



White Paper

STEM Education in the Northeastern Maryland Region

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By:
Angela Corrieri
President
Mobile Digital Systems, Inc.
Member
Northeastern Maryland Technology Council (NMTC)

This White Paper is donated by the Participants including Mobile Digital Systems, Inc. to benefit the current and future generations of students in STEM studies in the Northeastern Maryland Region.

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INTRODUCTION

This White Paper investigates the STEM Education needs and opportunities being presented to the Northeastern Maryland Region as a result of the increase in activity at Aberdeen Proving Ground (APG) due to the Base Realignment and Closure Law of 2005 (BRAC).

This White Paper places central focus on the APG need for a workforce with Engineering, Scientific, and Technology skill sets, known as STEM skill sets. Also in significant demand is a workforce skilled in Management disciplines, including Procurement, Logistics, and Program Management.

Industry / Business is also affected by the need for a STEM- and Management- skilled workforce.

The time frame for the increase in the need for a STEM- and Management- skilled workforce is immediate and will grow for the next 20 years.

Both APG and Industry/ Business are acting quickly to meet those demands by recruitment and by supporting STEM- and Management-related programs in the Region with all of the school systems.

In this White Paper

This White Paper presents numerous efforts by all Education entities in the Northeastern Maryland Region occurring, expanding, and newly underway. These efforts provide STEM- and Management- related opportunities for pre-k-14 students.

This White Paper proposes a three step Project for addressing the Education needs of pre-k-20, thereby fulfilling the long term needs of APG, Industry/ Business, and the Community:

- a **Consortium of Northeastern Maryland** to draft a
- **Comprehensive Region-Wide STEM Coordinating Program** to coordinate and support all STEM Education efforts in the Region, and a
- **University Education and Research Park (UERP)**.

In supporting our Warfighter, the scope of the APG changes provides unprecedented demands on, and opportunity and benefit to all Stakeholders: the Community, Education, Military/ Government, and Industry/ Business. This affects Northeastern Maryland and the Region surrounding Northeastern Maryland.

Please feel free to contact us:

Angela Corrieri
President
Mobile Digital Systems, Inc.
C: (443) 987-2262
amcorr@mobiledigitalsecurity.com

Member, Northeastern Maryland Technology Council (NMTC)
Member, NMTC STEM Education Committee

A. DESCRIPTION OF PROBLEMS, REQUIREMENT

1) What are the problems, requirement that justify the project?

a) Need to fill a growing and sustained demand for a workforce that is skilled in STEM- and Management- related disciplines and that is Security Cleared, in the Northeastern Maryland Region due to increase in activities at Aberdeen Proving Ground (APG), for Military, Civilian Government, and Industry/ Business. Disciplines include:

- Engineers and Scientists – including Electrical, Computer, Communications, Biological/ Chemical, Mechanical, Environmental.
- Logistics, Support, and Maintenance
- Administration and Business

The growing demand is evidenced by the increase in direct and indirect jobs from APG activities estimated at 43,200. ¹

“...14,000 jobs are directly related to APG and Contractors. Nearly 90% of those jobs are in the [above] fields...” ²

Workforce demand is currently being met by the hiring of skilled candidates:

- currently residing in the Region and who commute outside the Region to work. These represent 45% of the Region’s workforce; and
- from outside the area.

An unknown number of these currently hold a security clearance.

There is an insufficient pipeline of the workforce to meet future needs. ³

b) Need to Recognize a sense of urgency to address the needs of APG.

Changes are occurring quickly. BRAC is to be completed by September 15, 2011. There is an urgent need for Army and all Stakeholders in the Region to work together to achieve operational readiness to successfully support our Warfighter.

c) Need for A Comprehensive Region-Wide STEM Coordinating Program to coordinate and support current and future STEM Education and Research efforts.

d) Need to expand current STEM Education in pre-k-14 school curriculums.

e) Need for a Research Park anchored by a 4-Year Higher Education Institution to address pre-K-20 needs, and with a focus on Engineering, Research, and Technology, and offering Baccalaureate and Post-Graduate Degree Programs

f) Need for supporting Sustained Innovation by providing a growth and sustaining environment for small business technology startups. The increase in APG activities present an opportunity to build and sustain the Northeastern Maryland Region’s global competitiveness in all disciplines of technology. This directly contributes to supporting our Warfighter, and benefiting the community.

The geographical area affected is Region-Wide, which, according to the Chesapeake Science and Security Corridor (CSSC), includes counties in the Northeastern Maryland Region including Harford and Cecil Counties, plus Baltimore County and the City of Baltimore. Also, counties in the States of Delaware and Pennsylvania are affected and which are located within a 50 mile radius of APG. ⁴

The increasing demand for a skilled Workforce is being experienced with many military installations affected by BRAC, including Ft. George Meade located in Anne Arundel County, MD, 50 miles southwest of APG. Competition for skilled workforce between the two installations will be inevitable as they both share similar needs for the same skill sets.



Figure 1: Northeastern Maryland Region: STEM / Workforce Needs

2. What are the current efforts to meet the need?

Presented below are Current STEM and STEM-supported Programs and Efforts to meet APG's needs. These Programs and efforts need enhancement, expansion, support, and coordination. Where appropriate, specific "**Next Steps**" notes are provided for Expansions of current Programs, and Implementation of New Programs.

SMA is a significant STEM Program...

a) Education:

i. Science and Math Academy (SMA): This is a significant STEM program offered to students in Harford County Public Schools. Coordinated by Ms. Donna Clem, the first freshman class of 50 students started in 2004. The SMA provides talented students with advanced STEM curriculums and mentors, and supports 200 students per year, approximately 50 students in each grade level, 9-12. Ms. Clem assisted and has been a major force in the design, implementation, and success of the SMA. Ms. Clem provides a total environment for students, including enlisting excellent teaching and support staff, enlisting mentors for the students from the scientific community and ensuring SMA participation in the Capstone Program. SMA is currently able to accept only one in eight applicants.⁵

Next Steps: The SMA Program must be expanded in order to provide additional students with this comprehensive learning and practicum environment.

