



University System of Maryland
Economic Development and Technology Commercialization

July 2017

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I. Some Notable Highlights

83% increase in new patents filed
(228 in FY 2016) compared to FY 2011.

366 disclosures in FY 2016
compared with 224 in FY 2011.

\$1.28 billion in extramural funding.

USM is ranked **9th** in the US in total sponsored research funding.

375 joint MPower research proposals since FY 2012.
Over **80** joint awards. The anticipated dollar value of
the awards exceeds **\$90 million**.

547 new companies
facilitated since FY 2011 against the 2020 strategic plan goal of 325.

26 IP-based Startups in FY 2016 compared with
7 in FY 2012 – **270%** increase.



II. Context

In recognition of the increasing importance of translational research, entrepreneurship and innovation, and the supply of skilled workers in STEM fields for the State of Maryland, the University System of Maryland (USM) created a Board of Regents Committee on Economic Development and Technology Commercialization in July 2011.

The Committee, working with the Chancellor's Office and the Vice Chancellor for Economic Development, provides strategic leadership for the USM's economic development and technology commercialization initiatives, as well as other entrepreneurial programs. In addition, several state and federal programs (including the Maryland Innovation Initiative, Invest Maryland, I-corps and other programs) have been launched in recent years, fostering entrepreneurship in Maryland and assisting researchers with commercializing their intellectual property. Efforts by the USM have been focused on strengthening the entrepreneurial ecosystem, leveraging USM resources through collaborations, boosting site miner and licensing staff resources, enhancing partnerships with state and federal programs, and improving access to capital for entrepreneurs and researchers. UM Ventures was launched as a joint initiative of the MPowering the State Program in 2012, bringing together the resources of the University of Maryland, Baltimore and University of Maryland, College Park to commercialize discoveries, and create economic impact by engaging partners in industry. The \$25 million Maryland Momentum Fund was launched in 2017 to enhance funding sources to USM affiliated companies.

USM institutions have facilitated the creation of 547 companies since July 2011, exceeding the 2020 Strategic Plan goal

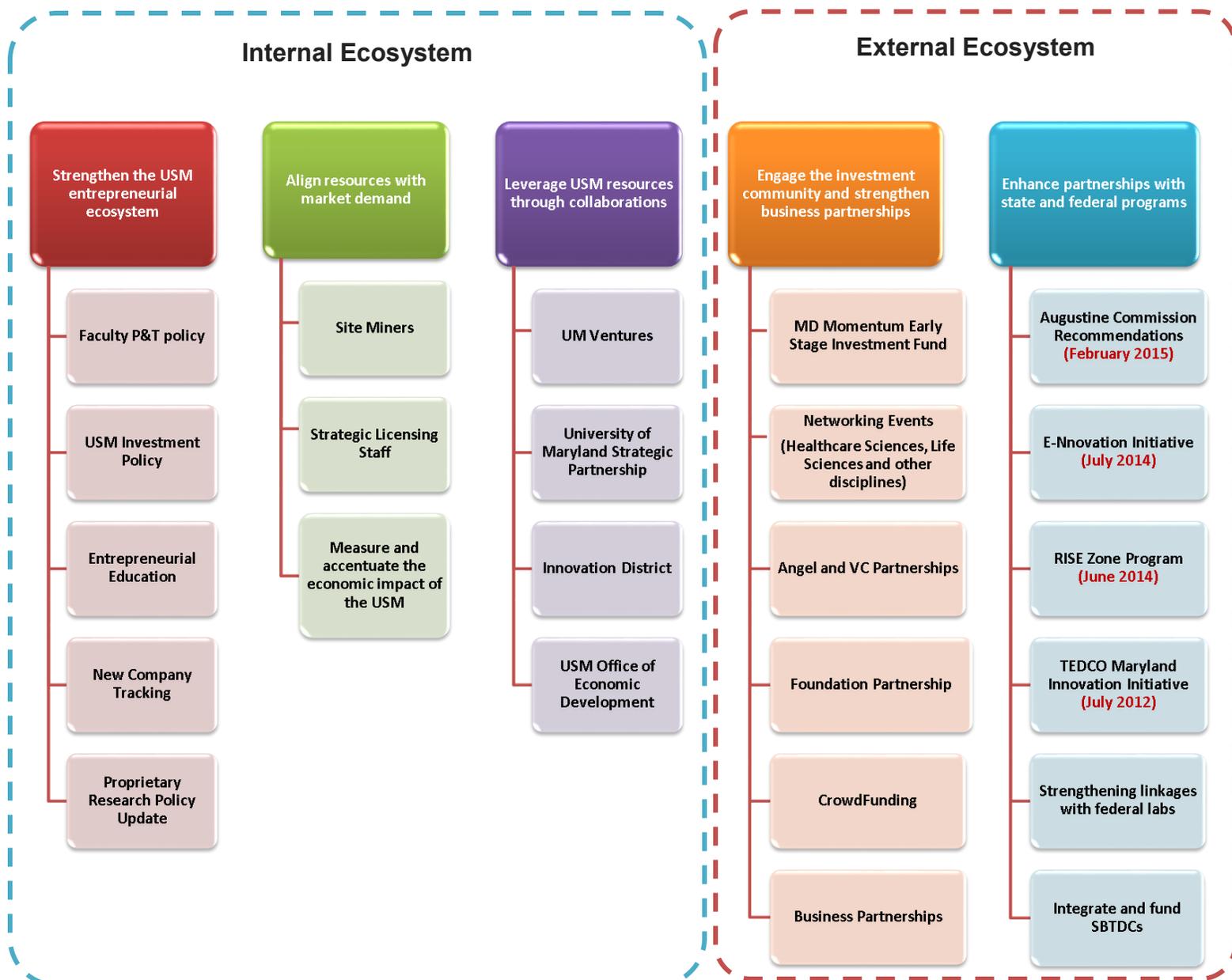


Maryland 2016 State Technology and Science Rankings

- 1st Technology Concentration and Dynamism**
- 1st Technology and Science Workforce**
- 2nd Research and Development Inputs**
- 4th Human Capital Investment**

