



Committee: Directly to Council
Committee Review: N/A
Staff: Craig Howard, Deputy Director
Purpose: To receive testimony/final action - vote expected
Keywords: UMD, Economic Development

AGENDA ITEM #14
November 29, 2022
Public Hearing/Action
REVISED #2

SUBJECT

Supplemental appropriation to the County Government's FY23 Operating Budget, Institute for Intelligent and Immersive Computing for Science and Medicine Non-Departmental Account, \$15,000,000 (Source of Funds: General Fund Undesignated Reserves)

EXPECTED ATTENDEES

None

COUNCIL DECISION POINTS & COMMITTEE RECOMMENDATION

The Council will hold a public hearing and consider action on the supplemental appropriation.

DESCRIPTION/ISSUE

The Executive proposes the subject appropriation to fund a new Institute for Intelligent and Immersive Computing for Life Sciences and Medicine (the "Institute") in North Bethesda (see ©1-3). The County executed a Memorandum of Understanding (MOU) with Universities of Maryland College Park and Baltimore and University of Maryland Medical System (collectively, the "Universities"). The subject appropriation is for seed funding of the new Institute, and the current expectation is for the County to provide an additional \$5 million annually for another five years following the launch. The Council introduced this supplemental appropriation on November 15, 2022.

SUMMARY OF KEY DISCUSSION POINTS

- The Executive held a press conference announcing the MOU to create an "Institute for Health Computing" on November 10, 2022 (see ©4-16).
- The total proposed direct funding by the County for the new Institute is \$40 million over six years. The Executive proposes using the General Fund reserves to fund the \$15 million appropriation in FY23.
- The County is supporting the startup costs for the new Institute through the proposed \$15 million appropriation (summarized below). See ©17 for a more detailed breakdown.
 - \$3.0 million for new equipment
 - \$1.6 million for installation staff and services
 - \$3.0 million for tenant improvements (e.g., raise the ceiling of the leased floor)
 - \$1.3 million for the lease
 - \$6.3 million for staff costs of the new Institute (e.g., the research team)

- The MOU also requires the County to support the ongoing operating expenses of the new Institute for \$5 million annually for years two through six.
- Executive staff provided a breakdown of the anticipated funding commitments from the Universities for the new Institute (see ©18-19). The following summarizes these commitments:
 - \$23 million was spent between 2018 to 2022 for faculty and staff to establish a Center on Artificial Intelligence. These expenditures were invested on the respective campuses of the universities, not in North Bethesda.
 - \$10 million during the next three years to purchase related health system clinical data.
 - \$5 million annually for ongoing operating expenses of the new Institute.
- Executive staff provided the major milestones for the new Institute on ©18. The Institute is expected to find a final location around FY29 in North Bethesda.
- Per Executive staff, the new Institute is expected to be self-sufficient after year 6. The new Institute will generate revenues through consulting fees with businesses and other third parties to conduct research. Based on the current estimated annual operating expenses, the new Institute would need to generate about \$10 million a year (not adjusted for inflation) to be self-sufficient.
- The County’s primary benefits of the new Institute, as conveyed in the current proposal, are: 1) the cache of having a premier research center in the County; and 2) potential business creation and/or growth by businesses desiring to locate near the Institute.
- On November 22, the Executive Branch provided written follow-up responses to the following questions (©20-24):
 - How will this effort support racial equity and social justice?
 - How will the effort partner with our education institutions already in the County?
 - How will the business community interact with this Center?
 - How can the Institute spend \$15 million in the current fiscal year, and can’t some of this expenditure be shifted to the following fiscal year?
 - Will the County seek additional state and federal funding?
 - Further clarity on funding commitments for the County and the Universities.

This report contains:

County Executive memorandum	©1
Proposed resolution	©2-3
Signed MOU	©4-16
Breakdown of the \$15 million expenditures	©17
Major milestones and universities funding commitments of the new Institute	©18-19
Executive Branch follow-up responses provided on November 22, 2022	©20-24

Alternative format requests for people with disabilities. If you need assistance accessing this report you may [submit alternative format requests](#) to the ADA Compliance Manager. The ADA Compliance Manager can also be reached at 240-777-6197 (TTY 240-777-6196) or at adacompliance@montgomerycountymd.gov




OFFICE OF THE COUNTY EXECUTIVE

Marc Elrich
County Executive

MEMORANDUM

October 27, 2022

TO: Gabe Albornoz, President
Montgomery County Council

FROM: Marc Elrich, County Executive 

SUBJECT: Supplemental Appropriation #23-49 to the FY23 Operating Budget
Montgomery County Government
Institute for Intelligent and Immersive Computing for Life Science and Medicine
Non-Departmental Account (NDA) \$15,000,000
(Source of Funds: General Fund: Undesignated Reserves)

I am recommending a supplemental appropriation to the FY23 Operating Budget of the Institute for Intelligent and Immersive Computing for Science and Medicine Non-Departmental Account (NDA) in the amount of \$15,000,000 to support the start-up and operational needs of the Institute for Intelligent and Immersive Computing for Life Sciences and Medicine (the Institute). The Institute will be located in the White Flint/North Bethesda area.

In partnership with the University of Maryland, College Park, and the University of Maryland, Baltimore, Montgomery County aims to establish the White Flint/North Bethesda area as a global center of excellence in computationally enabled life sciences research. The Institute will bring together world-class researchers exploring how Artificial Intelligence, machine learning, and virtual and augmented reality can facilitate knowledge discovery for human health and well-being. These funds will provide for lease costs, tenant security deposits, operating expenses, and staff expenses for the Institute.

I recommend that the County Council approve this supplemental appropriation in the amount of \$15,000,000 and specify the source of funds as General Fund: Undesignated Reserves.

ME:jk

cc: Joy Nurmi, Chief of Staff to Council President
Thomas Lewis, Development Ombudsman, Office of the County Executive
Jennifer R. Bryant, Director, Office of Management and Budget

Resolution No.: _____
Introduced: _____
Adopted: _____

**COUNTY COUNCIL
FOR MONTGOMERY COUNTY, MARYLAND**

By: Council President at the request of the County Executive

SUBJECT: Supplemental Appropriation to the FY23 Operating Budget Montgomery County Government, Institute for Intelligent and Immersive Computing for Science and Medicine Non-Departmental Account, \$15,000,000 (Source of Funds: General Fund: Undesignated Reserves)

Background

1. Section 307 of the Montgomery County Charter provides that any supplemental appropriation shall be recommended by the County Executive who shall specify the source of funds to finance it. The Council shall hold a public hearing on each proposed supplemental appropriation after at least one week’s notice. A supplemental appropriation that would comply with, avail the County of, or put into effect a grant or a Federal, State or County law or regulation, or one that is approved after January 1 of any fiscal year, requires an affirmative vote of five Councilmembers. A supplemental appropriation for any other purpose that is approved before January 1 of any fiscal year requires an affirmative vote of six Councilmembers. The Council may, in a single action, approve more than one supplemental appropriation. The Executive may disapprove or reduce a supplemental appropriation, and the Council may reapprove the appropriation, as if it were an item in the annual budget.
2. The County Executive has requested the following FY23 supplemental appropriation for the Institute for Intelligent and Immersive Computing for Science and Medicine Non-Departmental Account (NDA):

<u>Personnel Services</u>	<u>Operating Expenses</u>	<u>Capital Outlay</u>	<u>Total</u>	<u>Source of Funds</u>
\$0	\$15,000,000	\$0	\$15,000,000	General Fund Undesignated Reserve

3. The supplemental appropriation is needed to fund essential start-up costs and operational needs of the Institute for Intelligent and Immersive Computing for Life Sciences and Medicine.