The Region's STEM teachers must be given regular opportunities to improve and update their STEM knowledge

ii. The Region's STEM Teachers:

Cecil County Public Schools (CCPS) Teachers go above and beyond for CCPS students. CCPS ensures their teachers are afforded as many opportunities as possible to update their STEM knowledge and skills, including attending a STEM workshop at MIT, and knowledge on careers which incorporate STEM disciplines in the workplace.

Through a National Science Foundation grant, the University of Delaware, School of Engineering, has been able to include 6 Cecil County high school math and science teachers in the opportunity to participate in the Research Experience for Teachers (RET). RET is a 6 week long summer program designed to help teachers apply Math and Science knowledge and skills across different disciplines.

Next Steps: The Region's STEM Teachers must be given regular opportunities to improve and update their STEM knowledge. These Professionals must be given the time and opportunity to confer with each other and others on improving teaching approaches for STEM courses, whether the conference is in-Region or outside the Region.

Next Steps: The Region's non-STEM Teachers should be further included in STEM course discussions to increase their awareness of the STEM programs. Also, non-STEM Teachers must be offered the opportunity to pursue STEM or STEM-related knowledge to allow them the choice of teaching those courses.

The Region's Community Colleges fulfill a vital role...

iii. The Region's Community Colleges have STEM and STEM-related degree programs, curricula toward Associates Degrees in Engineering and all of the Sciences, including Physics, Chemistry, and Biology, as well as Mathematics, Computer Assurance, and Technology. Both Colleges have articulation agreements with 4-year institutions for STEM student transfers with Maryland Public and Private Universities.

The Community Colleges fulfill a vital role for the community, especially for students and employers. That a student attends Community College at any time is a credit to the student as well as the community. There are various reasons that a student may choose to attend Community College, including: inability to afford the expense of attending a 4-year institution, family obligations, work obligations, or the students decide to place themselves in position to better achieve at a 4-year institution.

Both Colleges in the Region have expended much effort and commitment to offer students up-to-date and forward looking programs including STEM- and Management-related Programs...

Both Colleges in the Region have expended much effort and commitment to offer students up-to-date and forward-looking programs, including STEM- and Management- related programs, to prepare them for the workforce or further University studies. The Colleges currently have several programs to assist students to transition to work, including Internship programs with Government and Industry.

Both Colleges have partnered with their respective Community Public School System by supporting STEM efforts at all levels, from the President to Faculty, including: supporting grant requests for expanding STEM programs, supporting students with STEM career awareness, and providing Faculty as mentors to students. Faculty also provide classroom science demonstrations at local public and private schools, and more.

Cecil College (CC) offers STEM-related curricula toward Associates Degrees in Government Contracting, Supply Chain Management, and Logistics. CC has collaboration with Salisbury University and Wilmington University, with non-STEM Degree programs. ⁶

CC has built a facility on campus to provide accommodations for teaching, support staff, and research activities for the Universities above. CC is pursuing additional grant funds to expand programs and facilities.

Harford Community College (HCC) also offers numerous noncredit certification courses in technical areas including Fiber Optics Technology and Microsoft Certifications. ⁷

To accommodate significant increases in enrollment in the STEM program over the past two years, HCC recently completed a \$14Million renovation and addition to the Science Building, with state-of-the-art facilities including laboratories.

HCC has used MHEC (Maryland Higher Education Commission) BRAC grant funds to purchase electronics lab equipment and developed courses in Engineering Technology and noncredit certification in Electronics Technology.

Next Steps: The Region's Community Colleges should be provided with greater collaboration by APG and Industry/ Business, and additional funding to expand programs.

All Cecil County High Schools have a STEM Academy...Harford County implemented the SMA in 2006 and is planning to implement STEM Programs in all the schools...

iv. Community Public School Systems

Cecil County Public Schools with 17,000 students: All Cecil County High Schools have a STEM Academy, with a total enrollment of 318 students in 5 high schools. Admission is not selective, the only criterion being that students must have passed Geometry by the 8th grade. The pre-Engineering Program has an enrollment of 527 and the Bio-Medical Pathway has 136 students.⁸

Cecil County pre-K-8 / Elementary Schools are expanding their **eSTEM Program** for students in elementary grades, including Kindergarten. An engineering curriculum will be introduced in Kindergarten classrooms during the 2010-2011 school year, to coach and encourage problem-solving through every day examples. Through a collaboration of the Science and Math Department, a 5th grade Science, Math, Innovation, Learning Event (SMILE) was successfully piloted at Gilpin Elementary School in May, 2010. Eighth grade Honors Science continues to be a success in the middle schools. Since 2006 there has been an increase in middle school students completing geometry prior to high school- a pre-requisite for participation in the STEM academy.⁹

All of the STEM Education courses have a business outreach component through Advisory Committees that are comprised of all disciplines in STEM industries. **Currently, CCPS is recruiting STEM Mentors for CCPS High School Seniors to assist students with Capstone projects.**

Harford County Public Schools with 30,000 students: besides the Science and Math Academy (SMA), STEM efforts in the pre-k-12 are being planned and implemented at this time. A Homeland Security curriculum has been implemented at Joppatowne High School. A program: "The Earth Science Excavated and Life Science Animated Academy" began in Summer 2010, and will continue through 2012. Also phasing in through 2012 is a program: "Engineering is Elementary" and includes Engineering disciplines: Chemical, Agricultural, Mechanical, Materials, and Electrical.

