This report was prepared by Appleseed, a New York City-based economic development consulting firm that works with government, corporations, and nonprofit institutions to promote economic growth and opportunity.
Johns Hopkins Lives Here

State of Maryland

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JOHNS HOPKINS AS AN ENTERPRISE

Johns Hopkins is a major Maryland employer, purchaser of goods and services, a sponsor of major construction projects and a magnet for students and visitors. In fiscal year 2010, we estimate that the Johns Hopkins Institutions directly or indirectly accounted for nearly $9.98 billion in economic output in Maryland, and 96,861 jobs\(^1\) – about 3.8 percent of all wage-and-salary jobs in the state.

- In the spring of 2010 the Johns Hopkins Institutions directly employed 53,532 people. This total included regular employees at the institutions’ various locations in Maryland, 81 percent of whom worked full-time, 6,050 part-time student employees, and 1,354 employees who worked at locations outside the state.
- About 93 percent of all non-student employees lived in Maryland.
- In FY 2010, Johns Hopkins spent $998 million on purchases of goods and services (excluding construction) from companies in Maryland, directly supporting approximately 5,433 FTE jobs.
- In FY 2010, Johns Hopkins spent $257 million on construction and renovation, including about $171 million paid to contractors based in Maryland. This investment directly supported more than 980 FTE jobs with Maryland contractors.
- In fiscal year 2010, Johns Hopkins purchased $141.6 million in goods and services (other than construction) from minority and women-owned businesses, and paid $37.8 million to minority and women-owned construction companies.
- We estimate that spending in Maryland by students and visitors directly generated $193 million in economic output in FY 2010, and 1,520 FTE jobs.
- Institutions affiliated with Johns Hopkins directly employed 3,874 people in Maryland in FY 2010. Their spending within the state on payroll, purchasing and construction directly generated an additional 397 FTE jobs with other employers in Maryland.
- Through the “multiplier effect,” spending by Johns Hopkins, its affiliates, its employees, vendors and contractors, and by students and visitors indirectly generated $5.3 billion in economic output and 38,592 FTE jobs.
- Johns Hopkins paid approximately $175 million in taxes and fees to the state in FY 2010; including $171 million in state income taxes withheld from the earnings of its employees. Johns Hopkins also paid about $16.3 million in taxes and fees to counties and municipalities around the state.

\(^1\) This figure excludes 6,050 students employed part-time by the University.
DEVELOPING HUMAN CAPITAL

- In the fall of 2009, 20,483 students – including 5,932 undergraduates and 14,551 graduate and professional students – were enrolled at Johns Hopkins. About 19 percent of all undergraduates and 52 percent of all graduate and professional students were residents of Maryland.

- Part-time graduate programs – such as the Engineering for Professionals program at the Whiting School of Engineering – are particularly important for the continued growth of the state’s knowledge-based industries. These programs are offered at multiple locations in Maryland – in Baltimore, Aberdeen, Columbia, Elkridge, Laurel, Rockville and at the Southern Maryland Higher Education Center in St. Mary’s County.

- In 2009-10, Johns Hopkins provided nearly $47 million in financial aid to students from Maryland.

- As of the summer of 2010, 59,146 Johns Hopkins graduates – 38 percent of all living alumni – lived in Maryland.

- Johns Hopkins is committed to K-12 education in the state of Maryland. During 2009-10, 1,933 students were enrolled in the University’s graduate education programs. The University is a member of the Professional Development Schools network in Maryland, and, as part of the program, supports teacher education in 14 schools in the state, including six in Howard County, four in Montgomery County, two in Anne Arundel County and two in Baltimore City.

THE IMPACT OF UNIVERSITY RESEARCH

- During FY 2010, spending on research and related programs at Johns Hopkins totaled $2.38 billion – an increase of 59 percent since FY 2003.
• Johns Hopkins consistently ranks first in research spending among all U.S. universities – by a wide margin.

• Almost all of this spending is financed from sources outside Maryland – state and local funds account for less than 0.5 percent of the total spent in FY 2010.

• With expenditures of more than $1 billion in FY 2010 and more than 5,000 employees, the University’s Applied Physics Laboratory, located in Laurel, is one of the largest university research centers in the U.S., and one of Maryland’s leading providers of contract services to NASA and the Department of Defense.