4. In partnership with the State of Maryland; the University of Maryland, College Park; and the University of Maryland, Baltimore, Montgomery County aims to establish the White Flint/North Bethesda area as a global center of excellence in computationally enabled life sciences research.
5. North Bethesda's proximity to the National Institute of Standards and Technology, National Institutes of Health, Food and Drug Administration, United States Army Medical Research Institute of Infectious Diseases, Agency for Healthcare Research and Quality, Walter Reed National Military Medical Center, and the Naval Medical Research Center provides a unique opportunity for it to emerge as the prime location for revolutionary healthcare and medical innovation enabled by artificial intelligence (AI), virtual and augmented reality (VR/AR) and big data.
6. The Institute for Intelligent and Immersive Computing for Life Sciences and Medicine at White Flint/North Bethesda will bring together researchers exploring how AI, machine learning, and VR/AR can facilitate knowledge discovery for human health and well-being.
7. The County Executive has requested a supplemental appropriation to the FY23 Operating Budget in the amount of \$15,000,000 for the Institute for Intelligent and Immersive Computing for Life Sciences and Medicine and that the source of funds will be General Fund: Undesignated Reserves.
8. The Non-Departmental Account created by this resolution will be administered by the Office of the County Executive, Development Ombudsman
9. The public was notified, and a public hearing was held.

Action

The County Council for Montgomery County, Maryland approves the following resolution:

A supplemental appropriation to the FY23 Montgomery County Government Operating Budget for the Institute for Intelligent and Immersive Computing for Science and Medicine Non-Departmental Account (NDA):

<u>Personnel Services</u>	<u>Operating Expenses</u>	<u>Capital Outlay</u>	<u>Total</u>	<u>Source of Funds</u>
\$0	\$15,000,000	\$0	\$15,000,000	General Fund Undesignated Reserve

This is a correct copy of Council action.

Judy Rupp
Clerk of the Council



MEMORANDUM OF UNDERSTANDING

This MEMORANDUM OF UNDERSTANDING ("MOU") is entered into by and among Montgomery County, Maryland (the "County"); University of Maryland, Baltimore ("UMB"); University of Maryland, College Park ("UMCP"); and University of Maryland Medical System Corporation ("UMMS"), each a "Party" and collectively the "Parties." UMB and UMCP are collectively referred to as the "Universities."

BACKGROUND

The Parties agree to a collaboration that will be called "***The University of Maryland 3 - Institute for Health Computing (UM-3-IHC)***" (the "Institute") in North Bethesda, which will leverage UMMS's provision of customized unique and diverse de-identified data sets and bring together world-class researchers exploring how artificial intelligence ("AI"), machine learning ("ML"), and clinical analytics can facilitate knowledge discovery for human health and wellbeing.

The Institute will be a transformative collaboration between the County, UMMS, and the Universities to establish North Bethesda as a national epicenter of computationally enabled biomedical research, population health, and precision medicine.

The Institute will employ state-of-the-art analytics, algorithms, and computation to address fundamental challenges in clinical medicine through a unique partnership between the County, UMMS, and the Universities. Additionally, the Parties will work together to provide collaboration opportunities to the Universities at Shady Grove ("USG").

The Institute will catalyze a clinical data science ecosystem at North Bethesda that draws FDA and NIH investigators, UMB and UMCP faculty, medical bioinformatic educational programs and students, and industry partners, allowing expansion of computational "dry" laboratories, virtual meeting rooms and classrooms.

The Institute will connect the University of Maryland ecosystem, with appropriate federal and state government agencies (NIST, NIH, FDA, USAMRIID, AHRQ, Walter Reed, the Naval Medical Research Center), and industry partners.

The Institute will align three pillars of expertise to advance population health in the State of Maryland and to serve patients and communities through innovations in computation:

- UMB, home to top-ranked health science professional schools including Medicine, Nursing, Pharmacy and Dentistry.
- UMCP, harnessing state-of-the-art expertise in public health, AI, ML, and virtual and augmented reality (“VR/AR”).
- University of Maryland Medical System Corporation (“UMMS”), which serves a 5.5 million patient population across allied member organizations, all linked through electronic health care records (“EHR”), and with a formal linkage to primary care and population health and historic and longitudinal data across the care continuum.

NOW THEREFORE, in consideration of the mutual promises set forth in this MOU and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the County, UMMS, UMB, and UMCP agree as follows:

1. Establishment of Institute.

a. The Parties agree that the Institute will advance clinical analytics and improve patient care, by using real-time access to patient populations, driven and refreshed by UMMS’s custom de-identified data curation connected with electronic medical record (EMR) data, pursuant to appropriate data licenses:

- Real world data;
- Population health;
- Pragmatic adaptive clinical trials; and
- Immersive computing for medicine and healthcare.

b. Detailed information regarding the four initial major initiatives of the Institute is set forth on **Schedule A**, attached hereto and incorporated herein by reference. The Parties acknowledge that Schedule A is conceptual in nature, non-binding, and will be formalized in subsequent written agreements signed by authorized officials of the Parties.

c. As part of establishing the Institute, UMB, UMCP, and UMMS will create appropriate governing documents that establish the Institute’s entity formation and govern the Institute’s internal operations, including without limitation bylaws; an operating agreement; and agreements related to the use and protection of intellectual property, confidentiality, data use, and other relevant matters.

2. Goals. The project goals for the Institute are set forth on **Schedule B**, attached hereto and incorporated herein by reference. As with Schedule A, the Parties recognize that Schedule B is in early conceptual stages and will be formalized pursuant to subsequent written agreements signed by authorized officials of the Parties.

3. Commitments of Parties. The Parties' commitments under this MOU are as follows:

a. Subject to the appropriation and availability of funds and to a future grant agreement that the Parties will negotiate, the County intends to commit \$40 million to the Universities and UMMS to support the Institute over six years, starting in FY 2023 with a \$15 million Supplemental Budget amendment, then \$5 million per year for the following five fiscal years for operating support for the Institute.

b. The Universities commit to spending a roughly equivalent amount (although not on the same schedule) over the next six fiscal years. That amount may include funds already expended within the last three fiscal years by the Universities on aspects of AI, ML, and VR/AR that are directly related to the establishment of the programs at the Institute.

c. Subject to the appropriation and availability of funds, the County, commits to (and has already applied for) a \$3 million federal earmark for the Institute. Subject to federal budget approval, the County has been designated to receive that additional \$3 million in start-up funding.

i. Of the \$15 million FY 2023 County intended commitment for the Institute, \$3 million will be designated as the required match for the federal earmark, with the result that the combined County and federal start-up funding for the Institute will be \$18 million.

ii. The earmark funds are contingent on the passage of an omnibus budget for the fiscal year in the current term of Congress. If the earmark is not passed, the County does not commit to replace those federal funds with County funds.

d. The County, UMMS, and the Universities commit to jointly seek additional funding from the State of Maryland to support the programs of the Institute.

e. The County may assist the Universities in identifying appropriate leased space for the Institute in the area immediately around the North Bethesda Metro Station for the next five to six years. The Parties expect that the Institute will relocate to the WMATA property at the North Bethesda Metro Station (the "Intended Site") at the end of the lease (assuming that the development of that site is proceeding). If the Intended Site is not ready, the Institute will pursue an extension of the existing lease or lease another space in the immediate area but will not move outside the North Bethesda Metro Station property area.

f. The County has already committed \$10 million in infrastructure to support the development of the Intended Site to ensure that it is viable for development within the time

frame for the planned relocation of the Institute to a free-standing building on the Intended Site, or a portion of an appropriate shared building on the Intended Site. D

g. Insofar as permitted by law, the County commits to continuing its efforts to redevelop the surrounding area to support the environment in which the Institute will be located to help ensure its success. This provision does not bind the Montgomery County Council.

h. The County, through its business and economic development function, will also work with the Universities to identify private sector life sciences, hospitality, and other sector companies in Montgomery County that could benefit from the research and consulting services of the Institute.

4. Term and Termination.

a. The term of this MOU will commence upon the signing by all Parties, and will be in effect until December 31, 2028, unless terminated earlier in accordance with this Article. Any renewals of this MOU must be exercised by the mutual written agreement of the Parties hereto in advance of December 31, 2028.

b. In the event of any breach, default, or other failure by a Party to perform any material provision of this MOU, another Party may terminate this MOU if the breach, default, or other failure is not cured within one hundred eighty (180) days of written notice thereof, subject to the dispute resolution provisions herein and the subsequent written agreements that address Institute operations, wind-down, and/or amended activities of the Parties.

c. The Parties may terminate this MOU at any time for convenience by unanimous mutual written consent addressing all appropriate required wind-down actions and responsibilities.

