MORGAN STATE UNIVERSITY

EXTERNAL RESEARCH ADVISORY PANEL

REPORT NO. 1

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Submitted to:
Dr. Victor R. McCrary
Vice President, Research & Economic Development

Compiled by:
Dr. Edet Isuk, Director, Research Compliance

Edited by:
Dr. J.V. Ortiz, Panel Chair

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External Research Advisory Panel
Report #1
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<u>PANEL MEMBERS</u>

Dr. J. V. Ortiz, *Panel Chair*
Ruth W. Molette Professor and Chairman
Department of Chemistry and Biochemistry
Auburn University

Ms. Camylle C. Coley, *Panel Vice-Chair*
Senior Consultant to the Director
DoD Office of Small Business Programs
Workforce Development & STEM Entrepreneurship

Dr. Dianne L. Poster
Special Assistant to the Principal Deputy
Director's Office
National Institute of Standards and Technology

Ms. Betsy Proch
IT Security Analyst
US Department of Homeland Security

Ms. Kelley L. Dempsey
Senior Information Security Specialist
National Institute of Standards and Technology
Information Technology Laboratory/Computer Security Division

Mr. Vincent B. Knox
Senior Associate General Counsel
Johns Hopkins University Applied Physics Laboratory

Ms. Magdalena Navarro
Physical Scientist/Senior International Program Manager
National Institute of Standards and Technology
International and Academic Affairs/ Office of the Director

Ms. Joanne C. Murphy
Chief Architect, CISSP
Signature Client Group
AT&T Operations, Inc.

Dr. Anthony Dent
Adjunct Professor, Cheyney University

MSU Division of Research & Economic Development (D-RED) Senior Staff

Dr. David Wilson
President
Morgan State University

Dr. Victor McCrary
Vice President
Division of Research & Economic Development

Dr. Mildred H. Ofosu
Assistant Vice President
Sponsored Programs & Research

Dr. Tim Akers
Assistant Vice President
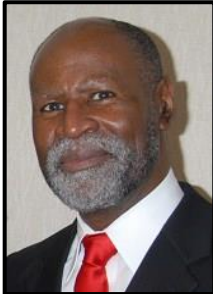Research Innovation & Advocacy

Dr. Edet Isuk
Director
Research
Compliance

Gerald Whitaker
Director
Base Realignment/
DoD Liaison

Dr. Kelton Clark
Director
Morgan P.E.A.R.L.

Ellis Brown
Acting Director
Morgan Community
Mile

Denise Bower
Interim Director
Restricted Funds
Accounting

Morgan State University External Research & Advisory Panel (ERAP)
Roles and Responsibilities

General Statement

The principal objective of the External Research & Advisory Panel (ERAP) is to advise Morgan State University (MSU) on how to achieve its vision as it relates towards being a premier, *research*, urban institution that conducts high quality, forward-looking, innovative research activities across its various schools and colleges. In addition, the ERAP is expected to offer advice on areas supportive and aligned to Morgan's research enterprise including technology transfer, and economic development activities. The External Research & Advisory Panel will meet twice a year, and provide a written summary report of its observations and recommendations to the MSU Vice-President of Research & Economic Development. The VP of Research & Economic Development will share this report with the Morgan State University President, President's Cabinet, and the Morgan State University Internal Research Council.

Specific Roles and Responsibilities

1. **Assess Morgan's Research Activities based on:**
   a. Domain expertise and experience in specific research areas
   b. Current research trends and prior work
   c. Current funding levels and trends
   d. Domestic and foreign technology advances
   e. Balance of STEM & non-STEM research across the University

2. **Assess Morgan's Research Administration by**:
   a. Evaluating the overall University Research Strategy led by the VP for Research & Economic Development
   b. Evaluating the University environment for its support of faculty research
   c. Evaluating the adequacy of metrics to assess reporting of sponsored programs
   d. Sharing of best-practices for oversight of sponsored programs
   e. Sharing of best practices for technology transfer
   f. Sharing of best practices for the University as a catalyst for economic development

3. **Benchmark Morgan's Research Capabilities**:
   a. Relative to alternative providers (e.g. other universities, National laboratories) and potential partners, based on quality, reputation and cost
   b. Based on potential for technology transfer and potential work for industry (where appropriate)
   c. Based on the adequacy of faculty to meet anticipated challenges
   d. Based on the adequacy of technical facilities to meet anticipated challenges
   e. Based on the University's reputation to attract both grants & contract and research faculty

4. **Advocacy of Morgan's Research Enterprise by:**
   a. Identification of potential partners and resources for Morgan State University
   b. Identifying opportunities for faculty and staff members to increase participation on external boards, and working groups to increase their exposure to the greater research community

MORGAN STATE UNIVERSITY

Vision Statement[i]
Morgan State University is the premier public urban research university in Maryland, known for its excellence in teaching, intensive research, effective public service and community engagement. Morgan prepares diverse and competitive graduates for success in a global, interdependent society.

Mission Statement[ii]
Morgan State University serves the community, region, state, nation, and world as an intellectual and creative resource by supporting, empowering and preparing high-quality, diverse graduates to lead the world. The University offers innovative, inclusive, and distinctive educational experiences to a broad cross section of the population in a comprehensive range of disciplines at the baccalaureate, master's, doctoral, and professional degree levels. Through collaborative pursuits, scholarly research, creative endeavors, and dedicated public service, the University gives significant priority to addressing societal problems, particularly those prevalent in urban communities.

Core Values

The following institutional core values guide the promotion of student learning and success, faculty scholarship and research, and community engagement at Morgan:

Excellence. Excellence in teaching, research, scholarship, creative endeavors, student services, and in all aspects of the University's operations is continuously pursued at Morgan to ensure institutional effectiveness and efficiency.

Integrity. At Morgan, honest communications, ethical behavior, and accountability for words and deeds are expected from all members of the University community.

Respect. Each person at Morgan is to be treated with respect and dignity and is to be treated equitably in all situations.

Diversity. A broad diversity of people and ideas are welcomed and supported at Morgan as essential to quality education in a global interdependent society. Students will have reasonable and affordable access to a comprehensive range of high quality educational programs and services.

Innovation. Morgan encourages and supports its faculty, staff, and students in all forms of scholarship including the discovery and application of knowledge in teaching and learning and in developing innovative products and processes.

Leadership. Morgan seeks to provide rigorous academic curricula and challenging co-curricular opportunities to promote the development of leadership qualities in students and to facilitate leadership development among faculty, staff, and students.

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[i] *Growing the Future, Leading the World:* The Strategic Plan for Morgan State University, 2011-2021
[ii] Ibid

Report of the External Research Advisory Panel
Morgan State University

On January 30 and 31, 2014, Dr. Victor McCrary, Vice President for Research and Economic Development at Morgan State University (MSU), convened the first meeting of the *Morgan State University External Research Advisory Panel (ERAP)*. Several presentations, a tour of facilities and discussions among members of the panel provided the background for written remarks from ERAP members that are summarized in this report.

1. Remarks on Presentations

MSU is engaged in some very exciting initiatives. The panel was particularly impressed with Dr. Lorece Edwards' work in the Community Health arena, Dr. Kofi Nyarko's research in data analytics, Dr. Victor McCrary's Urban Sustainability initiative, and, last but certainly not least, the Morgan Community Mile program, presented by Mr. Ellis Brown. While it was abundantly clear that these initiatives, along with the others that were presented to the panel, are being led by extremely dedicated and capable faculty and staff, it was equally apparent that each operates in a significantly resource constrained environment.

One consistent theme running through each of the various presentations was the need to identify, and tap into, additional funding sources in order to sustain the viability of the initiatives. Although the ultimate objective was clearly presented, less well presented was a description of the strategy that is being employed to reach this objective. One challenge MSU will face is trying to improve its share of the government funding market in an environment where across-the-board government research funding is at best stagnant. Success in this environment will require focusing MSU's limited business development resources (at least in the near term) on those government and non-government sponsors that hold the most funding promise.

MSU's strategy should involve a frank internal assessment of where its research strengths lie, coupled with identification of the funding sources most likely to have interests that are aligned with MSU's strengths. MSU's business development operation should then be focused on these funding sources, not only to ferret out promising solicitations, but also to develop relationships with the funders and educate them on how MSU's strengths can be best used to meet their programmatic objectives. The necessity for that focus was not evident in the material presented to the ERAP.

An integral part of the business development strategy should be a directed communications plan. One of the repeated comments from panel members was that they had no idea MSU was involved in the breadth of research and community involvement that they are involved in. If MSU is to succeed in doubling its research funding and in enhancing MSU's status as a Doctoral research institution, it needs to showcase its brand beyond Baltimore. MSU is doing great things and it needs to let the country (and even the world) in on its secret. For example, both Community Health and Urban Sustainability are areas of general interest well beyond the City of Baltimore and the State of Maryland. MSU has some very good ideas in these and other areas, and it needs to publicize them widely in order to attract funding from diverse sources to support the initiatives.

Lastly, if MSU is successful in expanding its funding sources, and especially if they succeed in obtaining more government contracts, they will need a contract administration function that is capable of supporting this expansion. Most of MSU's current funding is grant funding. Grant administration and federal government contract administration bear little resemblance to each other. Moreover, the penalties for getting federal government contract administration wrong, can range from painful to fatal (i.e., suspension or debarment) in egregious cases. MSU is in the process of bringing on board a contract administrator. While this is a necessary development, it is not sufficient to support a robust government contracts operation. For example, faculty and staff who work on cost reimbursement government contracts will need to be trained on accurate cost charging. The finance and accounting organization will likewise need to learn how to operate in an environment that is foreign to that in which they have operated in the past. In addition, policies and procedures covering a wide range of mandatory and best practices will need to be implemented. One contract administrator will not be enough to do all that will need to be done.

The presentations to the ERAP showed a diverse and active research program with a clear vision regarding the future. It appears that there is work still to be done to focus the vision into achievable bits and in building the infrastructure to support the vision.

The majority of funding at present comes from three main schools (Community Health, Computer Science, Mathematics & Natural Sciences, Engineering). The panel recommends that the Deans of each of these schools become very familiar with the Small Business Technology Transfer (STTR) Program and the Rapid Innovation Fund (RIF) Program. STTR requires small businesses to partner with schools to transfer technologies to the marketplace. This is a significant opportunity for MSU to begin to build contractual relationships with the Department of Defense while also supporting the MCM initiative. RIF is for technologies that are ready or very close to ready for use. The panel recommends that Dr. Aslan and MSU scientists with technologies at similar levels of readiness pay close attention to RIF and how their technologies may be used in a Defense environment.

The School of Engineering is an outstanding asset with a proactive and supportive Dean. This school's capabilities could interact productively with science faculty or PEARL (see below). It listed seven key areas of interest, many of which are in line with Department of Defense (DoD) priorities. The panel recommends building relationships with the following offices:

     i. Manufacturing & Industrial Base Policy
    ii. Operational Energy Plans & Programs
   iii. Industrial Research & Development
   iv. Rapid Fielding

MSU aims to become an Urban Sustainability Hub. NSF has a major opportunity on the street now that MSU should seriously consider.

2. Prospective Opportunities

Morgan State University is a Historically Black College or University (HBCU) that is stretching beyond its traditional boundaries, as can be seen in its expanding programs. To augment its growth, MSU should consider enlarging its current offerings through activities such as support for technology transfer for products from the engineering department, and development of cutting edge program such as cybersecurity. MSU is also developing an urban sustainability program that can align and draw together current programs while building community ties and enhancing its reputation as an innovator. MSU would do well to focus and concentrate on the areas of <u>technology transfer</u>, <u>cybersecurity</u> and <u>urban sustainability.</u>

Technology Transfer Program

The MSU technology transfer program's missions are to form commercialization strategies, including evaluating inventions, to protect and manage intellectual property, to negotiate agreements, and to educate faculty on the advantages of taking the next steps beyond research. The technology transfer program has increased its scope in the last year. By bringing in the right skill set and advocacy leadership, MSU was able to increase its disclosures from one to 14 in the last year. The technology transfer program brings in revenue through operationalization of innovations of obvious financial benefit to MSU, but there are some not so obvious benefits as well. A robust technology transfer program attracts donors and investors who will see MSU as a weighty contributor in high visibility fields. The program also builds the reputation of the faculty and the students, resulting in increased enrollment and enhanced career opportunities. MSU should continue to support this valuable program, while considering ways to enhance that support with resources, publicity, and senior management advocacy.

Cybersecurity

As our economy becomes ever more dependent on the internet, cybersecurity affects every aspect of modern life. Cybersecurity is a burgeoning academic field that will see significant growth in the next decade. MSU has shown its commitment to cybersecurity by its support of recent Maryland senate bills on cybersecurity innovation and development of a cybersecurity framework based on National Institute of Standards (NIST) guidance.

Many universities in Maryland and beyond are working with the Federal government to expand academic offerings in cybersecurity. MSU has a nascent cyber security program and is beginning to explore ways to augment its presence in the field. MSU is already working with the Department of Homeland Security (DHS), and should expand its cybersecurity connections within that agency, as well as explore programs based at the National Security Agency (NSA) and NIST.

Specific suggestions include:

1. Participate in NSA's IA Courseware Evaluation Program, at http://www.nsa.gov/IA/ACADEMIC_OUTREACH/IACE_PROGRAM/INDEX.SHTML . This certification will enable MSU to participate in other government programs, such as Scholarships for Services (https://www.sfs.opm.gov/). The goal of this program is to expand the use of national standards in information assurance education and training throughout the nation.

2. Participate in NSA's Colloquium for Information Systems Security Education (http://www.nsa.gov/ia/academic_outreach/nat_cae/colloquium.shtml)

3. Expand the cybersecurity program in conjunction with requirements that can lead to becoming a National Centers of Academic Excellence, as sponsored by NSA and DHS (http://www.nsa.gov/ia/academic_outreach/nat_cae/index.shtml)

4. Create a cybersecurity interdisciplinary program that melds urban sustainability with critical infrastructure protection (e. g. transportation, utilities, water supply, energy generation, telecommunication, water supply, food supply), public health, and resiliency (disaster preparedness).

5. Participate in Industry Days such as the recent NIST National Cybersecurity Center of Excellence (NCCoE) Proposed Federally Funded Research and Development Center (FFRDC) Industry Day.

6. Expand MSU's cybersecurity program for its own infrastructure in conjunction with its academic offerings in cybersecurity. Graduate and undergraduate students can do practical field work such as assessing MSU's infrastructure using NIST Special Publication (SP) 800-53 Recommended Security Controls.

MSU could explore partnerships with DHS in its cybersecurity programs such as Continuous Diagnostics and Mitigation (CDM) (http://www.dhs.gov/cdm). MSU also could pursue certification by the National Security Agency's Information Assurance Courseware Evaluation Program (http://www.nsa.gov/ia/academic_outreach/iace_program/index.shtml), which verifies that courseware meets requirements established by the Committee on National Security Systems National Training Standards Numbers 4011 and 4012. Note that there are also Academic Centers of Excellence (ACE) (http://www.nsa.gov/ia/academic_outreach/nat_cae/index.shtml) sponsored by NSA and DHS which, if MSU became an ACE, would afford its students masters- level scholarship program eligibility as part of the DoD IA Scholarship program (IASP) and the Federal Cyber Service Scholarship for Service (SFS) Program (http://www.nsa.gov/ia/academic_outreach/student_opportunities/index.shtml). Internships for program participants are also available.

Some general areas for information security research involve the information security threat and effectiveness/performance metrics. It is always difficult, if not impossible, to measure what didn't happen (i.e., whether information security incidents were actually prevented by security controls/tools) so the standard return on investment calculations cannot be made. Nonetheless, the question of how much information security is enough desperately needs to be answered as organizations struggle to protect their information with very scarce resources. Innovative research on effectiveness metrics is therefore sorely needed, as is research on whether or not specific security controls and tools are effective in countering specific threats.

Urban Sustainability

Dr. McCrary spoke at length about the development of urban sustainability programs, and how MSU is working to integrate existing programs into a new framework. Urban sustainability is a broad term that covers a wide-range of social problems, such as health, transportation, environmental, energy, food availability, resiliency (disaster preparedness), and social isolation. MCM are a natural fit into the umbrella of urban sustainability, and should be supported and expanded.

Examples

What follows are specific examples of urban sustainability ideas for MSU to explore beyond its borders so that MSU can continue to develop its capabilities as a world-class, research university.

Environmental Sustainability
1. Establish green spaces on old rail lines, rail yards,
2. Partner with the National Aquarium to clean up the harbor, waterways, planting grasses along waterways, and local fishing (Patapsco River, Chesapeake Bay etc.)
3. Sustainable urban fishing (PEARL – toxic monitoring of fish supplies)
4. Expand PEARL outreach to children in public and private schools about taking care of the Chesapeake Bay

Nutritional Food Availability, Allocation, and Safety
1. Expand or partner with local groups on Corner Store initiatives
2. Establish a four –point program for community garden and development
   a. Partner with the City of Baltimore and the private sector to secure and clean up potential gardening sites
   b. Community outreach to train urban gardeners (what to plant, when to plant, fertilizing, etc.) -
   c. Harvesting food for community farmers' markets and supplying the Corner Store initiative
   d. Education in public schools about gardening and eating fresh vegetables
3. Establish research in the areas of hydroponics, aquaponics, and vertical gardening (rooftops, skyscrapers)

4. Publicize program through local media venues with a community focus such as radio station WTMD.

Aging population
1. Nursing program that reaches out to the community to make sure aging citizens are properly fed and cared for, both in their homes and in institutions
2. Expand local access to health care (clinic, hospital, doctors)
3. Establish program for aging in place instead of aging in institutions
4. Align aging programs with Baltimore Department of Aging for support and mutual exchange of information and ideas.

Resiliency
1. Coordinate disaster recovery activities with cybersecurity program
2. Develop contingency plans for critical infrastructure. Incorporate contingency planning into academic program, community outreach, and MSU infrastructure planning. Resources include:
    a. NIST SP 800-34 Rev. 1 Contingency Planning Guide
    b. NIST (Draft) Cybersecurity Framework for Critical Infrastructure
3. Build disaster recovery academic programs through an alliance with FEMA's Emergency Management Institute (http://www.training.fema.gov/emiweb/edu/collegecrsbooks.asp). Resources include college-level course, textbooks, and other materials, as well as Emergency Planning for Higher Education.
4. Cross-coordinate usage of FEMA resources with the existing Red Cross alliance.

Patuxent Environmental and Aquatic Research Laboratory (PEARL)

PEARL is a research facility that focuses on the Chesapeake Bay and its estuaries. Research in multiple areas takes place at the well-appointed facility. PEARL's existing relationships include NASA, NOAA, NAVSEA, Calvert County Economic Development, and the Academy of Natural Sciences at Drexel University.

