



TURBOCAM is a global engineering solutions company and world leader in the development and manufacture of turbomachinery flowpath components with over 150 multi-axis milling centers at 10 locations in 8 countries producing well over one million parts per year. TURBOCAM specializes in 5-axis milling, ECM, and DMLS of integrally bladed parts up to 1,100mm such as: blisks machined from solid forging, axial and centrifugal impellers, turbines, compressors, expanders, turbochargers, pumps, stators, diffusers, nozzles, individual blades, and more for industrial, automotive, power generation, and aerospace applications. TURBOCAM is ISO 9001:2008 and AS9100:2004 certified. We are also Nadcap® certified for aerospace coatings.

TURBOCAM can readily support projected volumes of 100,000 units per year, including necessary investments in capital equipment.

Turbocam Energy Solutions, LLC, the Dover-based affiliate of TURBOCAM International that develops special processes for turbomachinery products, will collaborate with UNH to evaluate the possibility of replacing the traditional technology of casting by a novel additive manufacturing. Introducing this new cutting edge technology, called direct metal laser sintering (DMLS), requires making sure that the performance of the parts we make for our aerospace, industrial and automotive customers continues to satisfy all performance and certification criteria. This goal will be achieved by synergy of detailed microstructural characterization, mechanical testing for fatigue and creep of the specially made specimens and their microstructure based performance modeling.

**Leadership: Marian Noronha, Founder, Chairman, and President**

Replacing Forging and Casting by Additive Manufacturing for Components made of Alloy 718	8/31/14 – 2/28/16	University of New Hampshire	Marko Knezevic, College of Engineering and Physical Sciences
Evaluation of the CNC Feedrate Selection program ShortCut	6/5/00 – 12/31/03	University of New Hampshire	Barry Fussell, College of Engineering and Physical Sciences
Advanced Ducted Wind Turbine Technology for Small Scale Wind Energy Generation	5/1/06 – 1/31/09	University of New Hampshire	David Watt, College of Engineering and Physical Sciences
Microstructure and mechanical behavior studies to advance direct metal laser sintering of cobalt based superalloys	7/1/16	University of New Hampshire	Marko Knezevic, College of Engineering and Physical Sciences



HALO Maritime Defense Systems is an engineering company specializing in the protection of naval bases, offshore platforms, ports, palaces, nuclear power facilities, bridges, dams, refineries, desalination plants and other assets from terrorist attacks. The proposed project will produce a simulation-based design tool to predict strength and the hydrodynamic performance of marine anti-terrorism barriers, their components, and mooring systems under various environmental loading conditions and service regimes. This will provide the company with the ability to develop site-specific solutions for high risk sites in various parts of the world and incorporate new, cheaper and environmentally friendlier, materials.

HALO Maritime Defense Systems (HMDS) offers unique maritime sea barrier solutions (floating barriers) to secure critical assets vulnerable to water-based attacks. In a security-conscious world, both government assets – Navy Bases, Naval Ships in Hostile Territories, Airports, Coast Guard ships and facilities– and commercial and private assets such as ports, LNG Terminals, LNG Tankers, Nuclear Facilities, Oil Rigs, Desalination Plants, Pipelines, Palaces, and Cruise Ships– have a real, immediate, and critical need for high levels of protection. Protection levels that may be currently unfilled.

**Number of NH based employees: 13**

**Leadership: Paul Jensen, CEO**

NHIRC Projects	Project Dates	Partner Institution	PI
Numerical Modeling Tools to enhance Marine Anti-Terrorism Barrier Systems	7/1/16 -	University of New Hampshire	Igor Tsukrov, College of Engineering and Physical Sciences

*The NHIRC will provide HALO a critical tool to allow our engineers the ability to develop site specific solutions for our products for new potential deployment sites in various parts of the world and incorporate new, cheaper or environmentally friendlier, materials. Such an ability will result in a significant competitive advantage over our competitors by*

- *Reducing our development costs of new or modified barrier systems;*
- *Shorten the development cycle, allowing us to get products to the market quickly;*
- *Improving our reaction time to provide customers with sound, engineering backed, proposals;*
- *Allowing HALO to reduce cost and hire additional personnel*
- *Simplifying the analysis approach, allowing a broader spectrum of engineers the ability to utilize the software package more effectively.*