The newly formed Harford County STEM Advisory Board is supporting these efforts and implementing additional STEM Programs.¹⁰

Harford Technical High School (HTHS) has provided a full education curriculum and productive hands-on vocational training to prepare students for immediate job performance and productivity upon graduation. HTHS' curriculum includes applicable STEM programs as well as signature programs in the Bio-Medical fields. Additional programs in Cyber-Security and Comp-Sci are being discussed.¹¹

Next Steps: The Region's Community Public Schools should be provided with greater collaboration by APG and Industry/ Business, and additional funding to expand programs.

v. Summer Science Camps:

Cecil College offers four 2010 summer camps for students, two of which offer STEM and STEM-related courses: Cecil Science Institute (CSI) and Cecil Summer Scholars Program. for ages 13-18, from June 28 – August 13. ¹²

Harford Community College offers a wide selection of 2010 summer STEM courses in the HCC Continuing Education and Training Program- Youth and Summer Camp Programs from June 21 - August 28. ¹²

University of Delaware, a valued Partner of the Community Colleges and APG, College of Engineering offers a 2010 Summer Science and Engineering Program: "Engineering Cool Stuff 2010" for ages 12-16, in two sessions running July 12-23. ¹²

Next Steps: Summer Camp Programs should be expanded and provided increased funding.

Next Steps: Regional STEM Programs. There is a need for Regional STEM Programs. This would increase participation, for instance through new Regional STEM competitions for students.

Next Steps: Expand Participation in National and International Activities and Competitions, for example, the Army's eCybermission, FLL LEGO Competition, Robotics competitions, and more.

Science Cafés..for all residents of the Region, especially Parents of Students, and non-Science residents...

vi. Local Community- Wide Engagement- Science Cafés

For all residents of the Region, especially Parents of Students, and non-Science residents of the Region, the NMTC is implementing 'Science Cafes' to inform high school students, their parents, and the community-at-large of contemporary topics and issues in science and technology, the impact that science has on our day-to-day lives, and career possibilities and opportunities that Science can offer students.

This is a concept and plan implemented by Dr. Nina Lamba, Chief Scientist and President of CCL Biomedical, Inc, of Havre de Grace, MD, and NMTC Board Member.

vii. The Higher Education and Conference Center (HECC) in Aberdeen, Harford County, is a 26,000 square foot facility containing state-of-the-art classrooms, conference rooms, computer labs, wet lab, office suites, and other facility amenities. HECC provides vital support for instructional needs in the Region by providing classrooms and lab facilities for instruction, and is at capacity weekdays after 5pm.

Six Universities based outside the Region in Maryland offer classes for over 2,000 students annually. Students represent graduates from the Region's Community Colleges, as well as employees of APG and Industry/ Businesses in the Region. HECC is managed by Harford Community College, and has been approved to receive funding to expand its facilities and services offerings to meet the growing needs of the Region. ¹³

viii. Harford Senior Science Society (HSS): coordinated and supported by Harford Community College and NMTC, is comprised of science minded professionals, who are retired or semi-retired scientists, for the purpose of augmenting science programs in Harford County Schools by providing students with scientific advice as well as cooperative mentoring and encouragement. This Senior Science program has significant potential to provide students with real-world experience.¹⁴

Next Steps: Attention and awareness of this Program should be increased and the Program expanded. STEM Awards and Citations should be issued and publicized for participation milestones.

Outreach efforts enable APG to communicate its needs to the Schools and the Community, and to assist school programs...

b) APG efforts for Outreach to Education and Other in Community are significant. Outreach efforts enable APG to communicate its needs to the Schools and the Community, and to assist school programs by providing mentors, classroom demonstrations, and funding for needed equipment, and materials. APG, especially RDECOM, has significantly increased its collaboration with the School Systems in providing scientist-mentors, and career information.

i. Deputy to the Commander of RDECOM, Mr. Gary Martin participates in Community outreach activities, including participation in an October, 2009 Maryland Governor's Higher Education Summit, providing information on the status of APG activities and APG needs.

ii. University Collaboration: APG has Agreements with several Universities and Schools based outside the Region to help meet the needs of our Warfighter:

Army-RDECOM has signed a CRADA Agreement with the University of Delaware for Research and Development of Composite Materials and Antenna Technologies.

Army, RDECOM-CERDEC has signed a CRADA agreement with Morgan State University for Research Activities.

APG- Edgewood (ECBC) offers an International Baccalaureate Degree. ECBC is hosting 2 science teachers from Cecil County Public Schools to join engineers at the Mathematics STEM Learning Modules workshop.

iii. Community Public Schools Collaboration:

ARMY-RDECOM- CERDEC is conducting 5 summer camps in their 2010 Summer Science Program for students. CERDEC also conducted a 4-technology workshop for students on June 23, 2010 in collaboration with Cecil County Public Schools.

Army-RDECOM has significantly increased the number of Scientist-mentors it sponsors for the STEM programs in the Public Schools and the Colleges.

Baltimore Polytechnic Institute (Poly) / The Army Research Laboratory (ARL) at APG has begun a 3 year experimental outreach program to this engineering-focused high school via a cooperative research program that supports the school's Capstone engineering course known as the **Senior Engineering Practicum**. Students chosen for this course have shown the ability to function at the university level in their problem solving and engineering design abilities.

The objective of this (ARL-Poly) outreach program is to introduce students not only to the different fields of engineering but also to the analytic tools and techniques that the profession uses.

Next Steps: APG efforts should be further encouraged through increased funding to enable increased efforts by Command and Management staff, and Scientists. STEM Awards and Citations should be issued for participation milestones, and publicized.

c) Industry / Business and Professional Organizations' support of STEM Programs is significant and growing. These organizations provide funding for STEM Programs, Employee and Corporate time, and scholarships for students in STEM Programs, and include: *The Cecil County and Harford County Chambers of Commerce; Northeastern Maryland Technical Council (NMTC); Army Alliance, Inc.; National Defense Industry Association (NDIA); Armed Forces Communications and Electronics Association (AFCEA); Association of the United States Army (AUSA); Professional Associations Network (PAN); Sabre Systems, SAIC, Mitre, Battelle, Booz Allen Hamilton, CACI, and others.*

All Industry / Business in Northeastern Maryland, including those moving to the area should regularly be given opportunities to participate in STEM programs throughout the Region.