III. Strategic Focus Areas and Growth

The USM attracts close to \$1.28 billion in extramural funding annually. In terms of sponsored research funding, 66% of funding comes from federal sources and approximately 34% from non-federal sponsors. Collectively, the USM is ranked 9th in total sponsored research funding, 8th in federal research funding, and is ranked 14th in funding from non-federal sources. IP-based start-ups grew significantly from 6 start-ups in FY 2011 to 26 start-ups in FY 2016. Additionally, the number of USM invention disclosures, which is a leading indicator in the commercialization process, increased by 62% to 366 invention disclosures in FY 2016, compared to 224 in FY 2011. To transform and accelerate technology commercialization and entrepreneurship throughout the USM, the BOR Committee has focused on five strategic areas, as depicted in the following chart:



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USM activities initially focused on the internal entrepreneurial ecosystem, represented by strategic focus areas 1, 2, and 3, and is now shifting attention to the external ecosystem, represented by 4 and 5. Highlights of initiatives related to these strategic focus areas include:

1. Strengthen the USM entrepreneurial ecosystem

- a. The USM has put in place Faculty P&T and Sabbatical Leave policies that reward research with potential for commercial development.
- b. The USM has established processes for tracking new companies facilitated by all USM institutions and the SBDC centers.

2. Aligning resources with market demand

- a. The USM has boosted site miners, entrepreneurs in residence, and licensing staff resources.
- b. The USM has been tracking the alignment of its intellectual property assets with market demand through the regular tracking of new company formation. A recent follow-up study found that more than 70% of USM IP-based startups created between FY 2012 to FY 2014 were active.

3. Leverage USM resources through collaborations

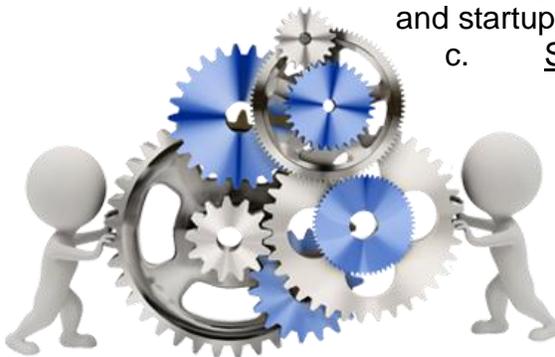
- a. UM Ventures, through collaborative leadership between the University of Maryland, Baltimore and College Park, is bringing innovative products to market, expanding collaborations with industry, and creating new jobs in Maryland by integrating the commercialization and entrepreneurial programs of the two powerhouse universities.
- b. Due to new investments in staffing and program funding as well as the coordination of the entrepreneurial offices at UMB and UMCP, UM Ventures has achieved significant growth in invention disclosures, licenses executed, and startup companies in the last two years.

c. SB 1052 -- University of Maryland Strategic

Partnership Act of 2016 (March 2016) formalizes the strategic partnership between the University of Maryland, College Park and the University of Maryland, Baltimore. It establishes a Center for Maryland Advanced Ventures (CMAV) on the Baltimore campus and a University of Maryland Center for Economic and Entrepreneurship Development (UMCEED) on the College Park campus.

d. Discovery District – Nearly \$1 billion in private and state supported construction is expected around College Park in the next five years. Through an agreement with the University of Maryland College Park Foundation, former Howard County Executive Ken Ulman is serving as a strategist for economic development and growth at the University of Maryland and its surrounding communities.

- e. Partnership agreements signed with FDA, NSA, and Federal R&D partnerships established with NIST@NCCoE and NIIMBL.



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4. Engage the investment community and enhance access to capital for USM-affiliated startups

- a. The Board also recently approved a USM Investments Policy that enables USM institutions to invest in start-ups that license USM intellectual property. In March 2017, the USM launched a \$25 million Maryland Momentum Fund to invest in early stage USM-affiliated businesses.
- b. The USM is also promoting networking events in the biomedical sciences and other disciplines, where faculty members and recent start-ups give presentations on their technologies to an audience of venture capitalists, angel investors and serial entrepreneurs.

5. Enhance partnerships with state and federal programs

- a. Augustine Commission Recommendations (February 2015) -- The Senate President and House Speaker convened the Maryland Business Climate Commission in March 2014 to examine the State's current economic development structure and incentive programs and make recommendations to enable Maryland to be competitive in economic and private sector growth and prosperity. The Commission submitted its first phase recommendations in February 2015 and a second phase report addressing tax issues was released in January 2016. As a result of the recommendations, HB 941, which creates a task force to study exemptions from higher education ethics requirements (e.g., conflicts of interest) and procurement rules to facilitate technology transfer, was passed during the 2015 legislative session.
- b. HB 442 -- Maryland Innovation Initiative (MII) (July 2012) -- MII was created as a partnership between the State of Maryland and five Maryland academic research institutions (Johns Hopkins University, Morgan State University, University of Maryland, College Park, University of Maryland, Baltimore and University of Maryland Baltimore County) and is designed to promote commercialization of research conducted in the partnership universities.
- c. Maryland Cyber Security Investment Incentive Tax Credit -- Effective January 2014, the purpose of this new program is to incentivize and attract cyber security companies to start-up in or move to Maryland and provides refundable tax credits for investments from an in-state or out-of-state investor.

