From the Original UAMMI write-up

The Wasatch Front and its surrounding counties support a highly specialized

manufacturing capacity in advanced composites materials and products. Utah has a 50-

year history in the Advanced Composite Cluster (ACC) with an infrastructure and

transportation system that has grown with the cluster. Utah’s ACC is a critical piece of

Utah’s manufacturing ecosystem supporting three of Utah’s most important clusters --

Aerospace Products and Manufacturing, Outdoor Recreation and Athletic Equipment, and

Transportation Equipment Manufacturing.

The Vision

Utah began manufacturing lightweight components for the strategic missile programs in

the 1950s. It has now grown into one of the most advanced composites centers in the

nation. Utah companies serve national and international markets from aerospace to

recreation. The region aims to strengthen its current leadership in composite

manufacturing by adding to its already strong ecosystem and providing supporting

infrastructure including the Utah Advanced Materials and Manufacturing Initiative

(UAMMI) and a chain of Local Solution Centers. UAMMI brings together public, private,

community, industry and education partners to assure growth and sustainability of one of

Utah’s most important manufacturing clusters. The Utah Legislature recently provided an

investment of $750,000 to formalize the UAMMI structure and begin programming for

and building of the UAMMI solution/innovation centers. A strong industrial ecosystem,

combined with a highly-educated population which is nearly eight years younger than

the national average, gives this region a good chance of succeeding.

U.S. Economic Development Administration http://www.eda.gov/challenges/imcp/

The Strategy

Workforce and Training: The workforce is a foundational element of industrial

ecosystems and key to economic prosperity. Industry members continue to express the

need for more skilled workers. UAMMI is expected to play an important role in

workforce development and training. It plans to form integrated and collaborative teams

with the Governor’s Office of Economic Development and other partners to develop

strategies for workforce development and training. These strategies include linking the

K-12 STEM pipeline, engaging industry in providing immersed work-based learning,

providing professional credentialing, applied technology certificates, college education,

and professional development and creating access to continuous skills upgrades to meet

the demands of a knowledge-based economy.

The Strategy Continued . . .

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The Strategy Continued….

Supplier Networks: The Advanced Composites industry supports a virtually complete

supplier network with over 50 companies. Additionally, Utah is home to Hill Air Force

Base which houses the Air Force Center of Industrial Excellence for Low-observable,

Stealth Aircraft Structural Composite Materials. UAMMI aims at further strengthening

and integrating Utah’s Advanced Composites Cluster (ACC) supplier network by

focusing on three areas: 1) increasing intrastate utilization of supplier network

capabilities and products; 2) creating a comprehensive understanding of Utah’s current

supplier network capabilities and how those capabilities match current and future

market conditions; and 3) creating a plan to fill gaps with the network.

Research and Innovation: By working through the Local Solution Centers, UAMMI will

maintain close collaboration among university researchers, the training programs at

applied technology colleges/community colleges, and industry, to benefit the complete

ACC ecosystem. These Local Solution Centers are envisioned to be a hub where

university researchers will learn about and address problems that industry faces. In

addition, students from the universities may find the Solution Centers a great place to

perform work on their theses that cannot be done in a university setting.

Infrastructure and Site Development: As Utah’s aerospace, sports equipment

manufacturing, and advanced composites industries continue to growth, there are

ongoing plans to shore up the underlying infrastructure. For example, FrontRunner

commuter rail’s expansion is planned to extend north to Brigham City in Box Elder

County and south to Payson and then Santaquin, with the possibility of even extending as

far south as Nephi in Juab County. Other infrastructure strengthening include the

establishment of three Local Solution Centers to bring industry, training, applied

research, and business incubators together.

Trade and Investment: In January 2015, Salt Lake County announced their participation

in an economic development network created by the Global Cities Initiative (GCI), a joint

project of the Brookings Institution and JPMorgan Chase to help business and local

governments to export and attract foreign direct investment. Resources are also

available from other public and private organizations including the Commercial Service

of the U.S. Department of Commerce to assist firms to export.

Operational Improvement and Capital Access: A network of public and private

organizations, including the Manufacturing Extension Partnership (MEP) and UAMMI, is

available to assist companies to improve their operations. For example, UAMMI helps

companies leverage all assets of the State of Utah through the Local Solution Centers.

Furthermore, companies in Utah have robust access to capital. Utah leads the entire

intermountain Region in access to risk and growth capital.