Support for Entrepreneurship to advance innovation and ramp-up for global competitiveness...

d) Support for Entrepreneurship must be increased at all levels. This includes Community- Based Businesses, as well as those with Military/ Government customers, and National and International Markets. These start-up and emerging businesses become a vehicle for meeting the growing needs of the local community, advancing innovation, as well as productizing/ commercializing innovation for specific markets. Those who benefit are ultimately the Warfighter, APG, Industry/ Business, and the Community.

This evolution of focus is supported by lessons learned by Research Triangle Park, North Carolina.¹⁵

The Harford County Business Incubation Center (HBIC) has recently been established and is offering facilities to businesses, including to those which are re-locating to Harford County from other areas. The HBIC, funded primarily by the Harford County Office of Economic Development, needs additional support for expansion of its ability to encourage entrepreneurship for building new companies, and provide coaching for business building.¹⁶

Cecil County: There is a need to consider a Technology Business Incubator in Cecil County.

The Region Small Business Development Centers (SBDC), are located in both Harford and Cecil Counties, are supported by the State and the respective College in each County. The SBDCs of the Region have assisted entrepreneurs in at least 1200 sessions annually and small business demand is growing. ¹⁷

Next Steps: Increased Effective Business Collaboration. There is a need for effective collaboration between and among business/ industry in the Region. Certainly, this is hindered by the security level of activities, competition for contract dollars, and competition for skilled labor force.

However, in the long term, our Warfighter and APG suffer because there is not enough innovation brought to projects.

There is a need for increased, effective business collaboration between large contractors and small business.

e) Other Needs. Transportation improvements for the Region's growth and quality of life are critical.

The Transportation infrastructure needs to be significantly augmented including roads, commuter rail, and other. This is being addressed through efforts of individuals and organizations in the Region, including the Chesapeake Science and Security Corridor (CSSC), State and Federal agencies, and is not addressed in the Project presented in this White Paper

f) The State of Maryland Higher Education Commission (MHEC) has provided guidance and grant funding for the expansion of education efforts including STEM Education in the Region. The MHEC is a valued partner in the efforts of all the school systems, and would be a major partner in the implementation of this Project. ¹⁸

g) The Maryland Lieutenant Governor's BRAC Sub-Cabinet, through Executive Director Asuntha Chiang-Smith has provided support with Transportation issues and Education funding. ¹⁹

Our Warfighter, APG, and all Stakeholders who participate will benefit...

6) How Will The Problem, Need Or Value Change Through This Project?

Through this project, our Warfighter and APG will benefit. Also, all Stakeholders in the Region who participate will all benefit. This Project will also benefit Government, Education, the Community, Industry/ Business, Community based non-technology Business, and Technology-based Entrepreneurs in the Region.

Direct benefits will occur through a sustained supply of a STEM- and Management-educated and skilled workforce.

- a) Our Warfighter will benefit through improved technology.
- b) APG will benefit through the close proximity of scientists, researchers, and technologists affecting scientific discovery in nearby facilities.
- c) The Community will have access to higher paid jobs, and contributing to a higher tax base.
- d) Industry/ Business will benefit by the cost savings of recruitment and hiring.
- e) Small Business and Technology Start-up businesses will benefit through greater access to resources that enable them to grow: Customers, Capital, Coaching.
- f) Any markets which are addressed by the businesses in the Region would be better served.

Global Markets addressed by the businesses in the Region would be better served...

All of these benefits would occur through all of the Stakeholders' commitment to support our Warfighter.

B. OVERVIEW OF THE ORGANIZATION

The organization to lead this effort is the ***Consortium of Northeastern Maryland (CNM)***. *The Northeastern Maryland Technology Council would be invited to be a partner member of the CNM.*

The CNM will be comprised of representatives from Military, Government, the School Systems, Universities, and Industry/ Business. These members have a history and commitment to serving the Warfighter and who are committed to increasing the pipeline of a quality-skilled workforce in STEM- and Management-related disciplines.

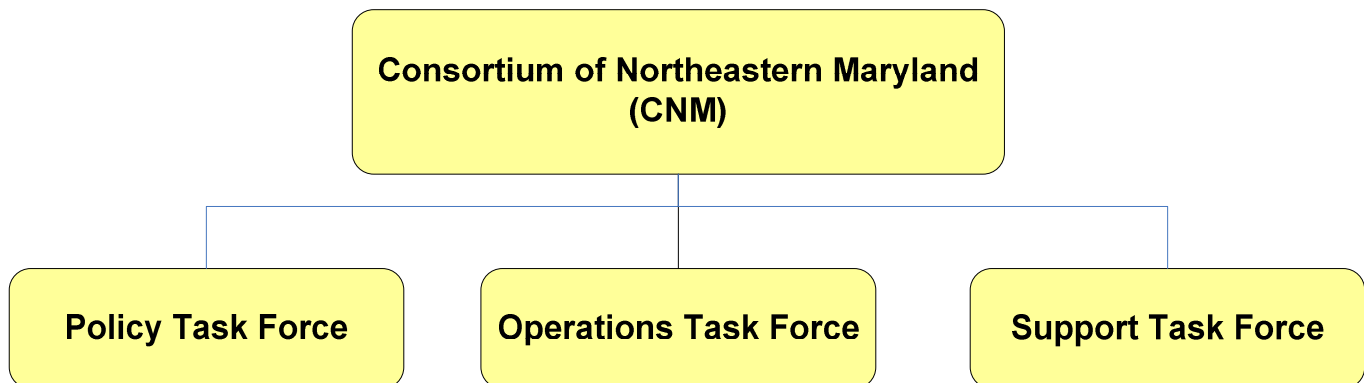
This Consortium would perform four roles:

- 1) Be a Supporter and Coordinator of STEM Programs in the Region;
- 2) Produce the Comprehensive Region-Wide STEM Coordinating Program Plan;
- 3) Assemble the resources needed to compose the Project Plan, presented on following pages;
- 4) Work with funding sources and Stakeholders to implement the Project Plan, including to build a *University Education Research Park*.