The USM, in addition to its efforts on expanding collaborations among USM research institutions, has launched a Maryland Momentum Fund to provide early stage capital

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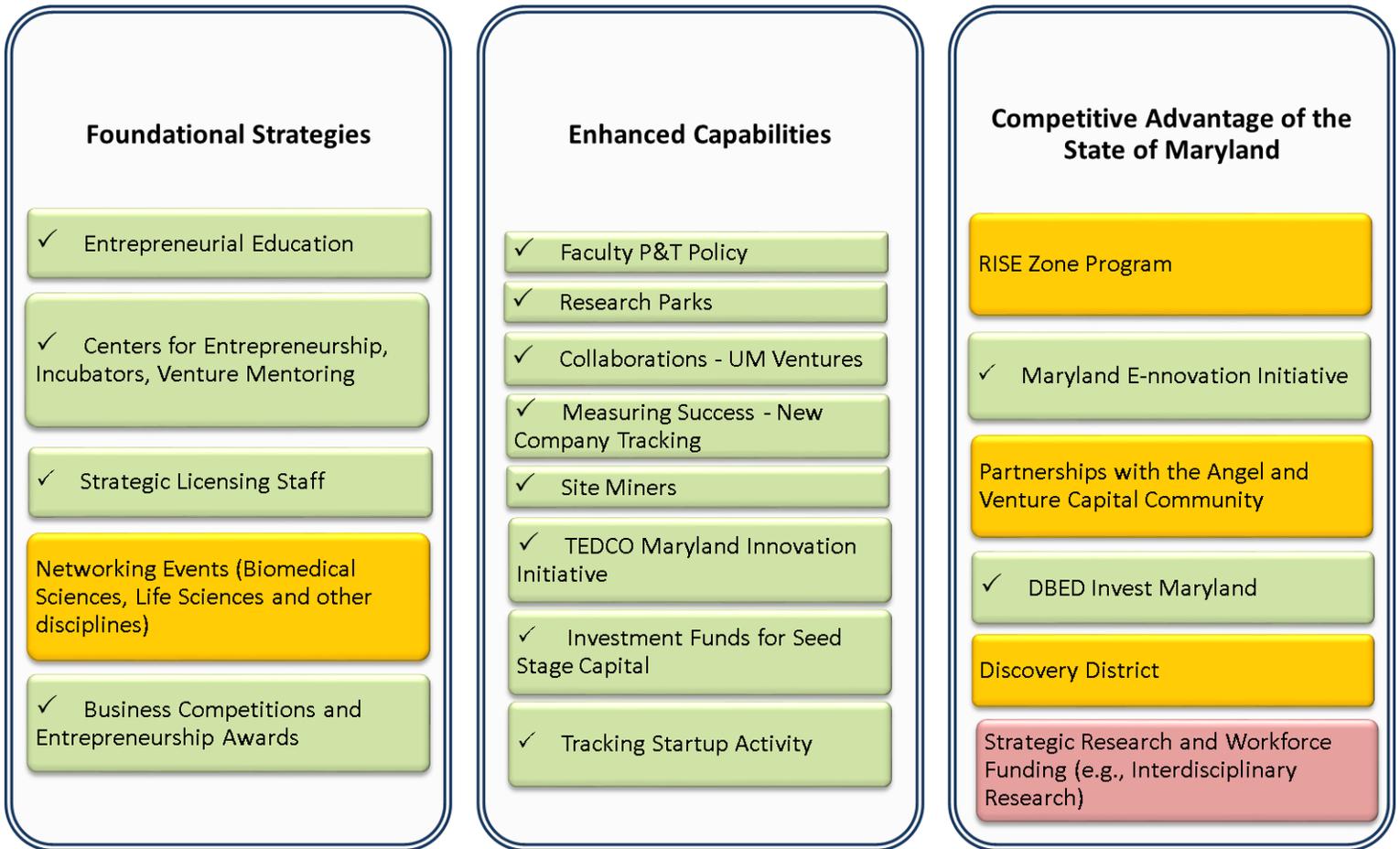
- d. The USM is working with NIST and other federal agencies to evaluate and develop strategies for accelerating the technology commercialization process.

In terms of the external ecosystem:

- The USM is also working on strengthening partnerships with various state and federal programs.
 - Legislative initiatives for economic development include the Maryland E-Nnovation Initiative, RISE Zone Program, and Cyber Seed Investment Fund
 - HB 741 -- Maryland "E-Nnovation" Initiative (July 2014) -- The E-Nnovation Initiative offers a state match to private funds, aiming to create a \$100 million matching fund for recruiting the world's best scholars to Maryland in areas as diverse as cyber security, biotechnology, STEM education, autonomous systems, language science and food safety. These scholars will be encouraged to work with other Maryland universities, federal labs or with innovative start-up companies, enhancing the integration of research into economic development. In FY 2016, UMCP and UMB were awarded a total of about \$4.2 million.
 - HB 742 -- RISE Zone Program (June 2014) -- The Regional Institution Strategic Enterprise (RISE) Zone Program is intended to spur significant financial investments in designated "RISE Zones" through enhanced property and income tax credits and accelerated depreciation schedules. The anticipated impact is stronger ties between key state, federal, and higher education institutions and increased economic development and neighborhood revitalization. A significant part of Maryland's economy, nearly 6%, is based on the research and development sector, suggesting that the opportunities for commercial development around universities and federal labs are strong.
 - TEDCO Seed Investment Fund HB 740 -- Cyber Seed Investment Fund (February 2014) -- As of November 2016, TEDCO has merged its Technology Commercialization Fund (TCF) and Cybersecurity Investment Fund (CIF) into the Seed Investment Fund. TEDCO will make seed investments of up to \$100,000 (or \$200,000 for some life science companies) to advance a technology toward commercialization. The applicant company must provide a 50% match concurrent with TEDCO's investment.

