization activities outcomes are measured in terms of following targeted outcomes: 1) number of new prototypes developed, 2) number of new products commercialize, 3) number of patent applications submitted, 4) number of patents approved, 5) number of SBIR grants awarded, and 6) number of jobs created. Of course, final outcome is measured based on the number of ideas/products commercialized.

CMEC offers several no-cost workshops and training sessions to the entrepreneurial and small business community, including: "1 MillionCups (1MC)", Founders Hours, and Intellectual Property Legal Aid (IPLA). **1MC** engages entrepreneurs with local communities around the world. Each week, two local entrepreneurs get an opportunity to present their startup story to a diverse audience of mentors, advisors and entrepreneurs. A six-minute presentation followed up with 20 minutes of questions and feedback session provides tips that can benefit and help promote start-ups. **Founders Hours** is a monthly 2-hr networking event for entrepreneurs that is highlighted by a keynote presentation from a seasoned and successful start-up founder. A panel discussion follows the 10-15 minute keynote, with Q & A from the audience. And finally, the Intellectual **Property Legal Aid (IPLA)** event offers half-hour counselling services by a patent attorney to innovators and inventors on the process of protecting intellectual property (IP), like trademarks, copyrights and patents.

In addition, CMEC hosts an annual PNW "Big Sell" event. The PNW Big Sell is a business pitch competition that is open to students, faculty and staff of PNW as well as to all regional residents

and college students all across the United States. This event provides a platform to advance entrepreneurial venture and communicate their vision to customers, investors and business leaders. In general, twelve finalists are pre-selected from all the applicants who first submit a two minute video presentation. These finalists compete live in front of a panel of three successful entrepreneurs with six minute pitches. Winners receive cash prizes.

As of July 23, 2018 more than 145 direct clients have received mentoring over a two year time period. The 1MC events have been attended by more than 1700 individuals with nearly 30,000 watching via on-line streaming services. These activities drive interest in entrepreneurialism, promote CMEC services and assist in prospecting new clients; but financial infrastructure or workforce of the regions served. However, resources are continuously needed to foster more comprehensive commercialization efforts by creating, developing and testing prototypes, providing assistance with patenting, discovering seed funding and assisting nascent entrepreneurs with the development business skills.

Between, June 1, 2016 and December 31, 2018, CMEC client demographics reflect inclusivity in terms of diversity of the population in Northwest Indiana. Recently CMEC has provided services to diverse clients as follows: Hispanic (8%); African American (15%); Asian (6%) and also in terms of gender diversity, female (28%).

Number of new prototypes developed	13 new prototypes
Number of new products commercialized	9 new commercialized products *
Number of patent applications submitted	24 patent applications submitted**
Number of SBIR or other grants awarded	2 grants awarded
Number of jobs created	36 direct and 122 indirect jobs ***

\* These numbers represent products developed and commercialized with CMEC assistance, not developed and Commercialized before consulting with CMEC.

\*\* This is according to IPLA program partner

\*\*\* Jobs are attributed to founders/co-founders who are marketing commercial products. "Ultimately, the Indirect Jobs created from manufacturing can include those in the supply chain, according to the Manufacturers Alliance for Productivity and Innovation. 3.4 full-time jobs are created with new manufacturing ventures". <https://www.mapi.net/blog/2016/02/new-study-shows-manufacturing-footprint-much-larger-perceived>

### Mutually Beneficial Agreement between University and Entrepreneurs

One of the key activities include specific agreements between the University and the entrepreneurs so that both entities benefit through commercialization. This is accomplished through the Simple Agreement for Future Equity (SAFE). SAFEs were developed by the prestigious Y Combinator start-up incubator in Silicon Valley in 2013 as a replacement for convertible notes or convertible debt instruments. Convertible notes are lengthy, often complicated, legal documents that allow the investor of loaned or granted capital to convert their loans/grants into equity if the new venture succeeds in raising significant capital or exits for a substantial sales price. SAFEs are simpler legal documents so that cash pressed early stage start-

ups don't spend all of their capital on legal bills. They however, do offer investors essentially the same rights for future equity stakes in fast growing start-up ventures.

## Summary

Commercialization of innovative ideas and products initiatives at PNW CMEC facility has strong support from a broad variety of relevant public and private stakeholders; and, has partnerships with diverse organizations that represent existing and new regional innovation cluster participants. However, planning of scaled pilot manufacturing facilities depends on success with SBIR grant and/or securing private equity. Such resources and cluster participants help grow, scale, and evolve the manufacturing assets within the region.

## Bibliography

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<sup>3</sup> U.S. Census Bureau and the Indiana Business Research Center (2016). Retrieved June 17, 2017, from <https://www.census.gov/quickfacts/table/PST045216/00>

<sup>4</sup> Gann, Carolyn, et al. "Small Area Income and Poverty Estimates: 2016." Current Population Reports, Nov. 2017, pp. 1–17.

<sup>5</sup> Wiseman, P. (2016, September 25). WHY IT MATTERS: Foreign trade impact on U.S. economy. Northwest Indiana Times. Retrieved June 20, 2017, from [http://www.nwitimes.com/news/local/govt-and-politics/elections/2016-election/why-it-matters-foreign-trade-impact-on-u-s-economy/article\\_bc598189-b70f-5e77-a6a2-a85fd8aad6b8.html](http://www.nwitimes.com/news/local/govt-and-politics/elections/2016-election/why-it-matters-foreign-trade-impact-on-u-s-economy/article_bc598189-b70f-5e77-a6a2-a85fd8aad6b8.html)

<sup>6</sup> <https://www.nwiforum.org/why-nwi-1>

<sup>7</sup> Bradley, B. (Writer). (2017, June 6). The Border War: How Illinois is losing out to surrounding states [Video file]. Retrieved June 20, 2017, from <http://wgntv.com/2017/06/06/the-border-war-how-illinois-is-losing-out-to-surrounding-states/>

*Note: Names of products/companies are not an endorsement of such products/companies.*

## Biography

**DR. NIAZ LATIF** is the Dean of the College of Technology at Purdue University Northwest. He has been Principal Investigator for National Science Foundation grants and US Department of Labor grant. He is a commissioner of ABET and also serves on the Board of Engineering Technology Division in ASEE.

**DR. MOHAMMAD ZAHRAEE** is the Associate Dean at the College of Technology at Purdue University Northwest. He has been Co-Principal Investigator for National Science Foundation grants and US Department of Labor grant. He has served on ABET Board of Directors.

**DEBORAH BLADES, M.S. TECH** is the Director of Industrial Relations at the College of Technology at Purdue University Northwest. She served as Project Manager for a US Department of Labor grant and is a current Project Manager for a National Science Foundation grant.

**MONT HANDLEY, B.A.** is the Entrepreneur in Residence and Associate Director of the Commercialization and Manufacturing Excellence Center at Purdue University Northwest. He is also the Founder, Inventor and Board Member of PittMoss, LLC.