PEARL's focus on the Bay has been profound, and can be used as a stepping stone to develop research programs that align with the urban sustainability program. PEARL should build on its existing relationships to expand its research into the effects of environmental issues on Baltimore, including food depletion, health issues, and rising tides.

The panel recommends looking to non-governmental organizations for grants and partnerships. Such organizations are very interested in sustainable fishing practices and developing partnerships with water-based industries, and are not just focused on strict preservation. Two organizations that develop partnerships to protect water *and* to promote sustainable fishing practices are the Environmental Defense Fund (EDF) and the Natural Resources Defense Council. The EDF now works with oyster fisheries in Louisiana to move oyster reefs and promote oyster/oyster reef growth and subsequent sustainable harvesting of the oysters. EDF has partnered with the Louisiana Department of Wildlife and Fisheries, so MSU may also want to check with similar departments in Delaware, Maryland, and Virginia, as well as the US Fish and Wildlife Service.

School of Community Health & Policy (SCHP)

SCHP has made significant strides in working with the health issues of emerging adults. One example is the GET SMART program (Students Mobilized and Retooled to Transform). The GET SMART project aims to prevent HIV, sexually transmitted infections, and substance abuse among 18 -24 year old emerging adults on campus and within a one mile radius of the campus.

SCHP's work in health issues of emerging adults is of particular value for its outreach to the community and can be used as a standard for reaching out to seniors, children, and working members of the community. The existing public health model has lessons for other components of the Urban Sustainability program in that it offers credit for practical work in the field. As Dr. Lorece Edwards noted in her talk, community lies in the heart of public health.

Morgan Community Mile (MCM)

Already designated as Maryland's Public Urban University, MSU can use the MCM program to expand MSU's influence into the wider surrounding community to explore issues of urban sustainability. Located in an underserved community, MCM has reached out and formed alliances with business and neighborhood associations such as the Baltimore police and MedStar Good Samaritan Hospital in order to understand the needs of the community and to advise on and organize activities for community health and well-being. The MCM is an especially valuable program in that it can be a vehicle to bring together multiple programs, such as community health and public policy, engineering, transportation and urban sustainability and infrastructure. MSU would do well to make the community its laboratory for urban revitalization, and already has the vehicle to do so with its MCM program.

The MCM appears to be successful for both the university and the communities which it serves. A publicity effort via the Baltimore Sun may help to convey that success.

The MCM and the School of Community Health provide an opportunity for MSU students to do community work by providing transportation or special arrangements for less mobile seniors. Engaging the senior community around the MSU is a good strategy for future donations.

Department of Defense (DoD)

It will be important for MSU administrators and faculty to become very familiar with the organizational structure of DoD in order to improve success rates. DoD's structure is not the same as that of other federal (i.e. civilian) agencies. Within DoD, in addition to the Military Departments, there are over 30 additional organizations, most of which have unique imperatives or initiatives that require various types of support. It will be important for relationships to be built throughout the organization, not just with one individual within the Office of the Secretary of Defense (OSD), since those persons are not necessarily the buyers. Consider that the Department has a significant community health mission, for example, when it comes to the military and their families. The Department does not solely have combat-related needs. However, MSU will need to familiarize itself with the DoD organizations that support each unique need. Research on the various components of the Department needs to be completed so that MSU can position itself to maximize its capability to support.

MSU will need to adopt a culture of seeking out opportunities, as opposed to expecting to automatically be offered them. MSU administrators and faculty will need to become familiar with contract cycles and websites that advertise opportunities. In addition, MSU personnel should become comfortable with attending industry days and responding to requests for information to not only help to establish relationships, but to publicize capability offerings. A key goal should be to develop name recognition for a specific capability or capabilities.

The panel recommends engaging with Derrick Henton at Test Resource Management Center (TRMC) if MSU has not already done so. Mr. Henton works with HBCUs to bring students on as interns supporting the contracts that are let through his organization.

Become familiar with the Defense Innovation Marketplace. The Marketplace is a website that consolidates access to DoD S&T resources in one spot. The website for Industry is http://www.defenseinnovationmarketplace.mil/industryresources.html. The panel highly recommends becoming very comfortable with this webpage as it provides information on where each DoD department and agency is headed in terms of S&T strategy and investments. The site also provides links to resources for doing business with the Department.

Keep in mind, too, that the Department is not only interested in completely new innovations, but also innovations that improve on past developments. MSU should also be very familiar with DoD TechMatch (www.dodtechmatch.com/DOD/PATENT/INDEX.ASPX), which catalogues existing DoD patents which can be licensed by industry to transfer the technology or to commercialize.

The panel recommends establishment of an Undergraduate Research Scholars program. The program would offer students credits (3-4 per semester), rather than funding (which can be uncertain at times) for their work with an MSU researcher. Students could attend supplemental seminars that allow them to gain interdisciplinary knowledge. Additionally, an end of semester poster fair for the scholars enables them to gain experience presenting complex ideas to other scientists. An example of a very successful program like this is at the University of Wisconsin-Madison (http://urs.ls.wisc.edu/).

MSU should pursue development or lease of SCIF space to improve success rates related to DoD contracts as many will require work to be performed in a secure facility. Hand-in-hand with this would be student training on what activities to pursue (or not) to ensure that they remain eligible for security clearances in order to be able to perform work on the contracts. This will also be relevant for their job searches upon graduation.

Prizes and Challenges

In September 2010, the Administration launched Challenge.gov, a one-stop shop where entrepreneurs and citizen solvers can find public-sector prize competitions. There may be opportunities for MSU to compete for awards to drive innovation and solve national problems - whether technical, scientific, or creative. In addition to Challenge.gov, there are organizations which also sponsor challenges, such as launch.org, a global initiative to identify and support the innovative work sponsored by NASA, USAID, the Department of State, and NIKE.

Industry Partnerships

Consider the development of a framework for MSU to enter agreements with industry partners for cooperation in sharing and developing research, resources, talent and innovative solutions to national and global challenges. Use existing models the University of Maryland has in place with companies such as Lockheed Martin. Enable faculty exchanges with industry, and vice versa.

Funding for Minority-Serving Institutions (MSIs)

Take a current snapshot of funding at MSU from sources that are specific only to MSIs and compare this to the availability of funding from these sources. Consider the development of a plan to enhance MSU's receipt of such funding.

Relationships with University of Maryland

In close proximity to PEARL in Saint Leonard, Maryland is the UMD Chesapeake Biological Laboratory in Solomons, Maryland. Opportunities exist for MSU to collaborate with students or faculty from CBL, or vice versa, due to this close proximity and similar research foci within both entities. PEARL staff could participate in a seminar series, for example, at CBL, or vice versa, to raise awareness of the opportunities for collaboration. Exchanges of CBL's full time graduate students may be possible with PEARL faculty, which currently does not appear to have a large pool of full-time, year-round graduate researchers.

In close proximity to MSU's main campus, the University of Maryland has established the Institute for Marine and Environmental Technology (IMET) at the Inner Harbor, Baltimore, Maryland. Opportunities exist for MSU faculty to collaborate with students or faculty from IMET, or vice versa on marine and environmental research and technology development. MSU faculty should consider participation in seminar exchanges between IMET and MSU on topics of interest to both entities.

Recent statistics from UMD indicate approximately 40% and 20% of undergraduate and graduate students, respectively, are minority students. MSU should consider the strong recruitment efforts of the state's flagship public university to attract minority students a potential loss of new MSU students, especially graduate students, and develop a plan to respond.

Data Capabilities

MSU has unique and strong capabilities in the area of data capabilities ("Big Data") across a number of departments. Recent policy directives from the Administration (OMB Memo M-10-06 Open Government Directive; OMB Memo M-13-13 Open Data Policy – Managing Information as an Asset; and, the February 22, 2013 Memo Increasing Access to the Results of Federally Funded Scientific Research) require Federal Departments and Agencies to take steps to make data, including scientific data, more readily available and accessible by the public. Opportunities exist for MSU to respond to competitions that will support the needs of Federal Departments and Agencies in this topical area. MSU should aggressively respond to calls for capability information so that MSU capabilities are advertised and known.

International Opportunities

MSU should find ways to engage with research at foreign universities and colleges, in particular in those areas where MSU is excelling and where there is a global interest. The needs of large cities, especially the future Mega Cities, include smart grids, renewable energy, intelligent transportation, affordable and accessible food produce, smart and energy efficient buildings and retro-fittings, and communication and egress in the event of a disaster. MSU should seek ways of increasing exchanges with universities in Africa, the Middle East, and South and Central America (for example, exchange programs where students can come one year to the other university and/or exchanges of professors for research sabbaticals).

Once technology is developed at MSU, global funds that support commercial development should be sought. For example, MSU could create links with the Bi-National Industrial Research and Development Foundation (BIRD). This foundation has 110 million dollars in an endowment that supports commercial development of technology in collaboration with one company from the US and another from Israel. BIRD supports the later stages of development and can also involve a university and a company venture. Typically not more than one million per project is funded. More information can be found at www.birdf.org.

To expand opportunities for global research, the panel recommends partnering with academic institutions in other countries, attracting more foreign students and creating an exchange-student program. This activity should provide contact and networking opportunities for MSU at a minimum and also help students expand their horizons. The panel also recommends looking for research, grant, and partnering opportunities with large global non-governmental organizations such as the Clinton Global Initiative, which has a focus on global sustainability, and the Bill and Melinda Gates Foundation.

Opportunities for Students

The panel recommends marketing MSU more to the general student population since its education cost is much lower than many universities and its curricula have expanded. HBCUs should increase the diversity of their student populations.

MSU students should seek more internships with U.S. government agencies such as NIST, National Oceanic and Atmospheric Administration, Department of Energy, and fellowships (e.g. Fulbright, American Association for the Advancement of Science, and the White House). The increase of certain majors at MSU should be linked with the nation's needs. For example, the President's Climate Action Plan indicates a need for individuals in the areas of Disaster Resilience Management and National Security. Other areas of increased need for engineers, scientists and professional managers are renewable energy, sustainability, energy-efficient buildings and cybersecurity, especially in the financial sector of the economy.

Non-STEM Research

Some ideas for non-STEM research that would fit well with existing MSU areas of expertise include looking into grants from the Department of State on African languages and sociology and from the Veterans' Administration on the sociology of military families. Related to the

community garden and demonstrating its benefits beyond just the food itself, sociological research could consider the following topics: how/how much/whether nutrition and health is improved, how community cohesiveness and pride are affected, whether children/teens involved in the garden do better/stay in school, development of metrics to measure the success of urban programs like community gardens and MCM. Federal organizations such as NIH, the Department of Education, and the Department of Housing and Urban Development may have grants or be willing to partner on research in those areas.

3. General Recommendations

General-Interest Publication

Publication of research results in non-research venues enhances the visibility of MSU research. While faculty are often not interested in these venues due to the potentially low impact factors for such publications, an annual award from the MSU President may incentivize faculty to publish a broad treatment of a specific subject area that appeals to readers with a wide range of interests.

Adaptability

The strength of MSU's research programs is noted as a top priority. MSU has made significant investments to strengthen its capabilities in technological fields critical to the long-term competitiveness of the University in technology development, as well as faculty recruitment. It is important for the University's core capabilities not be overleveraged by some key priority areas, inhibiting the University from adapting or adjusting to new technology areas quickly enough to address new growth areas as these become national priorities (for example, computational materials research, systems biology).

Development of Performance Metrics

Progress in meeting the MSU strategic research and development goals should be clearly defined. For example, MSU technology development will accelerate technological innovation for the nation and develop future leaders in research and development. It is not clear if MSU has identified ways to measure impact and progress. MSU should identify the use of tools to measure progress; the standing up of the ERAP is an example. The metrics for the intellectual property (IP) portfolio, for example, are noted as good baselines. These may need a close look for revision as MSU progresses in IP development.

ERAP's Composition and Missions

It is suggested to include additional representation on the ERAP from the private and academic sector. Academic members are in general, competitors, to MSU and having additional representation from this sector strengthens the panel's core expertise. In addition, it was not clear the MSU faculty understood the mission space of the ERAP. There was a general indication MSU faculty may mistakenly view ERAP as an entity that will fund research or one that would identify and secure funding for research. It is important for the faculty to have a good understanding of ERAP's function, to review and assess the current research portfolio, so that staff are not disappointed by ERAP's progress and accomplishments.

Professional Societies and Advisory Boards

Participation of MSU faculty in professional societies, not only as members but in leadership roles, enhances the visibility of MSU faculty expertise and research and is beneficial for networking purposes. Graduate and undergraduate students participating in research should be encouraged to attend national and international meetings and to submit more papers and posters. As not all grants are able to fully support student travel, University funding should be made available for student travel. This action also will encourage faculty to include students in professional society interactions. Incentives for participation by the faculty (e.g. paying membership dues) could be provided.

The panel recommends that MSU faculty and staff apply to serve on the advisory boards of other academic institutions as well as federal government advisory boards (e.g. those of NIST) in accordance with the Federal Advisory Committee Act (FACA) of 1972. Please see the following web pages for more information:
https://www.federalregister.gov/articles/2013/11/08/2013-26832/request-for-nominations-for-members-to-serve-on-national-institute-of-standards-and-technology;
http://nist.gov/itl/csd/soi/ispab.cfm; and http://www.gsa.gov/portal/content/104514

Research in Basic Sciences

To promote increased research, high teaching loads in the science and mathematics departments should be ameliorated by a release policy for faculty members who are successful in obtaining external funding. Junior faculty should be advised by senior professors who have been able to sustain active research programs. These departments may consider the systematic establishment of mentoring relationships between senior and junior professors. MSU should aim to increase the number of graduate students in these fields. Senior faculty who are no longer active in research should become involved in educational activities that support MSU's efforts to improve its research profile.

Publicity

Programs and events already in place such as the Innovation Day, the Research Town Hall, and the Research Colloquium are excellent. Such activities should be expanded and widely advertised. MSU faculty should attend and speak at colloquia at other academic and research institutions, if for no other reason than to network and raise the level of visibility of MSU. NIH and NIST both have active colloquium series featuring guest speakers from a wide variety of institutions and disciplines.

MSU's effort to boost research and economic development would benefit from a professional publicity strategy. The university has some excellent programs in place that many more people should know about. Consider hiring a publicist, at least on a temporary or part-time basis, to look for ways to increase MSU visibility. Additionally, specific expertise in grant writing, contract development, and professional project management may also be beneficial for MSU. The panel recommends consideration of hiring grant writers, project managers, and contract specialists as well as additional staff dedicated to interdivision coordination of projects and fund/grant seeking. Related measures include expanding the MSU web and social media presence, updating the current website, and creating YouTube sites and Facebook/Linked Pages for the various programs.

Increased attention should be given to elevating the research profiles of the faculty, especially by updating funding and publication information on departmental web sites. The entire MSU website needs an upgrade to show a more vibrant, informative institution. Citations of recent publications and grants received would help the situation. More information regarding research opportunities, grant successes and related issues would be helpful.

Centers of Excellence

It would be beneficial for MSU to partner with various Centers of Excellence. Many such centers are involved in conducting research, providing research grants, or working out use cases on multiple topics. NIST has the National Cybersecurity Center of Excellence which partners with private, public, and academic institutions (see [http://csrc.nist.gov/nccoe/)](http://csrc.nist.gov/nccoe/). DHS also has a Science & Technology Center of Excellence ([http://www.dhs.gov/st-centers-excellence)](http://www.dhs.gov/st-centers-excellence) which works with 12 Centers of Excellence across the country. In addition to working with existing Centers of Excellence, MSU could also seek to become a Center of Excellence itself on an emerging topic in which it already has expertise, such as research related to the visualization lab.

Technical Competitions

Another potential way to raise visibility, network, and provide students with real-world experience involving interdisciplinary and innovative activity is participation in technical competitions such as the Solar Decathlon (sponsored by Department of Energy). MSU should seek out other technical competitions involving innovation and/or sustainability. Robotics and cybersecurity competitions at the college level also are of interest.

4. Involvement of Faculty, Staff and Students

To amplify the research activities of MSU, a clear definition of goals and a widely held understanding of the means to achieve them are needed. MSU has talented and dedicated faculty, staff and administrators whose efforts must be focused toward productive, coordinated activities that lead to professional advancement. The education of MSU's students will thereby be enhanced and their opportunities for personal and professional fulfillment will be increased.

MSU's research administrators should continue to inform the faculty of opportunities for career advancement that also serve institutional missions. The technology transfer program, whose missions comprise commercialization, evaluation of inventions, protection and management of intellectual property, negotiation of agreements and education of faculty, is performing an important role. The faculty should be aware of opportunities in the field of cybersecurity that can engage their expertise in research and education. A third area of emphasis that builds on MSU's history and location is urban sustainability. The interdisciplinary nature of this field can involve specialists from pure and applied areas of the social and natural sciences. Faculty with interests in the arts and humanities also can make important contributions.

In addition to providing information about funding opportunities to the faculty, strong encouragement should be given to individuals who develop contacts with program managers and who monitor government web sites that provide information on emerging programs and resources. Faculty with complementary expertise should be encouraged to form alliances that collaborate on research and preparation of proposals. Similar encouragement should be provided to those who are active in professional societies and in the organization of scholarly meetings. Although the primary focus of this enhanced awareness should remain on domestic funding agencies (especially those of the federal government) that can provide substantial, continued support, there are international opportunities in which MSU, by virtue of its urban location and history of cultural diversity, can be especially competitive.

Colleges and departments should be encouraged to recruit faculty, especially in the junior ranks, who have demonstrated deep mastery of the fundamentals of their fields and the ability to bring this knowledge to bear on problems of contemporary interest. Because the needs and interests of funding agencies inevitably change over the course of an academician's career, search committees should consider a capacity for adaptation as well as publication in prestigious journals in the evaluation of candidates. Competitive start-up packages that suffice to attract the most talented researchers should be arranged for new members of the faculty who are likely to be successful in the competition for scarce, external funds. To compete for this talent, MSU's recruiting efforts should be selective and focused.

Faculty who already are successful in garnering external funds, especially if they are able to involve their colleagues in interdisciplinary projects, are likely to be under consistent pressure to publish, write proposals, advise graduate students and attend meetings. All of these activities take considerable amounts of time. Lowered teaching responsibilities are essential for maintaining active research programs. MSU must compete with other institutions for the services of successful researchers.

Not all members of the faculty will be competitive in the search for external funding. However, these individuals are likely to have expertise that can be incorporated in MSU's efforts to increase its activity in research. Undergraduate education often can be enhanced through student participation in research seminars, programs that enhance communication between undergraduate, graduate-student and faculty researchers, technical competitions within and between universities, outreach activities that involve the surrounding community (especially those that improve resiliency with respect to emergencies and service to children and seniors), international exchange programs, organization of public events that communicate or popularize MSU research and production of general-interest publications. Students thereby become part of MSU's public profile as a research institution that is firmly committed to broader impacts. The role of the faculty in recruiting and advising students and in communicating their achievements is indispensable. Department chairmen and deans should encourage faculty who take up the challenges and opportunities that involve students in MSU's research missions.