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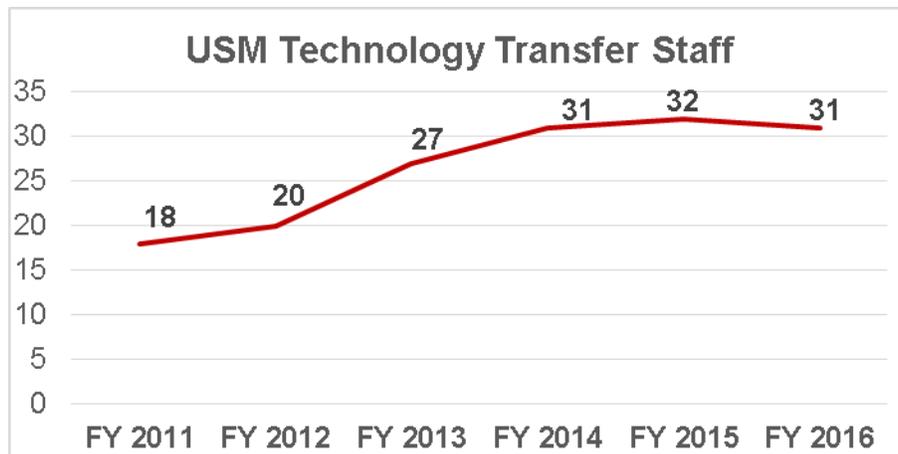
These initiatives have strengthened the USM's overall entrepreneurial capacity, as summarized in the chart below:



▪ Green boxes: programs successfully implemented ▪ Yellow boxes: programs in progress ▪ Red boxes: recently passed legislation

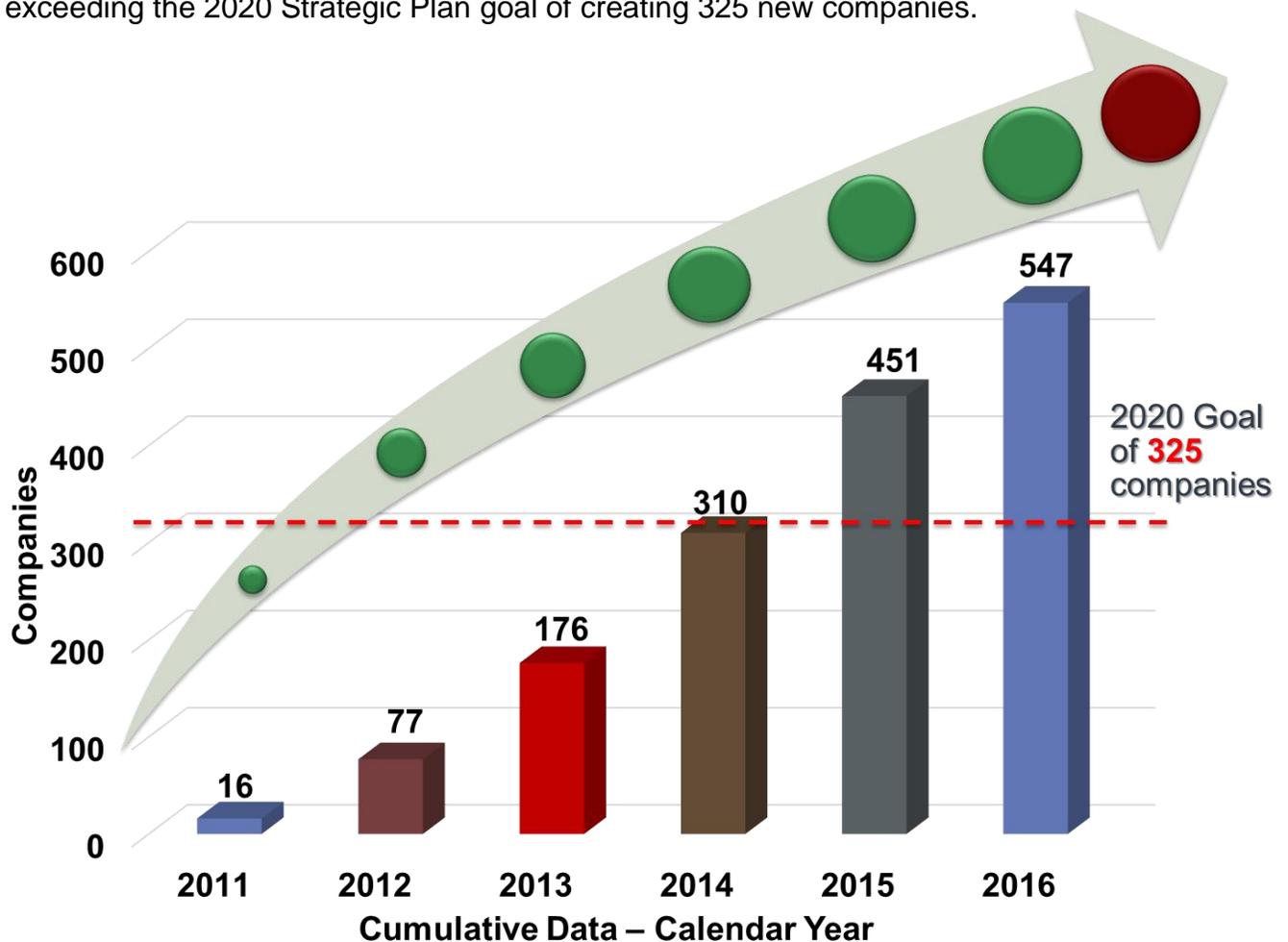
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Notably, the boost in technology transfer staff resources has resulted in significant growth in new patents filed and start-ups created based on the licensing of USM intellectual property.