• The University’s research strengths are well-aligned with industries – and emerging areas of technology – that are likely to play a critical role in the future of Maryland’s economy, including the life sciences, health care, defense, space, nanotechnology, information technology and cybersecurity.

MEETING THE HEALTH NEEDS OF MARYLAND COMMUNITIES

• Johns Hopkins Medicine is a leading source of high-quality health care for residents of Maryland. Of the more than 104,000 inpatients discharged during FY 2010 from the four hospitals that are part of the Johns Hopkins Health System – The Johns Hopkins Hospital, Johns Hopkins Bayview Medical Center, Suburban Hospital and Howard County General Hospital – about 92,000 (88 percent of the total) were Maryland residents.

• Hospital outpatient clinics, the 26 primary care centers operated in the state by Johns Hopkins Community Physicians, and other Johns Hopkins outpatient locations, reported a total of approximately 1.75 million patient visits in FY 2010 that involved residents of Maryland.

• In FY 2010, the Johns Hopkins Home Care Group provided in-home care to more than 36,500 patients in Maryland.

• As of the end of FY 2010, managed care plans administered by Johns Hopkins HealthCare provided comprehensive health care coverage to 233,725 Maryland residents.

• The value of charity care, community-based health care and other benefits provided by the four JHHS hospitals to communities in Maryland during FY 2010 totaled $219.4 million.

• The four Johns Hopkins hospitals are major exporters of world-class health care, bringing in patients from outside Maryland and the U.S. In FY 2010, the four hospitals generated about $490 million in inpatient and outpatient revenues from out-of-state patients.

SUPPORTING INNOVATION AND ENTREPRENEURSHIP

• During the past decade, Johns Hopkins has strengthened its commitment to translating the results of its research into new products and services – and, in some cases, into new businesses.

• In recent years, the pace of technology transfer activity at Johns Hopkins has increased, with the number of patent applications filed up by 57 percent between 2003 and 2010, and the number of new licensing and option agreements up by 46 percent.

• As of 2010, there were at least 40 companies in Maryland with ties to John Hopkins – either engaged in the commercialization of technologies licensed from the university, or started by Johns Hopkins faculty, researchers, students or alumni, or some combination of both.

• Johns Hopkins is an active partner in several major science and technology-based economic development initiatives in Maryland.
• The Baltimore Development Corporation’s Emerging Technologies Center @ Johns Hopkins Eastern provides flexible space and support services to start-up companies associated with Johns Hopkins and other universities in the city.

• The East Baltimore Science + Technology Park, adjacent to the main campus of Johns Hopkins Medicine, is one of the central elements of a broader, long-term effort to revitalize East Baltimore. The first of a number of research buildings planned for the Park, the 300,000 square-foot Rangos Building, was completed in 2009, and is now 80 percent occupied. The Building’s tenants, which include two University research institutes and several biotech companies with close ties to Johns Hopkins, now employ more than 400 people.

• The Shady Grove Life Sciences Corridor is an ambitious project aimed at doubling the size of Montgomery County’s life sciences cluster – already one of the largest concentrations of life sciences research and commercial biotechnology firms in the country – over the next several decades. The plan includes the development of about 4.5 million square feet of research and office space at the Belward Research Campus – a 108-acre site, owned by Johns Hopkins, near the University’s Montgomery County Campus.

• Johns Hopkins is helping to prepare Maryland’s next generation of innovators and entrepreneurs, through entrepreneurship education programs both in Baltimore and at its Montgomery County Campus in Rockville.

THE IMPACT OF AFFILIATED INSTITUTIONS

• Beyond the impact of the Johns Hopkins Institutions themselves, Maryland’s economy is strengthened by the presence of six institutions that, were it not for their relationships with Johns Hopkins, might not be in the state: the Space Telescope Science Institute, the Kennedy-Krieger Institute, the Howard Hughes Medical Institute, the Carnegie Institution for Science’s Department of Embryology, and research centers operated by the National Institute on Aging and the National Institute on Drug Abuse.

• Together, these six institutions directly and indirectly accounted for more than $672 million in economic output in Maryland and more than 6,800 jobs.

• A seventh affiliated institution was added in 2010, with an announcement that the Lieber Institute for Brain Development would open a new research center in the Science + Technology Park in East Baltimore.