U.S. Economic Development Administration http://www.eda.gov/challenges/imcp/

The Partnership

With the University of Utah at the lead, the UAMMI partnership is extensive and already

making progress. The partnership includes:

Research Institutions: University of Utah, Weber State University, Utah State University,

Salt Lake Community College, Davis Applied Technology College, Ogden-Weber

Applied Technology College, Granite School District/BioInnovation Gateway. Local

Economic Development Groups: State of Utah Department of Workforce Services, Salt

Lake County, Ogden City, EDCUtah, State of Utah Governor’s Office of Economic

Development, Air Force Sustainment Center Operation Location Hill, State of Utah STEM

Action Center. Industry: World Trade Center Utah, Logistic Specialties, Inc., Churchill

Oaks Consulting, Utah Manufacturing Association, Society for the Advancement of

Material and Process Engineering, EDO Corporation, ENVE Composites, Total Quality

Systems, Inc., EmergenTek.

Grant Introduction

The DoD is a major contributor to Utah’s economy. The State of Utah is home to Dugway Proving Grounds, Tooele Army Depot , Utah National Guard, and Hill Air Force Base (HAFB). HAFB is the state’s sixth largest employer and many defense contractors are located within Utah supporting the Air Force’s mission. HAFB’s annual economic impact is $3.26 billion.

In 2014 defense spending made up 2.3 percent of the state’s gross domestic product ranking it 23rd among the 50 states and District of Columbia for defense spending. In 2012, the value of defense contracts in Utah reached $2.7B. By 2014, however, that figure had dropped by a full third – to $1.8B. This decrease in spending and potential for more decreases, leave the state’s economy vulnerable. Examples of looming cuts include a nearly 400-position loss with the planned retirement of the A-10 and a loss of over 500 jobs with the planned consolidation of the C-130 maintenance workload. Additionally, with a limited knowledge of our supply, Utah is in a limited position to respond to the planned Air Force divestment of the HAFB-based organic workload.

The same is true for increases in DoD activity. In future projections FY16 and FY17 DoD budgets show an increase in mission workload at HAFB, which will pressure the regional labor pool. For instance, within the carbon composites supply chain Hill AFB will be growing mission in several areas with158 technical and engineering staff positions added in support of the Ground Based Strategic Deterrence initiative to recapitalize the Minuteman III infrastructure. Demands for software work at Hill AFB are growing due to the software intensity of new DoD weapons systems (legacy aircraft require 250,000 lines of code; F-16 aircraft require 6 million lines of code; F-35 aircraft require 24 million lines of code). As a result, Hill’s software workforce has grown by almost 10% per year for the past seven years. Due in large part to the F-35, this demand is forecast to continue with the potential for the Hill AFB software workforce to grow by hundreds of personnel within the next ten years.

Recently the workforce environment was labeled as entering "crisis mode" in Utah's composites, structural repair, low observable coatings, and non-destructive inspection (NDI) workforce. In fact, the shortage in labor is currently impacting Utah’s ability to bring additional DoD work to the state. Increased DoD mission at HAFB are competing for experienced technicians with external DoD F-22/F-35 supply chain work (Hexcel, Orbital ATK, Exelis, etc.). As workforce is stretched the same will happen with material resources such as use of qualified regional SMEs, regional material inventories, and the like. In short the challenge is the effective limit of resources, including human resources, needed to assure a strong commercial diversification of the regional ecosystem.

This is all to simply say the DoD is a significant member of Utah’s economy and a critical part of one of Utah’s most important manufacturing ecosystems, namely the carbon composites manufacturing cluster. For DoD growth and the growth of the overall ecosystem to be sustainable the growth must be managed and resourced with a vision to a viable future for the entire ecosystem.