Source: AUTM data

Further, since 2011, USM institutions have facilitated the creation of 547 start-ups, exceeding the 2020 Strategic Plan goal of creating 325 new companies.



IV. Economic Impact of the USM

A 2014 study on the economic impact of the USM, conducted by the Jacobs France Institute, provided ample evidence of the system's significant contribution to the health of the state's economy. For example:

- Economic activity generated by the lifetime incremental earnings of 1996 graduates support jobs earning \$5.9 billion in salaries and wages, resulting in a total of \$1.6 billion in additional state taxes.
- The overall increase in state income and sales taxes generated by USM graduates employed in Maryland, extrapolated from the analysis of the three graduating classes used in the study, totaled \$1.1 billion annually, an amount that exceeded the state's appropriation to the system.

USM graduates employed in Maryland increased state income and sales taxes by an estimated \$1.1 billion annually

Also, USM's FY 2014 budget included \$12 million in enhancement funding targeted to increase STEM, cybersecurity, and health-related enrollment. It is estimated that this investment would lead to an additional 1,000 students enrolled in these disciplines by FY 2017, ultimately leading to 700 additional degrees in the areas that will continue to drive the new economy. USM institutions enrolled more than 1,400 additional STEM and health care-related majors in FY 2014 alone and are adding the STEM majors needed to secure Maryland's economic future.

IV.1. Workforce Development

Ensuring that the state of Maryland has a high quality workforce and that the USM produces graduates whose degrees are closely aligned with the workforce and economic development needs of the State is one of the key goals of the USM strategic plan. The USM's success in demonstrating effectiveness under this goal, and the benefit such an alignment brings to both the State and USM graduates, has been a major factor in the System's recent success in building stronger relationships with the Governor and General Assembly.

Using the USM's workforce model to look at current state needs and how



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well our current level of degree production meets those needs, we see the following:

- **STEM** – STEM fields are the cornerstones of Maryland’s economic performance and are areas for which low production is recognized as a national challenge.
 - Current demand – Scientists: 2,175 per year (82% of demand met), Engineers: 2785 per year (54% of demand met), IT professionals: 5,860 per year (40% of demand met).
 - USM overproduces in some areas, including Chemical engineers (168% of demand), Health and Safety Engineers (162%), Biological Scientists, all types (118%) and Mathematicians (120%), while significantly under producing in others including: Computer Hardware engineers (13%), Geoscientists (45%) and all Information Technology fields (40%).

- **Healthcare** – The national shortage of nurses and other key healthcare is a workforce challenge at both the level of creating practitioners and of creating skilled faculty to educate those practitioners.
 - Current demand/supply – Nurses: 3,450 per year (41% of demand met), other high demand healthcare (such as Allied Health): 2,480 per year (30% of demand met).

- **Teachers** – Maryland faces a need to produce highly qualified K-12 teachers in very large numbers. Meeting production demands has been challenging and production remains below desired levels.
 - Current demand – Teachers: 3,570 per year (37% of demand met), other education: 2,655 per year (24% of demand met).
 - The USM does not meet 50% of current demand in any category of K-12 teacher production.

- **Business** – Some of the highest demand fields are for those with skilled training in business and financial disciplines. These educated workers are often in great demand in high-tech and biotech industries, but are frequently overlooked in discussion of the workforce.
 - Current demand – General Operations Managers: 1,660 per year (33% of demand met), Financial Services Workers: 1,365 per year (30% of demand met), and Accountants: 1,425 (21% of demand met).
 - Total demand for Business sector positions exceeds 10,000 per year with only around 45% of the need met by USM each year.

V. USM Research Parks' Impact

UMB, UMBC, and UMCP are each developing research parks that are transforming the economies surrounding their campuses.

*With 250 tenants,
USM research
parks are home to
6,350 jobs and
\$1.125 billion in
capital investments*

The research parks are home to:

- 6,350 jobs
- 250 tenants – including start-up and mature technology companies, federal research centers, private research institutes, workforce training and executive education.
- 2.9 million square feet of privately financed research space.
- \$1.125 billion in capital investment, the vast majority of which is from the private sector.

Capitalizing on university research strengths, the research parks are creating thriving technology clusters in Maryland:

- **Discovery District at UMCP:**
 - In early 2017, UMCP debuted the Discovery District, encompassing more than 150 acres, which is a key piece of the University's Greater College Park initiative, a \$2 billion public-private investment to rapidly revitalize the Baltimore Avenue corridor and academic campus.
 - The largest cluster of language scientists in the world and among the largest clusters of environmental scientists and food scientists in the US.
 - One of the 200 fastest supercomputers in the world and one of the fastest computer networks in the US.
 - Since 2003, new construction at the Discovery District has accounted for 26% of all new construction in Prince George's County.
 - UMCP is also home to the Technology Advancement Program (TAP) incubator for start-up companies and the Maryland International Incubator for US branches of international companies.
- **bwtech@UMBC:**
 - Home to the largest concentration of start-up companies (60) in Maryland.
 - With 50 cybersecurity companies, bwtech has the largest cybersecurity cluster in any university-affiliated research park in the US.
 - In the first six months of calendar year 2014, bwtech companies hired 105 UMBC students, employed 90 UMBC alums, and contributed \$4 million in taxes to the Baltimore County region annually.