Although faculty expertise in research and teaching is the foundation of MSU's research activities, the skills and knowledge of administrative staff also are required to sustain vigorous, externally-supported programs. The management of individual-investigator grants requires accounting and oversight services that now are performed by MSU staff. However, the complexity of grant and contract administration and the unfavorable implications of possible noncompliance with sponsor directives are likely to grow with MSU's success in garnering funds for extended, multi-investigator projects. Individuals who are familiar with the expectations of funding agencies and who are committed to the success of MSU researchers will be needed to provide administrative support.

With a climate of incentives that enlists the support of the faculty, that establishes a commitment to institutional success among the staff and that binds the goals of the institution to the professional development of all, MSU can, through an incisive choice of areas of strength, establish itself as an important research university. The most important beneficiaries of this project will be MSU's students. Their exposure to research and the enhanced education it provides will make them more flexible, competent and innovative in their careers.

Next Meeting

The Advisory Panel is scheduled to hold a follow-on meeting on <u>October 2-3, 2014</u> on the campus of Morgan State University.

APPENDIX

Appendix I: Meeting Agenda

Appendix II: Meeting Presentations
- ➢ Morgan State University Overview
- ➢ Division of Research & Economic Development Overview
- ➢ Morgan Community Mile
- ➢ Morgan P.E.A.R.L. Overview
- ➢ Faculty Research-Dr. Aslan, Chemistry
- ➢ Faculty Research-Dr. Edwards, Community Health & Policy
- ➢ Faculty Research-Dr. Nyarko, Engineering
- ➢ Urban Sustainability
- ➢ School of Community Health & Policy Overview
- ➢ School of Engineering Overview

Appendix III: Panel Readout

Appendix I:

Meeting Agenda

MORGAN STATE UNIVERSITY
GROWING THE FUTURE * LEADING THE WORLD

ITINERARY & LOGISTICS FOR VISIT OF THE
EXTERNAL RESEARCH ADVISORY PANEL
MORGAN STATE UNIVERSITY
THURSDAY JANUARY 30, 2014

Thursday, January 30th – Day 1

8:00 am – 9:00 am   Arrive for Continental Breakfast
   Boardroom, 4th Floor Earl Richardson Library, Morgan State University
- Panel members are to park in the campus garage next to Hughes Stadium

9:00 am Welcome to Morgan State University:
   Division of Research & Economic Development – Overview of Year One

10:00 am Break

10:15 am – 12:00 pm Faculty Research Presentations

- **HIV/AIDS Prevention – Lorece Edwards**
- **Novel Methods for Protein Crystallization – Kadir Aslan**
- **Decision Engine for Structured & Unstructured Data – Kofi Nyarko**

12:00 pm Lunch
   Interactive meeting with the MSU Internal Research Council

1:00 pm   Tour of Research Facilities
   Dixon Complex
   Center for the Built Environment & Infrastructure Studies

3:00 pm   Return to Richardson - Break

3:15 pm   School of Community Health & Policy Overview

3:45 pm   School of Engineering Cyber Security Overview

4:15 pm   Closed Session

5:00 pm   Read Out

5:30 pm Depart Morgan State University for Dinner Meeting

Friday, January 31st – Day 2

9:00 am   Assemble at Earl Richardson Library, 4th Floor Board Room

9:30 am   The Morgan Community Mile – Ellis Brown, Acting Director

10:00 am -12 pm Closed Session – Panel Members only

12:00 pm Lunch and ERAP Read Out on Findings

1:00 pm   ERAP 2014 Winter Meeting Ends; depart Morgan State University

V. McCrary's cell # 410-499-5204

Appendix II:

Meeting Presentations

MORGAN STATE UNIVERSITY

Growing the Future ~ Leading the World

January 2014

History

- 1867 it was founded as the Centenary Biblical Institute, the initial mission was to train young men in ministry

- 1890 the mission was broadened to educate both men and women as teachers

- The institution was also renamed to Morgan College in honor of the Reverend Lytteton Morgan, the first chairman of it's Board of Trustees, who donated land to the college

- 1895 the first baccalaureate degree was awarded to George F. McMechen

- 1915 Morgan College received it's first grant of $50,000 from Andrew Carnegie for the central academic building and for payment of all outstanding obligations

- Became a public college in 1939

History – cont.

- 1939 became a public college when Maryland purchased the school to provide more opportunities for its Black citizens
- Morgan was then opened to students of all races and became a comprehensive institution
- 1960's began it's transition from a teachers college to a liberal arts campus.
- Became one of two public campuses in the State of Maryland with comprehensive missions

- 1975 was designated as a University by state legislation and was granted permission to offer doctorates with it's own governing boards

- 1988 Maryland reorganized its higher education structure by making the campuses in the state college system part of the University of Maryland System, Morgan was one of two schools who were authorized to have their own governing board (Board of Regents). This also strengthened Morgan's authority to offer advanced programs

Type of Institution

- Designated as Maryland's Public Urban University
- The largest Historically Black College (HBCU) in Maryland
- Serves a culturally diverse population
- Surpasses almost every other college and university in the country in the number of applications it receives from African American high school graduates
- A Carnegie Classified Doctoral Research University (D/RU)
- A member of The Thurgood Marshall College Fund (TMCF) which is a philanthropic organization that fundraises college tuition money for black students and general scholarship funds for several schools This fund carries a "Four Star" rating by Charity Navigator
- Morgan State University's ranking in the 2013 edition of Best Colleges is National Universities, Tier 2

Vision

Morgan State University will be recognized nationally and statewide for:

- Its significant impact on access to higher education at all degree levels
- The effectiveness of its teaching and of its supportive environment in promoting student success
- Its contribution to doctoral-level research on significant problems
- Its service programs that improve the life of underserved populations
- President Wilson has articulated an emerging vision for Morgan to focus on urban sustainability and applied research on intractable challenges facing Baltimore and other urban centers across the nation and around the globe

MORGAN STATE UNIVERSITY
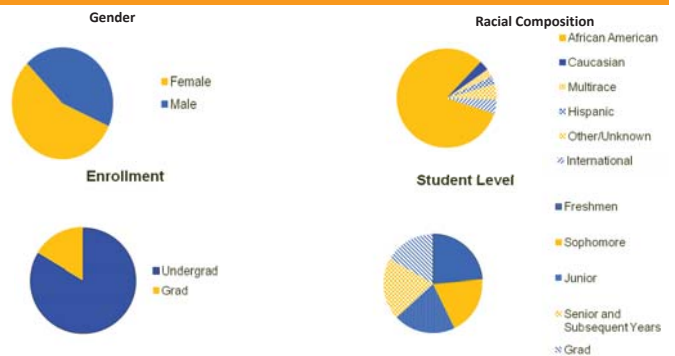*Division of Research & Economic Development*

Goal

- To develop a strategic plan that identifies goals and objectives to elevate Morgan's current Carnegie classification from DRU: Doctoral/Research University to RU/H: Research University (high research activity)
- Offer high quality academic programs and effective support programs and services to promote student academic success
- Provide students with a variety of options and reasonable degree of flexibility in their academic programs
- Offer competitive academic programs, research priorities, and service emphasis to students
- Extend recruitment and community service programs beyond the University's traditional service areas to strengthen its competitive position and attract a racially diverse student body
- Maintain an enterprising culture and infrastructure to enable the University to respond rapidly and effectively to changes in the environment
- Serve as a catalyst for the improvement of the surrounding community and City of Baltimore

MORGAN STATE UNIVERSITY
Division of Research & Economic Development

Values

Promoting student learning and success and faculty scholarship and research are the core values around which academic programs, support services, and business processes are organized

MORGAN STATE UNIVERSITY
Division of Research & Economic Development

Demographics

Gender
- Female
- Male

Racial Composition
- African American
- Caucasian
- Multirace
- Hispanic
- Other/Unknown
- International

Enrollment
- Undergrad
- Grad

Student Level
- Freshmen
- Sophomore
- Junior
- Senior and Subsequent Years
- Grad

Fast Facts

- Approximately 8000 Students
- Rolling admission 56% accepted
- 2012-2013 Tuition - $7,082 in-state, $16,426 out-of-state
- Room and Board - $8,878
- Retention Rate – 63%
- Overall Graduation Rate – 38%
- Total number of applicants – 7200
- SAT – 75th Percentile – 490 (Math, Critical Reading, Writing)
- ACT – 75th Percentile – 16
- Academic Staff – 437
- Administrative Staff – 1556
- Teacher-Faculty Ratio – 14:1
- Percent of classes with fewer than 20 students – 40.4%
- Attendance Status – Full-Time 83.4%, Part-Time 16.6%
- Undergraduate Transfer Students – 537
- 4-year graduation rate – 11%

What else about Morgan before we get to serious business?

- Located on 143 Acres of land in the northeastern section of Baltimore at: 1700 E. Cold Spring Lane, Baltimore, MD 21251
- Motto: *Growing the Future, Leading the World*
- School Colors- Orange and Blue
- Mascot– Bear
- The evaluation team of the *Middle States Commission for Higher Education* conducted a ten-year accreditation review of Morgan State University on April 6-9, 2008. The review sought to determine whether, or to what extent, the institution met the fourteen standards outlined in its Characteristics of Excellence in Higher Education. The evaluation team was impressed with the performance and progress of the institution, despite difficult economic and other resource constraints

Let's talk Academia – Programs of Study

- College of Liberal Arts
- The Clarence M. Mitchell, Jr. School of Engineering
- The Earl G. Graves School of Business
- The School of Architecture and Planning
- The School of Education and Urban Studies
- The School of Computer, Mathematical and Natural Sciences
- The School of Community Health and Policy
- The School of Social Work
- The School of Global Journalism & Communications

Academia - Outcomes

- Awards more bachelor's degrees to African-American students than any campus in Maryland
- In many fields, especially in engineering and the sciences, Morgan accounts for large percentages of the degrees that African-Americans receive from Maryland institutions (1st in Electrical Engineering)
- An above-average percentage of Morgan State University graduates enter graduate and professional schools
- Morgan ranks among the top four colleges and universities nationally in the number of black graduates who subsequently receive Ph.D. degrees
- 41% of the graduates have reported employment by graduation
- 35% of the graduates indicated they applied to graduate or professional schools
- 74% of the graduates re-apply to Morgan to programs directly related to their majors
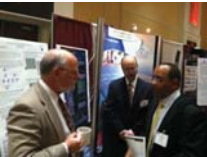- Over 130 Fulbright Scholars – more than all HBCUs combined

Partnerships

Division of Research & Economic Development

Slide 1

Division of Research & Economic Development (DRED)

30 January 2014
V. R. McCrary,
VP for Research & Economic Development
(443) 885-4631
victor.mccrary@morgan.edu

MORGAN STATE UNIVERSITY

Slide 2

Division of Research & Economic Development:
DRED

- **Morgan State University – Overview**

- **FY14 Strategic Goals & Organization**

- **FY14 Performance Snapshot**

- **Research Projects**

- **Morgan Community Mile**

- **Initiatives**

Slide 3

Division of Research & Economic Development:
DRED

- **Morgan State University – Overview**

- FY14 Strategic Goals & Organization

- FY14 Performance Snapshot

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- Morgan Community Mile

- Initiatives

Slide 4

Governance

- Comptroller
- Governor
- Board of Public Works
- Maryland Higher Education Commission
- Treasurer
- Board of Trustees St. Mary's College of MD
- Board of Regents Morgan State University*
- Board of Regents Univ. System of MD
- SMCM
- President
- USM Institutions

Provost & V.P. Academic Affairs | V.P. Finance & Management | V.P. Institutional Advancement | V.P. Planning & Info. Technology | V.P. Student Affairs | V.P. Academic Outreach & Engagement | **V.P. Research & Economic Development** | V.P. International Affairs
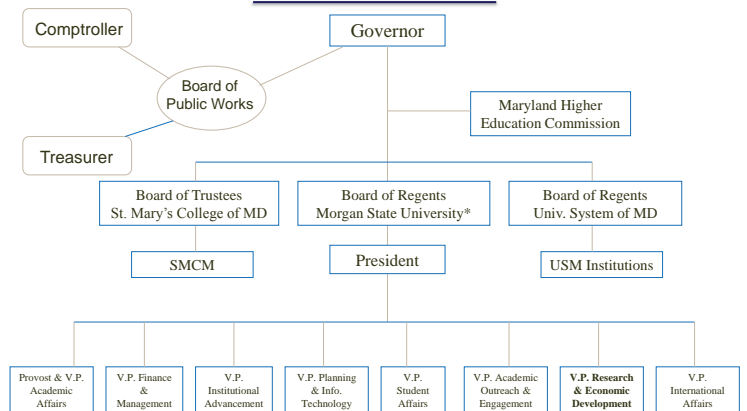
15 Members, including one Student Regent (1 year term), are appointed by the Governor for a 6-year term. Effective July 1, 2013, appointed new Board Chair (Kweisi Mfume) and regent (Tyrone Taborn). There is currently one board vacancy.

Maryland's Public Urban University

- **Student Population – 7,546**
  - In-state – 5,899
  - Out-of-state – 1,219
  - International – 428

- **Academic Programs**
  - 45 Undergraduate
  - 35 Master's
  - 16 Doctoral

- **Students**
  - Best Prepared
  - Many From Disadvantaged Backgrounds
  - Majority Have Significant Financial Need

Pie chart:
- MD - 78%
- Foreign - 6%
- NY - 6%
- NJ - 3%
- PA - 3%
- DC - 2%
- VA - 1%
- Other - 1%
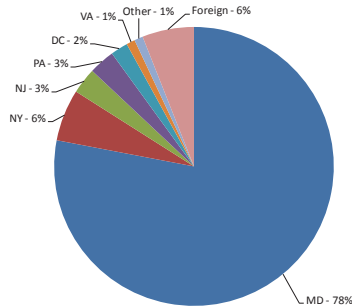
Morgan: Profile of a Leading Institution

Among a Handful of HBCUs Nationally, Classified as a Doctoral Research University

- We ranked **first** in the nation in the number of electrical engineering bachelor's degrees awarded to African Americans
- We ranked **second** nationally in the number of industrial engineering bachelor's degrees awarded to African Americans
- We ranked **second** in the State in the number of doctoral degrees awarded to African Americans
- We ranked **third** nationally in the number of architecture bachelor's degrees awarded to African Americans
- Among the **top five** institutions in the United States in awarding baccalaureate degrees to African Americans in Engineering, Architecture and Journalism
- Among the **top twenty** institutions nationwide in the fields of Hospitality, Accounting, and Marketing
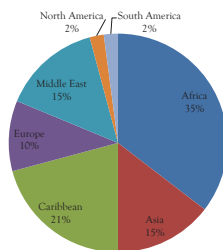
Quality and Value

- **First** among HBCUs nationwide in the number of students awarded Fulbright Scholarships (131) and **first** in the number of Fulbright Scholars on faculty (41)
- Approximately one-third of graduates pursue advanced degrees
- Repeat champions (second year in a row) of the Honda All-Star Challenge
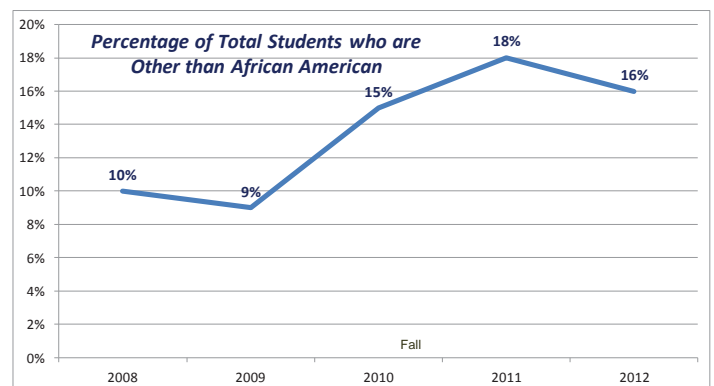- Producer of three (3) 4-star Army Generals

Morgan's Emerging International Student Population

- **408 International Students**
- **Undergraduates – 270; Graduates – 138**

- **Largest numbers from: Nigeria, Nepal, Saudi Arabia, Kenya, Ghana, Jamaica, Trinidad & Tobago, Brazil, India**

- **44 countries to which Morgan Students have won 131 Fulbright – related awards, making MSU the 1st among all HBCUs**

- **32 Countries to which Morgan Faculty have won 41 Fulbright-related awards**

- **2 Exchange faculty members and 2 exchange students from China**

Pie chart:
- Africa 35%
- Caribbean 21%
- Asia 15%
- Middle East 15%
- Europe 10%
- North America 2%
- South America 2%

Student Diversity

Percentage of Total Students who are Other than African American

Line chart (Fall):
- 2008: 10%
- 2009: 9%
- 2010: 15%
- 2011: 18%
- 2012: 16%

Morgan is becoming increasingly diverse with growing enrollments from across the nation and the world.

New School of Business Complex

Project Anticipated Completion: 2015

▪ Business Management Complex (BMC) and Bridge

The BMC will be the new home for the Earl S. Graves School of Business Management. The bridge will connect the West Campus at the BMC to the Main Campus (Morgan Commons) area.   Appropriation: $76.6M / Total Cost $81.6M.