*It is estimated that, if successful, HALO’s Research and Development team will double in size within the 1<sup>st</sup> year of using this package. This will directly impact and increase the number of technicians and field personnel that HALO employs as well.*



Graphicast, Inc. started in 1978 as a custom foundry of zinc alloy castings intended for industrial uses. The only alloy used, ZA12, is a zinc aluminum alloy developed in the early 1960s as an engineering alloy for industrial parts. Also developed during this era was the graphite tool permanent mod casting process that defines the heart of Graphicast’s business. Graphite molds work well with ZA12, producing castings with mirror like surfaces, high densities, and excellent dimensional stability. Graphite is easy to machine and is relatively inexpensive, making our casting molds much less expensive than comparable steel tooling and available within weeks instead of months.

Graphicast produces castings to customer’s specifications and designs. Graphicast has a portfolio of over 500 different graphite molds owned by 120 different customers. In any given year, we use about 180 of these molds to produce parts in lot sizes from 10 to 5000 parts. Some molds see service multiple times in a year. In 2016, Graphicast produced 121,000 castings valued at nearly \$2.9 million. Major markets are medical and laboratory diagnostic equipment, office machinery, electronic support frames and chassis, and general industrial uses.

**Number of NH based employees: 29**

**Leadership: Walter (Val) Zanchuk, President**

<b>NHIRC Projects</b>	<b>Project Dates</b>	<b>Partner Institution</b>	<b>PI</b>
Improving Reliability and Quality in a Permanent Mold Metal Casting Process	6/26/07 – 6/30/08	Dartmouth College	Ronald Lasky, Thayer School of Engineering
Structure/Property Characterization of 3D Printed Metal Parts	9/15/15 – 4/30/16	Dartmouth College	Ronald Lasky, Thayer School of Engineering

*The 2007/2008 casting project reduced internal scrap rates by 85%, creating more productive capacity and better quality castings.*

*The 2015/2016 3D printing project identified mechanical properties and material strengths of parts produced using two different 3D printing processes. The lower cost process produced acceptable strength for the intended applications. These results provide capital investment guidance otherwise not available.*



Albany Engineering Composites (AEC) is a division of Albany International Corp. (AIC), and is headquartered in Rochester, NH. AEC designs, develops, and manufactures advanced composite components for the aerospace and other high-performance markets, using innovative proprietary technologies. AEC was formed in 2005 by combining AIC’s existing Engineered Products Group with Techniweave (a small New Hampshire business acquired in 1998) and Texas Composites (a small Texas business acquired in 2005).

Product lines, facilities, annual sales: AEC has facilities in Rochester, NH, and in Boerne, TX. In Rochester, there are currently two operations that house manufacturing of 3D woven structures and research and technology, including a new 45,000-square-foot Research & Technology Center. AEC will be co-located with Safran Aerospace Composites in a 353,000-square-foot plant currently under construction in Rochester, where it will produce composite parts for the CFM LEAP engine. A second LEAP plant is currently under construction in Commercy, France. AEC’s facility in Boerne, Texas, specializes in molding composite components for aerospace applications. Sales through the third quarter of 2012 were \$47.7 million.

Number of New Hampshire employees: 353 as of December 2012

CEO, officers:

- Joseph G. Morone, President & CEO of Albany International Corp.
- Ralph Polumbo, Chief Operating Officer
- Diane Loudon, Senior Vice President, Operations
- Brian Coffenberry, Senior Vice President, Business Development, Research & Technology
- Jon Goering, Divisional Chief Technology Officer and Technical Leader for NHIRC Project

NHIRC Awards

Elimination of Microrcracking in 3D Woven Composite Structures	12/3/10 – 6/30/12	UNH	Igor Tsukrov, Mechanical Engineering
Elimination of Microcracks in 3D Woven Composites	5/15/09 – 5/31/10	UNH	Igor Tsukrov, Mechanical Engineering
Characterization and Evaluation of AIT's Gas Diffusion Layer for Fuel Cells	12/12/01- 6/30/04	UNH	V.K. Mathur, Chemical Engineering
Development and Characterization of High Temperature Ceramic Braided Seals	6/18/99- 7/31/02	UNH	V.K. Mathur, Chemical Engineering