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- UM BioPark:
 - UMB has the largest concentration of biotech companies in Baltimore City.
 - UMB start-up companies located in the BioPark have attracted over \$100 million in funding from venture capital firms and pharmaceutical companies.
 - UMB faculty and BioPark companies have collaborated to win over \$60 million in federal research funding.
 - In 2015, UMB physicians will begin treating cancer patients at the Maryland Proton Treatment Center, a \$250 million privately financed facility that will be the twelfth in the US and first in the region.

With assistance from the State, these three university research parks have the capacity to add at least another 3.6 million square feet and 7,500 high quality jobs.

VI. Ongoing Research Infrastructure Projects

- At Bowie State University (BSU), almost \$40 million to construct a new Natural Sciences Center.
- At Salisbury University (SU), more than \$53 million to construct a new academic commons, including a new library along with classroom, research, and study space.
- At the University of Maryland, Baltimore (UMB), more than \$81 million to construct a new Health Sciences Research Facility.
- At the University of Maryland, Baltimore County (UMBC), \$6 million to construct an interdisciplinary and life sciences research building.
- At the University of Maryland Center for Environmental Science (UMCES), \$4.5 million to equip the recently constructed Environmental Sustainability Research Laboratory.
- Through the USM office, \$4.7 million to construct a Biomedical Sciences and Engineering Education Facility at the Universities at Shady Grove (USG) and \$450,000 for the planning and design of the Southern Maryland Regional Higher Education Center New Phase III Facility.
- The new Engineering, Aviation, Computer and Mathematical Sciences Building (EACMS) for the University of Maryland Eastern Shore (UMES) opened in October 2016. The \$65 million, 166,000 square foot building includes spaces for engineering including a nano-technology lab featuring a clean room, aviation sciences, mathematics, computer sciences, and telecommunications departments, a TV broadcast studio and practice studios, a student radio station and editing rooms, and two Dean's office suites.
- UMBC's new \$123 million Interdisciplinary Life Sciences Building, which began construction in 2017, is aimed to connect teaching and research activities and stimulate collaborative approaches to advancing the State's biotechnology industry and increasing the number of STEM graduates. The building is scheduled for completion by Summer 2019. It will include eight new classrooms,

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four seating ninety students and the other four seating forty eight, and will also house six seminar rooms and another six collaborative project rooms.

- UMCP and Corporate Office Properties Trust (“COPT”) have commenced construction on a new 75,000-square-foot multi-story office building tailored to meet the needs of organizations focused on research and technology.
- The Hotel at the University of Maryland, a \$180 million luxury hotel, is planned to open by summer 2017. UMD has partnered with St. John Properties to construct 110,000 square feet of research and development space and a 45,000-square-foot building to house College Park Academy, a public charter school that will open in fall 2017.

VII. Some Recent Successes

- USM site miners and entrepreneurs in residence have been instrumental in assisting UMB, UMBC, and UMCP faculty and start-ups to win 100 Maryland Innovation Initiative awards, totaling more than \$10.1 million. In FY14, USM institutions received 34 MII awards, totaling over \$4 million. Five projects involved collaborations between faculty members at multiple institutions.
- 
- Since FY 2012, MPower (UMCP-UMB) has submitted 375 joint research proposals and received over 80 joint awards. The anticipated dollar value of the awards exceeds \$90 million. Proposal submission increased 65% from FY13 to FY15. The following are some examples of specific awards:
 - UMCP PI Dr. Pamela Clark (SPH) was awarded a \$19 million grant over five years for the Tobacco Center of Regulatory Science from NIH. Dr. Mongodin in the Institute for Genome Sciences (UMB) is a member of the team.
 - UMB Dr. Clare Fraser at the Institute for Genome Sciences was awarded a \$15.2 million grant over five years from NIH. Dr. Hector Corrada Bravo (UMCP; UMIACS) is a member of the team.
 - UMCP Drs. Payne and Bentley (ENG) were awarded a \$1 million NSF grant over four years for Thin Film Biofabrication for Integrated Bio-electronics. Dr. Jana Shen, School of Pharmacy, is a member of the team.
 - The Maryland E-Nnovation Initiative has awarded \$2.1 million each to UMB and UMCP in the first round.
 - Late last year, MedImmune, the global biologics research and development arm of AstraZeneca, announced a 5-year \$6+ million strategic collaboration that includes UMB, UMCP, and UMBC.
- 
- MedImmune has announced that they have identified the first five Joint bioscience-related research projects.