All members of the CNM are required to be *participating* members, providing funding or service hours or both, for achieving the goals of the CNM.

The CNM structure includes:

- a. A Policy Task Force
- b. An Operations Task Force
- c. A Support Task Force



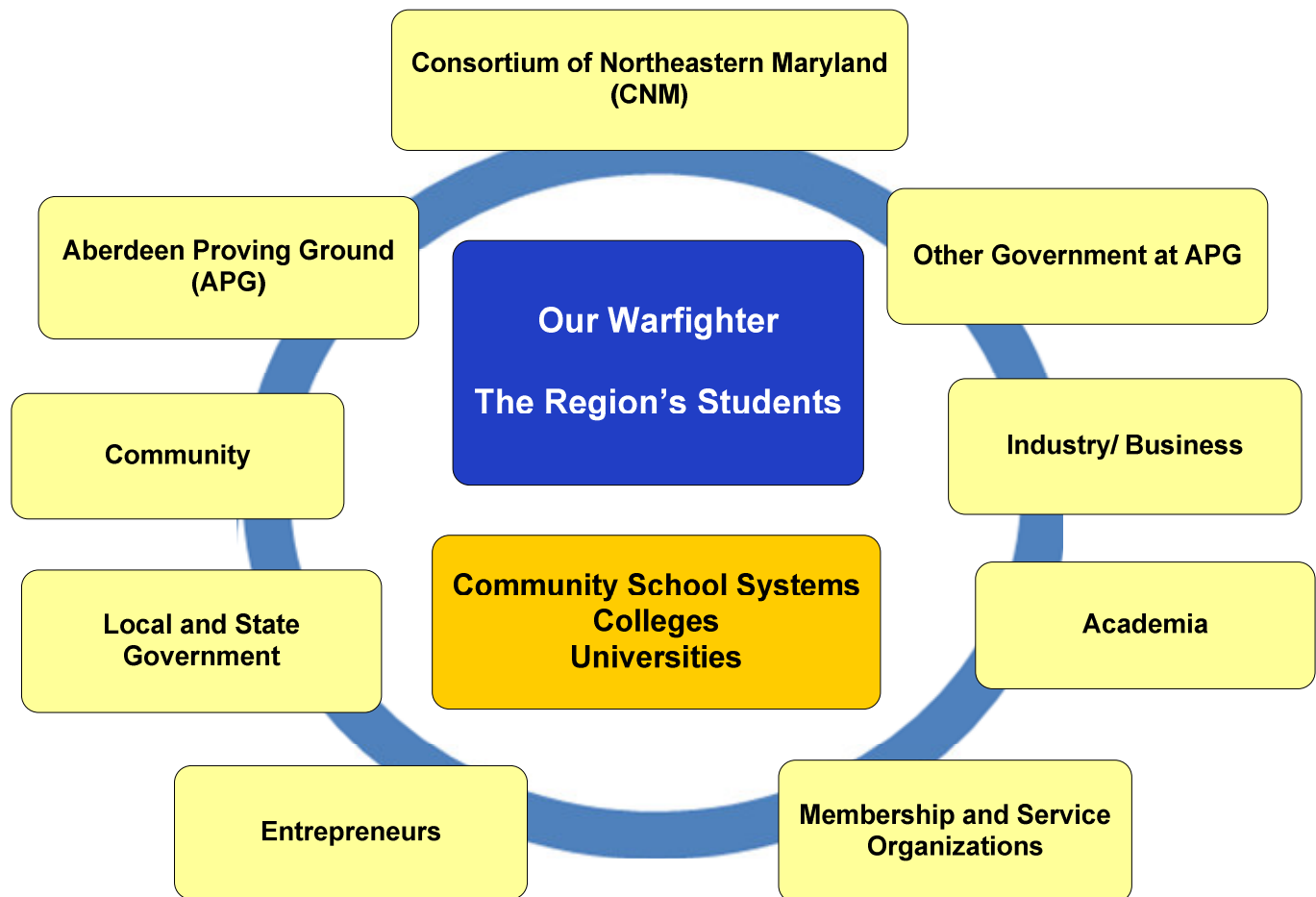
C. OVERVIEW OF PROPOSED PROJECT

1. What is the basic purpose of the project?

a) The Purpose of this Project is to provide a sustained pipeline of quality STEM- and Management- educated and skilled workforce to meet the long-term needs of our Warfighter, APG, and other Stakeholders in the Northeastern Maryland Region.

b) The Vision is to engage every member of the community, and calls on Research Park Technology Cluster models, and lessons learned from other successes, including:

- Research Triangle Park- North Carolina
- MIT/ Harvard/ Route 128
- Stanford / Silicon Valley
- XEROX PARC



c) The Goals of this Project are:

i. Build the Consortium of Northeastern Maryland (CNM):

ii. Create and Implement a Comprehensive Region-Wide STEM Coordinating Program to support, coordinate, and expand all STEM- and Management- education related efforts in the Region.

iii. Compose and Implement the Project Plan which major Goal is to

Build a University Education and Research Park (UERP),

a World Class University Educational Campus and Research Park for fulfilling:

A. APG's Research needs for Scientific discovery and Engineering to benefit our Warfighter.

B. Quality Innovation for our Warfighter.

C. The Workforce: Increasing the Pipeline and graduates with STEM- and Management-related skills for APG and Industry/ Business.

D. Local World Class Education: Enabling students graduating from the local school systems and attracting those from outside the Region to be able to earn Baccalaureate and Advanced Degrees locally, and have access to APG as a possible employer, as well as to the Businesses serving APG.