Impact

The technology developed in this project has allowed us to broaden our markets by expanding the range of components that can be fabricated using 3D weaving and resin transfer molding. These technologies are relatively new, but are being used in some major programs, such as the CFM LEAP engine program and the landing gear braces for the Boeing 787. Our LEAP program alone will bring approximately 300 manufacturing and engineering jobs into the area by the end of the decade. This commitment to New

to leverage our experience with composite engine component programs to expand into composite airframe applications. This additional growth is expected to bring in another 200 jobs. Again, these will be primarily manufacturing and engineering jobs that will require skills ranging from specialized machine operation, to shift supervision, to production planning, to product engineering.

This project requires very specific skills in solid mechanics, experimental methods, and computer programming and we are fortunate to have access to all of these at the University of New Hampshire. Without this help, we would likely pursue a teaming arrangement with another university with which we have past experience, such as the Georgia Institute of Technology, Rensselaer Polytechnic Institute, or Kansas State University.

#### Leveraged Funding

This project led to a successful proposal to a National Science Foundation (NSF) project award to answer fundamental research questions regarding the driving force for damage initiation. The NSF program will also provide validation of the modeling approach that was developed in the NHIRC program and is expected to bring the model to a mature enough stage to be used as a design tool.



AgTS is a NH based “S” Corporation formed in 2009. AgTS is a Veteran Owned Business that specializes in the two areas: 1- operation, maintenance, mission coordination, training and logistics for unmanned aircraft and 2 – technology development and insertion. This includes:

- **Field Service Representative (FSR) Support** - Knowledgeable personnel providing cost effective solutions to assist in the smooth operation of military Unmanned Aircraft System (UAS) equipment and installations. We are the # 1 supplier of contracted FSR services for the Insitu Scan Eagle worldwide – includes Afghanistan, US (and UK) ships.
- **Training Services Support** – Curriculum development, On-The-Job (OJT) training and MS SharePoint distance learning expertise are some of the services AgTS offers both domestically and internationally through US Foreign Military Support (FMS). Staff expertise includes the development of UAV based curriculum for a variety of platforms and customers.
- **Technology Development and Insertion** - As a small company, AgTS routinely partners with other technology minded businesses, academia and government to create innovative solutions to meet its customers’ needs. AgTS is experienced at mentoring and creating new companies to address specific needs (e.g. SempMira SAS for Colombia; Peak 3 Technical Services for FAA UAV Test Site Range Management Services). AgTS recently completed work on two NHIRC projects – Encapsulation of Photo Luminescent / Anti-Traction Material. The company is currently developing the commercialization plan for these two technologies as a part of new signature management, safety, and security company to be based in New Hampshire later this year.

**Number of New Hampshire Employees: 9**

**Leadership**

Keith Haney, CEO  
 Russell Mason, International  
 Marcel Piet, UAS Services  
 Bob Meyer, Corporate Compliance, Technology Programs  
 Brian Veroneau, CFO  
 Glenn Shwaery, Chief Scientist

<b>NHIRC Projects</b>	<b>Project Dates</b>	<b>Partner Institution</b>	<b>PI</b>
Encapsulation of Anti-traction Material for Security Applications	01/01/13 -08/20/14	University of New Hampshire	Nivedita Gupta Chemical Engineering
Development of High Performance Photoluminescent Based Powder Coatings	09/01/12-05/31/13	University of New Hampshire	Nivedita Gupta Chemical Engineering

**NHIRC Impact**

NHIRC has provided AgTS with the opportunity to work with the University of New Hampshire (UNH) to help develop two technologies that it hopes will serve as the key elements in a new signature management, safety and security company. Without access to the world class expertise and lab facilities from UNH, there would have been no potential means to develop these technologies as AgTS currently does not have lab facilities of its own. Aside from the NHIRC projects, AgTS frequently seeks out UNH expertise to do work (e.g. SBIR for dynamic camouflage coatings and development of alternatives to high pressure water jet technology). Both of these resources have directly contributed to the recent completion of NHIRC research and development projects that AgTS hopes will result in new innovative technology products that lead to increased job creation and new commercial opportunities.



