UNIVERSITY SYSTEM of MARYLAND

The Board of Regents Committee on Economic Development and Technology Commercialization

Minutes of the Public Session

November 19, 2019

The Committee on Economic Development and Technology Commercialization of the University System of Maryland (USM) Board of Regents met in public session on 12:30 pm on Tuesday, November 19, 2019 at the University of Maryland, Baltimore. Regent Leggett called the meeting to order at 12:34 pm.

Regents present were E. Fish, L. Pope, G. Attman, B. Gossett, I. Leggett, and L. Gooden. USM personnel present were B. Caret, T. Sadowski, L. Ryan, E. Herbst, D. Wilkerson, T. McDonough, and MJ Bishop. Others present were S. Sheppard, N. Lamba, J. Naft, L. Cassard, D. Irani, K. Porter, P. Ribolotto, M. Morris, J. Shaab, J. Lenzer, J. Hughes, and D. Drake.

Regent Leggett called the meeting to order at 12:34 PM and stated that he had the pleasure of visiting the University of Maryland, College Park recently and learned more about the coming transportation connections. He stated that he sees competition but also opportunity in Northern Virginia that will require cooperation among the System and support at the state level as well.

Featured Startup – Aimee Martin, CEO of BondTrue (Information Item)

Vice Chancellor Sadowski presented Aimee Martin, CEO of BondTrue, LLC, which was awarded a Phase II Maryland Industrial Partnerships (MIPS) grant and has been working with researchers at the University of Maryland, College Park.

Ms. Martin's husband, a surgeon, developed the device in his garage and patented the invention. Ms. Martin, with her extensive business background, wanted to get the invention to market in order to help patients. BondTrue's device addresses the problem of surgical site closure, which is an approximately $10B problem. BondTrue's device also allows a single surgeon to close a wound, which is not currently possible.

The market is huge, even with just straight-line incisions. In Phase I of the MIPS grant, the graduate students and their advisor met with the clinician in an iterative process until it met the needs of the many surgeons who have looked at the device and described their needs. Aimee then showed the design evolution and how UMCP helped them get from balsa wood to a 3D printed prototype, including costs of goods sold models. The UMCP researchers received $90,000 from the state, and BondTrue put in $10,000 of their own money for each phase. Phase II includes proof of concept testing via a pig skin model. Ms. Martin showed videos illustrating how the device pushes the skin together and allows the stitching component to align perfectly correctly with the incision. The FDA suggested bundling the device in kits with 3 different staplers that are on the market, since BondTrue's device is stapler-agnostic. BondTrue are applying for grant and private funding and will be hiring soon, anticipating

product launch in 2022. BondTrue has applied for another MIPS grant to develop their second product and plan to continue developing products.

Ms. Martin met Joe Naft of the MIPS program through her network at TEDCO and others around Baltimore. The regional ecosystem, including the University System of Maryland, has helped them greatly, including the TEDCO's MD PACE program for high-quality, pro bono regulatory assistance. BondTrue loves interacting with the university and looks forward to hiring graduates in the future.

Regent Attman asked if the company is connected to UMB and whether resources like the cadaver lab could be useful. Mr. Hughes responded that he would be happy to make connections to any resources or other clinicians at UMB, while J. Naft can continue connecting BondTrue to resources at College Park. Mr. Hughes mentioned that locating in a USM incubator would also make the company eligible for the Momentum Fund.

University of Maryland BioPark Update – Jim Hughes, Senior Vice President and Chief Enterprise and Economic Development Officer, University of Maryland (Information Item)

Jim Hughes, Senior Vice President and Chief Enterprise and Economic Development Officer, University of Maryland, Baltimore provided an update of existing the success of existing UMB placemaking initiatives and the proposed plans for new buildings on Martin Luther King (MLK) Boulevard in downtown Baltimore.

Mr. Hughes explained that UMB is building spaces not only for startups but also for growing companies. He added that a good percentage of UMB's research with industry is with BioPark companies. Mr. Hughes relayed how 10 years ago, Marco Chacon brought a company with about 10 employees from Hopkins Bayview to the BioPark, and they were recently acquired for $1.2B, most of which is being recirculated into Baltimore to start the next series of companies. Catalent now has 4 locations in Maryland and a lot of jobs. Illumnia is launching its first performance center on the East Coast in the BioPark, flying in customers and staff east of the Mississippi and from Europe for training. BioParks tenants are a mix of small and larger companies, including service companies; it's a collaborative environment.

Mr. Hughes described local development affecting the current campus and expanded plans. Lexington Market and Hollins Market will be redone. The first new Catholic school in decades will be in the vicinity, and a new residential facility (close to 300 apartments renting now), is open near the BioPark.

Mr. Hughes described the new development planned for MLK, 2 acres of land between Fayette and Baltimore Street, with plans to break ground in March of 2020. They are renovating a historic firehouse, which will likely hold a restaurant. Phase 2 will provide another building. Mr. Hughes described development plans with big entrepreneurial lobbies enabling clusters of people meeting and talking about their next ventures, with 20,000 square feet will be dedicated to innovation (small companies). There will be a conference center featuring many entrepreneurial events and programming. The Momentum Fund and other entrepreneurial programs would be located there. Mr. Hughes states that UMB wants to have space available for all System universities to provide programming, too. There is great potential economic impact from just the first building, which will cost $189M. Economic impact numbers include construction jobs, which they will be linking to community training programs.

Regent Leggett asked if the City of Baltimore had invested in the project to which Mr. Hughes responded that the city worked with them to acquire some land at a price of $2.7M, which allowed them to assemble a larger continuous parcel. Mr. Hughes added that UMB is working with the city to get a RISE Zone designation, are receiving tax credits for the first 5 years, and are talking to the state for potential support. Regent Leggett further inquired about job tax credits, to which Mr. Hughes responded that these were mostly on the state level and would come into play later.

Mr. Hughes went on to describe that much of the space will be designed to specification; more than normal, in fact. Vice Chancellor Sadowski commented that more spec space was most common in markets with a backlog of demand for spec space and that private financing also avoids private use issues.

Regent Pope asked if there were estimates on when Phase II would occur to which Mr. Hughes responded that they will mostly likely wait until it is 80% leased and are meeting with at least one prospect who wants to take the whole building, among others. Mr. Hughes commented that they always would like to have some space available because it is difficult to have to turn away great companies.

Regent Attman stated that there are so many great things happening in Baltimore driven by USM universities and that crossing MLK cannot be overstated. Regent Attman stated that no developer wanted to go west of MLK, and UMB did it. Mr. Hughes added that the original BioPark was a leap of faith by the Regents, but now other developers are coming.

Vice Chancellor Sadowski added that at the recent Association of University Research Parks conference, they emphasized how much these types of projects are fueling company growth as opposed to Fortune 100 companies building their own campuses.

USM Office of Economic Development Update – Tom Sadowski, Vice Chancellor for Economic Development (Information Item)

Vice Chancellor Sadowski reported that the latest Momentum Fund investments are Neoprogen and MinnowTech. The diversity of deals is coming along; for example, MinnowTech is out of UMCES. Neoprogen is led by Bill Niland, who led Harpoon Medical, which also was affiliated with UMB. The Fund is doing what it intended to do with better performance than expected. Mr. Sadowski noted that co-investing with Sanofi is a terrific sign and that Claire Broido Johnson is doing a great job expanding the top of the funnel. Regent Gooden asked how many jobs have been created, to which Vice Chancellor Sadowski replied that efforts at tracking that are underway, and Dr. Caret noted that the Fund is still a new initiative. Vice Chancellor Sadowski reported that the Advisory Board has grown and that a few people dropped off such as Ron Gula, who is still investing and collaborating with USM.

Vice Chancellor Sadowski reported that the Council of University System Presidents approved a proposal to become a strategic partner of the state-wide Open for Business campaign. Over 3 years, $150,000 will be spent, shared among the institutions. Messaging from the institutions will be embedded within the campaign, for which the Maryland Department of Commerce, the organizing body, is glad.

Vice Chancellor Sadowski reported new traction on the Maryland Technology Infrastructure Fund and renewed focus on legislative champions for the effort. The goal of the Fund is to create a more competitive state-wide, innovation-driven economy and generate wealth creation to pay for other state needs via small state investments that attract private/external, non-state matching funds. Regent

Leggett asked Vice Chancellor Sadowski to explain what happened last year to which he responded that there was broad Senate support for the bill but they could not get the Ways and Means Committee in the House to vote on the deal; therefore, at the 11th hour, the bill did not move forward, and the $16M designated from the governor's budget was taken up for other initiatives. Regent Leggett asked about the prospect for the coming session, to which Vice Chancellor Sadowski replied that Senator Bill Ferguson and Speaker Adrienne Jones understand these types of initiatives, which is encouraging. Dr. Caret added that they are working with Johns Hopkins University to position the bill well with the legislature. Regent Gossett stated that the addition of Johns Hopkins University and the Maryland Department of Commerce adds gravitas.

Vice Chancellor Sadowski reported that the RISE program potential isn't being fully realized and that he is hopeful for an amendment for tax credits for universities to not only buy down the cost of construction but also incentivize tenancy.