5. Miscellaneous.

a. *Relationship of Parties.* The Parties are not (and nothing in this MOU may be construed to constitute them as) partners, joint venturers, agents, representatives, or employees of the other. No Party has any right or authority to bind or obligate another Party in any manner or make any representation or warranty on behalf of another Party.

b. *Liability of Parties.* The Parties agree that each Party shall be responsible for its own actions and omissions, and the acts or omissions of that Party's officers, employees, agents, and contractors, in the performance of this MOU. Furthermore, the liability of the Universities shall be governed exclusively by the terms and provisions of the Tort Claims Act, Title 12 of the State Government Article, Annotated Code of Maryland, as amended from time to time. The County's liability and performance under this MOU is subject to, limited by, and contingent upon the appropriation and availability of funds, as well as the notice requirements and damages limitations stated in the Local Government Tort Claims Act, Md. Code Ann., Cts. & Jud. Proc. Sec. 5-301, et seq. (the "LGTC"); and Md. Code Ann., Cts. & Jud. Proc. §5-5A-02, (together the "County Indemnification Statutes"), all as amended from time to time. This MOU is not intended

to create any rights or causes of action in any third parties or to increase the Applicant's liability over and above the caps provided in the Indemnification Statutes. This MOU does not bind the County in its regulatory capacity.

c. *Insurance.* Each Party shall maintain adequate insurance, in the forms (including self-insurance), types and amounts, that it deems appropriate, in its sole and absolute discretion, for its provision of services under this MOU, including as applicable, professional liability, errors and omissions insurance, commercial general liability insurance, cyber liability insurance, and worker's compensation insurance.

d. *Confidential Information.* Prior to any sharing any confidential information, including but not limited to UMMS data, the Parties will enter into separate agreements to address confidentiality and data use.

e. *Notices.* Any written notice required under this MOU shall be sent to the attention of the signatories hereto at the addresses set forth on the signature page.

f. *Governing Law.* This MOU shall be governed by the laws of the State of Maryland without reference to its conflicts of laws principles.

g. *Modifications.* The Parties agree to periodically meet and discuss the terms of this MOU to make any necessary amendments or modifications. This MOU shall only be modified by written agreements signed by the authorized representatives of each Party.

h. *Disputes.* The Parties will work to resolve disputes amicably and shall elevate disputes to their chief executives if such disputes cannot be resolved at the project level within thirty (30) days of good faith resolution efforts. Additional executive resolution and collaboration procedures shall be memorialized in the anticipated operating agreement or other governing document between the Parties.

i. *Assignment.* This MOU and any rights and obligations hereunder shall not be assigned without the prior written consent of the non-assigning Parties, which shall not be unreasonably withheld.

j. *Waiver.* No provision of this Agreement shall be waived unless done so in a writing signed by all Parties to this MOU. The waiver of any provision of this MOU shall not be deemed to be a continuing waiver or the waiver of any other provision of this MOU.

k. *Entire Agreement.* This MOU and its attachments constitute the entire understandings of the Parties with respect to the subject matter of this MOU. All prior agreements, whether oral or written, are superseded by this MOU.

l. *Counterparts.* This MOU may be executed in counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. Counterparts may be delivered via facsimile, electronic mail (including PDF or any electronic signature complying with the U.S. federal E-SIGN Act of 2000, e.g., www.docusign.com),

or other transmission method. Any counterpart so delivered shall be deemed to have been duly and validly delivered and be valid and effective for all purposes.

[Signatures on following page]

IN WITNESS WHEREOF, the parties enter into this Memorandum of Understanding.

MONTGOMERY COUNTY

By: _____
Marc Elrich
County Executive

Date: _____

*Address: 101 Monroe Street, 2nd Floor
Rockville, MD 20850*

UNIVERSITY OF MARYLAND, BALTIMORE

By: _____
Bruce E. Jarrell, MD, FACS
President

Date: _____

*Address: Office of the President
220 Arch Street, 14th Floor
Baltimore, Maryland 21201*

UNIVERSITY OF MARYLAND, COLLEGE PARK

By: _____
Darryll J. Pines, PhD
President

Date: _____

*Address: Office of the President
Main Administration Building
7901 Regents Drive
College Park, MD 20742-5025*

UNIVERSITY OF MARYLAND MEDICAL SYSTEM CORPORATION

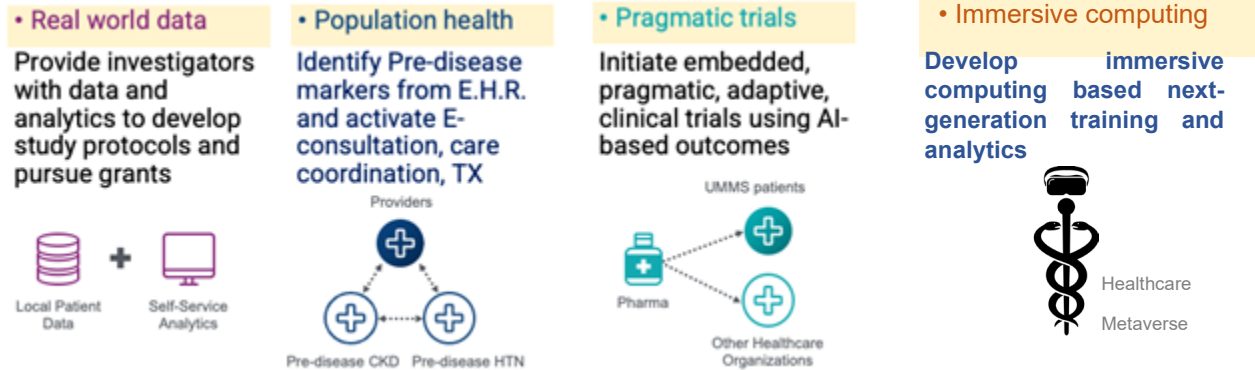
By: _____
Mohan Suntha, MD, MBA
President and CEO

Date: _____

*Address: 250 West Pratt Street
Baltimore, Maryland 21201*

SCHEDULE A
MAJOR INITIATIVES

Real-time access to patient populations, driven and refreshed by electronic medical record (EMR) data



1. **Real-World Data:** Harmonize and analyze UMMS clinical data and UMB research data to create multi-omics and real-world clinical information data sets to advance systems biology and clinical analytics. De-identification systems with removal of >16 identifiers allow for HIPAA-compliant (as applicable) data sharing and analysis across the University of Maryland ecosystem.
 - a. Examples of real-world data include the use of ML algorithms to study emerging disease and risk stratification, such as the risk factors for development of early kidney disease, early predictors of risk in pregnancy, and predictors for the development of addiction and overdose.
 - b. Real-world health records are being increasingly characterized by multiple data streams of heterogeneous data, such as biomedical sensors in an ICU (temperature, blood pressure, respiratory rate), real-time brain imaging (fMRI, fNIRS, EEG, or MEG), and several other sources. Systemic approaches to developing real-time algorithms, software systems and toolkits for ingestion, filtering, visualizing, and analyzing multiple interacting data streams will revolutionize the use of big data in health care and medicine.
2. **Population Health:** UMMS has a uniquely diverse and vulnerable patient population, presenting a critically important opportunity to identify early signs of disease that are easily accessible from the electronic health care record. Programs will be developed to reach out to patients with these risk factors via electronic consultation, nurse educators and care coordinators, and specialty services to recommend early interventions and to partner with the primary care community and patients to bend the curve of “pre-disease” towards health.

- a. Examples include programs that identify pre-diabetes or out of control diabetes using lab values like high glucose and hemoglobin A1C to target health education and drug treatment. Similar approaches target early kidney disease by rising creatinine, and early high blood pressure in pregnancy, known to worsen pregnancy outcomes. Identification of rapidly rising weight allows opportunities to improve healthy living, target food desserts, and introduce new highly potent weight loss treatments, like the GLP1 agonists and SGLT-2 inhibitors.
 - b. As physicians and scientists engage with data-driven models of disease progression, it is critical that they incorporate fairness from the ground up by bringing together scholars of medicine, data science, and AI/ML with members of the very communities suffering from the burdens of race and history. Disparities in race, gender, and socioeconomic status impact healthcare systems in ways that are hard to identify, and yet they are often reproduced in biased AI/ML predictions because their training data incorporate biases arising from population health disparities.
3. **Pragmatic Adaptive Clinical Trials:** The future of clinical research is to move the trials outside of the “white tower” of academic medical centers and into the community. Patients can be identified through the EHR after diagnosis in outpatient clinics and regional hospitals.