# Celdara Medical

Celdara Medical builds academic and early-stage innovations into high-potential medical companies, identifying discoveries of exceptional value at the earliest stages and moving them toward the market. Celdara Medical partners with inventors and their institutions, providing the developmental, financial, and business acumen required to bridge discovery and profitability. With robust funding options, a diverse and high impact Programmatic pipeline, and partnerships with world-class academic institutions and industry leaders, Celdara Medical navigates all aspects of a complex industry, accelerating science to improve human health.

**Number of New Hampshire employees: 11**

## **Leadership**

Jake Reder, CEO

Michael Fanger, CSO

<b>NHIRC Projects</b>	<b>Project Dates</b>	<b>Partner Institution</b>	<b>PI</b>
Cellular Immunotherapy for Cancer	05/14/10 - 11/30/11	Dartmouth Medical School	Charles Sentman, Microbiology and Immunology
Scleroderma Diagnostics	12/05/08 – 02/28/11	Dartmouth Medical School	Michael Whitfield, Genetics

## **NHIRC Impact**

Thanks to the early support of the NHIRC, Celdara Medical has brought its scleroderma diagnostics service to the market and is currently supporting drug developers in their clinical trials as well as individual clinicians through its CLIA certified lab. Celdara Medical continues to advance the science behind this program with SBIR funding, and was profitable in its first year of sales. NHIRC funding also helped the company to advance its cellular therapy for cancer, which has attained over \$4M in NIH SBIR funding, some of which will support a Phase I clinical trial (patients will be enrolled at the Dartmouth-Hitchcock Medical Center). Celdara Medical has also recently signed a term sheet (A round: \$10M) after being approached by a major Boston-area VC to spin out this technology.

In total, the company has attained almost \$10M in funding (not including the \$10M investment mentioned above) in its four-year history, the majority of that coming in 2012. In dollars, the NHIRC funding was small, but in impact, it was huge – The early funding allowed the company to position itself to be successful with both NIH grants and venture investors.



*Innovative Chemistry for High-Tech Applications*

Conductive Compounds, Inc. is a Hudson, NH based manufacturer of specialty ink, coating, sealing and adhesive materials used by manufacturers of printed electronics and electronics assemblies. Founded in 1994, Conductive Compounds, Inc. leased its first research and production facility in Londonderry, NH in 1999 and moved to the current facility in 2008. In the new and rapidly growing area of nanoparticles, there is a lot of hype surrounding the claimed properties and commercial feasibility of nanoparticle with limited demonstrations of fusible nanoparticle conductive inks. These inks are not currently commercially viable due to limitations of other properties such as adhesion to substrates, higher fusing temperatures and most importantly cost. Most efforts on nanoparticle conductive ink development have focused on digital (inkjet) printing to deliver the conductive ink to a suitable substrate and then allowing it to fuse as the ink dries. While there have been demonstrations of commercial printing these inks onto paper and other substrates, to date there have been very limited fully commercial applications of digital printed nanoparticle conductive inks.

Number of New Hampshire employees: Fourteen (14) in NH facility and has 13 direct and indirect sales reps located throughout Asia and Europe.

CEO, officers:

Don Banfield , CEO; E. Sue Banfield, Secretary; J. Eileen Banfield, Treasurer

NHIRC Project

Silver Nanoparticle Synthesis and Process Design for Printable Conductive Media

1/1/11- 12/31/12 UNH

Dale Barkey  
Chemical Engineering

Impact

Successful commercialization will require additional personnel in research and manufacturing at Conductive Compounds, Inc. Our preliminary estimates are that a minimum of seven to ten additional personnel would be required initially to support production scale up, sales and further technical development. This project has engaged four undergraduate chemical or environmental industrial process engineering majors. The resulting development of knowledge capital, and the direct interaction of undergraduates with us has increased the potential for hiring and retention of UNH students in productive careers in the state.