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Master Plan Complete Build Out

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Charting the Course: Ten-Year Strategic Plan

Five Goals

❖ Enhancing Student Success

❖ Enhancing Morgan's Status as a Doctoral Research Institution

❖ Improving and Sustaining Morgan's Infrastructure and Operational Processes

❖ Growing Morgan's Resources

❖ Engaging with the Community

5

Division of Research & Economic Development: *DRED*

▪ Morgan State University – Overview

▪ **FY14 Strategic Goals & Organization**

▪ FY14 Performance Snapshot

▪ Research Projects

▪ Morgan Community Mile

▪ Initiatives

12

DRED:
FY14 Strategic Goals

- **$30M - $35M in external sponsor funding**

- **Increase Department of Defense research funding from 5% to 10% of active portfolio**

- **Position Morgan favorably for renewals of current grants & contracts**

- **Develop Intellectual Property Portfolio** *(3 patent actions, 6 disclosures);* **further engage industry**

> *'Morgan is the HBCU of Choice'*

MORGAN
STATE UNIVERSITY

Division of Research & Economic Development:
FY14 DoD – An Opportunity for Morgan

For FY 14 DoD S&T is $11.98B, ($11.86B in FY13)

Basic & Applied research areas still ripe in a down market; DoD in search of good, affordable ideas & innovations!!)
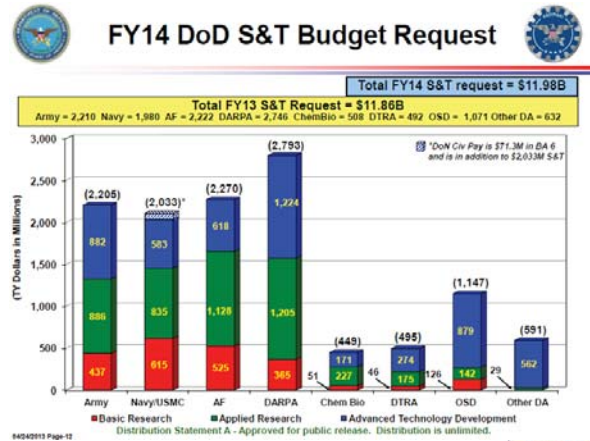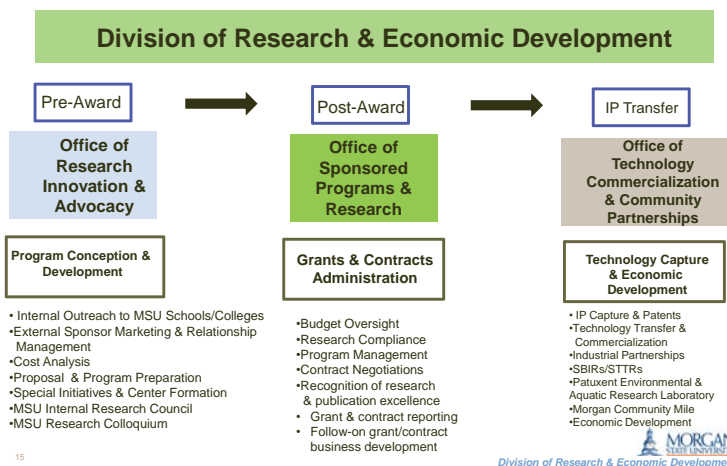
MORGAN
STATE UNIVERSITY

DRED:
Organizational Structure

MORGAN
STATE UNIVERSITY

Division of Research & Economic Development:
DRED

- Morgan State University – Overview

- FY14 Strategic Goals & Organization

- **FY14 Performance Snapshot**

- Research Projects

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- Initiatives

MORGAN
STATE UNIVERSITY

DRED:
FY14 Contracts & Grants Snapshot

FY14 to-date	FY14 1st Quarter	FY13 Final	FY13 to-date	FY13 1st Quarter
$19.3M	$12.6M	$28.4M	$11.8M	$7.8M
80 tasks	47 tasks	115 tasks	42 tasks	35 tasks

Why so good so far?

Our faculty stepped up!

FY2013: 117 proposals submitted
Wins: 42 (36%)
Not Awarded: 39 (33%)
Pending: 36 (31%)

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MORGAN STATE UNIVERSITY
Division of Research & Economic Development

Dollar Amount of Grants & Contracts

$28.4M
$23.8M
$23.5M
Fiscal Year
2008 2009 2010 2011 2012 2013
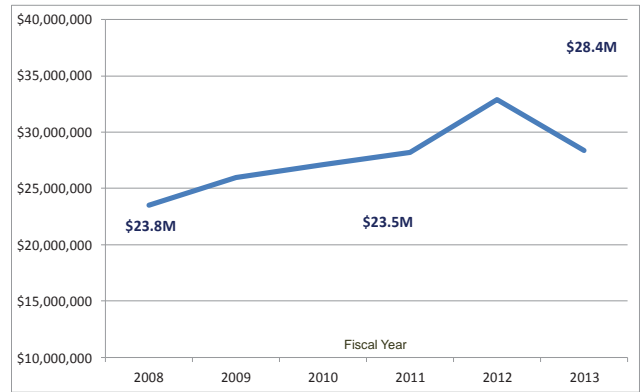
Morgan has accrued some recent advancements in grant and contract activities and has recently placed much more emphasis in this area.

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MORGAN STATE UNIVERSITY
Division of Research & Economic Development

DRED:
FY14 1st Quarter Operating Unit Performance

47 funded tasks (23 new, 24 continuing) equaling $12.6M

- *School of Engineering: 15 tasks, $2,151,454 (17%)*

- *School of Computer, Mathematics, & Natural Sciences: 14 tasks, $1,567,080 (12.5%)*

- *School of Education: 4 tasks, $1,561,632 (12.4%)*

- *School of Community Health & Public Policy: 4 tasks, $527,780 (4.2%)*

- *School of Social Work: 1 task, $397,774 (3.2%)*

- *Division of Academic Affairs - Title III: $5,381,155 (43%)*

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MORGAN STATE UNIVERSITY
Division of Research & Economic Development

DRED:
IP Portfolio

2010-2012 –
- **We received one disclosure**
- **Filed our first provisional, and subsequently, first utility patent application**

2013 –
- **We received 13 disclosures – including 1 copyright and 1 trademark**
- **In the process of filing provisional patents on at least 5 of those disclosures**
- **Awarded two (2) MII Phase 1 grants for translational research**

MORGAN STATE UNIVERSITY
Division of Research & Economic Development

MSU's Research Thought Leaders

Dr. Seth Vannatta
Philosophy & Religious Studies

Dr. Leon Woodson
Mathematics

Dr. Lorece Edwards
Public Health

Dr. Guoyong Wen
GESTAR

Dr. Gloria Hoffman
Biology

Dr. Glenda Prime
Advanced Studies, Leadership & Policy

Dr. Gabriel Tenabe
Office of Museums

Dr. Tiffany Mfume
Student Retention

Dr. Yacob Astatke
Electrical Engineering

Dr. Sandra Chipungu
Social Work

Division of Research & Economic Development

Dr. Timothy Akers
SCMNS

Dr. Mansoureh Jeihani
Transportation & Urban Infrastructure

Dr. Kadir Aslan
Chemistry

Dr. Monique Head
Civil Engineering

Dr. LeeRoy Bronner
Industrial Engineering

Dr. Sherine Brown
Nutrition

Dr. Matthew Burger
GESTAR

Dr. Guangming Chen
Industrial Engineering

Dr. Melanie Follette-Cook
GESTAR

Dr. Jason Sippel
GESTAR

Mr. Clement Anyadike
Institute of Urban Research

Dr. Chunlei Fan
Biology

Dr. Andrew Farkas
National Transportation Center

Dr. Linda Loubert
Economics

Ms. Terralyn Frazier
Talent Search

Division of Research & Economic Development

DRED FY13 Accomplishments:
Research Town Hall - March 7, 2013

Research Town Hall
Office of Research and Economic Development

Faculty and research administrators are all invited to:

• learn about new OR&ED initiatives

• provide suggestions to OR&ED to enhance research and enterprising

• give insights that will help guide the future directions of OR&ED.

Speaker:
Dr. Victor McCrary
Vice President
OR&ED

March 7, 2013
11:00am–1:00pm
Schaefer Engineering Building Rm 241

Details:

RSVP:
Ashlee Kirkland
Tel: 443-885-4630
Email: Ashlee.Kirkland@Morgan.edu

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Division of Research & Economic Development

DRED FY13 Accomplishments:
MSU Research Colloquium – March 26, 2013

MORGAN STATE UNIVERSITY
OFFICE OF RESEARCH & ECONOMIC DEVELOPMENT

Research Colloquium

on

Semiconductors & Cybersecurity

with guest speaker:

Dr. Dean R. Collins

(Managing Member of DRC Consulting, LLC and Retired Deputy Director of DARPA's Microsystems Technology Office)

March 26, 2013 (TUE)
2:00pm–3:00pm
@ Murphy Fine Arts
RECITAL HALL

SNACKS
WILL BE SERVED

RSVP: LiAni Richardson or Marvin Perry at 443-885-3447 or LiAni.Richardson@Morgan.edu

BOGUS!

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Division of Research & Economic Development

DRED:
MSU Internal Research Council

- Community Health And Policy
- Global Journalism and Communication
- Education and Urban Studies
- Liberal Arts
- Graduate Studies
- Computer, Mathematics, and Natural Sciences
- Social Work
- Business and Management
- Architecture and Planning
- Engineering

MSU Internal Research Council

Division of Research & Economic Development
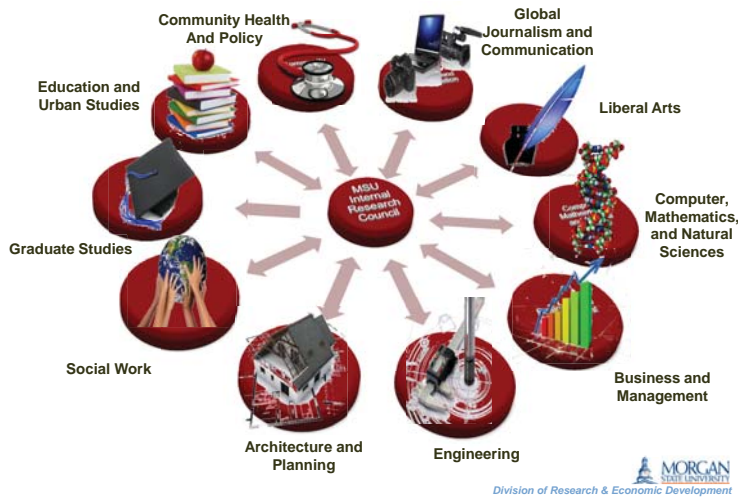
DRED:
MSU Internal Research Council – Why?

"Ambassadors" from each School/College help shape a coherent & balanced research strategy across the Morgan State Enterprise

- **Prioritize research efforts that MSU can capitalize upon**
- **Communicate funding opportunities**
- **Identifying multidisciplinary funding opportunities**
- **IP & tech transfer & commercialization**
- **Research compliance & integrity**
- **Formulate incentives to increase faculty participation in seeking external funding**

Division of Research & Economic Development

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DRED:
MSU Internal Research Council 2014 Members

- **Dr. Victor McCrary, V.P. for Research & Economic Development, Chairperson**
- **Dr. Edet Isuk, Division of Research and Economic Development, Vice-Chairperson**

- **Dr. Mark Garrison, School of Graduate Studies**
- **Dr. Kim Sydnor, School of Community Health and Policy**
- **Dr. Carl White, School of Engineering**
- **Dr. LeeRoy Bronner, School of Engineering**
- **Dr. Glenda Prime, School of Education and Urban Studies**
- **Dr. Robert Singh, School of Business and Management**
- **Dr. Halaevalu Vakalahi, School of Social Work**
- **Ms. Barbara Blount-Armstrong, Division of Institutional Advancement**
- **Dr. Willie Bragg, Division of Academic Outreach & Engagement**
- **Dr. Dereje Seifu, School of Computer, Mathematical & Natural Sciences**
- **Dr. Siddhartha Sen, School of Architecture and Planning**
- **Dr. Alice Jackson, College of Liberal Arts**
- **Dr. Umaru Bah, School of Global Journalism and Communication**

Division of Research & Economic Development

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DRED:

Division of Research & Economic Development

Slide 29
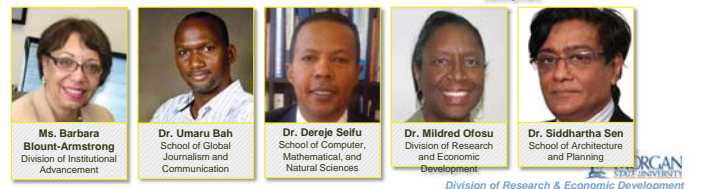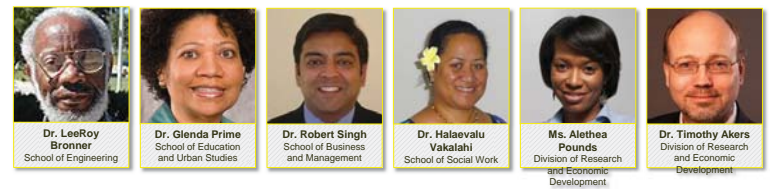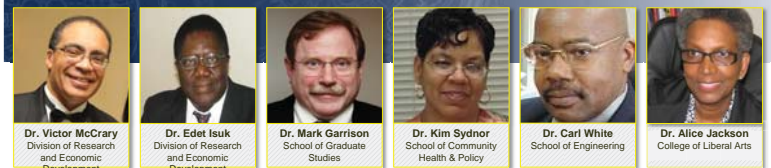
Guiding Principles:

- **Need for strategy for capture**

- **Need to coordinate sponsor interactions**

- **Need more boots on the ground**

- **Need to 'manage' existing research relationships**

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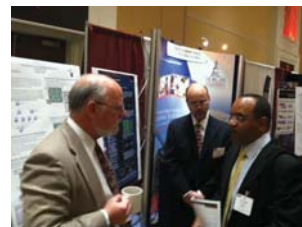*Division of Research & Economic Development*

Slide 30

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Division of Research & Economic Development

Slide 31

Gerald Whitaker

Sponsors: ARL, APG, Navy

Domain Expertise: DoD, BRAC

FY14 Goals: $5M

- Finalize CRADA with APG

- Tasking from Indian Head, NSWC

- Army IDIQ

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Division of Research & Economic Development

Slide 32

- **First HBCU to exhibit & become a member of NDIA**
- Major annual conference which attracts DoD funding agencies and defense contractors
- Morgan State University's exhibit highlighted Morgan's technical capabilities and faculty
- Opportunity for defense contractors to partner with an HBCU – Morgan!!

NDIA
National Defense Industrial Association

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Division of Research & Economic Development

Division of Research & Economic Development: DRED

- **Morgan State University – Overview**
- **FY14 Strategic Goals & Organization**
- **FY14 Performance Snapshot**
- **Research Projects**
- **Morgan Community Mile**
- **Initiatives**

Division of Research & Economic Development
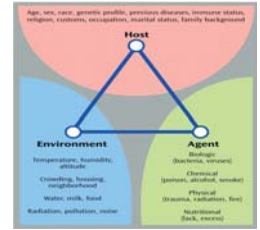**MORGAN STATE UNIVERSITY**

The Get Smart (Students Mobilized and Retooled to Transform) Project PI: Lorece V. Edwards, Co-Directors: Ian Lindong, &Tim Akers

Project Goals

- **Prevent and reduce substance abuse and transmission of HIV/AIDS**
- **Develop environmental strategies to reduce risk factors and increase protective factors**

Programmatic Framework

Sponsor: Substance Abuse and Mental Health Administration (SAMHSA-DHHS)

Amount: $900,000 over 3 years ($300K/yr)

Supports: Health Services, the Counseling Center and the Health & Wellness Center & 15 undergraduate students

Program Manager: Ms. Wilma Pinnock

Collaborators: MCM, Harbel Prevention and Recovery Center, Light Health & Wellness, and Sisters Together & Reaching

Accomplishments & Payoffs To-Date

Solid collaborations with the business/health service providers within the MCM

In-kind donations (e.g., services) from the Public Health Alumni Chapter

Information dissemination via WEAA –

"The Voice of the Community"

Division of Research & Economic Development
MORGAN STATE UNIVERSITY

University of Maryland National Center for Strategic Transportation Policies, Investments, and Decisions University Transportation Center Consortium Member, PI is Dr. Z. Andrew Farkas

Project Goals

1. **Education**: a multi-disciplinary program and experiential learning
2. **Human Resources**: an increased number undergraduate, graduate and professional programs of the Center
3. **Diversity**: students, faculty and staff who reflect the growing diversity of the U.S. workforce
4. **Research Selection**: research that balances multiple objectives of the program
5. **Research Performance**: an ongoing program of basic and applied research
6. **Technology Transfer**: availability of research results to potential users in a form that can be directly implemented, utilized or otherwise applied.
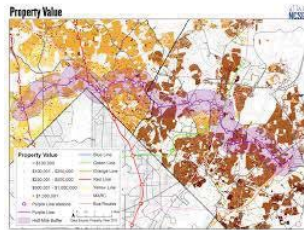
Programmatic Framework

Sponsor: U.S. Department of Transportation, Research and Innovative Technology Administration

Amount: $300,000 for 2 years

Program Manager: Dr. Lei Zhang (UMD)

Dawn Tucker-Thomas (USDOT-RITA)

Collaborators: University of Maryland, Arizona State University, Louisiana State University, Morgan State University (Maryland), North Carolina State University, Old Dominion University (Virginia), University of New Orleans (Louisiana)

Accomplishments & Payoffs To-Date

Budgets have been submitted to USDOT for funding.