The EHR is “flagged” to ask if the doctor and patient want to enroll in an intervention trial of a new therapy and then a research coordinator remotely calls the patient and family for consent. The patient is randomized to treatment A, B, C, vs. placebo, and outcomes are monitored continuously by blinded artificial intelligence protocols that assess pre-specified efficacy outcomes in the electronic health care record, e.g., *Which treatment is working better to improve organ function, survival, hospitalization, etc.?*

If one treatment is better than the other, the next patients are adaptively randomized in greater and greater proportions to the treatments that work, thus limiting the risk of a patient receiving a treatment that does not work. Once a treatment is statistically superior, the trial is automatically stopped.

- Examples include the REMAP-CAP clinical trials group which adaptively randomized patients with SARS-CoV2 in hundreds of regional hospitals and rapidly established the efficacy of hydrocortisone, anti-IL6, and heparinization, improving mortality during severe COVID-19 pneumonia.
4. **Immersive Computing for Medicine and Healthcare:** Metaverse is the next horizon in healthcare. Immersive VR/AR for medical training has the potential to fundamentally change, improve, and reduce the cost of training and maintaining skills across all aspects of healthcare—in Maryland, across the United States, and in developing countries worldwide.

The Institute will develop VR tools for medical education and training for several scenarios including: (a) clinical encounters and patient interviews, (b) planned medical surgeries and medical procedures, and (c) time-critical surgeries at a shock-trauma center.

The Institute's goal is to facilitate an immersive experience of such medical encounters and procedures, in the form of immersive playback from high-fidelity VR recordings that can be navigated in space and time. Annotations (multimedia, text, graphics) added by experts could further enhance the effectiveness of such reconstructions as compelling education, communication, and archival tools.

Currently, surgeons and other healthcare providers must simply remember how to perform operations. This is especially problematic for complex and often emergent operations like femoral artery closure, upper extremity fasciotomy, and subclavian artery procedures. Immersive VR for training has the potential to fundamentally change, improve, and reduce the cost of training and maintaining skills in these procedures, and across all aspects of healthcare.

The State of Maryland is fortunate to have what is arguably the world's finest trauma care facility, the R Adams Cowley Shock Trauma Center in Baltimore. Known simply as "Shock Trauma," the center admits more than 8,000 critically ill and injured patients each year, with a survival rate of approximately 96 percent.

Shock Trauma, working closely with computer science experts at UMCP, will develop a unique program at the Institute that would use the latest advances in immersive networked technologies—VR/AR over 5G networks—to train emergency care providers in Maryland, in the nation, and around the world. These emerging technologies could be rapidly deployed and scaled up, and prototypes of various systems are already under development.

- One example is a virtual training system in development that provides an almost lifelike experience in conducting a lower extremity fasciotomy (LEF), a limb-saving technique of cutting the sheath of tissue encasing a muscle to treat loss of circulation.
- Other telepresence training modules would address the latest advances in onsite stabilization and transportation to medical facilities, specialized diagnostic imaging techniques, emergency airway intubation, and more.

The immersive technologies being developed by Shock Trauma, UMB, and UMCP can be easily scaled up over 5G networks, offering time-critical expertise to almost any number of physicians at virtually any location that has internet access. This includes rural areas in Maryland, which could be used as a testbed for these lifesaving training modules before they are deployed on a global scale.

SCHEDULE B
CONCRETE PROJECT GOALS

Years 1-2:

1. Establish initial (temporary) location and begin first endeavors utilizing existing MPower projects.
2. Consolidate de-identified electronic health care data from inpatient and outpatient practices of UMMS and University of Maryland Faculty Physicians, Inc. (“FPI”) into a central data warehouse (and cloud-based systems). This is largely complete (real-world data is currently accessible and informs the demographic presentations contemplated in this MOU).
3. Design deidentification systems to allow clinical and multi-omics patient-centered real-world investigation available at the investigators’ desktops.
4. Design HIPAA-protected clinical analytics systems to improve the efficiency and quality of patient care, design and initiate pragmatic and adaptive clinical trials, and support implementation science.
5. Recruit Institute Director(s), Center Director(s), and data scientists with dual appointments and physical presence at UMMS, the Institute, UMB and/or UMCP. This could include additional physical presence of the director at the Universities at Shady Grove.
 - Examples include population health focused on maternal health, disparities, cardiovascular, renal, oncology, and infectious disease, pharmacoepidemiology, climate medicine, real-world data ML, quantum-biomedical computing, emerging pathogen detection, precision medicine, patient-centered drug design, and pragmatic adaptive clinical trials.
6. Leverage existing educational programs at Universities at Shady Grove and develop “big data” and VR/AR training programs (undergraduate, masters, and graduate programs) virtually and physically integrating with the Institute. Capitalize on undergraduate and graduate student experiential learning opportunities as research integrated with the Institute.
7. Assess the existing and potential partnerships with NIH, NIST AHRQ, FDA, and other federal agencies.

Years 3-5

1. Plan and build a new, permanent home for the Institute at the Intended Site.
2. Consolidate multi-omics data sets, provisioned by UMMS, from UMB basic and translational research into a central data warehouse (or cloud-based systems) including genomics,

transcriptomics, proteomics, metabolomics, lipidomics, and phenomics for project-based and systems-based analysis.

3. Use clinical and linked population-based data analytics to drive programs in population health that identify early disease or pre-disease risk factors and deliver targeted preventive health care for individuals and target populations.
4. Expand embedded randomized adaptive pragmatic clinical trials architecture in all UMMS hospitals and UMMS/FPI clinics.
5. Develop population-based clinical analytics and data-driven interventions designed to eliminate unconscious bias and health care disparity and inequity.
6. Develop competitively funded project partnerships between UMB, UMCP and UMMS that break down silos and catalyze partnerships between basic, clinical, population health, and computational science domains.

Program Leadership

Leadership will be tasked with an overarching mission to rapidly develop the infrastructure and architecture to leverage the vast clinical and biological sciences information in UMMS and UMB, which must be coupled to a parallel major initiative to recruit data scientists and train the next generation of data scientists at UMCP. These data will not be useful without a rich ecosystem of translational data scientists, and the scientists will not succeed without access to rich data sources. These catalytic investments are expected to drive NIH, Patient-Centered Outcomes Research Institute (PCORI), State, County, and industry funding and partnerships.

Dr. Amitabh Varshney, Dean of the University of Maryland College of Computer, Mathematical, and Natural Sciences, and Dr. Mark T. Gladwin, Dean of the University of Maryland School of Medicine will oversee the recruitment of three key leaders representing UMB, UMCP, and UMMS. Dr. Warren D'Souza, PhD, MBA, FAAPM, Vice President, Enterprise Data and Analytics and Chief Innovation Officer, UMMS, will lead the UMMS efforts with additional resources dedicated immediately to accelerate the development of data integration, distribution, programming, and clinical analytics in collaboration with computational partners from UMCP to accelerate development.

Three Institute Directors will be assigned as interim or recruited as co-Institute Directors: one co-Institute Director from UMMS, Warren D'Souza; one co-Institute Director from UMB, ideally a physician-scientist and an expert in systems biology and clinical analytics (real-world evidence, pragmatic and adaptive clinical trials, multi-omics systems biology); and a second co-Institute director from UMCP, who is an expert in mixed reality, advanced computing, and AI.

The Deans and Institute Directors will recruit Center Directors and data scientists, as well as align current faculty, to “mine, analyze, and visualize” the real-world data and develop programming strategies to embed new population health initiatives and pragmatic trials structure into the

electronic health care record and regional hospital/clinic environments. This will require additional recruits in complementary areas of computational science (programming, VR/AR, advanced statistics, and AI/ML Bayesian outcomes analysis).

The Deans and Institute Directors are expected to develop robust partnerships with community representatives, NIH, FDA, DOD, and industry allies to advance the scientific, clinical, and regional development missions.