Leveraged Funding

The NHIRC project allowed us to apply for and receive federal funding from the National Science Foundation for \$450,000 to carry the project forward. Without the initial NHIRC funding we would have had a more difficult, if not impossible, task of obtaining this additional funding.



Design Mentor, Inc., founded in 2000, is a privately held engineering firm specializing in design and development of medical devices and fluid management systems. Core competencies of the company and its employees center on medical pumps, (e.g. IV pumps, dialysis machines, apheresis systems) which require expertise in plastic consumables, electro-mechanical systems, mechanical, electrical, and software engineering as well as design assurance including requirements & risk management and verification & validation test activities.

In 2001, the company began developing its own proprietary platform pumping technology, the Ventriflo™ True Pulse Pump. While the company continues to support client companies in the design and development of complex medical devices, its goal is to fully develop and commercialize the Ventriflo™ system, the first truly pulsatile pump that can be used for cardiac surgery and other applications.

**Product Lines**

Design Mentor is an engineering services company that provides project-based services to medical device companies throughout the country. It is also developing a proprietary pump system that will be used initially in cardiac surgery applications.

**Number of New Hampshire Employees: 5**

**Leadership**

Doug Vincent, President & CEO

<b>NHIRC Projects</b>	<b>Project Dates</b>	<b>Partner Institution</b>	<b>PI</b>
Pulsatile Pressure Pumping for Cardiopulmonary Bypass	01/01/11 - 12/31/12	Dartmouth College	Ryan Halter, Engineering

**NHIRC Impact**

With grant and communication support from the NHIRC, Design Mentor established a strong working relationship with Dartmouth-Hitchcock Medical Center. The resulting collaboration yielded a preclinical study of the Ventriflo™ True Pulse Pump, which was reported at the 10th International Conference on Pediatric Mechanical Circulatory Support Systems in Philadelphia in May 2014. A full paper from this work is in preparation.

NHIRC not only provided a matching grant for the study with DHMC but also established the connections needed for DHMC and Design Mentor to collaborate effectively. This collaboration was the direct result of NHIRC efforts.

Design Mentor has also received the benefits of support from NHIRC in education and grant-writing efforts. In December, the company completed a major grant application to the National Institutes of Health (NIH) through the Small Business Innovation Research (SBIR) program with support from NHIRC partner BBC Entrepreneurial Training and Consulting. This support has also contributed to Design Mentor being awarded first place in a business competition held at the NIH-SBIR annual meeting in Albuquerque in October 2014.

# ImmuRx



# ImmuNext

ImmuRx was founded in 2005 to develop a drug platform discovered by Dartmouth Professor Randolph Noelle which stimulates the immune system so well that it may be able to treat a wide variety of cancers such as melanoma, lymphoma and lung cancer. It may also treat chronic infectious diseases such as hepatitis C and tuberculosis.

The successor company, ImmuNext is developing novel therapeutics that modulate the immune system to treat cancer and autoimmune diseases. ImmuNext recently signed a deal with Johnson and Johnson worth over \$150,000,000 in upfront fees, sponsored research and potential milestone payments.

Number of New Hampshire employees: ten (10)

CEO: David DeLucia

### NHIRC Projects

Optimization of Immune System Stimulant in Preparation for Human Clinical Evaluation	12/4/09- 12/31/10	Dartmouth	Mary Jo Turk Microbiology and Immunology
Drug Platform for Cancer and Infectious Disease: Development of Component for Human Use	11/30/07-12/31/09	Dartmouth	Randolph Noelle Microbiology and Immunology

### Impact

NHIRC awards were the first funding we had. They catalyzed the growth of ImmuRx and the successor company, ImmuNext. We have discovered new drugs that may advance the treatment of cancer and autoimmune diseases, and have created 10 high tech jobs and expanded the NH Biotech sector.