We propose this UERP be a joint venture/partnership among all Stakeholders:

APG, The Region's communities, the Region's Public School Systems, the Community Colleges, Several Universities including an Engineering and Technology - Centered University such as the Massachusetts Institute of Technology (MIT), Industry/Business, including large, small, and start-ups, and Local, State and Federal Governments.²¹

The University(ies) selected would adopt priorities germane to APG, the community, and Stakeholders, including the fostering of Innovation by encouraging and coaching technology business start-ups.

We propose this UERP be a joint venture/partnership among all Stakeholders...

Example: Research Triangle Park (RTP), North Carolina²²

Some similarities and differences exist between the Northeastern Maryland Region and Research Triangle Park (RTP), North Carolina.

The biggest difference is that the Northeastern Maryland Region has a significant existing and growing customer with significant and growing needs, which RTP did not have at its inception.

Another difference is that RTP devotes significant efforts to encouraging and supporting technology business start-ups and collaboration among businesses, which is not readily apparent in Northeastern Maryland.

The most significant similarity is that there is unanimous agreement that Education and Stakeholder participation are the Vehicles to increase the supply of quality STEM- and Management- skilled workforce.

viii. Technology Business Start Ups:

For Innovation to reach and benefit our Warfighter, there needs to be encouragement and support for entrepreneurs who start and grow technology business start-ups in a win-win environment. ¹⁸

Example: The Maryland Biotechnology Center planned for Montgomery County, MD ²³

MIT and other Universities have been valued partners in the formation and success of numerous technology business start-ups along Massachusetts Route 128, Silicon Valley, and other locations globally. ²⁴

Technology Business Start-Up companies must understand the risks they are about to, and should assume for operating and growing, including identifying their markets, funding, team building, product development, and selling to local, national, and global markets. And for assuming that risk, understand that there could be the corresponding reward to return to them.

These companies must have ready access to funding through Angel and Venture Capital as well as government and industry grants for development and technology transfer.

Several comments in the media by our legislators and others have suggested that Northeastern Maryland is in a position to become the next Silicon Valley. Technology Business Start Ups will help make that happen.

2. Who will benefit from it? Describe the geographic area and population to be served.

Several populations will benefit from the estimated increase in jobs:

- a) Our Warfighter, through the APG/ Military, and Other Government Agencies in the Northeastern Maryland Region.
- b) The local population of the area, numbering over 700,000, and specifically students in pre-K-20 and beyond.
- c) Industry/ Business: Large, Small, and Start-ups with increased revenues through larger and additional contracts due to their ability to hire additional knowledgeable workforce.
- d) The nation will benefit through the area's developing global competitiveness.

3. How is this project unique? Is it similar to other programs but covers a different area? Does it employ a new approach?

a) Unique: This project is unique in several ways:

i. Opportunity and Mission: This Project presents an unprecedented opportunity to address the needs of our Warfighter, Military/ Government, as well as to transition technology to other markets, and with a vision toward global competitiveness.

ii. Sustainable: APG is located in the Region and represents a ready-made opportunity to serve a large customer.

While there are many STEM Programs around the country, most rely on continued grant funding without a plan for self sustainment nor for a progression to subsequent knowledge and hands on experience.

This project provides for an immediate beginning of a return on investment in the form of: immediate employment of an increasing number STEM students in intern and summer positions made possible by the increase in contract dollars. This Return on Investment increases annually, as increasing number of students qualify for employment and add to the tax base.

b) Similar and Unique: This project is the same as those models mentioned in C.1.b above, in that priority is placed on Education for the purpose of producing an educated workforce and innovation to meet the needs of a customer. Those models do not concentrate their efforts on meeting the needs of our Warfighter/ Military/ Government.

There are other STEM projects and programs, but few have the sustainability as this project proposes.

4. Why does this project deserve prioritization more than others competing for attention?

a) The need is immediate. Our Warfighter deserves uninterrupted, quality support. DOD's timeline of the BRAC initiatives is to complete moves of significant U.S. Army and other activities to APG by September 15, 2011.

b) The Stakeholders are numerous, motivated, and currently participating in bringing about solutions.

c) Return on Investment would be immediate.

d) Perfect Location for a/n UERP. There are unique characteristics of the area:

i. A community which is knowledgeable of the presence of, and needs of Army.

ii. Increasing diversity of the Community-- proven as one of the best attributes for supporting a successful environment.

iii. Available Land. A plentiful supply of Land is available in both Harford and Cecil Counties. Planning must consider the traffic implications of the UERP. One consideration is to utilize the Bainbridge Center in Cecil County for the UERP.

The need is immediate. Our Warfighter deserves uninterrupted, quality support.

5. What is the plan: product, cost, promotion, place and position?

a) We propose a two step process spanning 20 years, executed by way of the Activities on the following page.

i. Compose the Project Plan.

Cost of the Compose Project Plan: \$6.7 Million over 1 year.

iii. Implement the Project Plan.

Cost of the Implement Project Plan: estimated at \$1.3 Billion.

This \$1.3 Billion figure was estimated from two sources:

