MPOWERING THE STATE
UNIVERSITY OF MARYLAND STRATEGIC PARTNERSHIP

SOCIAL WORK
INFORMATION STUDIES
ARTS & HUMANITIES
Anatomy and Neuroscience
AGRICULTURE
DENTISTRY
PUBLIC ENGINEERING
BEHAVIORAL AND SOCIAL SCIENCES
JOURNALISM
NURSING
Biology
Geographical Sciences
BUSINESS
Bioengineering
Program in Trauma
Kinesiology
MEDICINE
Epidemiology
Psychology
Sociology
Government and Politics
Orthopaedics
Cell Biology and Molecular Genetics
Diagnosis Radiology and Nuclear Medicine
Science of Pain
LAW
Hearing and Speech Science
PHARMACY
COMPUTER, MATHEMATICAL, AND NATURAL SCIENCES
Criminology and Criminal Justice
EDUCATION
Chemistry and Biochemistry
Computer Science
Biochemistry and Molecular Biology
PUBLIC HEALTH
The University of Maryland Strategic Partnership: MPowering the State (MPower) combines the extraordinary resources of the state’s largest public research engines — the University of Maryland, Baltimore (UMB) and the University of Maryland, College Park (UMCP) — to strengthen and serve the state of Maryland and its citizens.

Since its creation in 2012, MPower has fostered hundreds of collaborations that are growing Maryland’s innovation economy, advancing interdisciplinary research, increasing educational benefits, and addressing the state’s most critical issues.

The University of Maryland Strategic Partnership is delivering on a vision of collaboration, innovation, and transformative impact across the state.

To learn more about our impact, and our future, please visit mpower.maryland.edu.
GROWING MARYLAND’S ECONOMY

The University of Maryland Strategic Partnership: *MPowering the State* fuels the state’s reputation as an international, intellectual, and commercialization leader by consistently bringing scientific discoveries and inventions to market.

103
STARTUPS LAUNCHED SINCE 2011

67
INVENTIONS LICENSED TO COMPANIES IN FISCAL YEAR 2019

265
JOBS CREATED OR RETAINED IN BALTIMORE BY THE CENTER FOR MARYLAND ADVANCED VENTURES SINCE 2017

The *UM Ventures* collaboration combines the entrepreneurial resources at UMB and UMCP to help researchers and inventors license, patent, and commercialize their university-invented creations and launch university startups. Faculty-invented products and services include agriculture products, software, clean technology, nanotechnology, sensors, medical devices, diagnostics, and therapeutics. In Fiscal Year 2019, UM Ventures tallied 302 potential inventions from faculty with 67 licensed to companies, generating more than $3 million in licensing revenue to UMB and UMCP.

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<thead>
<tr>
<th></th>
<th>FY19</th>
<th>Growth FY11 to FY19</th>
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<tbody>
<tr>
<td>Invention Disclosures</td>
<td>302</td>
<td>46%</td>
</tr>
<tr>
<td>Licenses</td>
<td>67</td>
<td>139%</td>
</tr>
<tr>
<td>Startups</td>
<td>15</td>
<td>200%</td>
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UM Ventures manages the Center for Maryland Advanced Ventures (CMAV), created by law in 2016 to strengthen the commercialization of high-potential, university-based discoveries and to create jobs in Baltimore by encouraging university-created or -sponsored technology companies to locate in the city. **CMAV funds have been committed to 16 university-affiliated or -sponsored technology entities, creating or retaining 265 jobs in Baltimore.** CMAV initiatives also provide mentorship to UMB and UMCP students on the unique challenges of commercialization in the life sciences industry while offering creative, collaborative support and funding to entrepreneurs.