Dr. Caret added that The Maryland E-Nnovation Initiative Fund (MEIF), administered by the Maryland Department of Commerce, has provided millions of dollars each year to retain or attract star faculty via matching money for endowments. UMCP and UMB as primary research institutions have been successful, in addition to other institutions such as Towson, and there may be action in the session related to it since it is due to sunset soon. Vice Chancellor Sadowski agreed that it is another great tool in the toolbox worthy of support.

Regent Gooden asked if anyone in the System is directly interfacing with Amazon and responsible for nurturing and growing that relationship. Vice Chancellor Sadowski replied that the System has attempted to track all activity, but that reporting from each USM institution has not been consistent or complete to date. Dr. Caret added that the site that UMCP has opened up will be the primary connection point for the System, with UMCP bringing other institutions to the table. In some ways, the USM dwarfs what Virginia does, and industry knows that. Regent Gossett asked if anyone would be hired to be a USM point person and Regent Leggett responded that the System has plans in the making that could consider incorporating such an element to address strategic corporate partnering opportunities. Vice Chancellor Sadowski cautioned that Amazon is just one company of many that should be considered.

Regent Gossett commented that it would be interesting to see where Momentum Fund companies started and where they are now, including bumps in the road and some who didn't make it.

Greater Washington Partnership – Capital CoLAB Project – MJ Bishop, Associate Vice Chancellor, Director, William E. Kirwan Center for Academic Innovation (Information Item)

Dr. Bishop stated that the Kirwan Center works at the intersection of learning sciences, technology, national re-thinking of higher education business models, and supporting institutions to move in those directions, too. They identify things that are working and scale those practices. They also engage in statewide practices to pursue funding and share best practices. One initiative is the strategic implementation of online learning; they are System-wide members of Edx, an online learning platform.

Dr. Bishop stated that today she will be speaking about credentials such as badges to connect the dots between curricular and co-curricular activities, considering human skills like problem-solving skills, leadership, etc. Digital badges are digital icons that can be placed on a student's LinkedIn page and act

like electronic portfolios, explaining the credibility of the badge issuer and what was done to obtain the badge. Recently, CISCO has helped develop problem solvers badges. Students on the campus engage with state-of-the-art equipment through this partnership, and lesson materials are aligning toward problem solver badges. GEICO has also expressed interest toward a leadership badge so that if a graduate leaves with a leadership badge, they are a shoo-in for entering the leadership program. Dr. Bishop stated that they are also engaging with NASA.

Dr. Bishop stated that alternative credentials have been gaining traction. Earlier this year, the Greater Washington Partnership spoke with the full board about looking at ways to make the Capital Region one of the best places to work and live. Recently, they launched the capital CoLAB and identified four credentials, one being Digital Generalist, which demonstrates digital competencies for anyone, including English Majors. There are also specialized Machine Learning, Data Analytics, and Cybersecurity credentials, which look a lot more like majors on USM campuses. The GWP has worked out a set of KSAs that the group of employers are looking for. Until recently, the Capital CoLAB project has been working with a tight set of universities; UMCP and UMBC have been involved. MJ spoke with Jason and his colleagues after the board meeting and asked if there was a role for the Kirwan Center to bring on the rest of the institutions. Dr. Bishop reported that they have been in conversations with the GWP for a couple of months and last Tuesday got the green light to bring the other USM institutions into the Capital CoLAB project. It will allow institutions to have greater reach without demanding much more staff time. Because much content will be online, they are excited about letting current employees engage with these as well. Dr. Bishop stated that the plan is to work with the institutions that would like to participate, focusing first on the Digital Generalist badge, then moving to the specialist badges, which the GWP is especially excited about. The Kirwan Center has promised to ramp up quickly and will work with Edx to see what content they have, in addition to developing online content. Dr. Bishop thanked Jack Seuss and UMBC for encouraging sharing that content among institutions and stated that at the end of this week, the Kirwan Center will send requests to the institutions for participants.

Vice Chancellor Sadowski agreed that there is need to scale up quickly. Non-USM institutions can provide these credentials, and some are acting quickly, but none can provide the depth and scale of what we can provide. Dr. Bishop added that the GWP was notably surprised and pleased by the System-ness.

Regent Gooden asked if the badges will be expressed on the transcript, to which Dr. Bishop replied that GWP credentials will be used in another pilot about a comprehensive learner record in order to facilitate their inclusion. Dr. Caret added that Business Higher Education Forum and Business Roundtable are also tied into the GWP because their needs are so great. For example, PWC hires 15-20k new employees a year.

Regent Leggett asked how commonality across different institutions and programs will be achieved and how important that is to industry. Dr. Bishop responded that with previous Kirwan Center efforts, they ensured the same set of outcomes and rubrics to make sure it meant the same things and regularly calibrate among themselves. The Kirwan Center plans to apply those methods to the GWP project as well, though they are not sure to what degree calibration is happening already in the GWP. Vice Chancellor Sadowski commented that this is one of the reasons why they wanted to bring Dr. Bishop into the conversation.

Partnering with Industry to Drive Innovation – Julie Lenzer, Chief Innovation Officer, University of Maryland, College Park and John Paul Sawyer, Director of Strategic Research Initiatives, University of Maryland, College Park (Information Item)

Ms. Lenzer reported that College Park has been working to become a better partner to industry and unleash innovation. Companies, startups, and interaction with people outside of the university are a big part of that; they are working to reduce the friction associated with these activities. Federal investments are going down, and the top research universities have a healthy, diverse portfolio. Companies want to outsource their R&D and are asking how to reduce that friction; UMCP is in fierce competition for their own faculty with the companies they are trying to work with. Ms. Lenzer added that students want experiential learning just as much as employers.

Ms. Lenzer stated that the top thing on the list for companies is talent recruitment, with some licensing interest. UMCP's industry-sponsored research is small compared to peers; however, they have a lot of potential and pilots underway to address this. Ms. Lenzer stated that companies want one "front door" for access to the university, but there can also be a sense of scarcity that counters the front door approach and reduces sharing company connections.

Ms. Lenzer showed newly developed options available for licensing intellectual property (IP) and stated that some simplified options are more of a signal because companies still want to negotiate terms. Master agreements allow UMCP to negotiate some sticking points, such as federal and state requirements that UMCP cannot compromise on. With a master agreement approach, a project can get approved in as quickly as 5 days with a scope of. Mr. Sawyer added that IP options have been enormously helpful in staring out conversations regarding master agreements. Regent Leggett asked if there were standards across universities for this, to which Ms. Lenzer and Mr. Sawyer responded that there is no standard across the country or even in the USM, but that several models such as the Minnesota model, which UMCP adopted, have become standard.

Ms. Lenzer also explained that with technologies like AI and machine learning, they are seeing more open sourcing and companies having more leverage to require open sourcing. Thus, UMCP is shifting in some cases to cede a bit on the IP in front in favor of possibilities for a broader relationship. Ms. Lenzer commented that throughout it all, they are trying to be up front with term sheets and be transparent.

Ms. Lenzer continued that the Discovery District was seen more as an office park but not a bridge back into the University. Hiring an intern is not enough; they are trying to make those partnerships robust. Mr. Sawyer noted that the Purple Line is an important part of this; the message is that campus is almost doubling in size, and your company can be a part of it.

Ms. Lenzer and Mr. Sawyer described a strategic engagement pilot with Lockheed Martin, with a point person in each function across both large, complex organizations. Regent Gooden commented that USM needs this for Amazon, except across all institutions.

Ms. Lenzer stated that Amazon has an interesting model that engages faculty part-time during and summer months as an employee with Amazon stock, referred to as dual-employment. UMCP addressed any potential ethics concerns and obtained approval to partner in that way, which is good because this is the only way that Amazon would like to engage in that sense. However, not all details have been worked out, with some employees still on leave without pay at Amazon. Regent Gooden commented

that it seemed to be win-win for faculty and Amazon to which Ms. Lenzer replied yes and now they are looking at graduate students, because Amazon wants them, too, though the ethics are even more difficult to navigate. Regent Gooden asked about the difference between graduate student employment and interns, to which Ms. Lenzer responded that conflicts are more complicated for graduate student employment when research advisors are potentially involved. Regent Gooden said that she does not doubt that there are lot of potential problems and that we should study it, to which Ms. Lenzer added that it is not just in relation to Amazon; it is Microsoft and others. Dr. Caret added that another challenge is faculty using the institution as the safety net and asking for leave of absence after leave of absence, even if limits are set.

When asked how the USM could be helpful, Mr. Sawyer replied that he appreciates the USM help they are already receiving; for example, Vice Chancellor Tom Sadowski has been helpful in navigating matching funds relationships, and Ellen and her team has been helping them track private use. Mr. Sawyer continued that additional assistance for things like database tools to track research strengths across the System would be useful and that a $250,000 a year software program can help do things like narrow down 5 researchers across 3 institutions that are experts in an area of interest to an industry partner. Vice Chancellor Sadowski added that the USM Office of Economic Development holds quarterly meetings with the institutions and also recently addressed this issue of industry collaborations at that meeting.

Vice Chancellor Sadowski asked for the Committee to consider the minutes from the meeting of the EDTC on September 12, 2019. Regent Gossett put forward the motion to approve, and Regent Gooden seconded the motion. Regents Attman, Gooden, Leggett, and Gossett were in favor, with Regent Fish abstaining from the vote because she was not present at the September 12 meeting.