ENGAGEMENT WITH MARYLAND COMMUNITIES

• Beyond its involvement in improving K-12 education, providing health care and partnering to revitalize East Baltimore, Johns Hopkins is engaged in a variety of other efforts to strengthen Baltimore neighborhoods and to meet the needs of community residents.

• Johns Hopkins is an active participant in the work of several organizations that are engaged in the revitalization of communities in which it operates, including the Greater Homewood Community Corporation, the Historic East Baltimore Community Action Coalition and the Central Baltimore Partnership.
Johns Hopkins also seeks to strengthen neighborhoods through its Live Near Your Work program, which provides grants to encourage Johns Hopkins employees to purchase homes near its principal locations in Baltimore. In FY 2010, the program provided grants totaling $416,000 to 70 employee homebuyers.

The Center for Social Concern, located on the Homewood campus, provides a base for more than 50 student-run programs that serve Baltimore communities, ranging from after-school tutoring to Habitat for Humanity to GED preparation for female inmates at the Baltimore City Jail. In 2009-10, more than 1,500 students performed more than 79,700 hours of volunteer work in programs based at CSC.

At the East Baltimore campus, SOURCE (Student Outreach Resource Center) provides a focal point for community engagement for students in the School of Medicine, the School of Nursing and the School of Public Health. SOURCE estimates that in 2009-10, students at the three schools performed at least 19,500 hours of community service work – either as volunteers or through service learning courses.

Students participating in service learning courses in the Carey Business School and the School of Education performed more than 16,000 and 17,000 hours of community service work, respectively.

Johns Hopkins employees are also actively engaged in the community. In 2009-10, through its Johns Hopkins Takes Time for Schools program and other efforts, 193 Johns Hopkins employees regularly worked as volunteers in Baltimore public schools; together they accounted for 37 percent of all registered volunteers in the city’s school system.

During fiscal year 2010, more than 1,000 employees of JHHS hospitals performed more than 143,000 hours of volunteer work.

Through Healthy Families Howard County, employees at Howard County General provide parent education and other support services to first-time parents throughout the county.

Howard County General Hospital offers a wide range of wellness programs for county residents at its Wellness Center and at other locations throughout the community. In 2009, these and other community programs served about 40,000 people.

Through its HeartWell program, Suburban Hospital’s Community Health and Wellness Department conducts free heart health clinics several days each week at senior centers in Montgomery County.

Johns Hopkins also contributes to the quality of life in Maryland through its cultural programs, such as concerts and other performances at the Peabody Institute – which in 2009-10 drew a total audience of more than 12,000 – and through partnerships with local arts organizations at the Montgomery County campus.

JOHNS HOPKINS AND THE FUTURE OF MARYLAND’S ECONOMY

Johns Hopkins is and will remain a valuable partner in Maryland’s strategy to rev up its economy and further strengthen its communities. It is the state’s largest private employer and its largest research institution; it is a leading provider of high-quality health care and a leading educator of the state’s professional workforce. It is a headquarters for ideas and innovation and a wellspring of new businesses and economic activity.

Johns Hopkins recognizes that, just as it depends on Maryland to foster an environment where ingenuity can thrive, Maryland depends on Johns Hopkins to apply that ingenuity for the common good. The futures of Johns Hopkins and the state that has been its home for 135 years are inextricably linked.
The Johns Hopkins Institutions – including Johns Hopkins University and the various institutions and organizations that together comprise the Johns Hopkins Health System – play a central role in Maryland’s economy. They are a major enterprise in themselves, and also contribute to the vitality of the state’s economy through activities related to their mission – education, research, health care, technology transfer and service to the communities in which they operate.

This report assesses and, where possible, quantifies, the impact of the Johns Hopkins Institutions on the state’s economy. Part One provides a brief overview of Johns Hopkins and – to provide a context for the analysis that follows – briefly discusses recent economic trends in Maryland. Part Two analyzes the impact of Johns Hopkins as an enterprise – a major employer, purchaser of goods and services, and sponsor of construction projects; and analyzes, as well, the impact of spending in Maryland by students at and visitors to Johns Hopkins.

Part Three discusses the University’s role in the development of Maryland’s “human capital.” Part Four examines how its role as one of the nation’s leading research institutions contributes to the state’s economy; and Part Five discusses the role of Johns Hopkins in meeting the health care needs of Maryland residents. Part Six of the report focuses on the commercialization of technologies initially developed at Johns Hopkins and more broadly, on the development of new businesses in Maryland with ties to the Johns Hopkins Institutions. Part Seven briefly describes several Baltimore institutions that are affiliated with Johns Hopkins and their contributions to the state’s economy.