CMAV also staffs the **Maryland Momentum Fund (MMF)**, a University System of Maryland (USM) $10 million early-stage investment fund that invests in Maryland-based, USM-affiliated startup companies. CMAV funds a full-time director of MMF, based at UMB, and a 50 percent investment manager, based at UMCP. In Fiscal Year 2019, MMF reviewed 137 companies seeking investments, representing five USM institutions, and invested in five of them. **The MMF investment helps companies bridge from early success to the next stage of growth, which often is a large investment, commercial launch, or commercial expansion.**

The image shows a group of people in a modern office setting, possibly related to UM Ventures or CMAV initiatives.
RECENT UM VENTURES SUCCESSES

Breethe, a UMB startup developing a portable artificial lung, raised $6 million, bringing total investments to $16 million since 2015. Breethe employs 20 people in Baltimore.

CoapTech, a UMB startup developing a medical device to allow feeding tubes to be placed without the need for a surgical setting, won a $1.2 million Small Business Innovation Research (SBIR) award from the National Institutes of Health (NIH). The grant will support a 40 patient clinical trial at the University of Maryland Medical Center. In May 2019, CoapTech received U.S. Food and Drug Administration (FDA) 510(k) clearance for the device.

Gliknik, a UMB startup developing multiple therapeutic products, received a $15 million milestone payment from Pfizer after the start of a Phase I clinical trial for the potential treatment of a rare neurological disorder, chronic inflammatory demyelinating polyneuropathy.

Gel e, a joint UMB and UMCP startup developing advanced hemostatic and wound treatment products, received “breakthrough” status designation from the FDA for its first internal use flowable device. Gel e is expanding its label to include use for internal and surgical applications. The first product, now on an accelerated path as a “breakthrough” device, is an expanding injectable hemostat, Life Foam™, which can rapidly provide temporary control of bleeding from noncompressible abdominal wounds that are not amenable to tourniquet application in trauma and battlefield conditions.

InventWood’s cellulose based nanotechnologies are transforming today’s most commonly used products, creating superior, more natural goods while building a more sustainable future for generations to come. This UMCP startup’s product line includes Transparent Wood, MettleWood, and Insulating Wood.

Ion Storage Systems, a UMCP startup, is developing safe, cost effective, and energy dense batteries that can be deployed under the most extreme climate conditions. The batteries offer thermal uniformity, strength, and weight for powering electric vehicles of the future, among a wide range of other applications. The company raised $8 million in financing to begin manufacturing.

MBlue Labs, a UMCP startup, is offering Bluelene™, a line of revolutionary anti aging skin care products powered by methylene blue. This line has been scientifically shown to preserve skin cell health better than any other anti oxidant skin formulation. Bluelene™ stimulates skin cells to produce both collagen and elastin and is currently available via the company website and Amazon.

NeoProgen, a UMB startup, completed a $1.5 million seed funding round, which included a $245,000 investment from the Maryland Momentum Fund (MMF). NeoProgen is developing a novel cell based therapy...
for people who experience a heart attack and patients with advanced heart failure. NeoProgen plans to initiate a Series A investment round of $8 million to $10 million to fund a Phase I trial, which is expected to start enrolling patients during the first half of 2020.

**NextStep Robotics**, a UMB startup tackling stroke rehabilitation, was awarded $1 million by NIH’s National Institute of Neurological Disorders and Stroke to finalize design of a new device to address foot drop. If milestones are met and approved by NIH, NextStep will receive an additional $4.4 million over four years. In May 2019, NextStep received $600,000 in a second round of funding, including an investment from UM Ventures.

**N5 Sensors**, a UMCP startup, developed ultra sensitive, highly selective, low-power, and economical chemical sensors that allow micro scale chemical sensor arrays to be designed on a single chip with tailored sensitivity and selectivity. N5 Sensors is commercializing this technology for a variety of sensing applications, such as environmental monitoring, toxic chemical release detection, and industrial safety. The company has received eight SBIR awards and introduced its products to the market.

**pathOtrak**, a UMCP startup, developed a portable and easy-to-use device that shortens the time to test for pathogens in a food supply from 24 hours to four hours. This technology uses a microfluidic chip device to bypass time consuming processing steps to separate and test food borne pathogens from unprocessed samples.

**PaverGuide**, a UMCP startup, offers a structural base for paving systems to allow any sidewalk or patio to be made permeable. Manufactured from recycled plastic, it exceeds H 20 loading design standards and can be installed faster and cheaper than the stone it replaces.