Beginning in 2005 the Utah Governor’s Office of Economic Development (GOED) and community and industry leaders have worked actively to build a robust cluster-based ecosystem based on advanced materials with a focus on carbon composites. In 2013, this effort and related community was branded as the Utah Advanced Materials and Manufacturing Initiative (UAMMI). Led by the University of Utah this community has actively and successfully coalesced to create a solid foundation of support for one of Utah’s foundational manufacturing sectors. A striking result is the investment in UAMMI of $750,000 by the Utah Legislature in FY16 to formalize the UAMMI structure and begin programming of both buildings and curriculum for the ecosystem. The FY16 investment will be followed with a $1,000,000 investment in FY17 to continue basic UAMMI operations and for support of programming such as this proposed project. To warrant these investments UAMMI presented a coordinated front of industry, Utah’s largest military base, higher education, public/private partnerships, industry associations, state and local government support and, of course, a solid commitment of leadership by the University of Utah. The UAMMI partnership, existing for roughly two years, has already helped in recognizing challenges the regional ecosystem must face. Several challenges are critical, while others are longer-term. One of the most striking challenges faced by the carbon composites manufacturing cluster is managing workforce and resources to support both developing commercial markets for diversification and the significant defense-related market. As such UAMMI and the University of Utah have most recently led efforts resulting in an eight institution (including three Applied Technology Colleges, a regional Community College, and three universities) DOL TechHire proposal and responded to a request for information for an Air Force Research Laboratory-sponsored National Network of Manufacturing Institute.

This proposed project is designed to enable Utah, and specifically, Utah’s carbon composites cluster’s understanding of the regional DoD supply chain and to increase the cluster’s ability to respond to shifts in regional defense spending by bolstering stress points in the supply chain and with constructive diversification of the entire supply chain and ecosystem. More specifically, UAMMI led by the University of Utah is proposing a program to map the entire Utah regional carbon composites supply chain, including the intrinsic inclusion of workforce and workforce suppliers. Basic to this proposal is also the training of supply chain members in order to allow more robust participation within the supply chain. Finding and mapping the local and regional defense supply chain including all tiers of contractors and sub-contractors is a critical part of this proposal and will allow the region to further craft a response strategy to bolster this supply chain in light of shifting DoD demand. This response will include an analysis of assets such as, specialized training curriculum and providers, corporate assets, commercialization assets, entrepreneurial assets, capital assets and availability, and manufacturing specific supply chain resources.

Need for Assistance

With a deep fifty-year history, and an ecosystem with over 60 companies directly producing carbon fiber parts, the associated supply chain supporting these companies the Utah supply chain is large, complex and poorly understood. In fact, Utah’s entire manufacturing industry is largely imprinted with advanced composites resulting in Utah companies either being created to leverage advanced composites in specific industries (e.g. ENVE, HyperComp, Conductive Composites, Orbital ATK, Hexcel, etc.) or existing companies moving large manufacturing operations to Utah to leverage Utah’s advanced composites workforce and supplier network (e.g. Boeing, BAE, Janicki, Harris, Goode, etc.) As stated earlier, the regional carbon composites industry is heavily weighted toward supporting DoD products and missions with an array of companies in the carbon composites industry directly supplying DoD missions. Examples include Orbital ATK supplying carbon composite wing skins to the Lockheed Martin F35; Harris Aerospace supplying structural components to the Lockheed Martin Fâ€3•5, Sikorsky CHâ€5•3K, and Lockheed Martin Joint Air-to-Surface Standoff Missile (JASSM) missions; Janicki Industries supplying tooling for the Sikorsky S-97; Conductive Composites doing cutting-edge research with the DoD in material design for products ranging from antennas to aerospace structures; and Hexcel producing base materials such as carbon fiber and pre-preg for both commercial and military aircraft. Additionally, via groups like the Ogden Air Logistics Complex at Hill Air Force Base (HAFB), BAE Systems, Inc., and Lockheed Martin, Utah supports US Air Force maintenance missions, including battle-damage repair of carbon composite structural elements, and distribution for several of the nation's premier fighter aircraft including: the F-35 Lightning II, F-22 Raptor, F-16 Fighting Falcon and A-10 Thunderbolt. In addition, Utah supports the maintenance of Minuteman III ICBM composites and rocket motors for the DoD and the majority of landing gear for the DoD. In fact, as part of this mission HAFB houses the Air Force’ s Center of Excellence for carbon composites and the Technical Repair Center for composites and advanced materials and the AFLCMC Advanced Composite Office. This extensive involvement of DoD manufacturing and support in the regional supply chain creates a dynamic ecosystem with multiple driving agendas, a large degree of complexity, and significant economic opportunity if managed well (and economic pitfall in the converse). Overall the entire cluster has a large concentration of employees and companies with companies directly manufacturing composite parts or materials and shipping these products to a global market. Regionally, the carbon composites industry covers nearly 30% of the counties in Utah and is served by educational programs in eight universities and regional vocational/technical colleges.