North Bethesda Institute Capital Expenditures

EQUIPMENT

(40) TensorEX TS4-194492555 @ \$12,089.45	\$483,578.00
(320) Nvidia A6000 GPU @ \$4,450.00	\$1,424,000.00
(10) APC AR3100 42U Rack @ \$1,303.19	\$13,031.90
(10) ServerTech Dual PDU Bundle @ \$4,352.00	\$43,520.00
(4) Mellanox SN4600C 100GbE Switch @ \$29,769.83	\$119,079.32
(20) DellEMC H400 Storage Node @ \$28,073.94	\$561,478.80
(20) VR/AR computers with headsets and displays	\$120,000.00
(2) High intensity laser projectors	\$220,000.00
SUB-TOTAL EQUIPMENT (CDS REQUEST)	\$2,984,688.02

INSTALLATION PERSONNEL

IT Director, 20% FTE	\$33,937.28
Platform Engineer, 2 FTE	\$203,548.80
Network Engineer, 30% FTE	\$22,270.56
Help Desk Manager, 40% FTE	\$30,542.72
INSTALLATION PERSONNEL	\$290,299.36

FRINGE BENEFITS

Calculated @ 35.40 or 29.30% for the personnel	\$85,057.71
TOTAL INSTALLATION PERSONNEL COSTS	\$375,357.07

Annual Computer Networking and Electricity	\$298,468.80
Hardware Service Contract	\$447,703.20
TOTAL INSTALLATION and SERVICE	\$1,121,529.08

Data Center Renovations (raised floor, HVAC, Power)	\$1,000,000.00
Office Renovations from the Shell Space	\$2,000,000.00
Space Lease 25,000 sq ft @ \$50/sq ft	\$1,250,000.00
Startup Costs for New Professional Researchers & Faculty at North Bethesda Institute	\$6,268,425.00

Recruit start up for PIs and research teams on site for three areas:
 SOM Co-director of institute, Center director or PI focused on
 Population health, Center director or PI focused on Real world
 data-clinical analytics.

TOTAL INSTALLATION and INSTITUTE COSTS	\$14,999,999.17
---	------------------------

Projected Milestones/Timeline:

- 11/1/22 – Introduction of \$15M Supplemental Budget Proposal – Institute
- 11/15/22 – Council Hearing on \$15M Supplemental for Institute – Testimony expected Office of the County Executive, Development Ombudsman, and Dean of partnering University computational sciences department.
- Mid-November - (date between 11/10 and 11/17, yet to be determined) – MOU signature between County and Partnering Universities’ Presidents.
- Nov. 15 to Feb. 1 (dependent on date of MOU and subject to Council budget approval) – Recruitment of leadership, signing of lease, and beginning of purchases for computational equipment (note: much of the required equipment is specialized and some may be subject to supply chain issues).
- Feb./March – Opening of Institute in leased space with Institute senior staff and leadership (subject to transition timing for senior leaders).
- March through October 1, 2023 – Buildout and installation completion for initial computational assets beginning in FY 23 and continuing into the beginning of FY 24. Continue staffing up.
- FY 28-29 – Expectation is to move to permanent building or larger space in a shared building on the Washington Metropolitan Area Transit Authority (WMATA) property at North Bethesda Metro Station.

Commitments:

By County:

- \$40M to the Universities to support the Institute at North Bethesda over six (6) years:
 - \$15M in FY 23 (Supplemental Budget Appropriation Required);
 - \$5M per year for five (5) years beginning in FY 24.

By Universities:

- Establishment of a joint Institute for Intelligent and Immersive Computing for Life Sciences and Medicine at North Bethesda and commit to spending a roughly equivalent amount of funds as the County, although not on the same schedule, over the next six (6) years:
 - \$23M spent between 2018 and 2022 in faculty and staff expense in anticipation of establishing a Center on AI and VR/AR (many of whom will remain in UMCP).
 - \$2M per year for at least five (5) years for a total expenditure of \$10M beginning in 2021 and extending through at least the first three (3) years for an “informatics core” for the translation and application of raw, anonymized data to clinical research.

- At least \$10M in funding in the first three (3) years for an expedited ramp-up of related health system clinical data analytics necessary to support the ongoing operation and innovation
- At least \$5M per year in operating expenditures by the Universities to meet the ongoing space, staffing, electrical and infrastructure costs of the Center, matching the County expenditures for the first five (5) full years of operations.
- After year six (6), it is anticipated that the Center will sustain itself without the support of the County, through research consulting with private life sciences and other private corporate entities, federal grants, and continued support from the Universities where necessary.

By County and Universities Jointly:

- The County and the Universities commit to jointly seek significant additional funding from the State to support the programs at the Institute at North Bethesda.
- The County and the Universities commit to applying their current diversity and inclusion commitments to this project, and further commit to make a conscious focus on including research that addresses disease that has disproportionate impact on minority populations.

Response to Supplemental Questions from County Council, Nov. 22, 2022

“Institute for Health Computing” (UM 3 - IHC)

(Note: The Institute was referred to in earlier submissions to the Council as the “Institute for Intelligent and Immersive Computing for Life Science and Health Care)

Background: This joint research Institute for Health Computing is a partnership of the University of Maryland College Park (UMCP), the University of Maryland Baltimore (UMB), and the University of Maryland Medical System (UMMS).

1- How will this effort support racial equity and social justice?

The biggest potential impact on racial equity and social justice from this partnership is the opportunity to support a significant step forward in closing the health outcome disparities suffered by under-represented minorities in the County, the State, and across the country.

Because of the diversity of its patients, over 60 percent of the data sets in UMMS’ patient data base are from historically under-represented communities. In this new Institute UMB, UMCP and UMMS will partner to leverage recent advances in artificial intelligence (AI), computing, and data analytics to create a premier ‘learning health care system’, that is, a system that evaluates both de-identified data and secure, digitized medical health data to diagnose, prevent and treat diseases in patients in the County and across the state of Maryland.

The first step to improved health outcomes for populations that have traditionally received second class care is to fully understand the extent of the problem. The rich and diverse data sets from UMMS will allow for a deep understanding of health equity issues, unique to this Institute, and will help position the county as a leader in health equity.

It is hoped that the application of these advanced computational systems to the very diverse data base of the UMMS’ patient population will not only lead to improved outcomes in the overall patient population, but also help to close racial and other disparities in health care outcomes that have been endemic in Montgomery County, the State and across the U.S. for a very long time.

In terms of commitment to racial equity and diversity more generally, all three of the partner institutions have a strong history and commitment to diversity and racial equity. The University of Maryland Baltimore has publicly committed to diversity as a core value: “At UMB, we embrace and are committed to diversity, and we value inclusive and just communities. We oppose racism and oppression in all their forms. Equity and Justice are part of the University’s Core Values.” The UMCP also has a strong record of commitment to the value of diversity, which is stated as a vision of the institution: “We envision a university that fully embraces diversity, equity and inclusion as morally right and educationally sound, and that centers on the wellbeing of individuals and communities.” The third partner, UMMS, with over 30,000 employees statewide, is also strongly committed to diversity and racial equity in its hiring and contracting as well as in the medical services it provides.

Another, less obvious, benefit to racial equity and social justice in the County is that the Institute’s A.I., Machine Learning, and Virtual and Augmented Reality (VR/AR) capabilities can also be expected to create new employment opportunities in the County beyond health care research. As the Institute for Health Computing’s capabilities grow and evolve, the County’s growing biomanufacturing sector will potentially benefit from the VR/AR in training for work from entry level to advanced functions. Also, several large hospitality companies in the County have also expressed interest in the benefits of virtual reality for training, which could continue to keep Montgomery County at the leading edge of that industry and will give Montgomery County residents trained here a competitive advantage in employment in the County and beyond.

2- How will the effort partner with our education institutions already in the County?

The UMCP and UMB partners already have a variety of education programs at the Universities at Shady Grove, and their plan with this new research institute is to establish a number of new internship and fellowship programs for students at the Universities at Shady Grove. Internships will also be available for students at

Montgomery College. The presence of the Institute in the County will open a new avenue of job training and practical experience in research from the start from the first year of operation of the Institute and continuing into the future.

The UMCP and UMB also believe there is an opportunity to establish a wider array of related advanced computing and life science courses at the Universities of Shady Grove, including the possibility of additional courses at the graduate level, to support the additional demand for advanced computing and life science workers that is expected in the County in the coming years. However, those additional course opportunities are still in planning stages.

3- How will the business community interact with this center?