**Veralox Therapeutics**, a startup led by a UMB graduate, raised $5.4 million in seed funding. The round was co-led by Sanofi Ventures and the JDRF T1D Fund. MMF also is an investor. Veralox is developing small molecule therapeutics that treat the underlying pathologies of thrombosis and Type 1 diabetes.

**Xcision**, a UMB startup selling the GammaPod stereotactic radiotherapy system for breast cancer in the United States, received a CE certification mark, paving the way for new sales in Europe and offering patients the latest option in noninvasive breast cancer treatment.
The University of Maryland Strategic Partnership: MPowering the State creates and supports complementary, multidisciplinary research collaborations that ignite innovation and high-impact discoveries. UMB and UMCP share world-class research programs, with scores of partnerships with government and businesses, creating jobs and underscoring Maryland’s distinction as a top research innovator in the nation.

MARYLAND: A NATIONALLY RECOGNIZED RESEARCH POWERHOUSE

Recognition of University of Maryland research is at an inflection point in history and delivering on an important vision of the Maryland General Assembly and the University of Maryland Strategic Partnership Act. Over the next 12 months, Maryland will begin jointly reporting research achievements and emerge on the national scene as a billion dollar research enterprise, joining the top tier of research universities in the United States.

The joint reporting of Maryland’s total research expenditures is a direct result of Senate Bill 1052, the University of Maryland Strategic Partnership Act, passed by the legislature in 2016, and the subsequent creation of a combined research office for both UMB and UMCP.
$1 BILLION+
FISCAL YEAR 2019 UMB AND UMCP COMBINED
AWARDS FROM FEDERAL, STATE, AND LOCAL
RESEARCH GRANTS AND CONTRACTS

600
JOINT RESEARCH PROPOSALS
SINCE 2012

80+
SEED GRANTS
AWARDED TO FACULTY FOR JOINT
RESEARCH COLLABORATIONS
A new seed grant challenge
to research the impact of artificial
intelligence in medicine
is sparking new partnerships.

1 VICE PRESIDENT
FOR RESEARCH
JOINTLY APPOINTED BY THE UMB
AND UMCP PRESIDENTS IN 2018

$204 MILLION
IN JOINT FUNDING AWARDED SINCE 2012
SELECTED RESEARCH PARTNERSHIPS

**OPIOID USE DISORDERS RESEARCH COLLABORATION:**
*Developing treatments to address the opioid epidemic in Maryland and nationwide.*
UMB’s School of Medicine, UMCP’s Center for Substance Abuse Research, and two dozen other schools and departments are researching solutions to address the opioid epidemic that kills thousands of Marylanders each year. Results from this multi-year work are impacting training, outreach, and policy while sparking new collaborations and grants.

**MARYLAND BLENDED REALITY CENTER:**
*Developing innovative applications for visual computing technology in research, health care, and training.*
UMCP computer scientists and UMB medical professionals are researching the use of augmented and virtual reality technology in medical and health care applications such as critical care patient diagnostic tools, nonopioid pain management, and next-generation medical education tools. This immersive technology also is being used to train police to identify and combat implicit bias.

**CENTER FOR BRAIN HEALTH AND HUMAN PERFORMANCE AT COLE FIELD HOUSE:**
*Cutting-edge center focusing on the advanced study of the brain and nervous system.*
The new center at the renovated Cole Field House in College Park — the first shared research facility created by the Strategic Partnership — brings together leading researchers in neuroscience, genomics, biomechanics, and other fields. An adjacent orthopaedic center will bring leading-edge medical facilities to UMCP, allowing for the rapid translation of research into practice.

**INSTITUTE FOR BIOSCIENCE AND BIOTECHNOLOGY RESEARCH (IBBR):**
*Developing solutions to address major health and scientific challenges that benefit patients while creating economic development in Maryland.*
Located in Montgomery County, in the heart of Maryland’s biotechnology corridor, IBBR is a partnership among UMB, UMCP, and the National Institute of Standards and Technology (NIST). It forms key alliances with biopharmaceutical companies and federal agencies to develop biomedical and health care solutions and accelerate commercialization. Last year, its researchers were awarded 11 new grants with funding totaling $21.5 million. Among dozens of projects, researchers are developing vaccines for hepatitis C and other infectious agents. IBBR also provides infrastructure support to the biopharmaceutical industry through a nationwide public-private partnership.