The meeting ended at 2:30pm.

Respectfully submitted,

Isiah Leggett, Chair
Committee on Economic Development
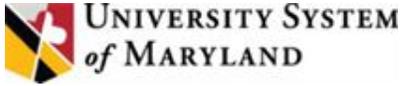and Technology Commercialization

**Board of Regents
Committee on Economic Development and Technology Commercialization**

**February 10, 2020
University of Maryland, Baltimore
Saratoga Building
220 North Arch Street, Baltimore, Maryland**

Public Session Agenda

(1) **Featured Start-Up: ARMR** – Chibueze Ihenacho, CEO (Information Item)

(2) **Chesapeake UAS Corridor Initiative** – Matt Scassero, Director, University of Maryland UAS Test Site (Information Item)

(3) **The Institute for Cyber Resilient Energy-Efficient Manufacturing (CREM)** – Donna Ruginski, Executive Director for Cybersecurity Initiatives and Nilanjan Banerjee, Associate Professor at University of Maryland, Baltimore County (Information Item)

(4) **USM Office of Economic Development Update** – Tom Sadowski, Vice Chancellor for Economic Development (Information Item)

   a. Momentum Fund
   b. Maryland Technology Infrastructure Fund and Other Legislative Priorities
   c. USM Competitiveness
        i. MD Quantum Alliance
       ii. Corporate Engagement Efforts - Amazon
      iii. Greater Washington Partnership – Digital Credentialing Effort Update
   d. Venture Development Report

UNIVERSITY SYSTEM *of* **MARYLAND**

BOARD OF REGENTS

SUMMARY OF ITEM FOR ACTION
==INFORMATION== OR DISCUSSION

TOPIC: Featured Startup - ARMR

COMMITTEE: Economic Development and Technology Commercialization

DATE OF COMMITTEE MEETING: Monday, February 10th 2020

SUMMARY: Chibueze Ihenacho, CEO of ARMR, will present the company, which is developing technology to increase survivability after traumatic battlefield injury by controlling hemorrhage. The company was founded in 2014 and is located in the University of Maryland, Baltimore's BioPark. ARMR was approved for investment by the Momentum Fund and recently secured matching co-investment.

ALTERNATIVE(S): This item is for information purposes.

FISCAL IMPACT: There is no fiscal impact

CHANCELLOR'S RECOMMENDATION: n/a

COMMITTEE RECOMMENDATION: DATE:

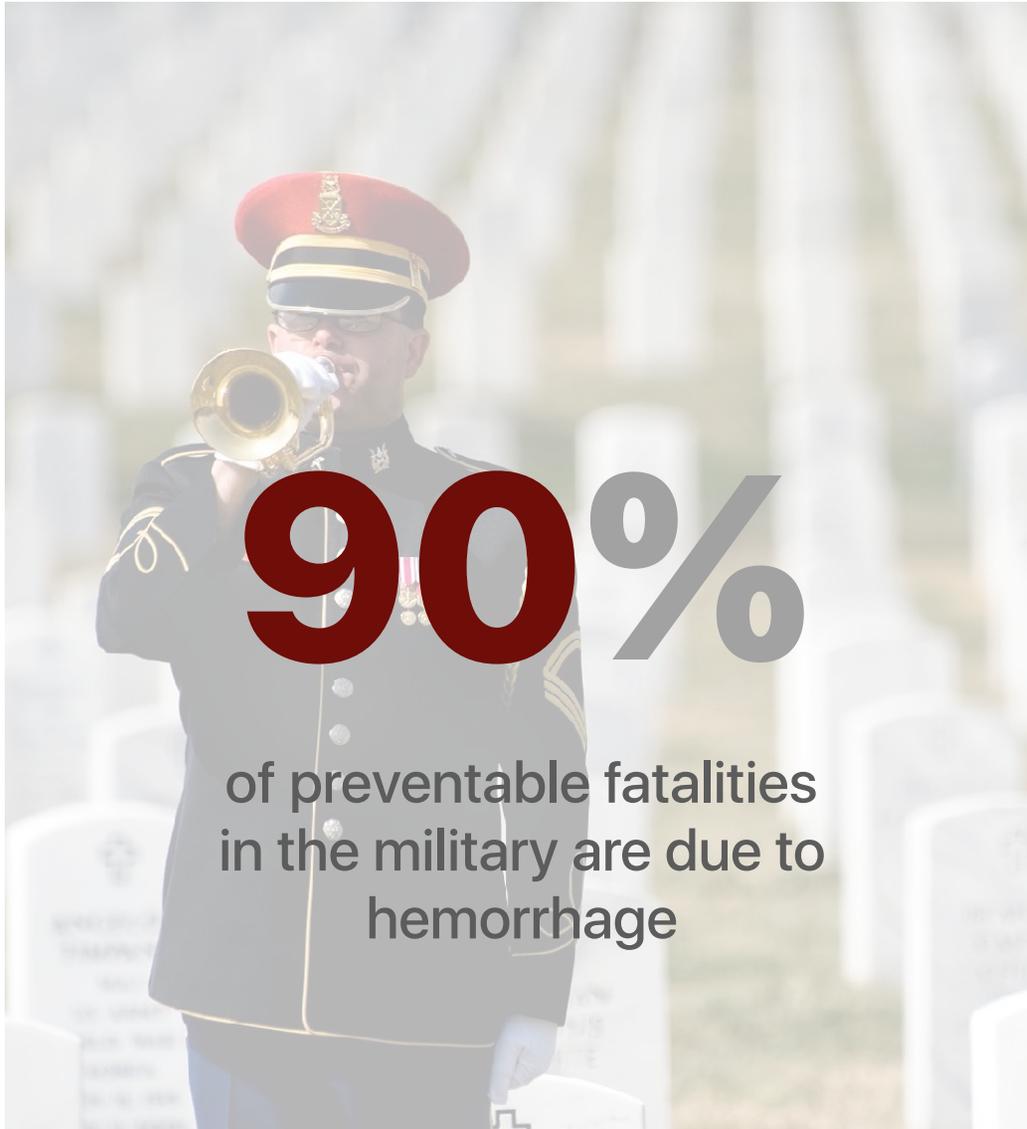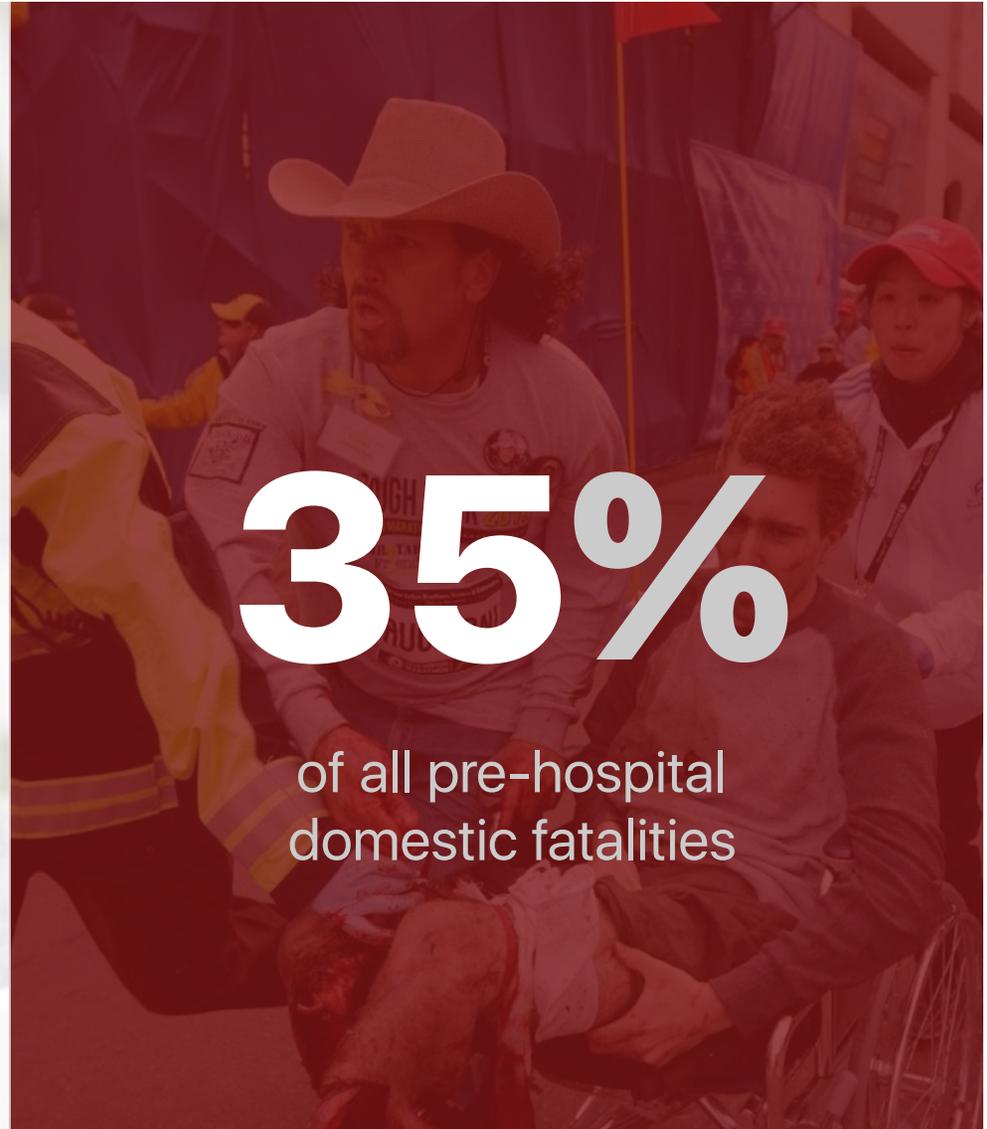BOARD ACTION: DATE:

SUBMITTED BY: Tom Sadowski (410) 576-5742

90% of preventable fatalities in the military are due to hemorrhage

35% of all pre-hospital domestic fatalities

U.S. NEWS

Are U.S. Soldiers Dying From Survivable Wounds?