The supplier network is complex and relatively opaque to many of the Original Equipment Manufacturers (OEMs) and difficult for small to medium enterprises (SMEs) to penetrate. A problem this proposal addresses directly. In over 280 one-on-one interviews with the regional supply chain including OEMs directly supporting DoD products and missions, UAMMI found distinct needs for supply chain mapping, understanding, reinforcement (via SME training and recruitment), and diversification. Additionally, the social network underlying this industry, while extensive with a fifty-plus year history in Utah, contains gaps; limiting the network’s ability to aid in responding to rapid market changes. The ability to understand the social network is critical in keeping a smoothly and efficiently operating supply chain. The most robust supply chains are supported by individual relationships and person-to-person communication. As personnel change the understanding of the relationships held with a particular person is an important part of rebuilding a position’s function. Thus, for entities in the regional supply chain to operate optimally an understanding of the unique relationships held within their respective entity is critical. Related to this problem is a need to help supply chain entities meet to discuss problems and solutions to drive innovation in the regional supply chain was also identified through the industry interviews. This again points to a somewhat underdeveloped social network.

Further, a strong signal found during industry interviews is the need for an integration of workforce development/training efforts. This integration would allow industry members of the supply chain ready access to new workforce and an ability to understand and influence regional workforce development efforts. Strikingly, with a fifty-year history of manufacturing, the regional DoD carbon composites supply chain underutilizes small to medium sized vendors. In order for the regional supply chain to better support regional OEMs and to keep OEMs located in the region, the supply chain must have a significant local usage of smaller businesses. A significant barrier to this more integrated regional supply chain is the capability level of the SME community as venders to OEMs. For instance, SMEs supplying simple tooling could fill a need for supplying subassemblies, if the SME were able to certify the subassembly; opening the door to creating a high value product. Conversely SMEs overly focused on the DoD supply chain have significant exposure to changing regional or national DoD markets. Supply chain assessment and training is critical to the efficient utilization, strengthening, diversification and sustainability of the A&D Supply Chain. For Utah to continue to effectively support the critical capacity necessary for defense-related manufacturing, and to expand and strengthen its A&D industry within the commercial marketplace UAMMI must understand and better support Utah’s regional carbon composites supply chain in order to assure a high resiliency of the supply chain to changes in DoD mission and spending. Additionally, has an emerging voice of the industry UAMMI must create tools to communicate this understanding to inform state and national leaders of both perils and strategies in sustaining and growing this industry. Overall, the mapping of the DoD-related supplier/collaborator network and building a system for both understanding and analyzing the network is a relatively large task. And, while the Utah legislature is helping support the initiation and staffing of the

UAMMI idea, the size of this project is a more significant undertaking than UAMMI has resources to support at this point in time. Thus, assistance to accomplish this project is required.

Grant Abstract

While Utah’s carbon composites industrial sector includes a significant footprint in commercial aerospace and sports equipment manufacturing, the regional carbon composites industry is heavily weighted toward supporting DoD products and missions. This relative imbalance means shifts in DoD utilization of the regional carbon composites supply chain significantly impact the regional aerospace and sports manufacturing industries. An example is the current near crisis level of available skilled labor in the technical workforce. This situation will be exacerbated by Hill AFB staffing needs with significant increases in the F-22 Raptor and F-35 Joint Strike Fighter maintenance, repair, modification workload. These acute increases combined with recent and projected national defense spending decline of 28 percent from FY 2011 to 2019 create significant challenges in maintaining and growing a regional carbon composites ecosystem.

For Utah to understand, mitigate and even take advantage of challenges to the carbon composites ecosystem the University of Utah, leading the Utah Advanced Materials and Manufacturing Initiative (UAMMI), is seeking a grant from the Department of Defense Office of Economic Adjustment to undertake the project of mapping the Aerospace and Defense (A&D) carbon composites supply chain. This mapping includes workforce development and training elements. This project will enable an effort to stabilize the ecosystem and look toward future growth and diversification of the supply chain assuring a highly resilient carbon composites ecosystem for supporting regional DoD work and Utah’s overall economy.

Outcomes from this project will include a stronger, more coordinated regional A&D supply chain ultimately producing increased corporate efficiencies, coordinated additions of high wage, benefitted jobs within the A&D labor force and an increased set of regional contracting capabilities for regional Original Equipment Manufacturers (OEM) and an improved composite industrial base.