Part Eight provides some examples of other ways in which the Johns Hopkins Institutions are engaged in meeting the needs of Maryland’s communities.

Finally, Part Nine explores several reasons why Johns Hopkins could play an especially valuable role during the next decade as a partner in the continued growth of Maryland’s economy.
When Johns Hopkins, a Baltimore merchant, died in 1873, he left behind a gift of $7 million, to be divided between a new university and a new hospital, both of which were to bear his name. Three years later, when the Johns Hopkins University opened its doors, President Daniel Coit Gilman declared the new university's commitment to “the encouragement of research…and the advancement of individual scholars who by their excellence will advance the science they pursue and the society where they dwell.” The Johns Hopkins Hospital opened in 1889, and the Johns Hopkins University School of Medicine four years later. Within twenty years of his death, Hopkins’s vision had led to the creation of America’s first real research university and its first academic medical center.

More than a century later, the merchant’s vision endures. The Johns Hopkins University perennially ranks first among U.S. universities in total research spending; and The Johns Hopkins Hospital has been rated by *U.S. News and World Report* as the best hospital in the U.S. for twenty consecutive years.

THE JOHNS HOPKINS UNIVERSITY

The Johns Hopkins University is comprised of nine schools (Table 2) with a total enrollment of more than 20,000 undergraduate, graduate and professional students, along with the Applied Physics Laboratory – a division of the University whose primary mission is to conduct scientific and technological research for federal agencies on topics related to national and homeland security and space exploration.

These major divisions of the University operate at four principal locations in Baltimore, and at several other locations in Maryland and the District of Columbia.

- The **Homewood campus**, located in north Baltimore’s Charles Village neighborhood, is the University’s headquarters, and home to the Krieger School of Arts and Science, the Whiting School of Engineering and the School of Education.

- The **East Baltimore campus** is home to the School of Medicine, the School of Nursing and the Bloomberg School of Public Health.

- The **Peabody Institute** is located in Baltimore’s Mount Vernon neighborhood, near many of the city’s leading cultural institutions and organizations. The Institute is also a partner in a national music conservatory in Singapore.

- The **Carey Business School** occupies four floors of the Legg Mason building in the city’s Harbor East area.

- The **Mount Washington campus**, located on the northern edge of the city, houses Johns Hopkins administrative offices and several research programs as well as a variety of other non-profit and commercial tenants. The campus also includes a conference center that is owned by Johns Hopkins and managed by a private contractor.
The Applied Physics Laboratory (APL) is located on a 399-acre campus in Laurel, Maryland, halfway between Baltimore and Washington, D.C. The APL also leases space in an adjoining office park and has field offices at three sites in Maryland (Fort Meade, Silver Spring and Patuxent River) and 18 other sites throughout the U.S.

The School of Advanced International Studies (SAIS) and the University’s D.C. Center, which offers a variety of academic programs, are located in Washington, D.C. SAIS also has programs located in Bologna, Italy and Beijing, China.

The 36-acre Montgomery County Campus, located in Rockville, Maryland, offers programs in the arts and sciences, engineering, business and education; it also includes a 108-acre site nearby that is being developed as a research campus for the University and for other non-profit, corporate and government research partners.

The Columbia Center, located in Columbia, Maryland, offers a range of programs for working adults, with a particular focus on teachers and other education professionals.

THE JOHNS HOPKINS HEALTH SYSTEM

The Johns Hopkins Health System is similarly comprised of multiple divisions operating at multiple locations.

- The Johns Hopkins Hospital, founded in 1889 and located in East Baltimore, is a 994-bed acute care facility that serves as the principal teaching hospital for the Johns Hopkins University School of Medicine and as a major center for medical research. The Johns Hopkins Hospital has been cited by U.S. News & World Report as the best hospital in the U.S. for 20 consecutive years.

- Johns Hopkins Bayview Medical Center is the current incarnation of a hospital that was founded in 1773 – making it one of the oldest continuously operating hospitals in the U.S. For many years this facility functioned as a municipal hospital and was named City Hospitals. The
city transferred ownership to Johns Hopkins in 1984. Today it is a 348-bed acute care hospital with particular strengths in geriatric medicine, neonatal intensive care and alcohol and substance abuse as well as Maryland’s only adult burn center.