Despite Advances in Care, the Military Failed to Save Some Troops in Iraq and Afghanistan From 'Potentially Survivable' Wounds

Email   Print   118 Comments   f t g in   A A

By MICHAEL M. PHILLIPS   CONNECT

Updated Sept. 19, 2014 5:47 p.m. ET

A U.S. Army soldier receives medical assistance after being injured by an explosive in Afghanistan in 2012.
Agence France-Presse/Getty Images

In an unassuming building in suburban Washington, a team of military medical specialists spent six months poring over autopsies of 4,016 men and women who had died on the battlefields of Iraq and Afghanistan.

They read reports from the morgue at Dover Air Force Base, where bodies arrived in flag-draped coffins. They examined toxicology reports. They winced at gruesome photos of bullet wounds and shredded limbs. In each case, the doctors pieced together the evidence to determine the exact cause of death.

WSJ 125   **Wall Street Journal** ✓
@WSJ   Follow

Are U.S. soldiers dying from survivable wounds? on.wsj.com/1sciOgr

RETWEETS   FAVORITES
138   79

8:40 AM - 20 Sep 2014

THE WALL STREET JOURNAL. ☰ U.S.

14

Bullet damage at the Le Carillon restaurant in Paris

Christian Hartmann / Reuters

Fighting Terrorism With Tourniquets

When groups like ISIS strike, can civilians act as first responders?

The White House
Office of the Press Secretary

For Immediate Release   October 06, 2015

FACT SHEET: Bystander: "Stop the Bleed" Broad Private Sector Support for Effort to Save Lives and Build Resilience

"The drum-beat of large-scale violence, including school shootings and terror attacks, has pushed the concept into the mainstream and has convinced the White House that the most severely wounded can't wait for professional aid. Indeed, after the Boston Marathon bombing, bystanders and others applied 27 tourniquets to the wounded."

Requires Medic
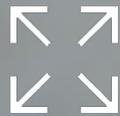
Bulky

Inaccesible

Ineffective
for Junctional Hemorrhage

- DEMO -

✓ **LIGHTWEIGHT**

✓ **ADAPTABLE**

✓ **FAST APPLICATION**

✓ **CONDUCIVE TO BUDDY CARE**

OUR SOLUTION:

BUSINESS OPPORTUNITY

BUSINESS MODEL & MARKET

Total Address Market (TAM): International Military & 1st Responders, PMCs, Disaster Relief, Industrial Safety, etc.

Serviceable Available Market (SAM): US Military & 1st Responders

Target: US Special Ops & LEO Small Tactics Units

ARMR is targeting a large, established market of millions of military, paramilitary and first responder personnel with urgent need both domestically and internationally.
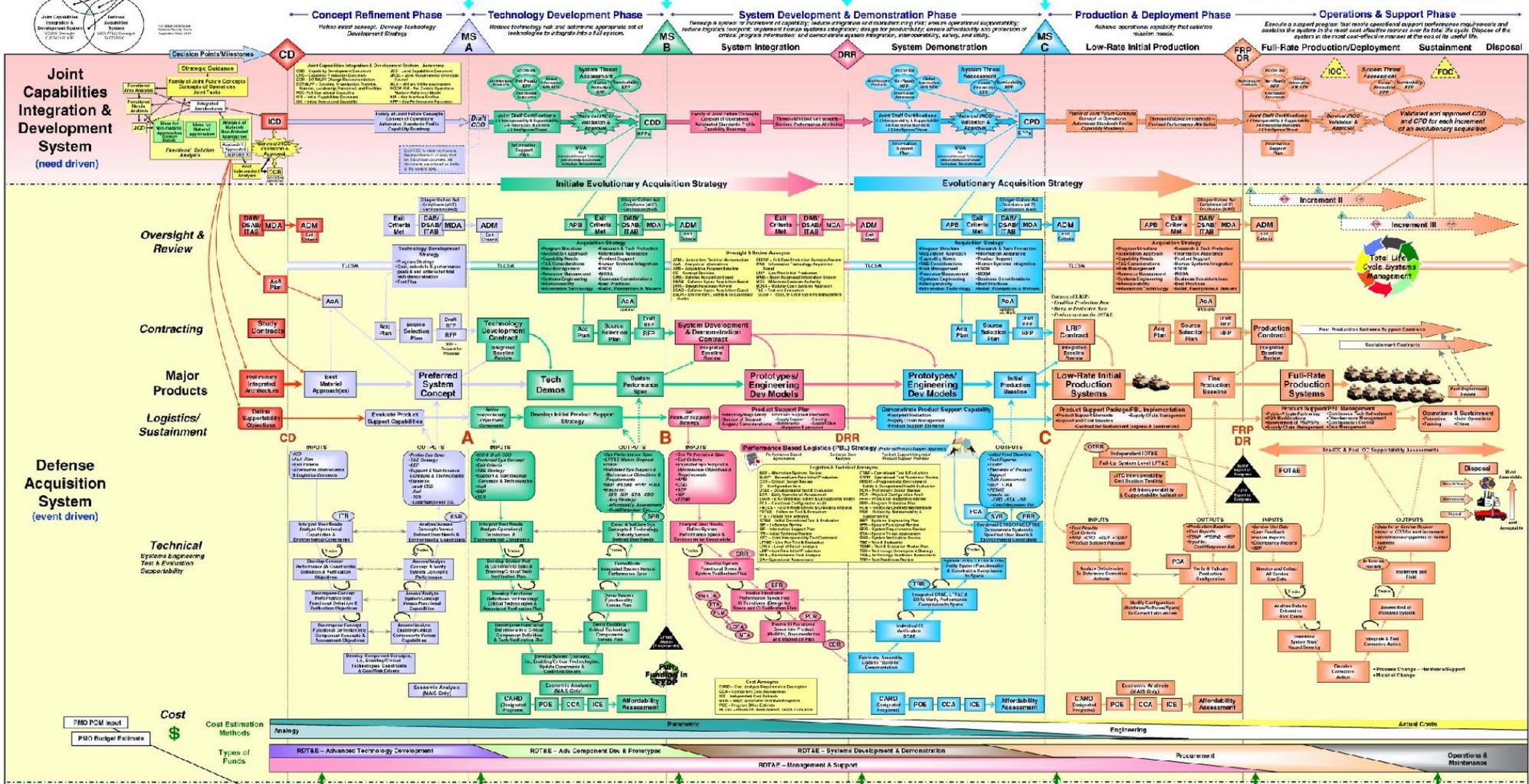
✓ 70-75% Gross Margin

✓ Annual Recurring Revenue

✓ High Medical Compliance/Liability Mitigation

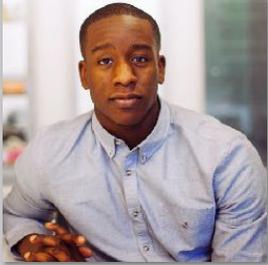# Integrated Defense Acquisition, Technology, & Logistics Life Cycle Management Framework

OPERATIONAL TEAM:

CHIBUEZE IHENACHO	DR. AMIT MEHRA	PAUL FLOYD	JOHN DEVITA	ANDREW STEPHENS	SHEREE WENTZ	ARAM BASHIAN
CEO, Founder (FT)	COO	CFO, Board Member	Bus Dev Lead	Senior Designer (FT)	Graphic Designer	Manufacturing Lead

ADVISORY TEAM:

GEN (R) PHILIP BREEDLOVE	MARY WHITELY	MAJ GEN (R) ELDER GRANGER (MD)	STEVE BRIGNOI	DR. KHALID BARAZANJI	STEVE HILTON, ESQ	COL (R) RICK STARRS
EX-USEUCOM	EX-GSA Administrator	EX-TRICARE	EX-DARPA; EX-SOF	USAARL	Gov Relations / Investor	NAVREF / MRMC

TRACTION

"What they've now proposed is the concept of proactive positioning; proactive hemorrhage control. For us, this is the next generation tourniquet."