### Leveraged Funding

- Raised >\$10,000,000 in NIH SBIR grants and private equity
- Strategic partnership with Johnson and Johnson worth >\$150,000,000 in potential milestones
- Sponsored >\$2,000,000 in research at Dartmouth



Itaconix Corporation is the world leader in polymers from itaconic acid. The company produces polymers for everyday applications that achieve three essential objectives – safety, performance, and sustainability. The flagship Itaconix® DSP™ polymers are water soluble ingredients currently used in over 40 consumer and industrial detergents for managing water hardness and improving performance. The company was founded in 2008 based on technologies developed and licensed from the University of New Hampshire.

**Number of New Hampshire employees:** 16

**Leadership**

John R. Shaw, CEO, Director, and Co-Founder

Yvon Durant, CTO, Director, and Co-Founder

<b>NHIRC Projects</b>	<b>Project Dates</b>	<b>Partner Institution</b>	<b>PI</b>
Purification Technology for the Production of Itaconic Acid	01/01/11 - 12/31/11	University of New Hampshire	Jennifer Durant Biochemistry
Polyitaconic Esters	12/04/09 - 12/31/10	University of New Hampshire	Yvon Durant Material Sciences
Continuous Polymerization of Itaconic Acid	05/15/09 - 11/30/10	University of New Hampshire	Yvon Durant Material Sciences
Process Scale up for the Polymerization of Itaconic Acid	12/05/08 - 12/31/09	University of New Hampshire	Yvon Durant Material Sciences

**NHIRC Impact**

- Itaconix launched its first polymer in 2009 based on the Process Scale Up NHIRC project. This polymer is being used in a growing number of leading consumer detergent and cleaner products.
- The company built its production pilot and its expanded production facility based on the Continuous Polymerization NHIRC project.
- The company is developing new polymers based on the Polyitaconic Esters NHIRC project.
- The company has launched 5 new products.
- Itaconix has received 8 patents.
- The company has increased employment in NH from 2 to 16 people.
- Itaconix has received over \$2.8 million in additional grants.



LNI is a leading provider of standards based, consumer and patient centric, end-to-end connectivity and interoperability solutions from personal sensors into the cloud and through the care providers. LNI licenses commercial grade implementations of industry standard protocols that follow the Continua Guidelines including ISO/IEEE 11073-20601 managers and clients as well as IHE transactions, mobile and fixed hubs, cloud based services, and integrated solutions.

**Product lines**

- Industry standard protocols
- Mobile and fixed hubs
- Cloud based services
- Integrated solutions

**Number of New Hampshire employees:** 12

**Leadership**

Mike Mazzola, CEO

Barry Reinhold, President, CTO

<b>NHIRC Projects</b>	<b>Project Dates</b>	<b>Partner Institution</b>	<b>PI</b>
Characterizing Sympathetic Response to Verify Medication Adherence	2/01/15 – 01/31/16	University of New Hampshire	Radim Bartos, Computer Science
Remote Health Monitoring in the Continua Model	01/01/14 – 05/31/15	University of New Hampshire	Radim Bartos, Computer Science

**NHIRC Impact**

The NHIRC program serves as a vehicle to allow LNI and UNH to align strengths to achieve significant advances in next generation connect health solutions.



New Hampshire Optical Systems (NHOS) was formed in 2010 to serve the people of New Hampshire as a Competitive Local Exchange Carrier (CLEC). Our corporate headquarters is located in Nashua, NH with several other satellite offices around the state. NHOS was chosen by University of New Hampshire (UNH) to be a Broadband Technology Opportunities Program (BTOP) sub recipient from five finalists following an intensive 5 month open bid and evaluation process. NHOS's middle mile project falls under Network New Hampshire Now (NNHN) BTOP grant award from the National Telecommunications and Information Administration (NTIA).

NHOS has constructed over 450 mile of the 750 miles and is on schedule to complete this June. This will provide all new next-generation fiber optic cabling across all 10 counties in New Hampshire. We have engineered this fiber optic network to provide a next generation IP platform to all businesses in NH. Our product offering will allow customers access to new services and provide them with choices historically not offered in NH. This network will allow NH businesses the ability to access services typically only available in larger cities, and provide economic growth by lowering the cost of connectivity in towns like Keene, Berlin, and Littleton.