Division of Research & Economic Development
MORGAN STATE UNIVERSITY

Visual Analytics for Science and Technology at a *Minority Serving Institution* (VAST MSI): Increasing the Pipeline for STEM Research in Product Development and DHS Workforce Opportunities PIs: Tim Akers & K. Peters

Project Goals

1) **Introduce STEM undergraduate students to research opportunities and curriculum that are focused on visualization informatics**

2) **Cultivate early career STEM faculty in DHS related research linked to DHS Centers of Excellences (COEs).**

Programmatic Framework

Sponsor: Department of Homeland Security

Amount: Original (Sept. 2012): $750,000 (Phase 1) New Award (July 2013): $750,000 (Phase 2) *Total Award: $1.5M*

PIs: Drs. Tim Akers & Kevin Peters

Collaborators: Purdue University

Commercialization Potential: Mobile APP Dev. & Other Technologies by Faculty

Accomplishments & Payoffs To-Date

- MSU is developing expertise in data visualization and visual analytics programming;
- Actively developing a *Cybersecurity* Training Infrastructure;
- Finalizing the *Visual Analytics* Laboratory in the Library;
- Developed the *iLEAPS* Mobile App – *Law Enforcement APP Assistance Program for Students*

Division of Research & Economic Development
MORGAN STATE UNIVERSITY

- **Open House to showcase Morgan State University's (MSU) research facility dedicated to research, education, and economic development for the Chesapeake Bay & its estuaries**

- **Over 200 persons in attendance, including Federal, state, and local dignitaries (NASA, NOAA, NAVSEA, Calvert County Economic Development)**

- **Formal name change: *MSU – PEARL***

- **Collaborative research agreement with the Drexel University & the Academy of Natural Sciences at Drexel University**

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Division of Research & Economic Development

Division of Research & Economic Development:
DRED

- Morgan State University – Overview

- FY14 Strategic Goals & Organization

- FY14 Performance Snapshot

- Research Projects

- **Morgan Community Mile**

- FY14 Initiatives

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Division of Research & Economic Development

DRED:
Morgan Community Mile

Facts on the Morgan Community Mile

- Size of the Morgan Community Mile: **12.2 Square Miles** (7796.5 acres)

- Number of Census Tracts: **32**
- Number of Baltimore Community Statistical Areas: **9**
- Number of residents in the Morgan Community Mile: **114,296** individuals in 2010
- Number of neighborhood associations in the Morgan Community Mile: more than **56**
- Number of business associations in the Morgan Community Mile: **6**

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Division of Research & Economic Development

DRED:
Morgan Community Mile

- **Morgan Community Mile Board- *September 26, 2013***

- **NECO Congress Participation – *October 19, 2013***

- **Baltimore Police Community Meeting - *October 21, 2013***

- **Steering faculty research towards MCM**

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Division of Research & Economic Development

Slide 41

Division of Research & Economic Development: *DRED*

- Morgan State University – Overview

- FY14 Strategic Goals & Organization

- FY14 Performance Snapshot

- Research Projects

- Morgan Community Mile

- **Initiatives**

Slide 42

DRED: *Initiatives – Johns Hopkins University*

- **September 17th visit by APL Director, Ralph Semmel**
  - Summer internships via ATLAS program
  - Research collaborations
  - Mentor/protégé opportunity

- **JHU Engineering – Hopkins Extreme Materials Institute (HEMI) – K.T. Ramesh**
  - $90M Army Contract
  - $100K in Morgan student internships/year
  - Managed by Morgan School of Computer, Mathematical, & Natural Sciences

Slide 43

DRED: *Initiatives – VPs of Research Summit September 25, 2013*

- **What is the state of research in our institutions?**

- **What are best practices we can share?**

- **How can we work together?**

Slide 44

DRED Looking Ahead to FY14: *Challenges*

- **Lack of internal and external networking**

- **Support of graduate students to help faculty with research**

- **Identification of funding resources for faculty to access**

- **Need for reduction/release time in course load**

- **University has many contractual workers who may not be committed to doing research.**

- **Building a sense of entrepreneurism among MSU research faculty –** *takes time and perseverance!*

- **Forging an environment of inclusion and trust for the role of MSU non-STEM faculty in research –** *MSU's research prowess includes ALL faculty and disciplines!*

- **Securing external funding in a very tight Federal and State funding environment –** *relationship management is the key to our success!*

MORGAN STATE UNIVERSITY

morgan **c⟳mmunity** mile
growing sustainable communities

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morgan **c⟳mmunity** mile
growing sustainable communities
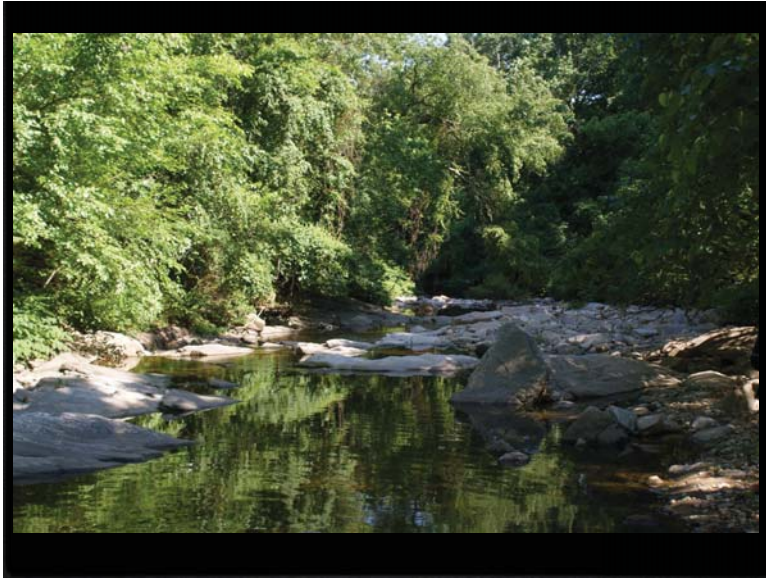
- •Morgan founded 1867 as Centenary Biblical Institute
- •Changed Name to Morgan College in 1890
- •Morgan moved to current site in 1917
- •Became Morgan State College in 1939
- •Became Morgan State University in 1975
- •2017 - Sesquicentennial (150th) Anniversary of Morgan State University
- •2017 – Centennial Anniversary of being at this location

THE PRESIDENT'S VISION

Morgan's motto, "**Growing the Future, Leading the World**," underlies the development of this strategic plan (*Growing the Future, Leading the World: The Strategic Plan for Morgan State University, 2011 –2021*).
.
Approved 8/2/11

morgan **c⟳mmunity** mile
growing sustainable communities

*Morgan State University is the premier public urban research university in Maryland known for its excellence in teaching, intensive research, effective public service, and community engagement. Morgan prepares diverse and competitive graduates for success in a global, interdependent society."**
**Morgan State University 2011-2021 Strategic Plan*

Slide 1

DRED:
Organizational Structure

Division of Research & Economic Development (DRED)

Pre-Award ⟷ Post-Award ⟷ IP Transfer

Office of Research Innovation & Advocacy	Office of Sponsored Programs & Research	Office of Technology Commercialization & Community Partnerships
Program Conception & Development	Grants & Contracts Administration	Technology Capture & Economic Development

- Internal Outreach to MSU Schools/Colleges
- External Sponsor Marketing & Relationship Management
- Cost Analysis
- Proposal & Program Preparation
- Special Initiatives & Center Formation
- MSU Internal Research Council
- MSU Research Colloquium

- Budget Oversight
- Research Compliance
- Program Management
- Contract Negotiations
- Recognition of research & publication excellence
- Grant & contract reporting
- Follow-on grant/contract business development

- IP Capture & Patents
- Technology Transfer & Commercialization
- Industrial Partnerships
- SBIRs/STTRs
- Patuxent Environmental & Aquatic Research Laboratory
- Morgan Community Mile
- DRED & TEDCO

Division of Research & Economic Development

Slide 2

morgan
c@mmunity
mile
growing sustainable communities

Morgan State University

1. Montebello
2. Mayfield
3. Herring Run Park
4. Arcadia
5. Lauraville
6. Beverly Hills
7. Morgan State University
8. Morgan Park
9. Harford- Echodale / Perring Parkway
10. Mt.Pleasant park
11. Loch Raven
12. Perring Loch
13. Stonewood- Pentwood - Winston
14. Hillen
15. Ednor Garden-Lake Side
16. Original Northwood
17. New Northwood
18. Woodbourne Heights
19. Ramblewood
20. Glen Oaks
21. Belvedere
22. Mid- Govans
23. Cameron Village
24. Woodbourne-McCabe
25. Kentworth Park
26. Winston- Govans
27. Richnor Springs
28. Wilson Park
29. Ren Lucy

Slide 3

morgan
c@mmunity
mile
growing sustainable communities

Baltimore Community Statistical Areas

Slide 4

The Morgan Community Mile

morgan
c@mmunity
mile
growing sustainable communities

Morgan State University

Slide 1

morgan community mile
growing sustainable communities

114,296
POPULATION

56
NEIGHBORHOOD ASSOCIATIONS

6
BUSINESS ASSOCIATIONS

32
CENSUS TRACTS

9
CSAs

12.2
SQ MILES
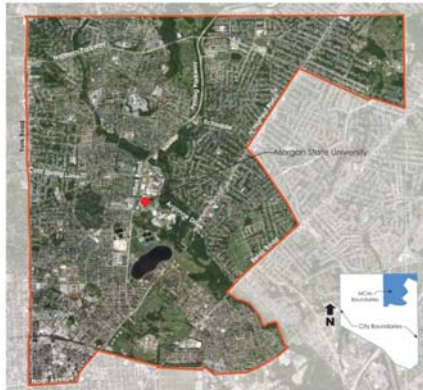
Significant Dates:
October 27, 2012 –MCM Kickoff
April 2, 2013 –Coffee and Conversation
April 26, 2013 –MCM Unveiling
September 26, 2013 –1stMCM Board Meeting
(EDA Grant, Outreach Inventory, Strategic Plan, Facilities Master Plan, Bicycle Master Plan, Morgan Education Consortium)
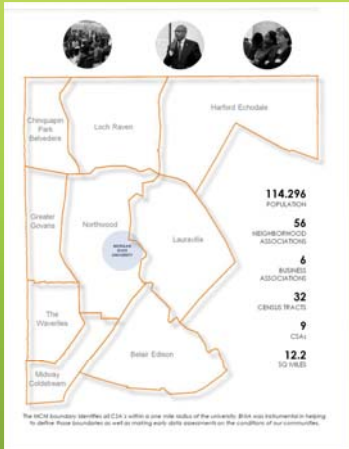
Slide 2

PRIORITY AREAS

promote HEALTH and SAFETY

develop and support EDUCATION and YOUTH DEVELOPMENT

improve the ENVIRONMENT

encourage LIVING, WORKING, AND SPENDING IN THE COMMUNITY

strengthen UNIVERSITY AND COMMUNITY RELATIONS

Slide 3

Morgan Community Mile Initiative Board Members

morgan community mile
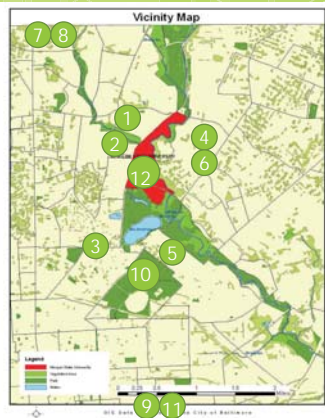
1. Northeast Community Organization (NECO)
2. NorthEast Development Alliance (NEDA)
3. Coldstream, Homestead, Montebello (CHMCC)
4. Hamilton-Lauraville Main Streets (HLMS)
5. Belair-Edison Neighborhoods, Inc. (BENI)
6. Harbel Community Organization
7. Medstar
8. City Police
9. Healthy Neighborhoods, Inc.
10. Civic Works
11. Baltimore City Public Schools
12. Morgan State University (6)

Slide 4

morgan community mile
growing sustainable communities
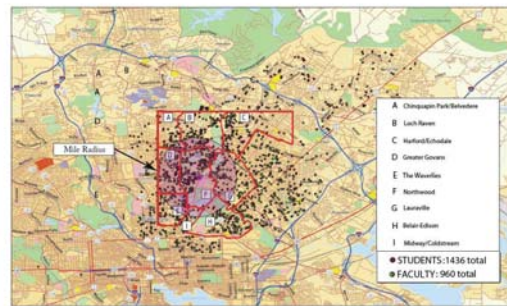
MORGAN MILE
STUDENT & FACULTY POPULATION
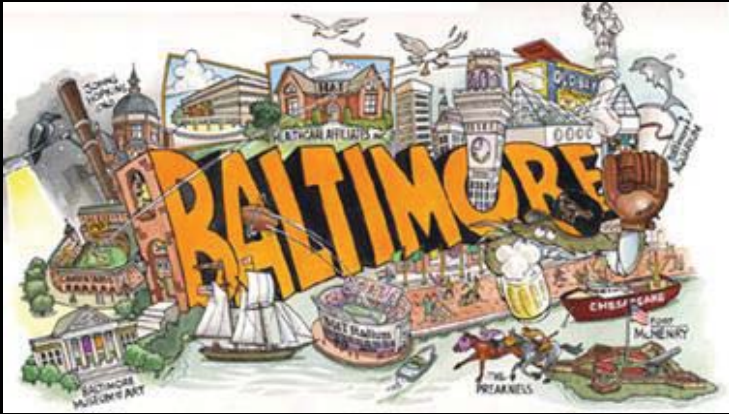
"When goods don't cross borders, soliders will"
- *Frederic Bastiat*

"We are surrounded by insurmountable opportunities"
- *Pogo the Possum (Walt Kelly)*

Morgan Community Mile Initiative
1st Projects

Live Near Your Work

Neighborhoods Within the Morgan Mile

morgan
c@mmunity
mile
growing sustainable 🍃 communities

**Morgan Community Mile Initiative
1st Projects**

BCPS 21st Century Buildings Project

morgan
c@mmunity
mile
growing sustainable 🍃 communities

21st
century buildings
for our kids

**Morgan Community Mile Initiative
1st Projects**

BCPS 21st Century Buildings Project

morgan
c@mmunity
mile
growing sustainable 🍃 communities

Baltimore City Public Schools
21st-Century Buildings Design Expo

Morgan State University
Morgan Community Mile Initiative

Chinquapin Park

Mt. Pleasant Park

Clifton Park and Lake Montebello

Herring Run Park

Sesquicentennial Park

Vicinity Map

Big Dreams…

Community Leadership Certificate Program
Community and Economic Development as an Academic Major
International Development as an Outreach Effort (i.e. MCM: Brazil)
- Meeting with Kelton Clark and Fatou Mboob (Gambia)
International Development as an Academic Major

Thank you for your time!

PEARL

Morgan State University

Kelton Clark
410.586.9706
Kelton.Clark@Morgan.edu
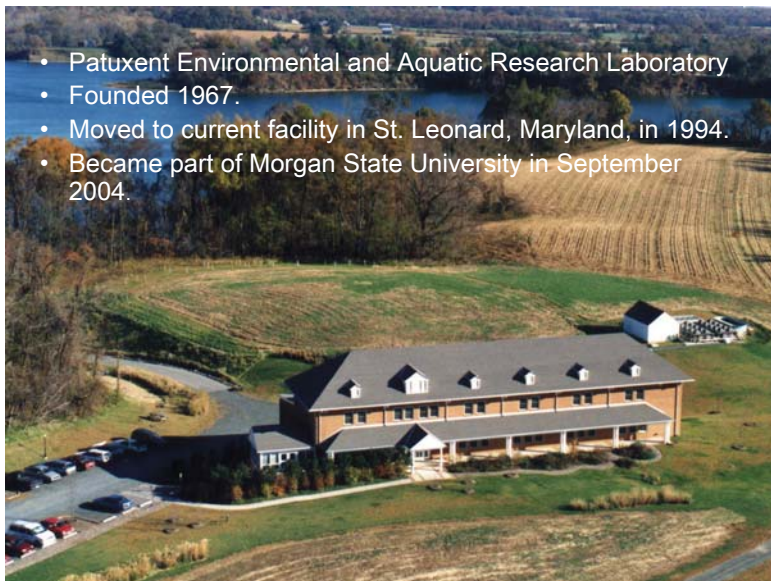
- Patuxent Environmental and Aquatic Research Laboratory
- Founded 1967.
- Moved to current facility in St. Leonard, Maryland, in 1994.
- Became part of Morgan State University in September 2004.

Facilities

- A 22,000 square foot laboratory and office building
- Both a Class 100 and a Class 1000 clean room
- Fleet of research vessels including the 42-foot R/V Leidy
- Private dock providing access to the Patuxent River
- Outdoor and indoor facilities with flow-through ambient water
- Scuba support and dive locker
- Teaching laboratory, conference room and library
- Range of research laboratories, including isotope, constant temperature and fluorescent microscope
- Shellfish hatchery capable of 90 million larvae per year.
- Industrial scale algae production

Personnel

- **Kelton Clark**
  - Patuxent River Commission
  - Oyster Advisory Commission
  - Taskforce of Sustainable Growth
- **Mark Bundy**
  - Natural Resource Economist
  - Former Asst. Secy. MDDNR
  - Developed MD Green Building Program
- **Chunlei Fan**
  - Remote Sensing/GIS
  - Quantitative Analysis
- **Richard Lacouture**
  - Monitoring Water Quality
  - Chesapeake Bay Water Quality Monitoring Program
  - Monitoring and Remediation of HABs
- **J Howard Hixson**
  - Thermal Discharge Compliance
  - Near Field Monitoring
- **Ann Marie Hartsig**
  - Phytoplankton Identification
  - HAB Rapid Response

Activities

Basic Research
- Economic Impacts of Offshore Wind Energy on Recreational Fisheries
- Hyperspectral Remote sensing of Coastal Productivity
- Long-term monitoring of Blue Crab, Oyster & Finfish Populations
- Chesapeake Bay Water Quality and Plankton Monitoring Program
- Calibration and Validation of Earth Sensing Instruments

Applied Research
- Use of Recycled Concrete Aggregate in Oyster Aquaculture
- Phytoplankton Index of Biological Integrity
- Power plant entrainment and impingement
- Thermal discharge
- Near field studies
- Long-term monitoring programs

Policy
- Tributary team
- Patuxent River Commission
- Oyster Advisory Commission
- Taskforce on sustainable growth and wastewater disposal
- Maryland Nutrient trading program

Implementation
- Power Plant & Industrial Monitoring
- NAVFAC task order
- Boston Harbor Outfall Monitoring Program
- MD Pfiesteria Monitoring Program
- Delaware Inland Bays Plankton Study
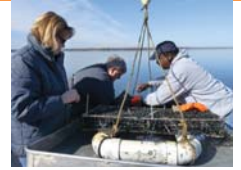
Accomplishments

- Phytoplankton Index of Biotic Integrity
- Major Input into Chesapeake Bay Crab Regulations
- Monitoring for Compliance
- Experimental Design and Analysis for Compliance Issues
- Economic Analysis of Environmental Activities
- Long-term Trend Analysis of MD Water Quality and Plankton Data
- Development of algorithms for water quality monitoring by hyperspectral remote sensing and GIS.
- Predictive model for harmful algae blooms

Education

- We provide hands-on experience and active learning in both field and laboratory settings to advance community interests in the environmental field.
- K-12 example: PLANS
  - Curriculum module based on PEARL phytoplankton and oyster research
  - Adopted by the Calvert County School system
  - Currently training the NERRS staff to transfer this program to their high school partners
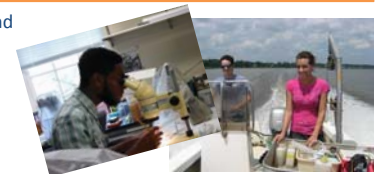
PEARL

Morgan State University
Kelton Clark
410.586.9706
Kelton.Clark@Morgan.edu

Capabilities

CAPABILITIES
- **Benthic, Pelagic & Near Shore Monitoring**
- **Water Quality Monitoring**
- **Power Plant and Industrial Compliance**
- **Hyperspectral Remote Sensing**
- **GIS in Coastal Waters**
- **Quantitative Analysis and Modeling**
- **Natural Resource Economics**
- **Population and Community Ecology**

Slide 1

MORGAN STATE UNIVERSITY

ARG
Aslan Research Group

iCrystal System **and Crystallization Platforms**

Kadir Aslan, Ph.D.
(Kadir.Aslan@morgan.edu)

Assistant Dean and Professor
Morgan State University

November 18, 2013

TEDCO

MII
Maryland Innovation Initiative

Slide 2

MII
Maryland Innovation Initiative

Background: Crystallization in Pharmaceutical Industry

ARG
Aslan Research Group

Problem: Crystallization is a critical step in determining the fate of drug candidates
There is a continuous need for new and improved crystallization techniques.