- Dr. Todd Rasmussen, COL
(Former) Director, Combat Casualty Research Program
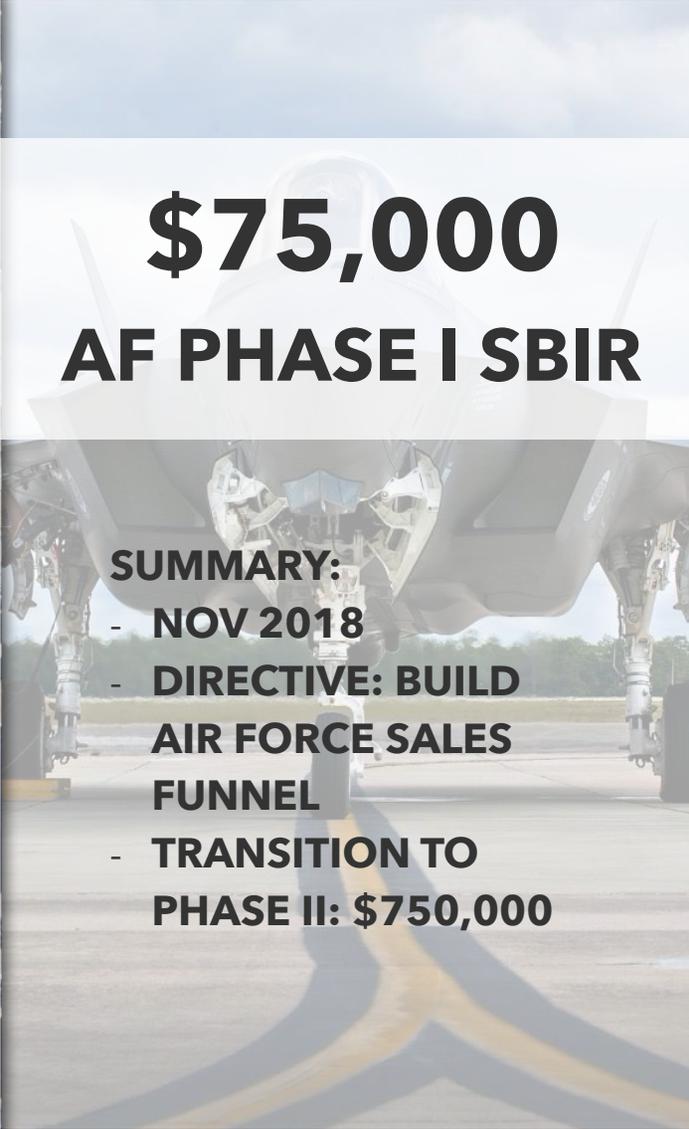
01

USER BUY-IN & PILOT DEPLOYMENTS

02

SUCCESSFUL COMPLETION OF VALIDATION STUDY WITH NAVY

$450,000
OSD (via ARL)

SUMMARY:
- APR 2018
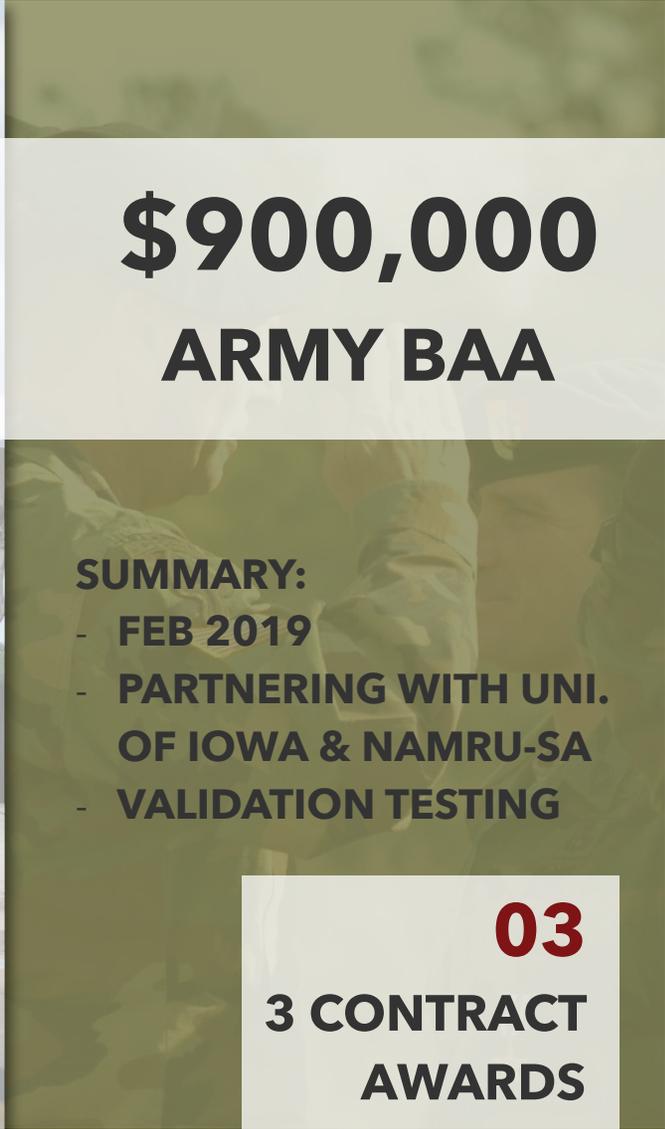- PARTNERING WITH DRAPER LABS

$75,000
AF PHASE I SBIR

SUMMARY:
- NOV 2018
- DIRECTIVE: BUILD AIR FORCE SALES FUNNEL
- TRANSITION TO PHASE II: $750,000

$900,000
ARMY BAA

SUMMARY:
- FEB 2019
- PARTNERING WITH UNI. OF IOWA & NAMRU-SA
- VALIDATION TESTING

03
3 CONTRACT AWARDS

04

LAW ENFORCEMENT PURCHASE INTEREST

05
VALUABLE PARTNERSHIPS

PATH FORWARD
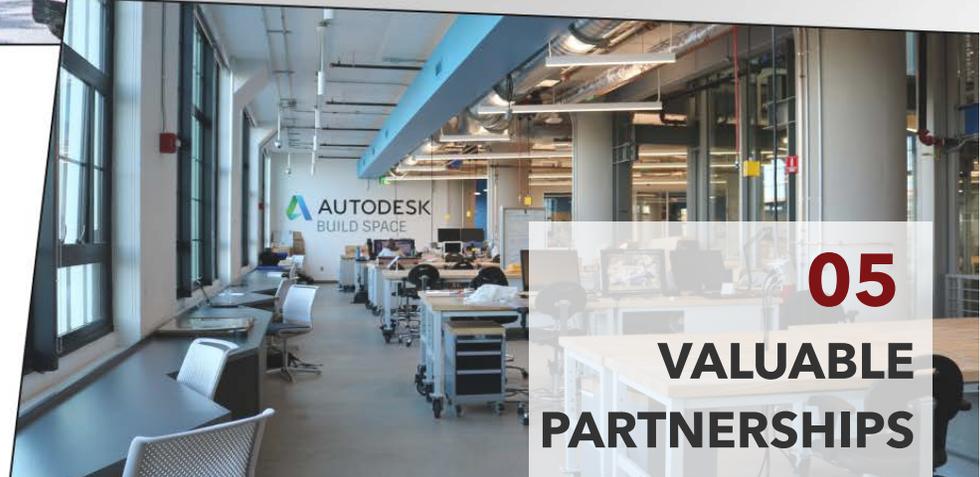
FUNDRAISING

SEED CAPITAL

Raise Amount: $750,000

Milestones:
- FDA 510(k) Submission / Clearance
- Recruit Experienced Engineering & Sales Talent
- Scale Manufacturing / Certify Supply Chain
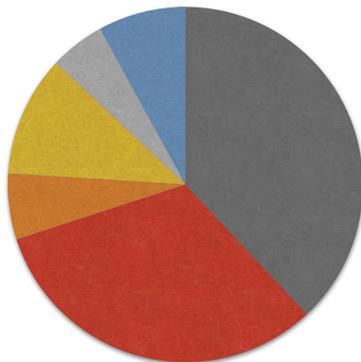
- R&D
- Labor
- Operations
- Regulatory
- Sales/Marketing
- Legal

PARTICIPATION

($750K+)

Closed   Available

CONTINUED PRODUCT EVOLUTION & DEVELOPMENT
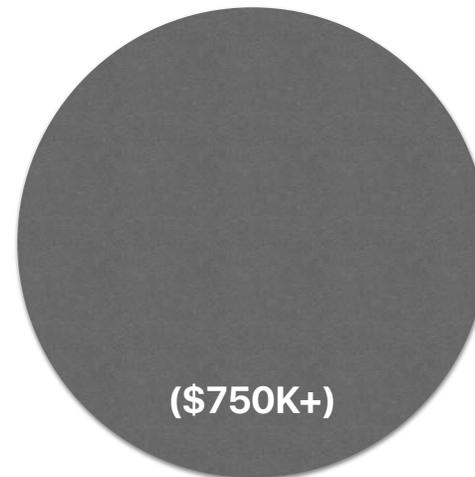
BRIGADIER GENERAL BILL CROSSLEY (ret.)

"…if [my friend who was killed in action] had your device, he would have retired this year. Our boys need this now!"

UNIVERSITY SYSTEM *of* **MARYLAND**
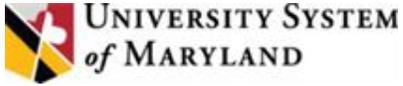
BOARD OF REGENTS

SUMMARY OF ITEM FOR ACTION
<mark>INFORMATION</mark> OR DISCUSSION

TOPIC: Chesapeake Unmanned Aircraft Systems Corridor

COMMITTEE: Economic Development and Technology Commercialization

DATE OF COMMITTEE MEETING: Monday, February 10th 2020

SUMMARY: Matt Scassero, Director of the University of Maryland UAS Test Site in southern Maryland, will present the Chesapeake Unmanned Aircraft Systems Corridor initiative, which will bring together government, academia, and industry to create a corridor structure connecting UAS points of interest and an ecosystem to support research, public safety, and commercial applications.