Number of New Hampshire employees: five (5), estimate hiring 5 more for EOY 2013

CEO, Officers:

Rob Carmichael, President and Chairman  
Jackie Hayes, Chief Financial Officer  
Steve Janko, Chief Technology Officer  
Jim Steed, Vice President

NHIRC Project

Turning on the Light on the Dark Fiber Model	5/1/12 – 6/30/13	UNH	Scott Valcourt, Strategic Technology IT
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Impact

The implementation of SDN/Open Flow will allow for innovative routing and switching protocols in our network. It is used for applications such as virtual machine mobility, high-security networks and next generation IP based mobile networks.

Leveraged Funding

The research work associated with SDN/OpenFlow will likely result in the ability to be strongly competitive for US IGNITE funding from the White House developing program, as well as NSF GOALI and SBIR/STTR funding. However, private investment will likely be the best source for future funding to expand this work. Additionally, NHOS would be the first SDN/OpenFlow provider in NH and would have competitive advantage over other providers in the state.



Unified Office was incorporated in February 2011 to develop and market an affordable integrated IP (Internet Protocol) premise and cloud-based business communications service for the Small and Medium-Sized Business (SMB) marketplace, primarily those with 10 to 100 employees.

Today the business world operates in real-time (Twitter, LinkedIn, Facebook). New legislation from Washington, such as “Obamacare”, provides new challenges in terms of regulatory compliance. That coupled with rapid pace of technology innovation over the last few years, in particular cloud-based systems, smarter smartphones, a whole new category of device in the form of tablets, and BYOD practices provide significant challenges for businesses of all sizes but in particular the SMB.

Current solutions are generally too expensive to deploy and typically don’t provide capabilities that meet the emerging needs of the SMB.

In contrast, Unified Office was built from the ground up to focus on emerging alternative devices (tablets, smartphones) to deliver a managed business-class communications service that absorbs the complexity of cloud-based systems, smartphones, tablets and BYOD, and creates easy-to-use innovative services based on open systems, to allow customers to be more productive and competitive.

Number of New Hampshire employees: five (5)

Officers:

Ray Pasquale, CEO & Founder  
Roger Tuttle, CFO  
Mark Galvin, Chairman

NHIRC Award

Unified Office IP-PBX	1/1/2011- 9/30/2011	UNH	Erica Johnson and Niels Widger Interoperability Lab
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Impact

NHIRC funding enabled Unified Office to initiate interoperability testing in a timely manner and allowed the company to accelerate its market launch schedule. The students involved gained valuable experience with VoIP technologies that can be applied to other VoIP testing efforts at the UNH-IOL and future careers in the telecom/data communications industries.



WWPass Corporation, based in Manchester, NH, offers solutions to the growing problems of cybercrime, electronic record loss and identity theft. WWPass raises the bar with a new approach to authentication, authorization, and document storage. Using the concept of distributed network storage with multi-party access control, WWPass developed the technology that allows companies and individuals to securely manage (access, store, process, and exchange) their private and confidential information while stopping fraud and identity theft.

With WWPass' new technology, instead of hard-to-manage and ubiquitously compromised username/password combinations, individuals can use a single electronic token, the WWPass PassKey™, to securely access web sites and cloud services, log in to VPNs, send and receive encrypted email, and even open doors. Users no longer need to track dozens of usernames and "strong" passwords, answer security questions, and fall back to even weaker authentication activities. The PassKey™ looks like a key fob, has USB and/or NFC interfaces, and can also come in a card form or embedded in certain smart phones.

### **Product lines**

The WWPass product line offers enhanced authentication solutions in multiple applications, secure cloud storage solutions, and software development kits, which assist web developers and technology solution partners to incorporate WWPass' technology into web applications and other IT Solutions.

During the first five years of operations, WWPass was devoted to research and development of its technologies. The stage of "proof of concept" implementation is now moving to "pilot project" stage and the full-fledged implementation of the WWPass-based solutions with several enterprise customers is scheduled for Q2, 2015.

### **Number of New Hampshire Employees**

9 people full time in NH and 30 engaged contractors, consultants, interns, etc. Additionally there is an affiliate in Brunnen, Switzerland.