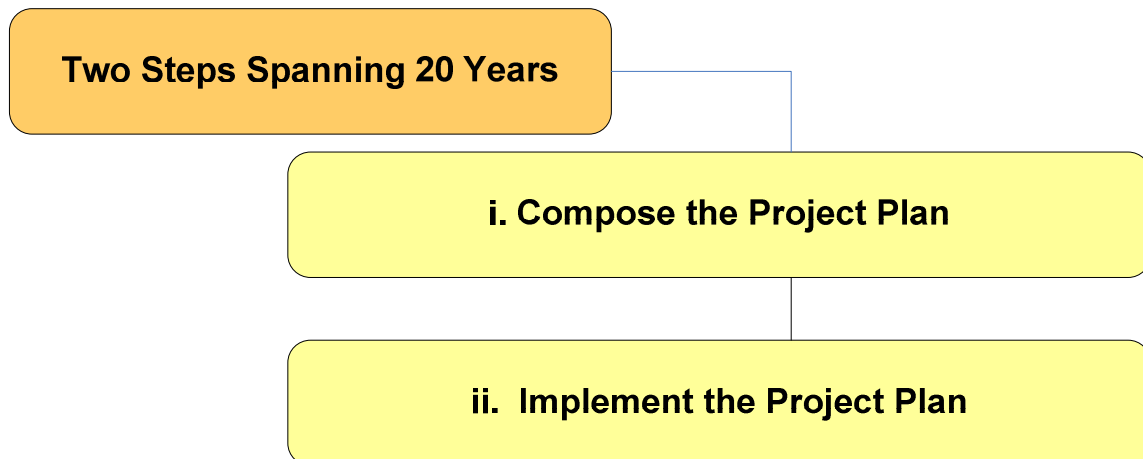
- 1) The planned Montgomery County, MD Bio Park for which \$1.3 Billion has been allocated.
- 2) The cost of Research Triangle Park for the years 1984 through 2006 at \$620 Million. In those 22 years, the funds made possible the purchase of 1,334 acres of land, and the building of 2.7 million square feet in 25 buildings.¹⁵

In comparing land and labor costs between North Carolina and Maryland, we found that Maryland costs are at least 100% higher than in North Carolina, therefore the \$1.3 Billion estimated cost.

b) The resulting products are:

- i. A sustained supply of an educated and motivated workforce for Military / Government and Industry/ Contractors.
- ii. Sustained quality innovation to meet the needs of our Warfighter.
- iii. A higher quality of life for the Community.
- iv. Stimulation of Entrepreneurism: for the transformation of scientific discovery and intellectual assets into capital formation and business development.

The place is the Northeastern Maryland Region.



D. Project Activities and Timeline

1. What exactly must be done in order to achieve the desired outcomes?

This Project is a multi-year engagement and requires the commitment and active participation of all the Stakeholders.

Implement Project Plan- UERP Activities and Timeline:

Year 1: Structure: Use the CNM – Consortium of Northeastern Maryland, comprised of all Stakeholders. Ensure a flat organization to facilitate effective communication and performance.

- a. Comprise the CNM Task Forces: Policy, Operations, Support.
- b. Gain acceptance and commitment of participation from the Stakeholders.
- c. Compose the Project Plan.

Year 2 After Approval and Funding:

Education:

Forge an agreement with an Engineering/Technology-based University such as MIT.

- a. Build partnerships with local School Systems, the SMA, Military/ Government, and Industry/ Contractors.
- b. Conduct sustained outreach to students and parents.
- c. Conduct advanced training for teachers at all levels.
- d. Prioritize programs: for employers, start up business support.
- e. Plan for and enlist Professors, Researchers and staff.
- f. Plan curriculums.
- g. Build a campus with plans for growth.
- h. Admit students. Begin instruction.

Other Stakeholders:

Further determine specific needs of APG and other Stakeholders: Military/ Government, Industry, Community including School Systems, Start Up Businesses. Ensure that needs are communicated to the UERP Consortium, prioritized, and addressed in a timely manner. Other engagement:

- a. Military/ Government: continue Education and other Community Outreach.
- b. Community: conduct informational Cafes, including Science, Technology, status of this Project, the Community's opportunities, other.
- c. School Systems: inform, survey, and engage the School Systems.
- d. Industry: inform, survey, and engage Industry in this Project.

Industry: Create a Foreign Trade Zone to facilitate export activities.

- a. Engage the Departments of Commerce and Treasury.
- b. Construct and lease Office/ Warehouse/ R&D space.

Start Ups: Attract motivated and impassioned entrepreneurs.

- a. Expand the HBIC in Harford County.
- b. Establish a Technology Business Incubator in Cecil County.
- c. Provide assistance and guidance with integrity.
- d. Guide and engage start ups in selling to their target markets.
- d. Attract Venture Capital to the Region.

Years 3 - 20:

Continue engagement of Stakeholders for executing, evaluating, modifying this Project when needed.

2. When will this project be implemented? Will it occur over a discrete time period or be an ongoing service?

The One-Year Project Planning Stage can begin immediately after funding - FY10- 11. Project Implementation could begin within FY 2011, and continue in stages over a 20 year period.

To assist the Planning and Implementation Stages, lessons can be learned from many examples without conflict or confusion, including the Maryland Biotechnology Center and Research Triangle Park, North Carolina.

3. Who will carry out project activities? What are their qualifications?

The Consortium of Northeastern Maryland, which is comprised of the Stakeholders and additional Advisory members as needed.

Should the first stage of this project be approved and funded, these groups will be activated to Compose the Project Plan, obtain approval and funding, and then Implement the full Project.

4. Additional Stakeholders and Participants.

Coordinate with Stakeholders on the State and Federal level, including the MD Office of the Governor; U.S., State, and Local Legislators; MD Governor's BRAC Subcabinet; MD Governor's Education Task Force; the MD State Department of Education; the Maryland Higher Education Commission (MHEC); the MD Governor's Workforce Investment Board; the MD Department of Business and Economic Development (DBED); the MD Technology Development Corporation (TEDCO); the President's Commission on Science and Technology Policy; the U.S. Department of Education.

E. OUTCOMES

1. What immediate and long-range results are expected? Will these results help the institution and others? Change children's lives, the educational community and the world?

The results will benefit our Warfighter and all other Stakeholders through a sustained supply of a quality STEM- and Management- educated workforce; students in the Community will *have a choice* of obtaining an excellent continuing Education locally or travel to other institutions and return to obtain jobs in the Region; the Community will benefit through access to well paying jobs, an increase in the tax base, and its ability to attract additional quality Merchants, Medical, First Responders, Housing, and other infrastructure which improve quality of life.