**MARYLAND CENTER FOR ADVANCED MOLECULAR ANALYSIS (M-CAMA):**
*Advancing the research and development of new drugs and medical treatments for disease.*
Located within IBBR in Rockville, the new center positions the University of Maryland to become a national leader in the use of cryo-electron microscopy (cryo-EM) technology to drive scientific innovation and discovery. Recognized as a breakthrough tool in developing drugs and medical treatments, cryo-EM impacts biomedical research through its ability to deliver imaging that transforms the understanding of biology and drug interactions in the human body. Working in partnership with NIST, the center houses cutting-edge instruments — as well as scientific leadership that has deep expertise with this technology — to guide and assist users from any University System of Maryland institution, as well as industry partners.
Advancing Research and Addressing Real-World Problems

MARYLAND BLENDED REALITY CENTER

CENTER FOR BRAIN HEALTH AND HUMAN PERFORMANCE AT COLE FIELD HOUSE

MARYLAND BLENDED REALITY CENTER

CENTER FOR BRAIN HEALTH AND HUMAN PERFORMANCE AT COLE FIELD HOUSE
MARYLAND COCHLEAR IMPLANT CENTER OF EXCELLENCE: Delivering advanced care to people with hearing loss.

Collaborators are combining the research and educational strengths of UMCP in audiology and speech-language pathology with the surgical and clinical expertise of School of Medicine faculty at UMB to deliver cutting-edge care for people with hearing loss. The goal is to make Maryland the premier location for educational training, clinical services, and basic and translational biomedical research on cochlear implants.

ROBERT E. FISCHELL INSTITUTE FOR BIOMEDICAL DEVICES: Bringing together skilled scientists, medical doctors, health practitioners, and bioengineers to research, design, and build life-saving biomedical devices and train the next generation of innovators.

The institute catalyzes the transformation of basic research into clinical practice and commercial success. The staff and a network of experts facilitate prototyping and manufacturing as well as venture creation, intellectual property creation, and successful passage of a product through clinical, regulatory, and reimbursement hurdles.

The institute has an office at UMCP and an innovation space for students, entrepreneurs, faculty, and staff. Planning is underway to create a location at UMB. Several projects are in development, including work on a portable medical device that can measure biochemical information in a patient to diagnose disorders such as schizophrenia.
The University of Maryland Strategic Partnership: *MPowering the State’s* joint educational offerings fuse the strengths and complementary missions of UMB and UMCP to attract talented students, create a pipeline for student advancement, and meet workforce demands and students’ needs for flexible training.

**DELIVERING ENHANCED ACADEMICS AND MOVING MARYLAND FORWARD**

**20+** JOINT ACADEMIC COLLABORATIONS CREATED, INCLUDING DUAL-DEGREE OFFERINGS, NEW DEGREES AND CERTIFICATES, GUARANTEED PATHWAYS TO ADMISSION, AND STUDENT ENRICHMENT PROGRAMS.

**600** BIOENGINEERING UNDERGRADUATES HAVE WORKED WITH UMB MEDICAL FACULTY IN CAPSTONE AND CLINICAL EXPERIENCES COURSES.

**750** UMCP STUDENTS HAVE PARTICIPATED IN MLAW: UNDERGRADUATE PROGRAMS IN LAW, TAUGHT BY FACULTY AT UMCP AND THE UMB FRANCIS KING CAREY SCHOOL OF LAW.
UMCP and UMB students have conducted research at the opposite campus through the UM Scholars program.

120

Master of Science in Law degrees have been conferred in specialties, including cybersecurity law and health care law.

115

New graduate degree programs have been created: Joint PhD program in Bioengineering launched in Fall 2019 and Master of Professional Studies in Public Safety Leadership and Administration to launch in Fall 2020.