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- Gliknik, a startup co-founded by a UMB faculty member raised over \$50 million, including an upfront licensing fee of \$25 million from Pfizer.
- bwtech@UMBC Cyber Incubator was a finalist for the International Incubator of the Year (National Business Incubator Association).
- Four bwtech companies are finalists for ICOY (Maryland Incubator Company of the Year) awards.
- Three startup companies leveraging technologies and know-how created at the University of Maryland, Baltimore have recently entered the commercial phase of business.
 - Advance Management Services was founded in January 2013 and achieved its first commercial sale during the second quarter of 2013. The company licensed software-based clinical outcomes management system for the healthcare industry from the University of Maryland, Baltimore.
 - Analytical Informatics (AI), founded in August 2011, offers a suite of quality improvement tools created by leading universities and innovative startup companies. These innovative tools have been proven to provide health care organizations with improved quality, efficiency and better workflows. In the last quarter, AI has added three new customers.
 - SilcsBio, LLC, founded in April of 2012 and located within the University of Maryland BioPark, provides software and services for drug discovery. SilcsBio has recently achieved initial revenue from drug discovery services from a company in Pennsylvania.
- Advanced Metrics, a UMB Health IT startup, moved quickly into commercialization since establishment only a year ago and moved from offices on the university's campus to the BioPark.
 - OmniSpeech, a UMCP startup that develops solutions to separate the speech signal from background noise for telecommunications applications, received \$2.8 million of funding.
 - Potomac Photonics, a digital manufacturing company specializing in micro technology for the biotech and medical device industries, has leased 8,000 SF of labs and offices at bwtech South. The CEO is a UMBC graduate; the company already is collaborating with UMBC and held a summit on 3D printing in May 2014.
- UMBC's business incubator, bwtech@UMBC, and Northrop Grumman recently announced KoolSpan as its latest graduating cyber start-up from the Cync Program. Cync is a unique global partnership between Northrop Grumman and the Cyber Incubator at bwtech@UMBC that nurtures cyber start-ups to commercialize next-generation technologies. Since being accepted into Cync, KoolSpan, a developer of a suite of patented, hardware-based mobile security encryption solutions, has grown from 8 to 40 employees, bolstered its intellectual property portfolio to more than 20 patents, and expanded into more than 55 countries.
- The Ratcliffe Foundation has awarded the Institute of Marine and Environmental Technology (IMET) —a joint research facility involving UMCES, UMBC, and



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UMB's School of Medicine—a three-year, \$600,000 grant to help young scientists cultivate the leadership and business skills necessary to bring their research into commercial markets.

- The co-founder of Oculus, Brendan Iribe (and other Oculus founders who are UMCP alumni), provided UMCP with \$31 million to help support a \$120 million new center called “The Brendan Iribe Center for Computer Science and Innovation” at UMCP. Oculus will help develop more UMCP partnerships with Facebook and other companies from Silicon Valley.
- The Institute of Marine and Environmental Technology incubator in Baltimore's Inner Harbor is helping to advance research, commercialize technology, and promote economic development focused on the environment and health care. They currently house eight companies and have graduated one.
- The UMB-UMBC Research and Innovation Partnership program focused on cutting-edge science and health celebrated its second round of seed grant recipients and held its inaugural Partnership Symposium this year to actively support meaningful and sustainable research partnerships between the two institutions.
- UM Ventures supports “New Ventures Initiative” (NVI) program at UMB. UMB's New Ventures Initiative is designed to bring together management expertise, business formation strategy, a physical space, and early-stage capital critical for success for new startups. Currently, NVI is hosting three portfolio companies, and plans to increase the number of its portfolio companies over the next year.



VIII. Highlights of Grant Awards

- The University of Maryland, College Park and the University of Maryland, Baltimore will be key partners in a new institute to advance U.S. leadership in pharmaceutical manufacturing. The National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL) is the 11th Manufacturing USA Institute with a \$70 million federal investment to the consortium of over 150 companies, educational institutions, nonprofits and state governments.
- UMD and UMBC are part of a \$87.5 million NASA research agreement that runs for 5 years. The Center for Research and Exploration in Space Science & Technology, also known as CRESST, pairs university scientists with researchers from the NASA Goddard Space Flight Center. Through the agreement, scientists will complete observational, experimental and theoretical research, including studies of the solar system, stars, galaxies and the universe.
- The University of Maryland will lead the NIH-funded Center for Engineering Complex Tissues. The NIH awarded \$6.25 million for the Biomedical Technology Resource Center, aimed at advancing techniques to create complex tissues and parts for the body such as for organs and bone.

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- UMCP's Earth System Science Interdisciplinary Center was awarded \$36 million by NASA for collaboration with the National Weather and Climate Prediction Center.
- UMB received a \$4.9 million grant from NIH for artificial lung research.
- With \$3.75 million in funding from the National Science Foundation, UMCP is teaming up with George Washington University and Virginia Tech to launch a regional Innovation Corps (I-Corps) node with one sweeping goal: find the best entrepreneurial student and faculty researchers and help them bring their discoveries to market.
- The BioMaryland Center, awarded \$1.5 million to eight companies, including Harpoon Medical Inc. and Otomagnetics, startups from UMB and UMCP.
- At UMB, the Schools of Dentistry and Medicine received a five-year \$10.7 million grant award from NIH to study the causes, prevention, and treatment of sexually-transmitted diseases.
- Also at UMB, the Institute for Genome Sciences at the School of Medicine has received a grant award of \$15.2 million over five years from NIH to create a research center to apply genomic techniques to the study of pathogens and their hosts.
- UMB's Institute of Human Virology (IHV) at the School of Medicine received a \$50 million five-year grant to stop the transmission of HIV from mother to child in Zambia as part of the President's Emergency Plan for AIDS Relief.
- Researches from UMCP's College of Agriculture and Natural Resources received a \$1.6 million grant from the U.S. Department of Agriculture to test a cutting-edge approach for eradicating influenza.