Several businesses have already approached the Universities about co-location opportunities and each of the Universities are reaching out to current contacts in Montgomery County and the Washington Metropolitan area to encourage the use of the services that will be available at the site. In addition, the Office of the County Executive's leadership and business outreach teams and the Montgomery County Economic Development Corporation will be working with the local business community to connect them to the new Institute and to connect Institute leaders to businesses that could benefit from the expertise at the Institute. Certain businesses already have reached out to County leaders to learn more about the Institute and potentially mutually beneficial research activity.

Response to Additional Questions –

4- How can the Institute spend \$15M in the current fiscal year and can't some of this expenditure be shifted to the following fiscal year?

The Institute does need the entire \$15M request in the current fiscal year. The Universities are planning, pending approval of the Supplemental Budget, to open the Institute in late February or March. The Institute has already identified several 'principal investigators' (PI's), each of whom leads a team of three to five or more researchers. Those PI's already have federal and other grants that they would bring with them to this site. Some of their respective teams may come with them and other positions will be hired locally. Those principal investigators need to

have a commitment for their salaries and the salaries of the related staff in order to move forward with relocating to Montgomery County. The plan is for the Institute to have about 20 staff people on board within the first few months, and to grow to about 100 staff within two to three years. However, the staff hired directly by the Institute is only a part of the expected employment coming to the County from this initiative and the County's investment of \$15M, since the Institute is expected to almost immediately draw private companies to co-locate close to the computer and personnel assets at the Institute.

Computer equipment is also a significant part of the funds required in the first year. That computing equipment must be purchased immediately in order to assure adequate time for installation, so the researchers do not lose time on their current grants when they move. Because of the complexity of installation, there is a set-aside in the budget for the \$15M that was submitted to the Council specifically for installation of the computer equipment. Those costs are also an immediate expense. Finally, the lease of 20 to 25,000 sq. ft, at about \$50 per square foot, is also an expense that will begin immediately. Some staff will likely be on site prior to the completion of installation and the Universities are considering temporary space for some staff pending completion of equipment install. There are appropriate, furnished, temp spaces in the immediate North Bethesda area to accommodate that possibility. For the Institute to be able to start as soon as planned and to be completely functional in the time frame needed, the entire \$15M requested needs to be available in the current fiscal year.

Over the next five years, the lease and ongoing operating expenses will be covered, subject to the approval of a future Council, by the five year \$5M commitment from the County and the Universities' expenditure of a similar amount each year.

5- Will the County seek additional state and federal funding?

The County did seek and was granted \$10M in funding from the State in the 2022 Legislative Session for work on the WMATA site to prepare the site for development. The plan is for the Institute to be located on that site. The County

also sought and was designated for a \$3M earmark by the Maryland Congressional Delegation. That money will become available if a federal omnibus budget passes before the end of the year.

Going forward, the County plans to work with the Universities to request funds from the State through the incoming Governor. In addition, some of the researchers who will be recruited to the Institute will bring federal research funding with them. The County will also seek other federal funding if other sources become available.

6. To clarify the sources of funding:

The County commits \$15M in the current year and \$5M per year for five years for a total of \$40M over six years for the purposes discussed above in item 4.

At the same time, the Universities have committed to spend a total of \$45M toward this project:

- The Universities have committed to expend \$2M per year over five years for a total of \$10M over five years for the computer informatics core that is needed to translate UMMS data for use in the Institute's research function.
- The Universities commit to spend \$10M in the first three years for a 'ramp up' of data analytics capacity (mostly staff cost) on the translation of data.
- The Universities commit \$25M from their State MPower funding to this project for ongoing operations over five years (\$5M per year) beginning next fiscal year to match the County expenditure over that time frame.
- In addition to the Universities' expenditures, UMMS has committed to expend \$14M per year for the duration of the next five years for their own data analytics and equipment expenditures to connect to and serve this IHC project.

For Further Information, Contact: Tom Lewis
Thomas.lewis@montgomerycountymd.gov

MEMORANDUM

November 28, 2022

TO: County Council

FROM: Craig Howard, Deputy Director

SUBJECT: **Supplemental appropriation to the County Government’s FY23 Operating Budget, Institute for Intelligent and Immersive Computing for Science and Medicine Non-Departmental Account, \$15,000,000**

As noted in the staff report for item #14 at ©20, the MOU agreed to by the County Executive, the University of Maryland College Park (UMCP), the University of Maryland Baltimore (UMB, and the University of Maryland Medical System formally agreed to the following name for this Institute: “The University of Maryland 3 (UM 3) – Institute for Health Computing”.

The County Executive’s October 27 transmittal and draft resolution referenced a different name: “Institute for Intelligent and Immersive Computing for Science and Medicine”.

As a result, Council staff recommends a technical amendment to replace all instances of “Institute for Intelligent and Immersive Computing for Science and Medicine” with “UM 3 – Institute for Health Computing” in the draft resolution submitted by the Executive (©2-3).

A modified resolution including the recommended technical amendment follows below at ©26-27.

Resolution No.: _____
 Introduced: _____
 Adopted: _____

**COUNTY COUNCIL
 FOR MONTGOMERY COUNTY, MARYLAND**

By: Council President at the request of the County Executive

SUBJECT: Supplemental Appropriation to the FY23 Operating Budget Montgomery County Government, UM 3 – Institute for Health Computing ~~Institute for Intelligent and Immersive Computing for Science and Medicine~~ Non-Departmental Account, \$15,000,000 (Source of Funds: General Fund: Undesignated Reserves)

Background

- Section 307 of the Montgomery County Charter provides that any supplemental appropriation shall be recommended by the County Executive who shall specify the source of funds to finance it. The Council shall hold a public hearing on each proposed supplemental appropriation after at least one week’s notice. A supplemental appropriation that would comply with, avail the County of, or put into effect a grant or a Federal, State or County law or regulation, or one that is approved after January 1 of any fiscal year, requires an affirmative vote of five Councilmembers. A supplemental appropriation for any other purpose that is approved before January 1 of any fiscal year requires an affirmative vote of six Councilmembers. The Council may, in a single action, approve more than one supplemental appropriation. The Executive may disapprove or reduce a supplemental appropriation, and the Council may reapprove the appropriation, as if it were an item in the annual budget.
- The County Executive has requested the following FY23 supplemental appropriation for the UM 3 – Institute for Health Computing ~~Institute for Intelligent and Immersive Computing for Science and Medicine~~ Non-Departmental Account (NDA):

<u>Personnel Services</u>	<u>Operating Expenses</u>	<u>Capital Outlay</u>	<u>Total</u>	<u>Source of Funds</u>
\$0	\$15,000,000	\$0	\$15,000,000	General Fund Undesignated Reserve

- The supplemental appropriation is needed to fund essential start-up costs and operational needs of the UM 3 – Institute for Health Computing ~~Institute for Intelligent and Immersive Computing for Life Sciences and Medicine~~.

4. In partnership with the State of Maryland; the University of Maryland, College Park; and the University of Maryland, Baltimore, Montgomery County aims to establish the White Flint/North Bethesda area as a global center of excellence in computationally enabled life sciences research.
5. North Bethesda's proximity to the National Institute of Standards and Technology, National Institutes of Health, Food and Drug Administration, United States Army Medical Research Institute of Infectious Diseases, Agency for Healthcare Research and Quality, Walter Reed National Military Medical Center, and the Naval Medical Research Center provides a unique opportunity for it to emerge as the prime location for revolutionary healthcare and medical innovation enabled by artificial intelligence (AI), virtual and augmented reality (VR/AR) and big data.
6. The UM 3 – Institute for Health Computing ~~Institute for Intelligent and Immersive Computing for Life Sciences and Medicine~~ at White Flint/North Bethesda will bring together researchers exploring how AI, machine learning, and VR/AR can facilitate knowledge discovery for human health and well-being.
7. The County Executive has requested a supplemental appropriation to the FY23 Operating Budget in the amount of \$15,000,000 for the UM 3 – Institute for Health Computing ~~Institute for Intelligent and Immersive Computing for Life Sciences and Medicine~~ and that the source of funds will be General Fund: Undesignated Reserves.
8. The Non-Departmental Account created by this resolution will be administered by the Office of the County Executive, Development Ombudsman
9. The public was notified, and a public hearing was held.