2. How serious are the need and necessity for immediate action?

The need is serious and immediate. Not only will there be an increase of 43,200 direct and indirect jobs, but also, 50% of APG current employees are due to retire within 5 years, exacerbating the demand for skilled and security cleared workforce.⁷

**The need is serious and immediate.
Our Warfighter deserves uninterrupted, quality support.**

F. EVALUATION

1. By what criteria will the success or failure of this project be measured?

Evaluation Criteria will include one or more appropriate of: Goals Based, Process Based, Outcomes Based, PERT, and Critical Path techniques. Full evaluation criteria will be formulated during the Compose Project Plan stage, and will include:

- Participation of all Stakeholders
- Cost/ Benefit to the Stakeholders
- Quality of Life in the Region
- Results achieved via Timeline/ Resource Allocation

2. Who will do the evaluation? When and how often will they do it?

An independent agency will be selected during the Compose Project Plan stage.

3. How will evaluation results be used? Who will see evaluations?

Evaluation results will be used to improve the program, including making decisions to increase, decrease, eliminate, or add activities. Since Public Funds are anticipated, the information will be available to the Public.

G. FUNDING

1. What is the anticipated total budget for this project? Give a complete budget breakdown.

a) Compose UERP Project Plan: estimated \$6.7 Million will be needed to compose a Project Plan over a one year period.

Compose Project Plan: University Education and Research Park (UERP)

| | |
|----------------------------|------------------------|
| Needs Assessment | \$ 4,000,000.00 |
| Workforce | |
| Education | |
| Curriculum | |
| Facilities | |
| Funding | |
| Community: | |
| Businesses | |
| Housing | |
| Land | |
| Develop Initial Draft Plan | 1,500,000.00 |
| Present to Stakeholders | 500,000.00 |
| Modify Draft Plan | 500,000.00 |
| Acceptance | 200,000.00 |
| Total Project Plan | \$ 6,700,000.00 |

b) Implement UERP Project: the Budget is anticipated at \$1.3 Billion over a 20 year period. Justification for this figure is made on the basis of purchase of land, construction of buildings, outfitting buildings with STEM- and Management- related and other needed Research facilities and offices, salaries for teachers and support staff, and other which would be detailed in the Implement Project Plan. Consideration is made that this is a 20 year plan and allowances are made for the time value of money, and changes in costs. ¹⁵

2. Where will the funding come from?

a) Compose Project Plan- UERP: would be funded by: Federal and State Government and Military sources.

b) Implement Project Plan- UERP: would be funded from multiple sources, including:

i. During the first five years:

- A. Federal and State Government
- B. Industry
- C. Foundations

ii. After five years:

- A. A small share of Tech Business Start Ups when successful in the marketplace.
- B. Industry.
- C. Student endowments.
- D. Increased local revenues from taxes resulting from higher paid jobs.

Conclusion and Next Steps

This STEM Education White Paper accurately describes the need to ensure a highly educated STEM- and Management- educated workforce in support of our Warfighter and our national defense, through Aberdeen Proving Ground, while providing enriching benefits to the Region and State of Maryland economy by building a **World Class University Education and Research Park (UERP)** in Northeastern Maryland.

The Northeastern Maryland Technology Council and other Organizations are invited as partners in the Consortium of Northeastern Maryland leading to the building of a World Class University Education and Research Park. The membership of the Organizations is comprised of Representatives from Education, Government, and Technology companies both defense related and private sector. They have excellent working relationships with county governments, valued advisory roles to local education in grades K-14, and successful relationships with Aberdeen Proving Ground. These existing attributes of the members would contribute to a successful Consortium of Northeastern Maryland, and a successful, World Class University Education and Research Park.

These existing attributes of the members would contribute to a vibrant Consortium of Northeastern Maryland, and a successful, World Class University Education and Research Park.

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All statements in this White Paper may not be endorsed by all participants.

Education:

Cecil College: Dr. Stephen Pannill, President
Dr. Mary Way Bolt, Vice President of Academic Programs
Dr. Diane Lane, Vice President of Student Services

Cecil County Public Schools: Ms. Kathleen Kunda, Coordinator, BEPAC
Mr. Frank Cardo, Supervisor Science

Harford Community College: Dr. James LaCalle, President
Dean Deborah Wrobel, Dean, STEM Education
Ms. Marlene Y. Lieb, Associate Vice President, CET

Harford County Science and Math Academy: Ms. Donna Clem, Coordinator
Harford County STEM Advisory Board: Ms. Joan Michel, Coordinator

University of Delaware: Kathleen C. Werrell, Assistant Dean, College of Engineering
Melissa Jurist, College of Engineering

Departments of Economic Development:

Cecil County: Mr. Vernon Thompson, Director
Mr. Roy Clough, Deputy Director

Chesapeake Science and Security Corridor: Ms. Karen Holt, Executive Director

State of Maryland, Governor's BRAC Sub-Cabinet:

Dr. Asuntha Chiang-Smith, Executive Director

U.S. Army:

Mr. Gary Martin, Executive Director to the Commander, RDECOM
Mr. Michael Lombardi, Program Manager, RDECOM-CERDEC

Business/ Industry:

Mr. Bernard D. DeMarinis, Mitre Corporation, Director, Strategic Initiatives
Mr. Drew Ellis, Battelle, Senior Marketing Manager
Dr. John Gaughan, Data Matrix Solutions, Program Manager
Mr. William Securro, President, Harford County Chamber of Commerce
Mr. Robert Carullo, Sabre Systems, Inc., Director of S&T Partnerships

Northeast Maryland Technology Council:

Mr. Randy Rippin, President, RTR Technologies, LLC
Mr. John Casner, Executive Director, NMTC (Northeastern Maryland Technology Council)
Mr. Andrew Renzulli, Chairman, STEM Education Committee
Dr. Nina Lamba, STEM Education Committee Member, CCL BioMedical, Inc.
Mr. Jack Roth, STEM Education Committee Member
Mr. Wallace Wills, STEM Education Committee Member
Mr. Michael Lombardi, STEM Education Committee Member
STEM Education Committee

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