2

New undergraduate majors in Neuroscience and Immersive Media Design will launch at UMCP in Fall 2020 and 2021.

2
SELECTED EDUCATIONAL COLLABORATIONS

Bioengineering Academic Programs
- UMB’s and UMCP’s leadership in bioengineering and medicine creates tremendous learning opportunity for students and faculty.
- UMCP undergraduates team with faculty physicians at UMB to experience firsthand the robust link between engineering and human health.
- Students are exposed to the medical field and clinical settings, see the direct application of medical devices in a hospital setting, and create their own engineering designs from concept to product.
- New joint PhD program in bioengineering the MPower Graduate Fellowship — spans both institutions and offers students an opportunity to create and deliver engineering solutions to challenging clinical problems related to medicine, pharmacy, or dentistry.

MLAW Undergraduate Programs in Law
- The MLAW programs offered at College Park give students exposure to ideas, mentors, and professional opportunities in law not normally available to undergraduates.
- Faculty from the UMCP College of Behavioral and Social Sciences and the College of Arts and Humanities as well as the UMB Carey School of Law teach a variety of subjects such as immigration and crime, global environmental law, health law, and structural racism and housing.

Master of Science in Law (MSL)
- Designed for working professionals, the MSL is a master’s level education in law, policy, and regulations, taught at College Park and online by UMB Carey School of Law faculty.
- The program offers specializations in health law, environmental law, patent law, cybersecurity law, and homeland security and crisis management law.

Coming next: Online certificate programs in cybersecurity law and homeland security and crisis management law designed specifically for lawyers.

Policing and Public Safety Administration
- A new master’s degree and certificate program in public safety leadership and administration target personnel in law enforcement, first response, social services, and other agencies that coordinate with the judicial system.
- Developed by faculty from UMCP’s College of Behavioral and Social Sciences’ departments of Sociology and Criminology and Criminal Justice, and UMB’s Carey School of Law, this program responds to an increasing need for advanced training in leadership, policy, and law for police and public safety officials and other public servants.

University of Maryland Center for Economic and Entrepreneurship Development (UMCEED)
- Established by law in 2016, UMCEED increases workforce readiness by creating degree programs in high impact fields such as neuroscience, virtual and augmented reality, biomedical devices, data analytics, and cybersecurity.
- The colleges of Behavioral and Social Sciences and Computer, Mathematical, and Natural Sciences (CMNS) will launch a new undergraduate neuroscience major in 2020 to train students interested in health care, allied health careers, biomedical industries, and clinical psychology. This will be the first intra college major offered at UMCP.
- A new Bachelor of Science and Bachelor of Arts degree in immersive media design offered by UMCP’s College of Arts and Humanities and CMNS will launch in 2021. A collaboration between STEM fields and the arts and humanities, the degree prepares students to be leaders in the production of augmented reality, virtual reality, and immersive media design disciplines.

UM Scholars
- This dynamic 10 week research program connects students from UMB and UMCP to faculty mentors at the opposite campus to work on projects designed to expand students’ knowledge and open their eyes to other fields.
- Students benefit from tailored faculty mentoring on topics such as health, science, public health, law, and social work.
SERVING MARYLAND — AND BEYOND

The University of Maryland Strategic Partnership: *MPowering the State* brings together top thinkers from multiple branches of expertise in health, science, law, and social science to redefine challenges and devise solutions that make a positive impact in Maryland and on society at large.

**AGRICULTURE LAW EDUCATION INITIATIVE (ALEI):**
*Educating and serving Maryland family farmers through expert information and training to help navigate complex legal issues such as estates and trusts, regulatory compliance, farm food safety, and other aspects of agriculture law.*

ALEI reaches the state’s agricultural community through in-person training, publications, social media alerts, and formal classroom education. It holds a popular annual conference on agriculture and environmental law that addresses current legal issues impacting Delmarva communities. Undergraduate students at UMCP and law students at UMB benefit from classes taught by legal specialists on agriculture and law.