ALTERNATIVE(S): This item is for information purposes.

FISCAL IMPACT: There is no fiscal impact

CHANCELLOR'S RECOMMENDATION: n/a

COMMITTEE RECOMMENDATION: DATE:

BOARD ACTION: DATE:

SUBMITTED BY: Tom Sadowski (410) 576-5742

Chesapeake UAS Corridor

February 10th, 2020

A UAS corridor throughout the Bay…

…to be used by…

- Defense
- Government/Civil
- *Industry*

….for…

- Research
- Public safety
- *Commercial applications*

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FEARLESS IDEAS

Concept outline

- Why?
  - Advancing unmanned/autonomous systems in MD
  - Economic development
  - Workforce development
  - Education attraction
  - Providing product services, esp. to underserved areas
  - Providing aviation services
  - **Somebody is going to do it…why not us?**

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FEARLESS IDEAS

Stakeholders
meeting held 14 November 2019 in Annapolis

- ## Government
  - FAA
  - NAS Patuxent River / NAWCAD / ATR
  - NASA Wallops
  - ATEC/ARL/Aberdeen Proving Ground
  - Maryland – MAA and DoC
  - Local county and municipal
  - Airports

- ## Academia
  - UMD
  - Johns Hopkins APL
  - UMES
  - Community colleges

- ## Industry
  - MissionGo
  - Vanilla
  - Offshore Aviation
  - Sentinel Robotics

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Other states / examples

- New York – UAS Traffic Management centric
- Virginia – commercial centric
- Ohio – AFRL centric
- Alaska – oil/petroleum centric
- Others?
- **Common thread – *LOTS* of state $**

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FEARLESS IDEAS

UAS Points of Interest

- Pax River / Webster
- Wallops
- St. Mary's County Regional
- Dahlgren
- Salisbury Regional
- Crisfield
- Aberdeen
- Baltimore!
- Offshore Warning Areas
- Not all inclusive, but gotta start somewhere…

Y'see, the idea is…

- A corridor structure connecting UAS points of interest
  - BVLOS
  - Integrated vice segregated
  - Not just small UAS (sUAS)
  - On demand, not individual COAs or just Part 107
  - UAS Traffic Management (UTM)
  - Flight Over People

BIG time considerations

- **Restricted airspace - Pax, Wallops, Aberdeen**
- **FAA Airspace & Airways**
- **Urban areas**
- **UAS Regulations**
  - Part 107
  - COAs
  - UTM
  - BVLOS
  - Flight Over People
  - Remote ID
  - Future?
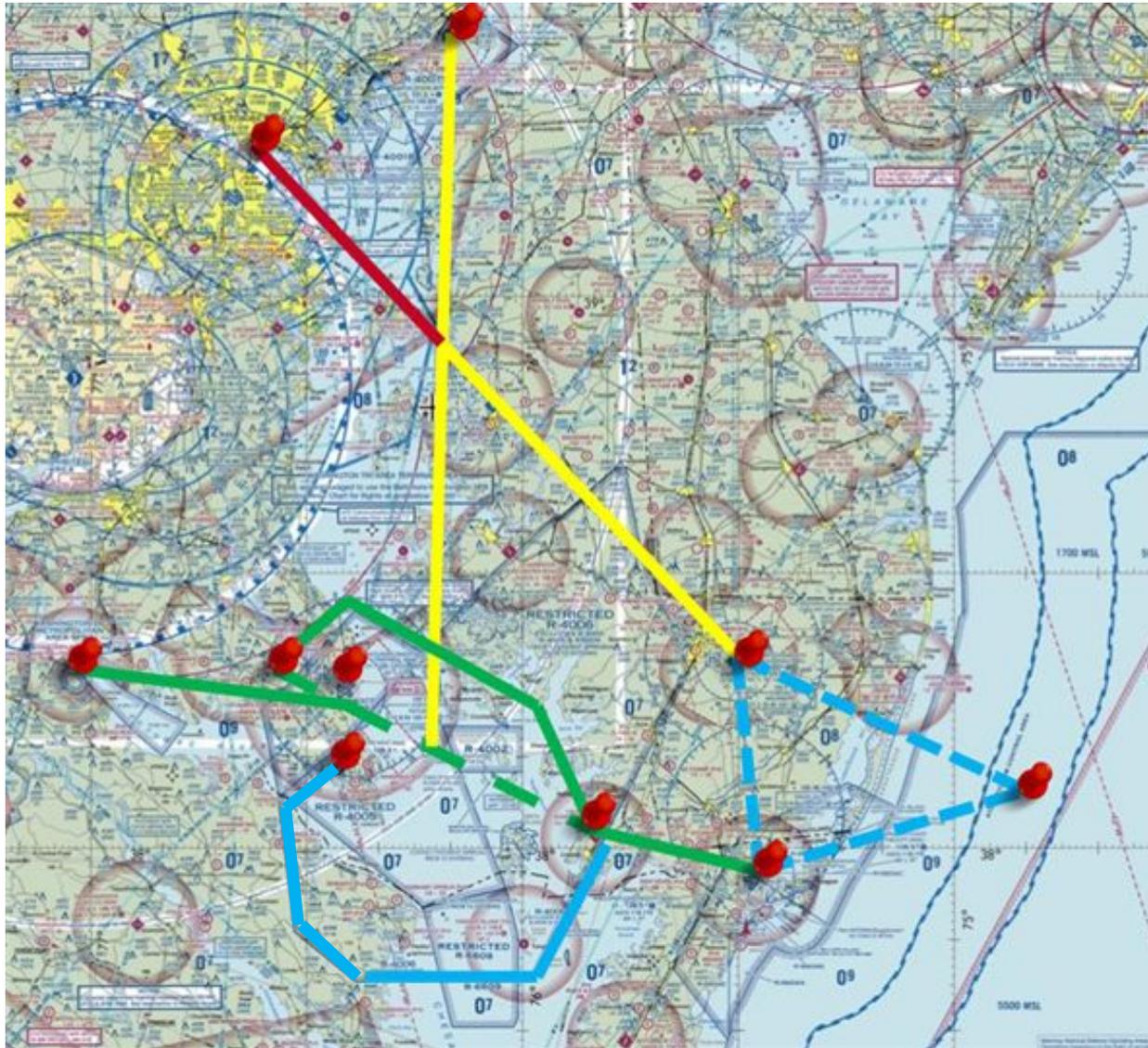
Routes in terms of difficulty – 1st glance

- **Blue solid: existing Navy UAS routing**
  - Within restricted airspace
- **Blue dashes: in-work Salisbury - Wallops**
- **Green: Pax/Dahlgren Crisfield/Wallops**
  - Affected by restricted airspace
- **Yellow: long distances**
  - Airports, Class B, urban, air routes
- **Red: Urban/congestion**

Implementation

- ## What will this take?

  - UTM, Radars, Detect And Avoid (DAA), Airborne/Ground Based Sense And Avoid (ABSAA/GBSAA), Automatic Dependent Surveillance-Broadcast (ADS-B), Transponder (IFF), Remote ID (RF ID)

- ## Phasing

  - Start low and sUAS, then build higher/bigger

  - Simple, easy routes first, but include bigger/higher UAS

  - Start with Salisbury's effort now

- ## Who "owns" it? Structure – Start with UMD UAS Test Site

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FEARLESS IDEAS

Resourcing / funding

- Needs
  - UTM
  - Radars
  - DAA, ground or airborne
  - ADSB, IFF, RF ID
  - Test operations
  - ?

- Sources
  - Maryland state
    - Dept of Commerce
    - Grants <$500K
    - Legislative package
  - Investment / sponsors
  - In kind
  - FAA / NASA – probably not – not "blessed" (IPP/UPP)
  - Federal legislative package, maybe via Navy and/or NASA?
  - Revenue?

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FEARLESS IDEAS

Next steps

- Everyone is onboard, interested and wants to be involved

  - Specific interests/capabilities – UMD, JHU APL, ARL, NAWCAD, Salisbury, MissionGo

- Next steps

  - **Phase Zero study - now**
  - Establish working group(s)
  - Chunk it out
  - Seek funding
  - UTM RFI/RFP for a portion of it

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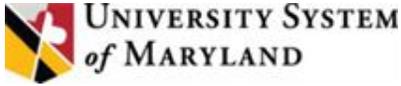
BOARD OF REGENTS

SUMMARY OF ITEM FOR ACTION
<mark>INFORMATION</mark> OR DISCUSSION

TOPIC: Cyber Resilient Energy-efficient Manufacturing (CREM) Institute

COMMITTEE: Economic Development and Technology Commercialization

DATE OF COMMITTEE MEETING: Monday, February 10th 2020

SUMMARY: Donna Ruginski, Executive Director for Cybersecurity Initiatives and Nilanjan Banerjee, Associate Professor at University of Maryland, Baltimore County will present on the Cyber Resilient Energy-efficient Manufacturing (CREM) Institute. Today's challenge in cybersecurity is to create a protective, widely deployed framework to stay ahead of adversaries. This requires an adaptable, scalable, and low-cost framework combined with diligent workforce development. The Cyber Resilient Energy-efficient Manufacturing (CREM) Institute has designed the technical solution framework and the tenets for workforce development. Now, with a partner network of 61 academic and industry leaders spanning 13 states, CREM provides the scale and diversity necessary for market implementation.