Action

The County Council for Montgomery County, Maryland approves the following resolution:

A supplemental appropriation to the FY23 Montgomery County Government Operating Budget for the UM 3 – Institute for Health Computing ~~Institute for Intelligent and Immersive Computing for Science and Medicine~~ Non-Departmental Account (NDA):

<u>Personnel Services</u>	<u>Operating Expenses</u>	<u>Capital Outlay</u>	<u>Total</u>	<u>Source of Funds</u>
\$0	\$15,000,000	\$0	\$15,000,000	General Fund Undesignated Reserve

This is a correct copy of Council action.

Judy Rupp
Clerk of the Council



OFFICE OF RACIAL EQUITY AND SOCIAL JUSTICE


Marc Elrich
County Executive

Tiffany Ward
Director and Chief Equity Officer

MEMORANDUM

November 28, 2022

To: Jennifer Bryant, Director
Office of Management and Budget

From: Tiffany Ward, Director
Office of Racial Equity and Social Justice 

Re: Racial Equity Impact Assessment (REIA) for Supplemental Appropriation (SA) #23-49 Institute for Intelligent and Immersive Computing for Life Science and Medicine

- I. **FINDING:** The Office of Racial Equity and Social Justice (ORESJ) finds that Supplemental Appropriation #23-49 *Institute for Intelligent and Immersive Computing for Life Science and Medicine* has the potential to advance racial equity and social justice in the long-term, though its short-term impacts are unlikely to reduce racial inequities affecting employment and business ownership in life science and biotech industries.
- II. **BACKGROUND:** The purpose of Supplemental Appropriation #23-49 Institute for Intelligent and Immersive Computing for Life Science and Medicine is to provide start-up and operational funds for said Institute, which is envisioned to support the County's life science industry and employment base. Researchers at the Institute will conduct advanced computing research in Artificial Intelligence, Machine Learning, and Virtual and Augmented Reality (VR/AR) and will support advanced (VR/AR) research and training capabilities in life sciences and manufacturing in the County. The Institute will be headquartered in the vicinity of the North Bethesda Metro Station and operate in partnership with the University of Maryland College Park and the University of Maryland Baltimore.

Based on available information, the Institute will support the County in the following ways:

- Enhance the County's academic research capabilities

- Complement higher education assets at the University of Shady Grove and Montgomery College
- Support private-sector life sciences industry; create new high-paying jobs
- Attract high-tech companies to the area
- Produce research that advances public health and related fields.

For this racial equity impact assessment, ORESJ will focus on the extent to which the Institute advances racial equity in the areas of education and employment in the life science industry (and STEM fields more broadly). ORESJ will also offer recommendations for how the Institute can help strengthen the County's small business ecosystem and advance equitable access for business owners of color, women, and other structurally excluded groups.

Employment and Education:

One of the main goals of the Institute is to create new, high-paying jobs in the life science industry. It is estimated that within the first three years of operation, the Institute will hire approximately 120 employees. The following is a snapshot of the life sciences industry in the County, including top subfields and major occupations and their wages.

In the County, the second-largest industry (based on the number of jobs) is the Professional, Scientific, and Technical Services industry, with approximately 75,000 jobs in 2020¹. The fifth-largest subsector in this industry is Research and Development in Biotechnology (an area in which the Institute will operate), which is expected to grow by 7% by 2025². Within the R&D in the Biotechnology subsector, the largest occupation group is Medical Scientists (except epidemiologist) at 12.1%, followed by Natural Sciences Managers at 6.7% and Biological Scientists, All Others at 4.5%³. According to the US Bureau of Labor Statistics (BLS), life and physical science occupations are generally higher paid than the average of all occupations. This is largely due to the education and skills required to work in these professions⁴. For example, in Montgomery County in 2020, the top qualifications in the Biotechnology and Life Sciences were Doctor of Pharmacy (PharmD), Doctor of Medicine (MD), medical license, Master of Business Administration (MBA), and Medical Technologist. For the top three occupations in the biotechnology subsector in Montgomery County, the hourly mean wage in Maryland in 2021 is as follows⁵:

¹ WorkSource Montgomery. Local Area Workforce Plan. 2020-2024. Available at:

[Mhttp://worksourcemontgomery.com/wp-content/uploads/2022/01/2020-2024-Montgomery-County-Local-Workforce-Plan.pdf](http://worksourcemontgomery.com/wp-content/uploads/2022/01/2020-2024-Montgomery-County-Local-Workforce-Plan.pdf)

² Ibid.

³ Ibid.

⁴ John I. Jones. "A Concise Look at Occupations in the Life and Physical Sciences". 2007. Available at:

<https://www.bls.gov/oes/physical.pdf>

⁵ Occupational Employment and Wage Statistics. May 2021 State Occupational Employment and Wages Statistics.

Maryland. Available at: https://www.bls.gov/oes/current/oes_md.htm#19-0000

Occupation	Mean hourly wage in Maryland
Medical Scientist (except epidemiologist)	\$52.36
Natural Sciences Manager	\$70.96
Biological Scientists, all other	\$51.85

Wages from these occupations exceed the self-sufficiency standard in Montgomery County in 2019—\$23/hour, \$8,096/month, and \$97,150⁶.

Based on the Institute’s research emphasis, it’s likely that many if not all the initial Institute jobs will fall into these three occupation categories. It is, therefore, clear that those initially employed by the Institute are likely to earn wages higher than the County’s self-sufficiency standard, creating sustained economic security for those hired by the Institute.

Given the likely economic benefits created by jobs at the Institute, ORESJ looked at employment trends across the top three occupations within the R&D in the Biotechnology subsector in the county (Medical Scientist (except epidemiologist), Natural sciences managers, and Biological Scientists, all other) as well as the three subfields making up the Professional and Technical Services industry to assess whether employment in these occupations is equitable by race, ethnicity, and gender. Using national data from 2021, ORESJ found an underrepresentation of Black and Latino workers in these three occupations. The trend is similar for Asian workers, except for in the medical sciences occupations. Women were underrepresented across most of the above occupations and industries, except Other professional, scientific, and technical services industries. *See the data analysis section for details.* Data at the County level show similar patterns of underrepresentation, where Black and Latino workers are less likely to be in management, business, science, and arts occupations than White and Asian workers⁷.

Research shows that the lack of diversity in science, technology, engineering, and math (STEM) fields (of which life sciences is a subcategory) is persistent and structural. Black and Hispanic workers are underrepresented in the STEM workforce compared to their representation in the workforce overall⁸. Black workers make up 11% and Hispanic workers make up 17% of the total US workforce, but only 9% and 8% of the STEM

⁶ This is the self-sufficiency standard in Montgomery County in 2019 for Two adults, pre-school, and school-age child. Montgomery County level data from the 2019 Maryland Dataset available here for download:

<https://selfsufficiencystandard.org/Maryland/>

⁷ Montgomery County Racial Equity Profile.

https://www.montgomerycountymd.gov/OLO/Resources/Files/2019%20Reports/OLO2019-7-6_20_19.pdf Pg. 14
 “MANAGEMENT, BUSINESS, SCIENCE, AND ARTS OCCUPATIONS”

⁸ Richard Fry, Brian Kennedy, and Cary Funk. Pew Research Center. “STEM Jobs See Uneven Progress in Increasing Gender, Racial and Ethnic Diversity”. April 1, 2021. Available at:

<https://www.pewresearch.org/science/2021/04/01/stem-jobs-see-uneven-progress-in-increasing-gender-racial-and-ethnic-diversity/>

workforce respectively. These gaps vary by job clusters within the STEM workforce⁹. For the life science field, specifically: Black workers hold 6% of jobs, Hispanic workers hold 8% of jobs, while White workers hold 65% of jobs¹⁰.