**SUPPORT, ADVOCACY, FREEDOM, AND EMPOWERMENT (SAFE) CENTER FOR HUMAN TRAFFICKING SURVIVORS:**
*Combating human trafficking through direct services, research, advocacy, and training.*

The SAFE Center is the first systematic, university-based program to serve victims of human trafficking with comprehensive legal, social, economic empowerment, mental health, and medical services. Since its founding in 2016, it has served 150 survivors of human trafficking and provided service to families of victims. Nine UMB and UMCP schools and colleges are engaged and 50 students have served internships at the center, helping to provide client services, develop programs and curriculum, conduct outreach, and do research. Located along the I-95 corridor in an area known as a hub for human trafficking, the center serves victims in Prince George’s and Montgomery counties.

SAFE CENTER DIRECTOR OF CLINICAL SERVICES ROSA “DELMY” ALVAYERO, MSW LCSW-C, OFFERS RESOURCES AT THE PRINCE GEORGE’S COUNTY DEPARTMENT OF PARKS AND RECREATION’S 2019 HISPANIC FESTIVAL.
JOINT LEADERSHIP FOR INTERNATIONAL GLOBAL HEALTH CONFERENCE:
Leveraging UMB’s and UMCP’s collaborative leadership in global health to share knowledge on critical issues facing the state, the nation, and the world.

In April, UMB and UMCP are co-hosting the 2020 Consortium of Universities for Global Health (CUGH) in Washington, D.C. The annual event attracts 2,000 attendees from more than 50 nations, including a sizable number of students. CUGH is one of the world’s largest associations of academic institutions addressing international challenges. Working under the conference theme, “Global Health in a Time of Worldwide Political Change,” UMB’s Center for Global Engagement and the UMCP School of Public Health’s Global Health Initiative are organizing three presentations that will feature university experts: Vaccines as a Tool for Public Health Equity; Global Security and Emerging Infectious Diseases; and Global Health and Human Trafficking, led by the executive director of the MPower-created SAFE Center.

ANNUAL PUBLIC HEALTH RESEARCH DAY @ MARYLAND:
Addressing public health research initiatives and ways to protect the health and well-being of communities in Maryland.

This popular daylong event, hosted by UMCP’s School of Public Health and the UMB School of Medicine’s Department of Epidemiology and Public Health, draws more than 600 students, faculty, and staff from UMB, UMCP, and other universities, plus attendees from nonprofits, government agencies, and the private sector.
MPOWER DAY IN ANNAPOLIS ANNUALLY SHOWCASES STUDENT PROGRAMS AND OTHER STRATEGIC PARTNERSHIP INITIATIVES.
MPOWER AT A GLANCE

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CURRENT PROGRAMS AND INITIATIVES
Agriculture Law Education Initiative (ALEI)
Bioengineering Capstone Design Course
Bioengineering Clinical Experiences for Undergraduates
Bioengineering Joint PhD
Center for Brain Health and Human Performance at Cole Field House
Center for Health-Related Informatics and Bioimaging (CHIB)
Collaborative, Cross-Institution Academic Degree Pathways to Multiple Schools and Colleges
Collaborative Research Proposals
Institute for Bioscience and Biotechnology Research (IBBR)
Joint Research and Innovation Seed Grant Program
Maryland Blended Reality Center (MBRC)
Maryland Center for Advanced Molecular Analysis (M-CAMA)

Maryland Center of Excellence in Regulatory Science and Innovation (M-CERSI)
Maryland Cochlear Implant Center of Excellence (MCICE)
Master of Science in Law (MSL)
MLAW: Undergraduate Programs in Law
National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL)
Opioid Use Disorders Research Collaboration
Policing Partnership: Master of Professional Studies in Public Safety Leadership and Administration
Robert E. Fischell Institute for Biomedical Devices
Support, Advocacy, Freedom, and Empowerment (SAFE) Center for Human Trafficking Survivors
Social Work Program Expansion at Shady Grove
University of Maryland Center for Economic and Entrepreneurship Development (UMCEED)
UM Scholars
UM Ventures / Center for Maryland Advanced Ventures (CMAV)