ALTERNATIVE(S): This item is for information purposes.

FISCAL IMPACT: There is no fiscal impact

CHANCELLOR'S RECOMMENDATION: n/a

COMMITTEE RECOMMENDATION: DATE:

BOARD ACTION: DATE:

SUBMITTED BY: Tom Sadowski (410) 576-5742

CREM

The Institute for Cyber Resilient Energy-efficient Manufacturing

Creating CREM

- Cost-efficient, self-sustaining threat-adaptive framework

- Virtual reality based experiential work-force development

- CREM Network: cooperative agreements with leading universities, government laboratories and private industry

- CREM Leadership: experienced in private entrepreneurship, R&D, cybersecurity and manufacturing

UMBC

CREM TECHNOLOGY SUMMARY

Approach Highlights

- Consumer-focused cyber solutions

- Real-time cyber-resilient and energy-efficient solutions

- Scalable workforce development using Virtual Reality (VR) and Augmented Reality (AR)

- Novel business model where revenue is tied to services

- Solutions that align with U.S. Objectives

Relevance to U.S. Cyber

- Foundation of a secure manufacturing reference architecture

- Continuously improve cyber posture of manufacturing plants and supply chains

- Scalable digital twin testbeds

- Increase cybersecurity awareness

- Share, prioritize, and analyze intelligence on threats

UMBC

CREM LEADERSHIP TEAM

Executive Team

- Mr. Andre Gudger, CEO and Institute Director
- Mr. Richard Decker II, CSO
- Ms. Donna Ruginski, COO
- Ms. Caroline Pisano, CFO

Strategic Governance Board

Dr. Freeman Hrabowski III, Mr. Mike Russo, Mr. Earl Wyatt, Dr. Grace Bochenek

Technical Advisory Board

Mr. Tom Morehouse, Dr. Sridhar Kota, Ms. Tina Williams-Koroma, Ms. Ellen Hemmerly, Dr. Alan Mantooth, Mr. Gary Martin

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CREM

KEY PARTNERS

Academia

Industry

Advanced Mfg/Iron/Steel

UC Davis. Texas A&M, JHU, Cornell, Potomac Photonics, Tradepoint

DOD-focused

RAMP-MD, APL, Eccalon, Phillips Corp., Equator Corporation, ARL

Bio-pharma

Purdue, Univ. of Delaware, UMBC, IALS, Johnson & Johnson, Regenxbio, MassBio

Clean Energy

AAEA, Picasolar, Offshore Wind Network, WattGlass, Today's Power, Fisher Arnold

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CREM

IMPACT & GOALS

Technology Impact

- Energy efficiency gains of up to 15%

- Near real-time detection of cyber-attacks with zero downtime during a cyberattack

- A cost-effective secure manufacturing reference architecture

- Minimize counterfeits, fraud, and anomalies in the global supply chain operations

- Cost-effective training for the next generation workforce using augmented reality and virtual reality

## Project Goals

- Single point of contact for U.S. Manufacturing in cyber-security for energy-efficient manufacturing

- Secure automation by real-time attack detection and degraded mode operation with zero downtime

- Secure global supply chain though innovations in watermarking, authentication, and traceability

- Develop cybersecurity awareness in manufacturing and supply chain operation

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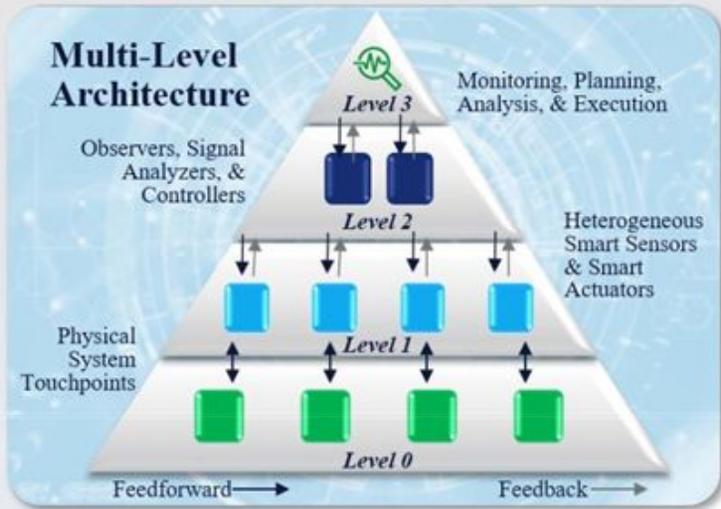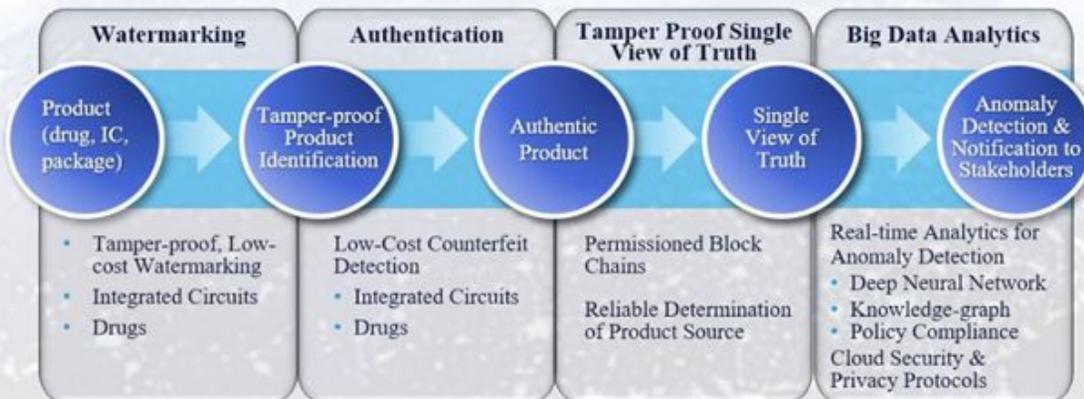
CREM EDUCATION & WORKFORCE
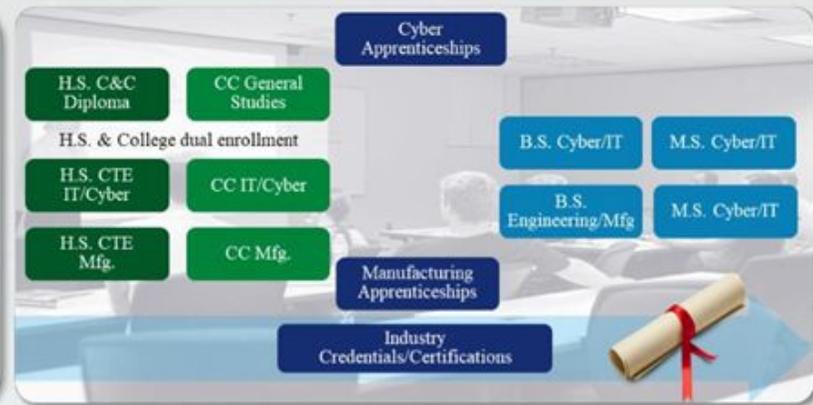
Short Courses	Long-term Curriculum	Hands-on Training
▪ Online course portal for manufacturing and cybersecurity ▪ In-person certificates in cybersecurity and energy-efficient manufacturing	▪ Incorporating cyber and manufacturing in K12. ▪ Curriculum development in community colleges	▪ Using VR/AR to get training on cybersecurity assessment and threat detection

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CREM KEY TAKEAWAY & ADMIN

Key Takeaway

- Security solutions with energy-efficiency, cost-effectiveness and flexibility

Project Information and Admin

- Institute for Cyber Resilient Energy-efficient Manufacturing (CREM)

- University of Maryland, Baltimore County (UMBC)

- Principal Investigators – Dr. Antonio R. Moreira, VP of Academic Affairs, UMBC, Dr. Nilanjan Banerjee, Associate Professor, UMBC

- Key Participant Information
  - Thirty-four academic, non-profit, and federal partners
  - Twenty-six industrial partners
  - One NGO

Requested Funds

- $5 M from Government over Five Years

UMBC

CREM

THANK YOU

Contact: Dr. Karl Steiner, VP Research, UMBC, steinerk@umbc.edu, 410.455.5636

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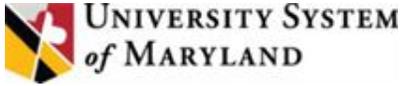
BOARD OF REGENTS

SUMMARY OF ITEM FOR ACTION
<mark>INFORMATION</mark> OR DISCUSSION

TOPIC: USM Office of Economic Development Update

COMMITTEE: Economic Development and Technology Commercialization

DATE OF COMMITTEE MEETING: Monday, February 10th 2020

SUMMARY: Vice Chancellor Sadowski will provide an update from the USM Office of Economic Development, including the Maryland Momentum Fund, legislative priorities for this session in Annapolis, USM initiatives enhancing its competitive standing in the areas of workforce development and corporate partnerships, and finally, the latest update on new venture development activity across the system.