Polymorphism Investigation

Form Selection and Process Design

Crystallization Process Optimization

Small Scale and Mass Production
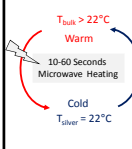
- Polymorphs
- Stable form

- Solubility
- Metastable zone
- Crystallization parameters
- Solvent, Crystal size
- Analytical Characterization

- Variation of crystallization parameters
- Optimization of bulk properties

2

Slide 3

MII
Maryland Innovation Initiative

Morgan Innovation: MA-MAEC "On-Demand" Crystallization

ARG
Aslan Research Group

Science behind our products
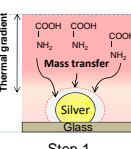
Metal-Assisted and Microwave-accelerated mass transfer: Glycine assembly

Microwave-accelerated mass transfer: Glycine nucleation

Metal-Assisted and Microwave-accelerated Evaporative Crystallization: Crystal Formation

$T_{bulk} > 22°C$ Warm
10-60 Seconds Microwave Heating
Cold $T_{silver} = 22°C$

Thermal gradient

COOH COOH COOH
NH₂ NH₂ NH₂
Mass transfer
Silver
Glass
Step 1

COOH COOH COOH
NH₂ NH₂ NH₂
COOH
Silver
Glass
Step 2

Glycine crystals
COOH
NH₂ NH₂ NH₂ COOH
Silver
Glass
Step 3

Thermal conductivity of water (22°C): 0.61 W / m K
Thermal conductivity of Silver: 429 W / m K
Thermal conductivity of HTS wells: 1.05 W / m K

3

Slide 4

New Crystallization Platforms
Ready for Commercialization

Slide 5

MII — Maryland Innovation Initiative | ARG — Aslan Research Group

Milestone 1:
Consumables

Milestone 1 (0-4 Months): *Product 1*. New circular PMMA crystallization platforms, which affords for homogeneous microwave heating, have more than 16 well capacity (i.e., 21, 95 and 204 wells, and can handle small volume samples (i.e., 20 ml).

Proposed Projects:
1) Computer simulations of the temperature variations of the new crystallization platforms inside a commercially available microwave oven and our "iCrystal system" using COMSOL Multiphysics software
2) Construction of the circular crystallization platform using PMMA disks (5 and 10 cm diameter, McMaster Co.), silicon isolators (GraceBiolabs)
3) Actual temperature measurements of samples inside the wells were measured using an infrared thermal gun during microwave heating to corroborate the predicted temperature variations by COMSOL,
4) Crystallization of selected amino acids and drug compounds to demonstrate the utility, reproducibility of our new crystallization platforms. Crystals will be characterized using Raman spectroscopy, FTIR spectroscopy and X-Ray diffraction method.
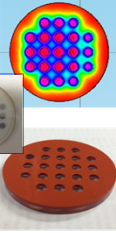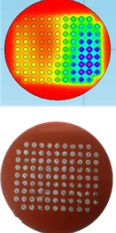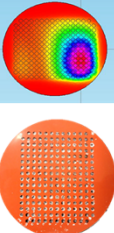
COMPLETED

5

Slide 6

Milestone 1:
Consumables

21 Wells | 95 Wells | 204 Wells

Commercialization Ready

6

Slide 7

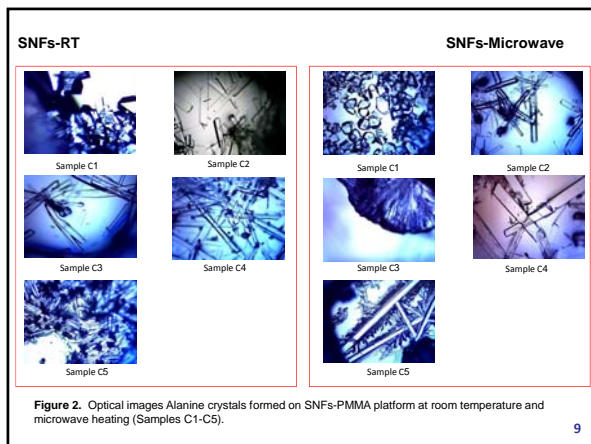| Microwave setting	Optical Images of Alanine Crystals								
	21 Wells			95 Wells			204 Wells		
Power Level	PMMA	Ag 1 nm	Ag 10 nm	PMMA	Ag 1 nm	Ag 10 nm	PMMA	Ag 1 nm	Ag 10 nm
N/A (RT)									
1									
3									
5									
7									
10									

Optical images Alanine crystals formed on PMMA platform at room temperature and microwave heating.

7

Slide 8

Crystal Engineering

8

SNFs-RT

SNFs-Microwave

Sample C1
Sample C2
Sample C3
Sample C4
Sample C5

Sample C1
Sample C2
Sample C3
Sample C4
Sample C5

Figure 2. Optical images Alanine crystals formed on SNFs-PMMA platform at room temperature and microwave heating (Samples C1-C5).

9

Milestone 2:
iCrystal System

Milestone 2 (0-9 Months): *Product 2:* The design, manufacture and testing of a prototype "iCrystal system" for high-end crystallization applications.

Proposed Projects:
1) Computer simulations for mono-mode microwave energy distributions in the microwave cavity of "iCrystal system" to determine the optimum size and shape of the microwave cavity.
2) Construction and testing of "iCrystal system" using a mono-mode microwave generator for microwave power and temperature distribution inside the microwave cavity,
3) Proof-of-principle demonstration of rapid crystallization of selected amino acids and drug compounds to demonstrate the utility of the "iCrystal system".
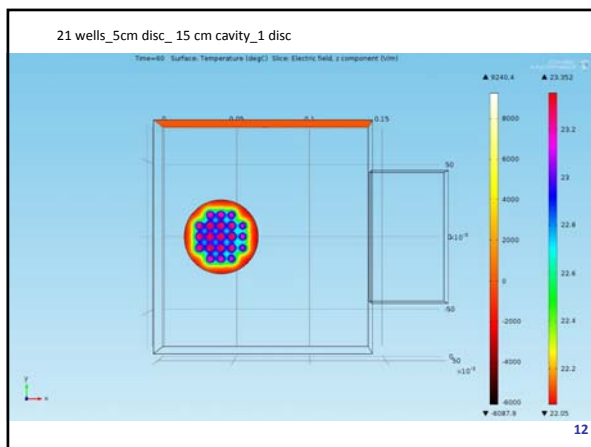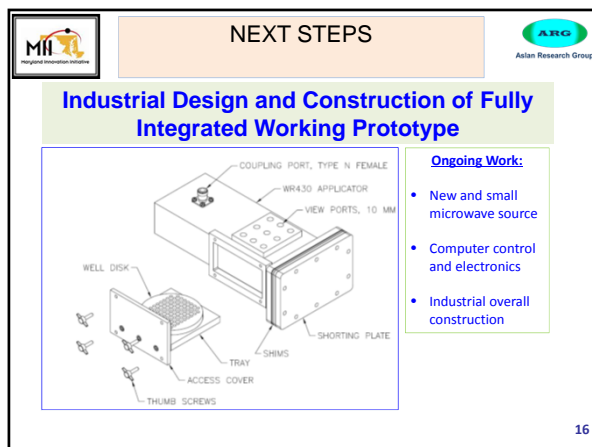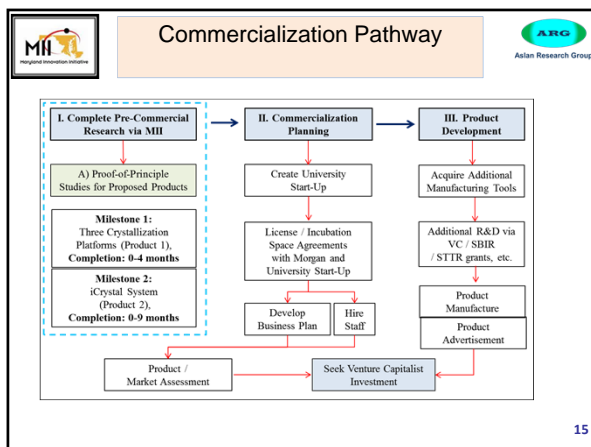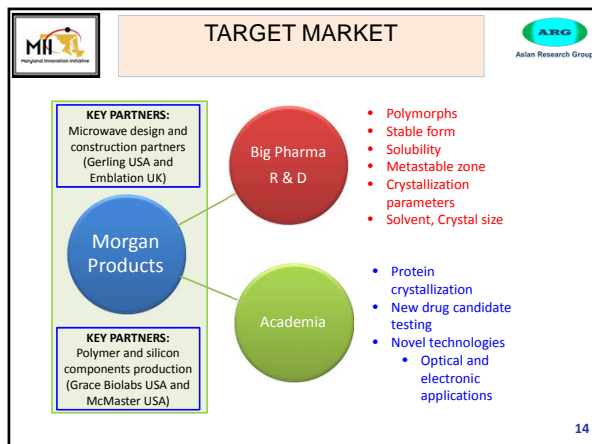
ONGOING

COMPLETED

10

Morgan Innovation: MA-MAEC
"On-Demand" Crystallization

MORGAN'S PRODUCTS

11

---

21 wells_5cm disc_ 15 cm cavity_1 disc

12

Slide 13

95 wells_10cm disc_15cm cavity

13

Slide 14 — TARGET MARKET

KEY PARTNERS:
Microwave design and construction partners (Gerling USA and Emblation UK)

Morgan Products

Big Pharma R & D
- Polymorphs
- Stable form
- Solubility
- Metastable zone
- Crystallization parameters
- Solvent, Crystal size

Academia
- Protein crystallization
- New drug candidate testing
- Novel technologies
  - Optical and electronic applications

KEY PARTNERS:
Polymer and silicon components production (Grace Biolabs USA and McMaster USA)

14

Slide 15 — Commercialization Pathway

15

Slide 16 — NEXT STEPS

Industrial Design and Construction of Fully Integrated Working Prototype

Ongoing Work:
- New and small microwave source
- Computer control and electronics
- Industrial overall construction

16

4

Industrial Design and Construction of Fully Integrated Working Prototype

Acknowledgements

- Morgan State University, Department of Chemistry
- NIH (K25 Career Development Award)
- Maryland Innovation Initiative – Phase 1 Award
- My students at MSU

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RESEARCH PRESENTATION
MSU
External **R**esearch **A**dvisory **C**ommittee

Lorece V. Edwards, DrPH, MHS
Associate Professor
Director of Community Practice and Outreach
School of Community Health & Policy

1

Objectives

- Provide a synopsis of my current research projects,
- Describe their significance, and
- Explain the need to identify additional resources.

2

The Get SMART Project
HIV/STDs & Substance Abuse Prevention

The Impact 2 Project
HIV Prevention Utilizing Technology

The Whisk Project
Women's Health- Sex and Gender Differences in Health Outcomes

Interconnected Relationships

3

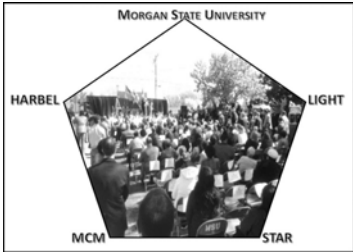**The Get SMART Project**

4

You've Got Funding!

SAMHSA's
Minority Serving Institutions
Partnerships with Community-Based Organizations
RFA # SP-13-006

(SAMHSA) BEHAVIORAL HEALTH AND HIV/AIDS
COORDINATED TECHNICAL ASSISTANCE CENTER (CTAC)
THE MAYA TECH CORPORATION

5

The SMART TEAM

6

The Morgan SMART Team

The Get SMART Team

Principle Investigator Dr. Lorece Edwards

The Get SMART Team

Co-Director for Program Implementation Dr. Ian Lindong

The Get SMART Team

Co- Director for Program Evaluation Dr. Timothy Akers

7

The Morgan SMART Team

Co-Director for Cessation Strategies Dr. Payam Sheikhattari

Co-Director for Performing Arts Shirley Dunlap

Co-Director for Risk Management Dr. Laurens Van Sluytman

Project Coordinator Dr. Denicia Fowler

8

SMART Community /Leaders and Partners

9

SMART Community /Leaders and Partners Morgan Community Mile (MCM)

- The Morgan Community Mile is a university-community partnership where residents, businesses, public officials, and other stakeholders come together with Morgan's faculty, students, and staff to make the community a better place.

- Morgan acknowledges the strength and diversity in its surrounding communities and leverages our skills and knowledge, academic research, and community engagement activities to improve and sustain the quality of life in Northeast Baltimore.

Get SMART Project

- **Goals:** (1) to prevent & reduce substance abuse and transmission of HIV/AIDS and,

  (2) to systematically realign the environmental priorities on campus to include

  sexual health and well-being of students, and

  (3) to meet the goals of "Healthy Campus 2020"

11

Goals/Objectives

- Utilizing two (2) evidence-based preventions, **Community Promise** (an HIV/AIDS intervention that relies on role model stories and peer advocates) and **TIPs** Training for Interventions Procedures for the University (training designed to help college students receiving the training make safe, sound decisions regarding their own high-risk alcohol and other drug behavior), on campus and within the Morgan Community Mile (MCM) among emerging adults (ages 18-24), the **goals** of the Get Smart Project are:

12

3

Get SMART Project

- **Purpose:**
  - Provide emerging adults with the educational tools to make health-related informed decisions.

13

Get SMART Project

- **Objectives:**
  - Implement two (2) evidence-based interventions
  - Enhance the intervention and provide community-based outreach by incorporating Fine Arts
  - Train peer educators to conduct community-based outreach to emerging adults of the same age
  - *Develop environmental strategies aimed at changing/influencing the institutions' built environment*
  - Prevent/reduce the transmission of HIV and STDs on campus/community through educational sessions and curriculum integration, and outreach
  - Prevent / reduce the use of alcohol and illicit drugs on campus/community through educational sessions and curriculum

14

Target Population

EMERGING ADULTS AGES
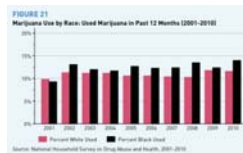### (AGES 18 – 24)
ON CAMPUS & MCM

15

Before the SMART Project

DID YOU KNOW?

1 IN 4
13-24
OCCUR BETWEEN AGES

1 in 4
NEW HIV INFECTIONS
occur in youth between the ages 13 to 24.

HUMAN RIGHTS CAMPAIGN #BEINTHEKNOW
WWW.HRC.ORG

FIGURE 21
Marijuana Use by Race: Used Marijuana in Past 12 Months (2001-2010)

Sexual Health High Risk Takers

17

Before

About 60% of all youth, with HIV do not know they are infected, are not getting treated, and can unknowingly pass the virus on to others.

Over half (54%) of new infections among young gay and bisexual males are in African Americans.

CDC, 2012

18

SMART Tool Box

Creative blend of social networking, social media, social marketing, and technology

19

SMART Tools

20

Fine Arts

LEADERSHIP
AND
STORYTELLING

21

After

too smart
to smoke

22

Healthier Emerging Adults
to
Grow the Future and Lead the World

23

The Impact 2 Project
(Intergenerational Model for Parents, Adolescents, and Children in Technology) Project in Community Health

National Institutes of Health National Library of Medicine

24

Impact 2 Project

- The Impact^2 Project is a HIV/AIDS community-based information outreach project aimed to promote and improve access to electronic HIV/AIDS information in a user-friendly way based on the principles of community-based participatory research (building on the strength and resources within the community).

25

Goals

- Improve and increase access to and utilization of NLM electronic HIV/AIDS-related health information by communities infected and affected by HIV/AIDS and sexual health disparities, namely the African American population.

- Increase dissemination of health related HIV/AIDS information with local community-based organizations and families.

- Promote awareness and use of technology applications in a culturally-sensitive manner for improved information access, enhanced-learning and ehealth literacy integrating community-based theater and Photovoice.

26

Community Partnerships

27

Empowering the Community to be Better Health Consumers

28

The Whisk Project

29

Project Aims

- **Include:**
  - Increase the awareness of sex and gender difference in women's health and health outcomes.
  - Inform students of career opportunities in the discipline biomedical health.

30

Goals

- Increase Sex Differences Research in Basic Science Studies
- Raise visibility of on-campus researchers involved with sex and gender differences research including women's health.
- Create opportunities for interdisciplinary collaboration between faculty, staff and students to create connections, interest and increase visibility of sex and gender differences and women's health research.

31

Campus Collaboration

- The Department of Women and Gender Studies
- The Nursing Program
- The Department of Health Education

32

Does Sex Matter?

33

Questions/Comments

34

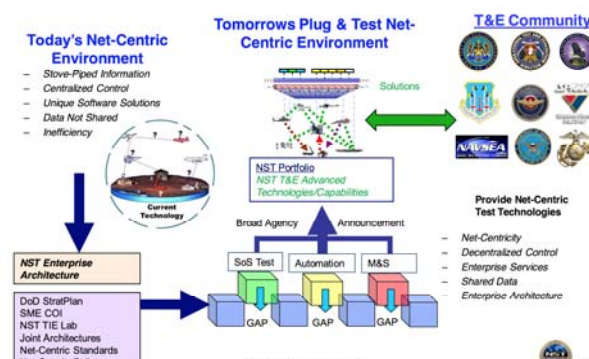**Test and Evaluation/Science and Technology Program**

Net-Centric Systems Test (NST) Test Technology Area (TTA)

Decision Engine for Structured and Unstructured Data

Kofi Nyarko, D.Eng.

Associate Professor, School of Engineering

Distribution Statement C
Distribution: Authorized to U.S. Government Agencies and their contractors only; Reason: administrative/operational use. Other requests for this document shall be referred to the Program Manager for Test & Evaluation/Science and Technology (T&E/S&T), Test Resource Management Center 4800 Mark Center Dr, Ste 07J22 Alexandria, VA 22350

NST Vision
To accelerate development of technologies for enhancing testing of Net-Centric and software intensive systems so as to provide agile T&E capabilities that are readily integrated and interoperable.