Other facilities located on the Medical Center’s 130-acre campus include the Johns Hopkins Bayview Care Center, a 276-bed long-term care facility and several biomedical research buildings.

- **Howard County General Hospital**, located in Columbia, Maryland, was founded in 1973 as a short-stay facility for members of the Columbia Health Plan. Today it is a 238-bed comprehensive acute care facility serving residents of Howard County. The hospital affiliated with the Johns Hopkins Health System in 1998.

- **Suburban Hospital**, founded in 1943, is a 222-bed community hospital located in Bethesda, Maryland, primarily serving residents of Montgomery County. Suburban affiliated with the Johns Hopkins Health System in 2009.

- **Johns Hopkins Community Physicians** provides health services to Maryland residents through a network of 26 primary care centers, including four in Baltimore City and 22 in other communities throughout the state.

- In addition to JHCP’s primary care centers, JHHS operates **health care and surgery centers**, which provide a wide range of specialty services on an outpatient basis, at three locations in the Baltimore suburbs.
• **Johns Hopkins Home Care Group**, founded in 1983, is a full-service home health care agency owned jointly by the Johns Hopkins University School of Medicine and JHHS. It provides comprehensive home care services (including medical equipment and supplies) for both adults and children in Baltimore City and in the six-county Greater Baltimore area, and a more limited range of services in six other Maryland counties.

• **Johns Hopkins HealthCare LLC**, a joint venture of the School of Medicine and JHHS created in 1995, manages three health care plans.

  » **Priority Partners Managed Care Organization** provides health care for recipients of Medicaid and other publicly-funded health care programs in Maryland.

  » **Johns Hopkins Employer Health Programs** provides health care for employees of the Johns Hopkins Health System and several partner institutions.

  » **Johns Hopkins U.S. Family Health Plan** provides health care to military families living in Maryland and in adjoining areas in several other states.

In November 2010, JHHS added another institution to its network – **Sibley Hospital**, a 328-bed acute care facility in Washington D.C.

In addition to the institutions that are part of the JHHS network, Johns Hopkins owns a 50 percent interest in Mount Washington Pediatric Hospital in Baltimore, which is governed by a board that includes representatives of Johns Hopkins and the facility’s other co-owner, the University of Maryland Medical System. Johns Hopkins Medicine also maintains affiliations with two other non-JHHS institutions – the Greater Baltimore Medical System and the Anne Arundel Medical Center.

**AFFILIATED INSTITUTIONS**

In addition to the schools, research centers and health care providers that are formally part of the Johns Hopkins University and the Johns Hopkins Health System, there are several other institutions that are closely affiliated with Johns Hopkins.

• The **Space Telescope Science Institute** manages scientific research, education and public outreach programs for the Hubble Space Telescope and the new James Webb Space Telescope (scheduled to become operational in 2014). The Institute, which was founded in 1981, is located on the University’s Homewood campus; it is managed by a consortium of major universities (the Association of Universities for Research in Astronomy) under a contract with NASA.

• The **Kennedy Krieger Institute**, founded in 1937, serves children and adolescents with developmental disabilities through an array of programs that includes health care, special education, research and professional development. The Institute’s facilities are located adjacent to the Johns Hopkins East Baltimore campus, in the city’s Greenspring neighborhood and in Montgomery County.

• The **Howard Hughes Medical Institute**, a non-profit foundation created in 1953, is one of the world’s leading biomedical research organizations. The Institute employs about 345 senior scientists and 700 post-doctoral researchers, who along with about 1,000 graduate students work primarily in laboratories located at 70 leading U.S. universities, hospitals and other research centers. HHMI’s headquarters is located in Chevy Chase, MD.

• The **National Institute on Aging** (NIA) conducts most of its in-house research at two NIA centers that are located on the Johns Hopkins Bayview campus – the **Biomedical Research Center** and the **Gerontology Research Center**.
• The principal in-house research center for the National Institute on Drug Abuse is also located on the Bayview campus.

• The Carnegie Institution for Science’s Department of Embryology – a leading center of research in developmental biology – has been affiliated with Johns Hopkins since 1913. It is located on the Homewood campus, and its researchers work closely with the University’s Department of Biology.