### **Leadership**

Eugene Shabygin, CEO  
Mikhail Vsogorets, CTO

<b>NHIRC Projects</b>	<b>Project Dates</b>	<b>Partner Institution</b>	<b>PI</b>
Secure Authentication and Data Management System for Healthcare	07/01/14 - 06/30/15	Dartmouth College The Institute for Security, Technology, and Society (ISTS)	Sergey Bratus, Computer Science

### **NHIRC Impact**

In order to be adopted by industry and government alike, WWPass technology and corresponding applications must be viewed by the outside world as being a truly innovative, state-of-the-art solution. This can only be determined through the technology's evaluation by independent computer security experts. InfoSec industry experience shows that a full and open review by academic and InfoSec industry experts is crucial for the adoption of security technologies. Technological offerings not subjected to such review tend to be met with skepticism and remain niche solutions. Thus, through the NHIRC project, WWPass engages the expertise of The Institute for Security, Technology, and Society at Dartmouth College (ISTS) to organize a comprehensive review of WWPass' solution. This collaboration thus serves WWPass' core mission of providing a new generation of authentication and electronic identity technologies, and also serves as an important milestone for its business development and growth.



Xemed is a product focused diagnostic drug company with broad expertise and IP in the field of hyperpolarized gas MRI, partnering with clinical researchers, the pharmaceutical industry, and the NIH to advance pulmonary functional imaging through the regulatory approval process towards commercialization. Xemed’s mission is to develop inhaled diagnostic agents that are capable of improving the standard of care of respiratory diseases by establishing hyperpolarized gas as a scientifically robust, clinically validated, FDA approved, and publically available diagnostic agent for magnetic resonance imaging of lung functional microstructure. Xemed has also identified commercialization paths for its component laser technologies, including instrumentation for neutron scattering studies of nanomagnetism, laser-based power delivery to drone aircraft, and weapons for ballistic missile defense.

**Product lines**

Helium-3 and xenon-129 are two gasses that are technically well suited for applications in pulmonary functional magnetic resonance imaging. Hyperpolarized helium-3 has provided the most data for validating biomarkers of disease and supporting clinical applications, but the near exhaustion of the helium-3 supply in 2009 and soaring helium-3 prices initiated the transition from helium-3 use to xenon-129. The concurrent emergence of Xemed’s efficient production technology for hyperpolarized xenon-129 is now driving that transition.

- **MagniXene®: Xemed’s hyperpolarized xenon-129 magnetic resonance imaging agent**  
Xemed and the MagniXene® Imaging Network of clinical research sites are validating MagniXene® toward FDA approval as a diagnostic drug and quantifying imaging biomarkers of disease phenotype and severity, for qualification by the FDA as a drug development tool.
- **MagniLium: Xemed’s hyperpolarized helium-3 product**  
Xemed is developing MagniLium™ as a hyperpolarized helium-3 lung imaging contrast agent for premature infants. This technology meets the high polarization, high flow requirements of the helium-3 fundamental nuclear physics research community.
- **Diode-Pumped Alkali Laser**  
Xemed’s research could yield a breakthrough in highly efficient production of concentrated laser beams, which could have military applications for reconnaissance, or domestic commercial applications in communication. An even stronger version of this laser could serve as a defense against ballistic missiles.

**Number of New Hampshire employees:** 10

**Leadership**

F. William Hersman, Chief Officer

NHIRC Projects	Project Dates	Partner Institution	PI
MRI Scanner for Hyperpolarized Xenon MRI of Human Lungs	12/08/06 – 06/30/10	University of New Hampshire	Bill Hersman, Physics

**NHIRC Impact**

UNH and Xemed partnered in demonstrating the quality of MagniXene® lung images to the medical community. NHIRC funding supported development of a custom MRI chest coil and the implementation of new software for MRI scanners. Isabel Dregely, the UNH student funded by NHIRC, was the 2011 recipient of the International Society of Magnetic Resonance in Medicine’s Young Investigator Award. Since the technology was demonstrated through the NHIRC grant, Xemed has raised \$7M in non-dilutive capital through competitive research grant proposals, diversified its revenue stream, and attracted over \$2M in commercial goods and professional service contracts.