Today's Net-Centric Environment
- Stove-Piped Information
- Centralized Control
- Unique Software Solutions
- Data Not Shared
- Inefficiency

Tomorrows Plug & Test Net-Centric Environment

T&E Community

Provide Net-Centric Test Technologies
- Net-Centricity
- Decentralized Control
- Enterprise Services
- Shared Data
- Enterprise Architecture
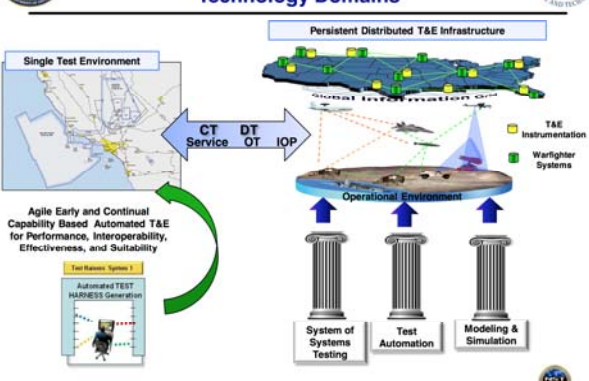
Distribution Statement C

NST Overview
Technology Domains

Distribution Statement C

Problem Statement

- **T&E Need**
  - Improve test communities ability to analyze and make decisions from large volumes of structured and unstructured test data
  - Rapid analysis of voluminous unstructured data, rich in spectral, spatial and temporal features, in support of data to decision
  - System that provides recommendations that lead to high value actions consistent with mission goals

- **S&T Challenge**
  - Develop a scalable system for processing voluminous net-centric data utilizing a Hadoop (NOSQL) back-end
  - Develop a system capable of extracting key events from unstructured and structured data
  - Develop a system capable determining which key events significantly contribute to specific test outcomes
  - Develop a system capable of determining the sequence of key events that lead to specific outcomes

NST Test Technology Area FY13 Annual Review – Distribution Statement C

Project Overview

- **DESU is a prototype hardware/software system to identify patterns and trends in heterogeneous net-centric data and to recommend associated T&E actions**
  - No current capability for automated processing of heterogeneous data (audio, text, video, images) for pattern discover suitable for detecting emergent behavior exist
- **Technology innovation**
  - Develop methods of providing structure to audio, images and text data using machine learning principles
  - Develop algorithms for fusing structured and unstructured data with the use of ontologies
  - Process of recommending T&E actions through automated pattern discovery and pattern/action association by example
- **DESU will mitigate the risk that deployed net-centric systems will fail due to unpredictable emergent behavior, which can be detected and examined to discover root cause**
  - Participants can identify trend/pattern to look for across multiple data types
  - Participants will receive alerts when patterns occur
  - Participants simply capture data containing pattern; no additional information needed to define patterns

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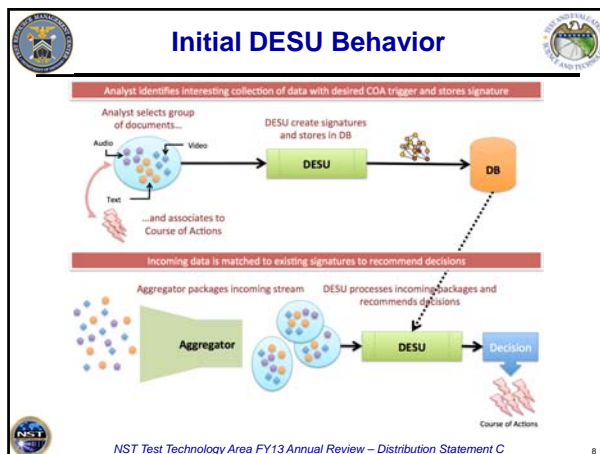
S&T Background

- **Use of traditional relational database management systems**
  - Performance suffers when tasked to perform on voluminous data derived from complex net-centric systems
  - Systems are not optimized for real-time processing and performance
  - Mostly suitable for structured data, but a middle layer is required for storage/retrieval of unstructured data
- **Limited means of working with unstructured data**
  - Limited methods for working with unstructured sources like audio, images and video
  - Limited use of semantic wrappers to help provide structure to unstructured data
- **Unable to effectively combine disparate data from multiple sources**
  - Insufficient means to process and analyze information from disparate sources to correlate data (prevent duplication, resolve conflicts, fill knowledge gaps)
  - Need to detect and mitigate data inconsistencies
- **No capability to trigger actions based on prior actions related to heterogeneous data**
  - Need a method to automatically detect trends and patterns and trigger alert when appropriate
  - Need a means by which to detect emergent behavior so as to better understand the conditions which lead to the event
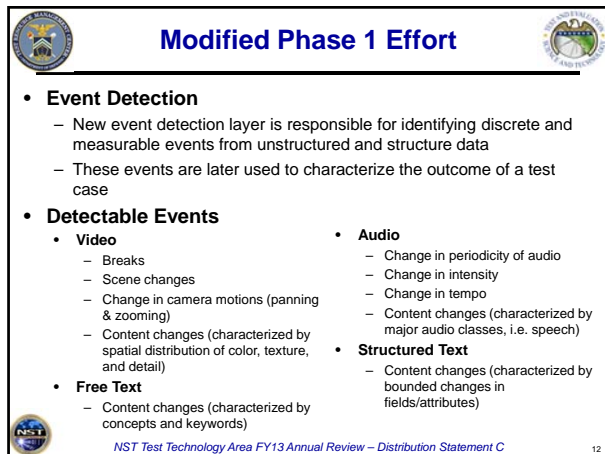
NST Test Technology Area FY13 Annual Review – Distribution Statement C   6

Project Scope

Phase	Technology Description	Technology Outcome/Deliverables	Start/ End TRL
1	Aggregation and correlation engine for unstructured & structured data	System capable of using semantic wrappers and ontologies to fuse structured and unstructured data	3/4
2	Random walk graph matching algorithm for unstructured & structured data	System capable of recommending one or more T&E actions based on captured patterns or trends	4/5
3	Interactive front-end to graph matching algorithm to support evolving ground truth	System capable of recommending actions based on evolving patterns or trends	5/6
End State	Set of algorithms and techniques for automated pattern discovery across disparate data sources	Decision support system that automatically recommends actions based on detected patterns and trends across complex heterogeneous datasets	6

NST Test Technology Area FY13 Annual Review – Distribution Statement C   7

Initial DESU Behavior

NST Test Technology Area FY13 Annual Review – Distribution Statement C   8

Slide 9 — Initial Phase 1 Efforts

Initial Phase 1 Efforts

Analyst identifies interesting collection of data with desired action to trigger and stores signature

Design, develop and demonstrate the conversion of fused heterogeneous data (text, images, audio, video) into a graph representation suitable for graph matching (phase 2) to identify patterns/trends
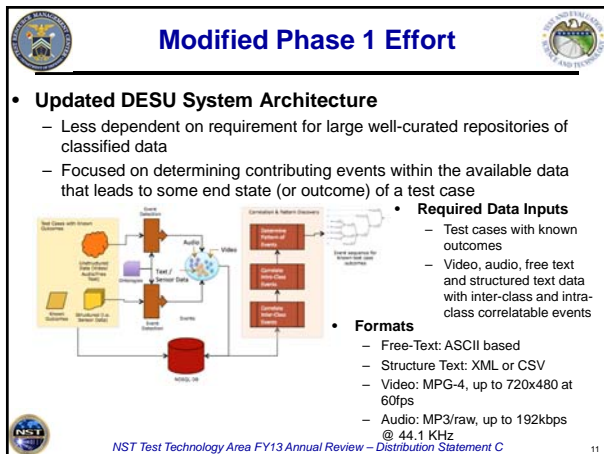
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9

Slide 10 — Planned Phase 2 Efforts

Planned Phase 2 Efforts

Incoming data is matched to existing signatures to recommend decisions

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Slide 11 — Modified Phase 1 Effort

Modified Phase 1 Effort

- **Updated DESU System Architecture**
  - Less dependent on requirement for large well-curated repositories of classified data
  - Focused on determining contributing events within the available data that leads to some end state (or outcome) of a test case

- **Required Data Inputs**
  - Test cases with known outcomes
  - Video, audio, free text and structured text data with inter-class and intra-class correlatable events
- **Formats**
  - Free-Text: ASCII based
  - Structure Text: XML or CSV
  - Video: MPG-4, up to 720x480 at 60fps
  - Audio: MP3/raw, up to 192kbps @ 44.1 KHz

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Slide 12 — Modified Phase 1 Effort

Modified Phase 1 Effort

- **Event Detection**
  - New event detection layer is responsible for identifying discrete and measurable events from unstructured and structure data
  - These events are later used to characterize the outcome of a test case
- **Detectable Events**
  - **Video**
    - Breaks
    - Scene changes
    - Change in camera motions (panning & zooming)
    - Content changes (characterized by spatial distribution of color, texture, and detail)
  - **Free Text**
    - Content changes (characterized by concepts and keywords)
  - **Audio**
    - Change in periodicity of audio
    - Change in intensity
    - Change in tempo
    - Content changes (characterized by major audio classes, i.e. speech)
  - **Structured Text**
    - Content changes (characterized by bounded changes in fields/attributes)

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Next Phase Outline

- **Technology**
  - Random walk graph matching algorithm
  - Decision engine framework development (governs recommendation of actions)

- **Development**
  - Attributed graph builder development
  - T&E actions management development
  - Random walk matching engine development
  - Matching candidate list processing algorithms

- **Prototype for demonstration testing**
  - Technology Insertion Environment Requirements
  - Scenario
  - Use cases

- **Documentation**
  - User manuals

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Development Test Bed

- **Test Bed Tools**
  - Assembling open source test bed tools for semantic structure analysis, image feature extraction, audio feature extraction, text feature extraction

- VAMP plugin provides a measure of key estimates (tempo, segmentation etc.)
- Depends on predetermined ontologies for feature extraction
- Use to extract high level subject tags (nature, crowds, animal etc.)

- Built tools to perform feature extraction in video frames
- Features are used to detect event changes (like content changes)

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Completion Plan

- **FY14**
  - Software algorithm development for matching engine
  - Testing with relevant net-centric data
- **FY15**
  - Installation and testing transition partner test range
- **Final Project Deliverables**
  - Hardware system comprising of scalable Hadoop database back-end and software algorithms
  - Software algorithms for automated T&E action recommendation based on fused heterogeneous net-centric data
  - User interface front-end for selecting patterns/trends to detect and providing feedback to evolve ground truth
  - Operating and calibration manual
- **Future Possibilities**
  - Involve more complex actions governed by specific domain knowledge

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"Urban Sustainability: Energy, & the Environment"

January 2014
V. R. McCrary, PhD
VP for Research & Economic Development
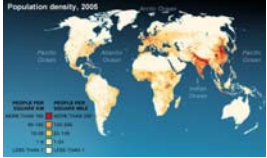(443) 885-4631
victor.mccrary@morgan.edu

MORGAN STATE UNIVERSITY

Division of Research & Economic Development

Urban Sustainability:
Definitions
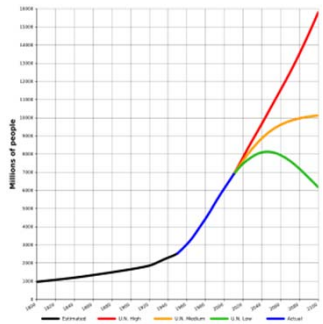
Urban: An urban area is characterized by higher population density and vast human features in comparison to areas surrounding it. *(Wikipedia)*

- **Population densities of 500-1000/sq mile (US Census Bureau)**

- Urban areas are created and further developed by the process of urbanization. Measuring the extent of an urban area helps in analyzing population density and urban sprawl, and in determining urban and rural populations.

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Urban Sustainability:
Population Forecasts call for Action

Division of Research & Economic Development

Urban Sustainability:
Fast Facts*

- Half of the world's population (3.5B) live in cities
- By 2055, 75% of the world's population will live in the cities
- Cities occupy 2% of the Earth's land, but account for 70% of both energy consumption and carbon emissions
- Urban economy is more productive and leads to innovation

* www.sustainablecities2013.com

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Urban Sustainability:
The People are in the Cities

Continent	Density (inhabitants/km^2)	Population (2011)	Most Populous Country	Most Populous City
Asia	86.7	4,140,336,501	China (1,341,403,687)	Tokyo (35,676,000)
Africa	32.7	994,527,534	Nigeria (152,217,341)	Cairo (19,439,541)
Europe	70	738,523,843	Russia (143,300,000; approx. 110 million in Europe)	Moscow (14,837,510)
North America	22.9	528,720,588	United States (313,485,438)	Mexico City/Metro Area (8,851,080 / 21,163,226)
South America	21.4	385,742,554	Brazil (190,732,694)	São Paulo (19,672,582)
Oceania	4.25	36,102,071	Australia (22,612,355)	Sydney (4,575,532)
Antarctica	0.0003 (varies)	4,490 (non-permanent, varies)[20]	N/A[note 1]	McMurdo Station (955)[21]

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Urban Sustainability Research:
Challenges

- Energy & Resource (water) management and allocation (clean air & water)

- Transportation Utilization

- Health prevention vs. disease maintenance

- Aging populations

- Nutritional food availability, allocation, and safety

- Resiliency – structural and psychological

- Communications & Transactions: system-to-system, system-to-person, person-to-person

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Energy

Division of Research & Economic Development

Urban Sustainability:
Alternative Energy

Maryland Offshore Wind Energy Research Challenge Grant (MOWER)
Maryland Higher Education Commission

Economic Impact of the Proposed Wind Turbines on the Offshore Marine Recreational Fishing Industry Study
Mark M. Bundy, Ph.D.
Patuxent Environmental & Aquatic Research Laboratory

OBJECTIVE
Estimate the change in the economic impact derived from recreational fishing associated with the development of an offshore wind turbine farm near Ocean City, Maryland

Division of Research & Economic Development

Environment

The President's Vision

*"Morgan State University is the **premier public urban** **research** university in Maryland known for its excellence in teaching, intensive **research**, effective public service, and community engagement. Morgan prepares diverse and competitive graduates for success in a global, interdependent society."**

*Morgan State University
2011-2021 Strategic Plan

Growing the Future,
Leading the World:
The Strategic Plan for
Morgan State University,
2011 – 2021

Morgan's motto, "**Growing the Future, Leading the World,**" underlies the development of this strategic plan.

Approved by Board of Regents
8/2/11
David Wilson, President

Division of Research & Economic Development

Morgan State University:
The Baltimore City Research Laboratory

- Urban areas are the new hubs for **innovation**

- Baltimore is on the upward path towards greatness!!

- The right "pieces" are in place – transportation, connectivity, culture, highly reputable educational institutions

- Baltimore is "Morgan's Research Laboratory"

- Apply results from this "laboratory" to other urban environments

Division of Research & Economic Development

GROWING GREEN INITIATIVE (GGI)

Growing the City's population by using *greening* techniques to:
- Stabilize and clean vacant and underutilized land;
- Improve public health;
- Stabilize communities while waiting for real estate markets to improve for development opportunities;
- Increase the efficiency of Baltimore's stormwater management program and support stormwater efforts of private development.

The Growing Green Initiative will use eight green space "typologies"

- Green Space
- Urban Agriculture
- Community Managed Open Space
- Green Parking
- Stormwater Management
- Urban Forests
- Small Parks and Open Spaces
- Mixed Greens (any combination of the other 6 typologies)

GREEN TYPOLOGIES

Disaster Preparedness and Planning Project

Climate change is real. Let's do something.

MORGAN STATE UNIVERSITY

Division of Research & Economic Development

Next Big Thing

- WASTE
- ENERGY – Distributed Grid/Renewable Energy (Maryland-Offshore Wind)
- Climate Adaptation (Disaster Preparedness)
- GPI – Baltimore should be first implementer

Division of Research & Economic Development

Example of "Big Research Topic": *Urban Resiliency*

Urban Resiliency: Research which provides technology and paradigms to sustain persons and structures from short and long term stress & trauma

Areas of Research under this "big topic":
- Mitigating biological agent outbreaks (natural or man-made)
- Buildings, structures, people exposed to extreme weather conditions
- Cyberattacks on systems, people, databases, etc
- Living in transition neighborhoods/areas of high unemployment

Needed Research Capabilities: population statistics, sensors, building materials, computer science, biology, mental health

MSU Schools/Colleges: Community Health, Engineering, Social Work, Computer Science/Math/Natural Science, Architecture

Division of Research & Economic Development

Slide 1

Sustainable Development Goals:
Empower Inclusive, Productive & Resilient Cities*

- End extreme urban poverty
- Ensure universal access to secure & affordable built environment & basis urban services
- Ensure safe water & air quality for all
- Ensure low carbon emissions
- Efficient land & resource use
- Investments into climate and disaster resilience

*An Action Agenda for Sustainable Development (2013)
Leadership Council of the Sustainable Development Solutions Network

Resilient Cities 2013
4th Global Forum on Urban Resilience & Adaptation

Division of Research & Economic Development

Slide 2

U.S. Department of Homeland Security
(Visual Analytics for Science & Technology at a Minority Serving Institution)

- **$750,000** Awarded in September 2012 (**Phase 1**)
- **DHS Site Visit to MSU June 11, 2013**
- ***Post-Site Visit Evaluation of MSU by DHS:*** Report Received July 2013 – **EXCELLENT**
- MSU Invited July 2013 to Re-Apply for Continuation Funding **$750,000** (**Phase 2**)
- ***Total Award Expected: $1.5 million***

MSU in the process of developing a cadre of expertise in data visualization and visual analytics programming

Division of Research & Economic Development

Slide 3

High-Performance Green Bridges

NSF HBCU-UP — **$240K**
PI: Dr. Monique Head, Dept. of Civil Engineering (2012-2014)

PROJECT OVERVIEW: Integration of research, education training of a community of scholars, and dissemination of results to address aspects of structural sustainability by establishing criteria for high-performance green bridges (HPGB) through 1) the development of a rating system similar to LEED for buildings, and 2) the validation of a new generation of seismic-resistant bridge columns that are reinforced with composite materials and energy devices.

Seismic-Resistant Design of FRP Bridge Columns
- Seismic design
- Construction of FRP bridge column prototype

Educational Training
- Brown bag seminar on seismic design, bridge engineering and experimental methods
- Hands-on laboratory demonstrations

Quarter-scale Experimental Testing
- Development of test plan and ground motions
- Evaluation of a FRP bridge column

Fig. 1: Integrated Approach

Slide 4

MARYLAND INNOVATION INITIATIVE AWARD WINNER- $100K

iCrystal System and New Crystallization Platforms for Rapid Drug Development

Kadir Aslan, Ph.D., Professor

EMPLOYMENT:
5 Undergraduate
2 Graduate
1 Faculty (summer)

ARG Aslan Research Group

MORGAN'S PATENT: CRYSTALLIZATION

Morgan Innovation 1: Consumables

Morgan Innovation 2: iCrystal System

COMMERCIALIZATION PLAN

STEP I. Complete Pre-Commercial Research via MII
Proof-of-Principle Studies for Proposed Products

STEP II. Commercialization Planning
Create University Start-Up

STEP III. Product Development
Seek Venture Capitalist Investment

Division of Research & Economic Development

Morgan State University:
Patuxent Environmental & Aquatic Research Laboratory (PEARL)

- Morgan State University's (MSU) research facility dedicated to research, education, and economic development for the Chesapeake Bay & its estuaries

- **Stakeholders:** NASA, NOAA, NAVSEA, Calvert County Economic Development

- Collaborative research agreement with the Drexel University & the Academy of Natural Sciences at Drexel University

Division of Research & Economic Development

National Institute of Health Award:

MORGAN STATE UNIVERSITY

CEASE

- **The CEASE intervention will be implemented at 18 new sites between 2013-16, including the** **Morgan Community Mile (MCM)**
- FY2014 funding ~ $460K
- Research Outcomes:
  - Feasibility, Fidelity, Penetration, Acceptability, Uptake, Cost
  - Retention, Effectiveness, Timeliness
  - Satisfaction (Clients, Peer-Motivators, Community, Organizations)

Sustainability:
Recent Reports

A NEW GLOBAL PARTNERSHIP:
ERADICATE POVERTY AND TRANSFORM
ECONOMIES THROUGH SUSTAINABLE
DEVELOPMENT

The Report of the High-Level Panel of Eminent Persons on
the Post-2015 Development Agenda

SUSTAINABLE DEVELOPMENT SOLUTIONS NETWORK

An Action Agenda for Sustainable Development

Division of Research & Economic Development

Sustainability Development Goals:
Four Dimensions

Economic Development & Eradication of Poverty	Social Inclusion
Environmental Sustainability	Governance, including Peace & Security

Division of Research & Economic Development

For further information:

Dr. Victor McCrary
victor.mccrary@morgan.edu

443-885-4631

Division of Research & Economic Development

School of Community Health and Policy

Public Health
Nutrition and Nursing

MORGAN STATE UNIVERSITY
GROWING THE FUTURE
LEADING THE WORLD®

SCHP's Mission

SCHP's *mission* is to prepare leaders who will
- ❑ generate and disseminate new scientific information designed to improve understanding of urban health problems,
- ❑ develop effective programs, and
- ❑ advocate for policies that enable underserved populations to attain optimal health.