• The Lieber Institute for Brain Development – the newest Johns Hopkins affiliate – is a non-profit research foundation specializing in neuroscience. In June 2010 the Institute announced that it will be moving into the new Science + Technology Park in East Baltimore – a location that the Institute chose in part due to the opportunities it offers for collaboration with researchers at Johns Hopkins.

All of these institutions contribute to Maryland’s role as a major center for scientific research – and their presence (and the scale of their operations) in Maryland is in part a function of their relationships to Johns Hopkins.

JOHNS HOPKINS IN CONTEXT: THE MARYLAND ECONOMY

Understanding the Johns Hopkins Institutions’ impact on Maryland’s economy requires an understanding of the context within which they operate. Prior to the beginning of the recession of 2008-2009, the state had seen five years of moderate growth. Between 2002 and 2007, payroll employment in Maryland grew by 4.7 percent – an increase of about 119,000 jobs. Earnings per worker grew from $46,298 to $50,596 – an increase of 7.8 percent.

As Table 3 shows, job growth in Maryland during this period was concentrated in a limited number of industries, including health care, professional and technical services, construction, restaurants and educational services. Together, these five sectors accounted for about three-quarters of all job growth in Maryland between 2002 and 2007.

Maryland’s growth during this period was based on a number of strengths, including a highly educated workforce; leading universities and academic medical centers; a strong base in government, institutional and corporate research and development; the presence of a number of large federal government installations, both military and civilian; and a concentration of government contractors in defense, intelligence, homeland security and other areas.

<table>
<thead>
<tr>
<th>Industry</th>
<th>2002</th>
<th>2007</th>
<th>Change</th>
<th>% Change</th>
<th>Average wage, 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health care</td>
<td>230,474</td>
<td>259,255</td>
<td>28,681</td>
<td>12.4%</td>
<td>$51,815</td>
</tr>
<tr>
<td>Professional/technical services</td>
<td>198,768</td>
<td>211,533</td>
<td>22,765</td>
<td>11.5%</td>
<td>$78,824</td>
</tr>
<tr>
<td>Construction</td>
<td>165,725</td>
<td>187,878</td>
<td>22,153</td>
<td>13.4%</td>
<td>$52,361</td>
</tr>
<tr>
<td>Restaurants</td>
<td>156,825</td>
<td>174,469</td>
<td>17,644</td>
<td>11.3%</td>
<td>$16,421</td>
</tr>
<tr>
<td>Educational services</td>
<td>49,240</td>
<td>56,475</td>
<td>7,235</td>
<td>14.7%</td>
<td>$45,145</td>
</tr>
</tbody>
</table>

Table 3: Leading growth industries in Maryland, 2002-2007
Based on its strengths in these and other areas, Maryland was rated by several organizations as being among the states that were best equipped to take advantage of opportunities for future growth.

- In their *New Economy Index* for 2008, the Information Technology and Innovation Foundation and the Kauffman Foundation rated the states on the extent to which they were “well-positioned for robust growth and innovation over the next decade.” They rated Maryland as the third best-prepared among the fifty states, behind only Massachusetts and Washington.²

- The Milken Institute’s *State Technology and Science Index* rates the states according to criteria such as their strength in research and development, human capital investment, and concentration of science and technology-based industries. In 2008, Maryland was ranked second—behind Massachusetts, but ahead of Colorado, Washington, California, and Virginia.³

In part because of its underlying strengths, Maryland has fared better during the recession than many other parts of the U.S. Between 2007 and 2009, payroll employment in Maryland fell by 3.4 percent—a loss of about 86,000 jobs, with job losses concentrated in construction, manufacturing, and financial services.

As a result of job losses during the recession, payroll employment in Maryland grew by only 1.4 percent between 2002 and 2009—a net increase of about 33,000 jobs. While the state’s gains during this period were modest, it is important to keep them in perspective. The rate of job growth in Maryland between 2002 and 2009 (1.4 percent) was actually higher than the rate for the U.S. as a whole during the same period (only 0.4 percent).


³ *State Technology and Science Index*. Milken Institute, June 2008.

Among the many institutions and companies that have contributed to the strength of Maryland’s economy during the past decade, the Johns Hopkins Institutions are noteworthy in several respects—as the state’s largest private employer, one of its leading educational institutions and leading providers of health care, its largest research enterprise and a source of new technologies and new businesses. The remaining sections of the report examine all of these aspects of Johns Hopkins’s contributions to Maryland’s economy.