ALTERNATIVE(S): This item is for information purposes.

FISCAL IMPACT: There is no fiscal impact

CHANCELLOR'S RECOMMENDATION: n/a

COMMITTEE RECOMMENDATION: DATE:

BOARD ACTION: DATE:

SUBMITTED BY: Tom Sadowski (410) 576-5742

USM Economic Development

Briefing for Regents Committee for Economic Development Tech Commercialization

February 10, 2020

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USM Economic Development
Updates

- Momentum Fund

- Maryland Technology Infrastructure Fund and Other Legislative Priorities

- USM Competitiveness

    - MD Quantum Alliance

    - Corporate Engagement Efforts - Amazon

    - Greater Washington Partnership – Digital Credentialing Effort Update

- Venture Development Report

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USM Momentum Fund
Portfolio

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MFFIRE

UMCP IP and Alum; May 2017
$198K invested, $1.2M round
World's most advanced wood burning stove

NEXTSTEP ROBOTICS

UMB IP, Towson Alum; Aug. 2017
$250K invested, $1.14M round
Exoskeleton robot to reverse foot drop for stroke victims. *Raised $600K follow-on round*

NAWEC
THE NORTH AMERICAN WAVE ENGINE CORPORATION

UMCP IP, Alum; Jan. 2018
$350K invested, $1.5M round
Advanced pulse jet engine

ZEST TEA

UMCP Alum; Nov 2018
$300K invested, $1.035M round
High caffeine tea, energy drink product

PAVER GUIDE ADVANCING PERMEABLE

UMCP IP; Feb. 2019
$300K invested, $675K round
Advanced semipermeable pavement system

retrium

UMCP Alum; Apr. 2019
$400K invested, $1.6M round
Agile software development management product

GEMSTONE BIOTHERAPEUTICS

UMBC/UMCP Alum; July 2019
$250K invested, $1.3M round
Tissue regeneration stem cell company

VERALOX THERAPEUTICS

UMB IP and Alum; July 2019
$500K invested, $5.4M round
Anticoagulant drug, therapeutics for rare blood disorders

NeoProgen

UMB IP and UMB Professor, Oct. 2019
$245K invested, $1.5M round
Cell-based therapy for cardiovascular disease

MINNOWTECH

UMCES Alum; Oct. 2019
$150K invested, $600K round
Measures the biomass of shrimp using sonar

MMF Investments to Date:
$3.2M; $15.9M external fund match (>4.3 X)
Average investment: $265,625K; average deal size: $1.4M

Co-Investors: *Sanofi, Middleland Capital, Abell Foundation, Lord Baltimore Fund, angel investors, Chesapeake Bay Seed Capital Fund, Dingman Angels*

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Maryland's (and USM's) Competitiveness

Maryland's economic prosperity is driven by its innovation-led economic growth, harnessed by key **advanced industries.** These industries are anchored by world-class university system, federal research assets and sustained by a significant talent base. According to The Brookings Institution, *"Advanced industries encompass the nation's highest-value economic activity …and are the country's best shot at innovative, inclusive, and sustainable growth." (Source: Brookings Institution, America's Advanced Industries—February 2015)*

These industries reshaping our global economy include —cyber security, life sciences, AI, quantum computing, robotics, medical devices and clean energy.

Key elements of innovation-led strategy:

- Advance strategic university and industry collaborations
- Incent place-making and/or innovation "ecosystem" development to retain/attract talent, foster collaboration and enable concentration of activity near federal labs and education/research institutions
- Address STEM talent and workforce needs through multi-institutional, industry inspired, traditional and non-traditional approaches
- Attract and leverage significant, long-term public/private investment
- Employ programmatic and opportunistic approach

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Maryland Quantum Alliance

Partnership of industry government and higher ed players
- AWS, IonQ, Lockheed, Northrop Grumman
- UMCP, UMBC, JHU, Morgan, George Mason
- Army Research Lab, NIST, APL, MITRE

UMCP played major role in National Quantum Initiative
- $1.275 billion over 5 years for establishing
  Major Research Centers across the US
- UMCP already has 200+ quantum researchers;
  one of the highest concentrations in the world

*"Academic research is no longer driven by the mantra publish or perish; it is now **partner** or perish" UM President, Wallace Loh*

"Quantum is bigger than the internet or the microprocessor"
Peter Chapman, CEO of IonQ

"Massachusetts doesn't have anything like this"
Ron Walsworth, Director of UMD Quantum
Technology Center (Harvard Faculty member for 16+ years)

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Amazon

- Connections made within Amazon and AWS with VPs of education and training, engineering and quantum computing

  - Multiple USM Institutions have established workforce and training agreements

  - Maryland Quantum Alliance Partnership, signed MOU

  - Collaboration Lab discussions underway in other areas to include AI / machine learning

- USM contractual staff – dedicated resource to Amazon

- USM resource will utilize existing and subsequent industry connections to identify / pursue other corporate partnership opportunities

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Greater Washington Partnership

- Kirwan Center for Academic Innovation has developed proposal to offer and scale GWP-inspired digital credentials
  - More than seven (7) USM Institutions participating
  - National deployment via EdX platform
- Federal Grant and State funding resources being explored via Business Higher Education Forum (BHEF), Maryland Dept of Labor and General Assembly

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2020 Legislative Session

Maryland Technology Infrastructure Fund (MTIF) – HB 343/SB 270
Maryland Technology Partnership Program – SB 602

- Enhancement of TEDCO authority to manage fund to invest in MD's Innovation Infrastructure
- Target 3-4x external investment to state funding
- Working with Gov's Office and engaging legislative leadership in collaboration with TEDCO, MD Commerce, JHU

Maryland Tech Internship Program – HB 79

- Expanding definition of tech business to include non-profits
- Legislative and administrative options being explored to enhance funding

Small Business Innovation Research (SBIR) Grant Assistance – HB 514, 521

- State funding to match federal grants and provide technical assistance via TEDCO

Maryland Ennovation Initiative Fund (MEIF) – SB 389

- Reauthorization of program and enhanced funding
- USM recommendations to MD Commerce enhance program flexibility and utilization

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USM Venture Development Report
Resource Navigation

New USM webpage shows resources across the USM for startups and small businesses: https://www.usmd.edu/usm/economic-development/resources.php

- By resource type (e.g., funding)
- By university

	Name	Location	Explore
BOWIE STATE UNIVERSITY 1865	Bowie State University	Bowie, MD	View Resources
FROSTBURG STATE UNIVERSITY	Frostburg State University	Frostburg, MD	View Resources
Salisbury UNIVERSITY	Salisbury University	Salisbury, MD	View Resources
TU TOWSON UNIVERSITY	Towson University	Towson, MD	View Resources

Resource Type	Examples	Explore
Advice	Meet with mentors, obtain pro bono counseling	View Resources
Training	Attend workshops and events	View Resources
Community	Tap into a community of other entrepreneurs and supporters	View Resources
Funding	Compete in business plan competitions, partner for R&D	View Resources

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USM Venture Development Report
Resource Navigation

UMCP just released an **Innovation Gateway (https://innovate.umd.edu/)** to help navigate and connect into UMCP's innovation ecosystem.

INVESTORS

INDUSTRY

STARTUPS & BUSINESSES

FACULTY

STUDENTS

ALUMNI

WHAT ARE WE INNOVATING AT UMD?

AREAS OF IMPACT

The Arts / New Technology

Agriculture & the Environment

Public Health / Social Impact

Partner & Invest   Start & Grow a Venture   Find Talent   Connect & Network

10
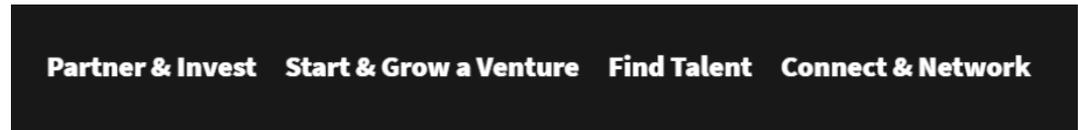
USM Economic Development
iSchool Engagement

Semester-long project with UMCP's College of Information Studies (iSchool)

- Students will gain real-life consulting experience under the direction of an instructor with deep industry expertise
- **Project Scope**: Develop a sustainable, cost-effective, and inter-operational process to collect, analyze, and visualize information about how companies are using the entrepreneurial programs available at USM institutions.
- Will **build on the foundation** of the Venture Development Report (Venture List and Resources List)
- Will **connect** with other efforts such as UMCP's Innovation Gateway

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USM Economic Development Strategy 2020

TALENT

- Enhance Workforce Programs (internships, apprenticeships and credentialing)
- Support pursuit or reauthorization of federal/state funding

CULTURE

- Leverage and Expand R&D Partnerships
- Amend IP and Tech Transfer Policies as required

CAPITAL

- Foster Momentum Fund Success
- Develop Sources of Earlier Capital
- Leverage Fed Opportunity Zones
- Enhance support for government / industry collaborations (MIPs, SBIR, etc.)

PLACE

- Leverage Fed Opportunity Zones
- Advocate for Enhancement of Place-Based Programs (RISE Zone/Opportunity Zones)

MARKETING

- Tell the USM Story (events, press, social media)
- Enhance Institutional Capacity to promote good news/strengths/opportunities ("Open for Business")

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