Practice-based service learning model

SCHP's Programs

Public Health Program
Behavioral Health Sciences
Health Policy and Management
Public Health Analysis
Nutritional Sciences Program
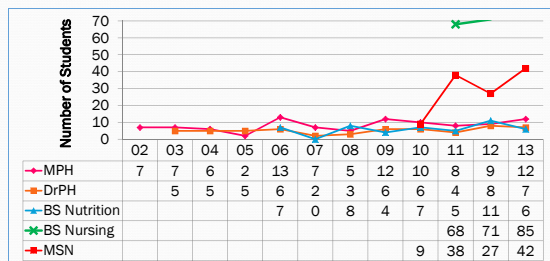### Nursing Program

SCHP Spring 2013 Enrollment

- **Public Health**
  - DrPH: 65
  - MPH: 36
  - *Total:* 101
- **Nutritional Sciences**
  - BS: 79
- **Nursing**
  - BSN: 485*
  - MSN: 47
  - Total: 532
  - * includes Pre-Nursing

Total SCHP Enrollment

712

SCHP Graduates

	02	03	04	05	06	07	08	09	10	11	12	13
MPH	7	7	6	2	13	7	5	12	10	8	9	12
DrPH		5	5	5	6	2	3	6	6	4	8	7
BS Nutrition					7	0	8	4	7	5	11	6
BS Nursing										68	71	85
MSN									9	38	27	42

Number of Students (y-axis: 0, 10, 20, 30, 40, 50, 60, 70)
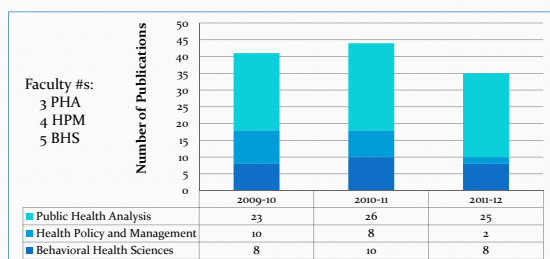
Public Health Program Goals

Goal 1: Provide and promote highly effective practice-based public health education to a diverse student body to increase: knowledge; cultural competency; problem-solving research and policy development skills; and the ethnic diversity of the public health workforce.

Goal 2: *Develop, translate and disseminate new knowledge in public health and best practices for prevention and policy development for urban communities in an effort to eliminate health disparities.*

Goal 3: Provide time and expertise filling areas of need to improve the health and well-being of the larger community.

Goal 4: *Develop an infrastructure with systems that support the program's academic, research, and service goals.*

PHP Faculty Peer-Reviewed Publications by Department

Faculty #s:
3 PHA
4 HPM
5 BHS

Number of Publications (y-axis: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50)

	2009-10	2010-11	2011-12
Public Health Analysis	23	26	25
Health Policy and Management	10	8	2
Behavioral Health Sciences	8	10	8

Nutritional Sciences Program
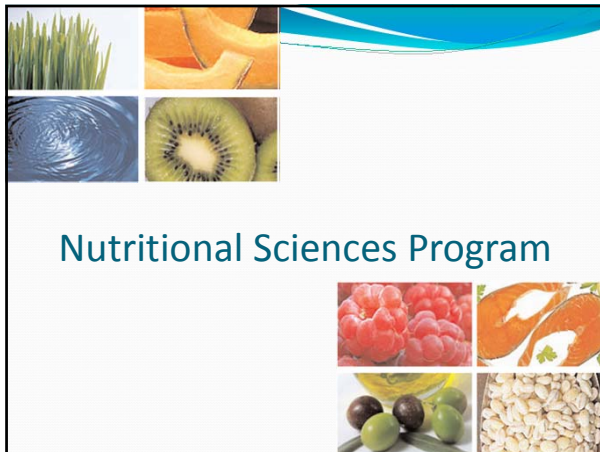
Nutritional Sciences Program

Goal 1: Enroll, retain and graduate a culturally diverse pool of students to meet the critical shortages and under-representation in the profession.

Goal 2: Prepare students with the knowledge and skills as defined by the *Foundation Knowledge and Skills for Didactic Component of Entry-Level Dietitian Education Programs.*

Goal 3: Prepare students to apply and perform satisfactorily in field/supervised practice programs as evaluated by the Preceptor/Supervisor.

Goal 4: Expand Didactic and Practice-based offerings

Goal 5: *Develop and Offer an ADA-Accredited Internship Program*

Goal 6: *Increase Faculty Research and Scholarship*

Goal 7: Develop a Master's of Science degree in Public Health Nutrition by 2015

Enrollment in and Graduates of the Nutritional Sciences Program

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Enrollment	20	23	25	22	24	24	32	40	41	51	65	72
Degrees	6	6	5	5	2	7	0	7	4	7	5	8

Faculty: 3 full-time and two "regular" adjuncts

Nursing Program

Nursing Program Goals

Goal 1: Educational Innovation: Prepare nurses for the changing healthcare environment, and increase the number of under-represented nurses in health care. Provide a nursing curriculum that will prepare nurse leaders for practice, research, and education.

Goal 2: Service/Practice Enhancement: Lead nursing practice partnerships that translate nursing science into practice to improve health outcomes. Make the nursing program more visible in the community.

Goal 3: Research Development: *Have faculty who are engaged in nursing research, focused on the community and on reducing health disparities. Initiate research productivity in focused areas of excellence of nursing, expand team science, and advance the state of nursing science.*

Goal 4: Infrastructure Development: Inclusion: Increase diversity among students, faculty, and staff and expand global experiences that demonstrate inclusion and appreciation for diversity. External Relations and Development: Increase the national, state, and local visibility and knowledge about the Nursing Program in order to improve engagement of alumni, friends, and donors and increase philanthropy.

Nursing Program Grant Funding

PI Name	Funder/Title	Amount
Mamie C. Montague, Ph.D., RN, MSN, FNP-BC, CNE, FAAN	Title III	$376,041.00
Mamie C. Montague, Ph.D., RN, MSN, FNP-BC, CNE, FAAN	Nurse Support Program II	$363,528.00
Mamie C. Montague, Ph.D., RN, MSN, FNP-BC, CNE, FAAN	MD Health Education Institute 'Who Will Care'	$327,842.00
Mamie C. Montague, Ph.D., RN, MSN, FNP-BC, CNE, FAAN	Nurse Support II Doctoral Program at an HBCU	$249,696.00

SCHP Areas of Research Interest

- ✓ Community Resiliency/Community Engagement
- ✓ Cancer
- ✓ Disaster Preparedness
- ✓ Health Literacy
- ✓ HIV/AIDS
- ✓ Mental Health (African Americans/Children)
- ✓ Obesity/Nutrition
- ✓ Occupational Health/Environmental Health/Food Safety
- ✓ Tobacco/Smoking Cessation

- ✓ Maternal and Child Health
- ✓ Men's Health (CVD/Mental Health)
- ✓ Women's Health (Violence Prevention)
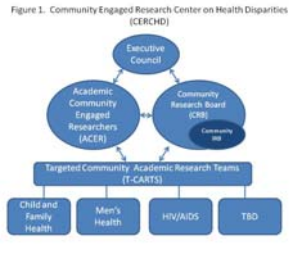- ✓ Prison Re-Entry Population

CERCHED

Community Engaged Research Center on Health Equity and Disparities

vehicle for joint efforts in research planning, implementation and dissemination with the academic institution and community partners.

Key is the bi-directional relationship between community partners and the academic institution

Core Units (TBD):
(1) a Community Research Board (CRB), (2) a working group of faculty and students as academic community engaged researchers (ACER) and (3) the Executive Council

Figure 1. Community Engaged Research Center on Health Disparities (CERCHD)

SCHP Grants

Funder/Grant Title	AMOUNT
Dept. of Education/Title III HBGI	$361,218.00
NIH-National Library of Medicine/Enable, Engage, and Empower HBCU's	$5,000.00
Admin. Courts MD Judiciary/Administrative Office of the Courts	$150,000.00
Johns Hopkins/Bloomberg-Towards a Community Resilience Index	$10,631.00
HIV/AIDS Community Information Outreach Project 2012	$40,000.00
ICF Corp./NIH/NLM-Women's Hlth Resources Dissemination Outreach Project	$50,000.00
Subcontract-Morehouse-The National Minority Male Project	$130,206.00
University of Maryland/Institute of Human Virology	$35,504.00
HRSA-Maternal & Child Health (MCH) Research	$71,025.00
Parks and People Foundation	$4,450.00

Public Alumni Chapter

Placements:

Institutes, Federal Agencies, Community Based Organizations
- American Institute for Research
- Center for Disease Control (CDC)
- Centers for Medicare & Medicaid Services (CMS)
- Departments of Health (City, County, and State)
- Health Resources and Services Administration (HRSA)
- Kennedy Krieger Institute
- National Institute of Health (NIH)
- US Environmental Protection Agency (EPA)
- US Food and Drug Administration (FDA)

Come visit us
Jenkins (3rd Floor – Hillen Road side)
and Portage Avenue
(between BP and 7-Eleven)

Strategic Direction For Growth
MSU School of Engineering

2011 THROUGH 2021

Who Are We

- One of about 350 higher education Institutions in the U.S. offering at least one engineering program accredited by ABET , Inc.

- Public institution located in a major urban center

- Offerings in 3 degree programs out of the 10 degree programs in U.S. with enrollments of at least 20K students

- Enrolls about 650 of the 30K African American (AA) Undergraduate engineering students in U.S.
- Fourth in enrollment of such students in all U.S.
- The three schools w/larger enrollments than MSU have 8, 8, and 6 of the 10 common most degree program offerings
  - MSU has the highest per capital enrollment per program of the three leading enrollers of AA Undergraduate students in U.S.

FROM HERE TO THERE

Where We Are -Present	Where To Go - Future
- House 4 distinct programs in electrical, civil, industrial engineering, and transportation systems - Total enrollment of about 850 students at all degree levels through the doctorate - Leading producer of AA undergraduate electrical and civil engineers in the nation	- Enhance interdisciplinary programs related to biomedical, secure cyberspace, sustainable energy, virtual realities, and novel learning modalities - Diversify student body and modes of program offerings - Increase to a total enrollment to between 1600 and 2000 by 2021 - Be among the top five producers of AA engineering doctorates in U.S.

SAMPLING OF FACULTY INTEREST

- **Craig J. Scott,** Chairperson; Professor; Ph.D., Howard University; M.S.E.E., Cornell University; B.S.E.E., Howard University.
  Research Interests: *Engineering Visualization for network security, computer vision and image/spatial data fusion; technology assisted formative assessment and differentiated instruction.*

- **Yacob Astatke**, Assistant Professor and Associate Chair for Undergraduate Studies; D.Eng., Morgan State University; M.S.E.E., Johns Hopkins University; B.S.E.E., Morgan State University.
  Research Interests: *Performance and QoS management in mixed wireless networks and online engineering course development and delivery.*

- **Arlene Cole-Rhodes**, Professor; Ph.D., University of California Berkeley; M. Phil, Cambridge University; B.S. (Mathematics), Warwick University.
  Research Interests: *Image processing with applications in remote sensing and avionics and signal processing for wireless communications.*

SAMPLING OF FACULTY INTEREST

- **Kemi Ladeji-Osias,** Associate Professor and Associate Chair for Graduate Studies; Ph.D. (Biomedical Engineering), Rutgers University; B.S.E.E., University of Maryland College-Park.
  Research Interests: *Synthetic Vision Systems, Haptic training in Biomedical Engineering, and integration of technology in the classroom.*

- **Farzad Moazzami,** Assistant Professor; D.Eng, Morgan State University; M.Eng., Morgan State University; B.S., University of Tabriz.
  Research Interests: *Wireless communications, Signal Processing, Information assurance*

- **Kofi Nyarko,** Associate Professor; D.Eng, Morgan State University; M.S., Morgan State University; B.S., Morgan State University.
  Research Interests: *Computational engineering, scientific/ engineering simulation & visualization, complex computer algorithm development, computer network theory (including Ad-Hoc Mobile Networks), portable computing design and development, advanced computer display technologies, and avionic system software development.*

SAMPLING OF FACULTY INTEREST

- **Michel Reece,** Associate Professor; D.Eng, Morgan State University; M.S.E.E., Penn State University; B.S.E.E, Morgan State University.
  Research Interests: *Device characterization and modeling using MMIC and MIC technologies at RF, microwave, and millimeter wave frequencies.*

- **James E. Whitney, II,** Associate Professor; Ph.D., Marquette University; M.S.E.E., Catholic University of America; B.S.E.E., University of Maryland-College Park.
  Research Interests: *Algorithm development and hardware design using digital and statistical signal processing; detection, estimation, and multispectral sensing and image processing.*

- **Gregory M. Wilkins,** Lecturer; Ph.D., University of Illinois; M.S.E.E. The Johns Hopkins University; B.S.E.E., University of Maryland-College Park.
  Research Interests: *Applications of computational electro-magnetic methods for the solution field behavior in guided wave structures and radiating systems (antennas).*

Drivers of Our Plan

- Global Competitiveness
- U.S. Trend Toward a Majority/Minority Nation
- Merging of Traditional Academic Disciplines
- Challenge to Traditional Modes of Learning
- 21st Century Grand Challenges for Engineering
  - Restore and improve the urban Infrastructure
  - Advance health informatics
  - Enhance virtual reality
  - Advance Personalized learning
  - Secure Cyberspace
  - Reverse-Engineering the Brain
  - Engineer the tools of scientific research

How Will The Plan Be Realized

- Forge partnerships with educational institutions both foreign and domestic
- Work closely with private industry and government agencies
- Put forth intense effort to bring on-campus disciplinary programs closer together
- Define and strengthen the concept of "real" Centers of Excellence
- Establish a university affiliated technology development and transfer center
- Attract and employ research professors, professors of practice, and research (non-teaching) engineers & technologists on both short and long term bases

CLARENCE M. MITCHELL, JR.
SCHOOL OF ENGINEERING
MORGAN STATE UNIVERSITY

THANK YOU
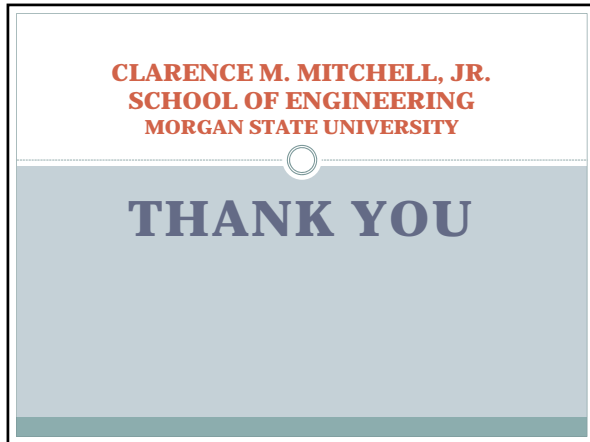
Appendix III:

Panel Readout

Morgan State University

External Research Advisory Panel

MSU Accomplishments

- New Vice Presidents
  - Research and Economic Development
  - International Affairs
  - Academic Outreach and Engagement

MSU Accomplishments, con't

- Morgan Community Mile and School of Community Health
- School of Engineering graduation statistics
  - Focus on system engineering and visualization
  - Collaborative opportunities with other disciplines
- More robust Technology Transfer
  - 14 Disclosures (up from 1)
- Standing up the MSU ERAP

Opportunity For Growth- International

- International
  - Develop institutional strategies for growing global research
  - Increasing the relationships with international universities and institutions
  - Increasing the number of international students
  - International Student and Faculty Exchange Program
  - Applying for international funding opportunities

Reaching Out To The Morgan Community

- Morgan Community Mile
  - Promoting cycling for health and environment
    - Expand bike lanes
    - Promote driver awareness
    - Ensure adequate secure parking
- Incentives for faculty and students to get involved
- School of Community Health and Policy
  - Involve the aging community inside/outside MSU
  - HHS research opportunity

Reaching Out To The STEM Community

- PEARL – forging relationships with:
  - Environmental groups
  - Other research institutions
  - Expand student involvement in research
- Expanding visualization techniques
  - Be a leader in this field (niche opportunity)
- Cybersecurity
  - NSA Information Assurance Courseware Evaluation Certification (Cyber Warriors and Scholarships for Services programs)
- Technology Transfer

Opportunities for Students

- Presidential Management Fellows
- Increase internships
  - Government (Federal, State, Local)
  - Private industry
  - Exchange students with international universities
- Certificates in related areas
- Increase student participation in national and international meetings
- Expand academic majors
  - Community and Economic Development
  - International Development/Relations
  - Sustainability
  - Cyber Security

Opportunities For Faculty

- Increase participation in academic and trade societies
  - Hold officer positions
- Faculty exchanges: public, private, international
- Increase participation in colloquiums
- Increase participation in advisory boards

Public Relations and Communication

- Publicity Strategy
  - Assign a public relations staff to work with faculty
    - Impression management
  - Expand social media presence
  - Targeted marketing
  - Web presence
    - More user friendly
    - Reach out to various audiences

Urban Sustainability Research Area

- Timing is critical
  - President's Climate Action Plan
    - Disaster Resilience Management
    - National Security
- Urban Water Issues, Infrastructure
- Expansion of MSU community initiatives
- Potential funding: EPA, NOAA, DOI, DOT, HUD, HHS, NGOs, industry partnerships

Success Metrics

- Completion of milestones
- Increase in funding (both value and sources)
- Student retention and placement
- Patents – how many?
  - Low hanging fruit (timing)
- Publications – how many and which ones?

Next Meeting

- Tentatively planned for one of the last weeks in September
- Two days

Next Topics

- Non-STEM research
- International Development
- Alumni presentation
- Urban development (School of Architecture)
- Provost presentation
- Booking rules on donations