ORESJ and The Office of Legislative Oversight (OLO) have documented in multiple racial equity impact assessments the root causes and structural factors creating the underrepresentation of Black, Latino, and women workers in STEM fields. From the colonial era to the present, racial inequities have characterized many aspects of the healthcare system and by extension the biotech (and life sciences) industry—the composition of the workforce as well as the treatment and outcomes of Black, Indigenous, and people of color within it¹¹. Persistent occupational and educational segregation¹², underinvestment in training and support for STEM teachers¹³, and inequitable access to higher education attainment continue to limit the participation and advancement of Black, Latino, and women workers in STEM fields. See the following analyses for additional details:

- Racial Equity and Social Justice (RESJI) Zoning Text Amendment and Statement. The Office of Legislative Oversight. ZTA 22-02 Density and Height Limits, Parking – Biohealth:
<https://www.montgomerycountymd.gov/OLO/Resources/Files/resjis/ZTA/2022/ZTA22-02.pdf>
- Racial Equity Impact Assessment (REIA) of Supplemental Appropriation (SA) #23-10 for ignITe Hub. The Office of Racial Equity and Social Justice:
<https://www.montgomerycountymd.gov/ore/Resources/Files/23-10.pdf>

The University of Maryland College Park and the University of Maryland Baltimore have public-facing statements demonstrating a focus on diversity and a commitment to it as an organizational value. ORESJ hopes that these values will be carried forward in the recruitment, hiring, advancement, and retention policies and practices of the Institute.

Based on the structural factors limiting the participation and advancement of Black and Latino workers in STEM fields, it is unlikely in the short term that the employment inequities described above will be narrowed by the creation of the initial Institute jobs. The development of robust policies and programs to address the upstream barriers to

⁹ Ibid.

¹⁰ Ibid.

¹¹ W.M. Byrd and L.A. Clayton. Journal of the National Medical Association. “Race, medicine, and health care in the United States: A historical survey”. March 2001; 93 (3 Suppl): 11S-34S. Available at:
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2593958/?page=15>

¹² Racial Equity and Social Justice (RESJI) Zoning Text Amendment and Statement. The Office of Legislative Oversight. ZTA 22-02 Density and Height Limits, Parking – Biohealth:
<https://www.montgomerycountymd.gov/OLO/Resources/Files/resjis/ZTA/2022/ZTA22-02.pdf>

¹³ Racial Equity Impact Assessment (REIA) of Supplemental Appropriation (SA) #23-10 for ignITe Hub. The Office of Racial Equity and Social Justice: <https://www.montgomerycountymd.gov/ore/Resources/Files/23-10.pdf>

advancement in STEM fields (K-12, community college, and other technical and skill training) coupled with Institute partnerships that provide paid employment opportunities across the career ladder—student, intern, apprentice, fellow, post-doctoral and beyond—will strengthen the Institute’s ability to shrink STEM employment inequities, and relatedly help to shrink income disparities in the County.

Small Business Development:

The Institute aims to attract high-tech businesses to the county, which has the potential to create additional jobs and enrich other sectors of the economy. To ensure that these investments help drive equitable economic development, ORESJ recommends that the Institute develop strategies for partnering with and investing in entrepreneurs of color, women, and other systemically excluded business owners. Many of the same systemic barriers limiting the participation of Black, Latino, and women workers in STEM fields as workers, affect the demographic composition of business owners in STEM fields as well as the size and survival of those businesses. ORESJ and the Office of Legislative Oversight have documented racial inequities in business ownership and their root causes:

- Racial Equity and Social Justice (RESJI) Expedited Bill 31-22. The Office of Legislative Oversight. Finance—Economic Development Fund – Small Business Innovation Research and Small Business Technology Transfer Matching Grant Program: <https://www.montgomerycountymd.gov/OLO/Resources/Files/resjis/2022/BillE31-22.pdf>
<https://www.montgomerycountymd.gov/OLO/Resources/Files/resjis/ZTA/2022/ZTA22-02.pdf>
- Racial Equity Impact Assessment (REIA) of Supplemental Appropriation #22-59 Business Advancement Team, Life Science & Technology Center. The Office of Racial Equity and Social Justice. <https://www.montgomerycountymd.gov/ore/Resources/Files/22-59.pdf>

In addition to economic inequities (disparities in wealth accumulation and employment opportunities) that generally affect the startup, growth, and survival of small businesses owned by people of color, ORESJ found the following barriers specific to the biotech industry:

- Access to higher education leading to doctorate-level industry knowledge. Education at the highest levels can be costly. Lower levels of wealth accumulation among Black and Latino people in the US, resulting from historical and current policies and practices of exclusion and exploitation¹⁴, along with burdens of student loan debt create economic

¹⁴ Angelita P. Howard, Liane S. Slaughter, Kaylin M. Carey, and James W. Lillard Jr. “Bridges to biotechnology and bioentrepreneurship: improving diversity in the biotechnology sector”. *Nature Biotechnology*. Volume 39, pages1468–1474. 2021. Available at: <https://www.nature.com/articles/s41587-021-01110-3>

barriers to accessing education opportunities necessary for entering the biotech industry.

- Access to start-up capital or seed funding. The Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Grants are often the first sources of funding for new ventures or projects that originate in academia¹⁵. Between 2007 and 2017, 3.6% of SBIR applications were submitted by what the awarding agency calls socially or economically disadvantaged owners, and 2.5% of awards went to this group. For comparison, organizations led by white men had about a 20% chance of having their application granted, whereas for women, socially and economically disadvantaged owners the win rate was less¹⁶. For socially and economically disadvantaged women the rate was 10%¹⁷. The picture from venture capital is not much different. In general, less than one percent of new businesses access venture capital¹⁸. Conversely, 64% of businesses use startup capital from family or personal wealth. Given preceding discussions about racial wealth disparities, this presents a significant barrier for entrepreneurs of color, particularly Black and Latino entrepreneurs¹⁹.
- Unconscious bias towards funding projects in or hiring from schools with large endowments and prestige. This can leave out students attending smaller schools, Historically Black Colleges and Universities, and Latino-serving Institutions²⁰.

Data Analysis:

ORESJ focused on the top three occupations within the R&D in the Biotechnology subsector in the county: Medical Scientist (except epidemiologist), Natural sciences managers, and Biological Scientists, all others. Below are the demographics for those employed in these occupations in the US:

Occupation	2021					
	Total employed	Percent of total employed				
		Women	White	Black or African American	Asian	Hispanic or Latino
Biological scientists	94,000	48.1	71.1	12.1	14.4	2.4

¹⁵ Brady Huggett. "Biotech's Pale Shadow". Nature Biotechnology. Volume 6. Number 1. January 2018. Available at: <https://www.nature.com/articles/nbt.4046.pdf>

¹⁶ Ibid.

¹⁷ Brady Huggett.

¹⁸ Victor Hwang, Sameeksha Desai, and Ross Baird. Ewing Marion Kauffman Foundation. Access to Capital for Entrepreneurs: Removing Barriers. April 2019. Available at:

https://www.kauffman.org/wpcontent/uploads/2019/12/CapitalReport_042519.pdf

¹⁹ Victor Hwang, et al.

²⁰ Brady Huggett.

Occupation	2021					
	Total employed	Percent of total employed				
		Women	White	Black or African American	Asian	Hispanic or Latino
Medical scientists	121,000	49.6	48.0	7.2	43.1	4.5
Natural sciences managers	21,000	–	–	–	–	–

Source: US Bureau of Labor Statistics. Labor Force Statistics for the Current Population Survey. Household Data. Annual Averages. Table 11. Employed persons by detailed occupation, sex, race, and Hispanic or Latino ethnicity. Available at: <https://www.bls.gov/cps/cpsaat11.htm>

Looking specifically at the three scientific fields that make up the professional and technical services industry, the demographics in the US are as follows:

Industry	2021					
	Total employed	Percent of total employed				
		Women	White	Black or African American	Asian	Hispanic or Latino
Management, scientific, and technical consulting services	1,651,000	43.9	80.6	8.8	9.1	7.8
Scientific research and development services	728,000	44.7	72.8	4.9	19.3	8.8
Other professional, scientific, and technical services	649,000	55.1	80.7	9.1	6.2	14.0

Source: US Bureau of Labor Statistics. Labor Force Statistics for the Current Population survey. Household Data. Annual Averages. Table 18. Employed Persons by detailed industry, sex, race, and Hispanic or Latino ethnicity. Available at: <https://www.bls.gov/cps/cpsaat18.htm>

cc: Ken Hartman, Director, Strategic Partnerships, Office of the County Executive
Thomas Lewis, Development Ombudsman, Office of the County Executive
Jake Weissman, ACAO, Office of the County Executive