UMB received a \$4.9 million grant from NIH for artificial lung research

VIII.1. Cybersecurity Grant Awards

- MITRE and the USM, with UMBC and UMCP as the lead institutions, won the bid to operate the nation's first Cyber Security Federally Funded Research and Development Center (FFRDC). The FFRDC contract has a ceiling limit of \$5 billion over 25 years.
- Bowie is one of 13 historically black colleges and universities awarded funding through a five-year, \$25 million grant as part of a consortium established by the U.S. Department of Energy. BSU will receive \$1.2 million to develop a pipeline for more minorities to enter the cybersecurity field.
- Frostburg's \$71 million Center for Communications and Information Technology, which opened in fall 2014, is the first new academic building at FSU in 11 years. It provides state-of-the-art technology and academic support for computer science and information technologies, mathematics, and other in-demand, high-tech disciplines.

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- At UMCP, the Advanced Cybersecurity Education Scholars, or ACES, is the nation's first-ever cybersecurity honors program and has established a new ACES Northrop Grumman Cybersecurity Laboratory. The ACES program, an ongoing partnership with Northrop Grumman, is educating the next generation of cyber professionals, and strengthening our state's and nation's economic future.

IX. Major Business Partnerships

- The **Gates Foundation** has awarded UMB over \$50 million in funding in the last five years. Projects focus on HIV, Malaria, and Shigella. In addition, the Gates Foundation has made substantial investments in two companies which have licensed UMB vaccine technologies: PaxVax, which is conducting Phase III clinical trials for a UMB Cholera vaccine; and PATH, which is conducting Phase II clinical trials for a UMB Shigella vaccine.



BILL & MELINDA
GATES foundation

- **Tokai Pharmaceuticals** (an early stage biotech company based in Cambridge, Massachusetts) has licensed from UMB a promising drug candidate to treat prostate cancer. Based on the success of Phase II clinical trials, Tokai had its IPO in October 2014. Its market capitalization is approximately \$350 million.



tōkai pharmaceuticals

- **Profectus** (a Maryland-based University start-up company) has raised over \$120 million in grant funding and equity investments to develop vaccines for HIV/AIDS and Ebola. Profectus was awarded \$50 million in multi-year federal funding in 2014.



PROFECTUS
BIOSCIENCES

- As mentioned above, **MITRE** and the USM won the bid to operate the nation's first Cyber Security Federally Funded Research and Development Center (FFRDC).



MITRE

- Started by UMCP graduate Kevin Plank, **Under Armour** (UA) announced recently \$3 billion in annual sales. Kevin Plank has contributed \$25 million towards the renovation of Cole into a \$155 million Center for Sports Medicine, Health and Human Performance in partnership with UMB. UMCP is working with UA on wearable technologies, sensors and entrepreneurship through Cupid's Cup, one of the country's best known student business competitions.



UNDER ARMOUR

- UMCP has received its largest in-kind software grant from **Siemens USA**, headquartered in Washington DC, with a commercial value of more than \$750 million. Siemens' product lifecycle management (PLM) software provides UMCP students and researchers with a sophisticated design and simulation tool for course work, research, academic projects, and team-



SIEMENS

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based competitions. The Siemens CEO is a member of UMCP's Energy Research Advisory Board.

X. Other Developments

- While the University of Maryland's *MPowering the State*, the structured collaboration between UMCP and UMB, is still in its early stages, it has already had a profound impact on technology transfer and commercialization efforts at the two institutions.
- Towson is expanding its entrepreneurial efforts as well, selecting Frank Bonsal III as TU's first director of entrepreneurship, marking the advent of a larger and more integrated approach to entrepreneurship at the university.
- At Salisbury, the Baltimore-based Ratcliffe Foundation has committed to as much as \$1 million to the Franklin P. Perdue School of Business over the next five years to support student entrepreneurs who are looking to create startups.
- UMB's Office of Technology Transfer announced the addition of an Entrepreneur-in-Residence (EIR), a pathologist/immunologist with experience in biosimilars, biomarkets, manufacturing, repurposed compounds, and start-up formation.
- Bowie State University launched a new entrepreneurship and small business management concentration, starting in fall 2016. The Bowie Business Innovation Center (BIC) became the first Maryland incubator at a historically black college or university (HBCU) when it opened in 2012. The Entrepreneurship Academy's annual Idea Competition allows students to compete for seed money and the chance to join the Student Business Hatchery.
- UMCP is now integrating the Lean LaunchPad into standard innovation and entrepreneurship courses across all 12 colleges within the University.
- Annually, the University of Maryland, Baltimore and The Johns Hopkins Alliance for Science and Technology Development meets for a full day, bringing together faculty members and investors to foster important biotechnical and pharmaceutical developments. The Alliance meeting includes presentations by faculty members, researchers, and start-ups to venture capitalists, entrepreneurs, and chief executive officers of biotechnology and pharmaceutical companies who are positioned to help presenters commercialize their technologies. In 2015, faculty researchers and entrepreneurs were awarded \$200,000 in prizes.



IMET founded the Harbor Launch incubator to support biotech and environmental startups

Economic Development and Technology Commercialization

- Salisbury University's Perdue School of Business offers entrepreneurship competitions and recently launched a new Innovation Hub. In addition to the 3-D printing facilities and rapid prototyping support offered at the lab, the new innovation hub includes dedicated spaces for idea generation and opportunity assessment.
- University of Baltimore Center for Entrepreneurship and Innovation housed 12 startups in 2016, and companies and entrepreneurs brought in a total of about \$1.4 million in revenue. UB opened a new incubator space in November 2016. The 1,950-square-foot space can support up to 28 startups.
- In 2016, the Institute of Marine and Environmental Technology (IMET), a joint research facility involving UMCES, UMBC, and UMB's School of Medicine, founded the Harbor Launch incubator that offers business services as well as office and lab space for biotech and environmental early stage startups.