Part Two of the report analyzes the impact of the Johns Hopkins Institutions as a major enterprise.
The Economic Impact of Johns Hopkins in Maryland
As a major enterprise in their own right, the Johns Hopkins Institutions contribute to the economic vitality of the State of Maryland in several ways – as a major employer, a buyer of goods and services from local businesses, a sponsor of construction projects and a generator of tax revenues. This part of the report addresses the Institutions’ impact in each of these areas.

In fiscal year 2010, the Johns Hopkins Institutions’ revenues totaled $7.62 billion. As Figure 2 shows:

- Patient care and clinical services ($3.63 billion) accounted for about 49 percent of all revenues;
- Grants and contracts ($2.39 billion) accounted for 31 percent of all revenues;
- Tuition and fees (net of institutional scholarships and fellowships) totaled $411 million – 5 percent of all revenues;
- Investment income totaled $187 million, about 2 percent of all revenues;
- Contributions and gifts accounted for $72 million, about 1 percent; and
- Other sources accounted for the remaining 12 percent of revenues.

Overall, we estimate that approximately 58 percent of the Hopkins Institutions’ revenues were derived from sources outside Maryland, reflecting the position of higher education, high-quality health care and sponsored research as three of the state’s leading “export” industries.
### Table 4:
Johns Hopkins employment by location in Maryland (excluding students), Spring 2010

<table>
<thead>
<tr>
<th>Location</th>
<th>Johns Hopkins site</th>
<th>Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baltimore</td>
<td>Homewood campus</td>
<td>4,898</td>
</tr>
<tr>
<td>Baltimore</td>
<td>East Baltimore campus</td>
<td>22,491</td>
</tr>
<tr>
<td>Baltimore</td>
<td>Bayview Medical Center</td>
<td>4,415</td>
</tr>
<tr>
<td>Baltimore</td>
<td>Other Baltimore sites</td>
<td>1,814</td>
</tr>
<tr>
<td>Howard County</td>
<td>Applied Physics Laboratory</td>
<td>4,986</td>
</tr>
<tr>
<td>Howard County</td>
<td>Howard County General Hospital</td>
<td>1,825</td>
</tr>
<tr>
<td>Howard County</td>
<td>Columbia Center</td>
<td>281</td>
</tr>
<tr>
<td>Howard County</td>
<td>Other locations</td>
<td>169</td>
</tr>
<tr>
<td>Montgomery County</td>
<td>Suburban Hospital</td>
<td>2,166</td>
</tr>
<tr>
<td>Montgomery County</td>
<td>Montgomery County Campus</td>
<td>71</td>
</tr>
<tr>
<td>Montgomery County</td>
<td>Other locations</td>
<td>48</td>
</tr>
<tr>
<td>Anne Arundel County</td>
<td>Johns Hopkins HealthCare</td>
<td>624</td>
</tr>
<tr>
<td>Anne Arundel County</td>
<td>Other locations</td>
<td>147</td>
</tr>
<tr>
<td>All other counties</td>
<td></td>
<td>2,193</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>46,128</strong></td>
</tr>
</tbody>
</table>

### Table 5:
Top ten largest private employers in Maryland, 2010

<table>
<thead>
<tr>
<th>Company</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Johns Hopkins</td>
<td>46,128</td>
</tr>
<tr>
<td>Walmart</td>
<td>17,715</td>
</tr>
<tr>
<td>University of Maryland Medical System</td>
<td>15,000</td>
</tr>
<tr>
<td>MedStar Health</td>
<td>14,867</td>
</tr>
<tr>
<td>Giant Food</td>
<td>13,403</td>
</tr>
<tr>
<td>Verizon Maryland</td>
<td>11,253</td>
</tr>
<tr>
<td>Northrop Grumman</td>
<td>10,800</td>
</tr>
<tr>
<td>Lockheed Martin</td>
<td>9,245</td>
</tr>
<tr>
<td>Marriott International</td>
<td>9,170</td>
</tr>
<tr>
<td>Adventist HealthCare</td>
<td>8,572</td>
</tr>
</tbody>
</table>
EMPLOYMENT AT JOHNS HOPKINS

In the spring of 2010, the Johns Hopkins Institutions together employed a total of 53,532 people. This total included 47,482 regular employees (excluding students), 82 percent of whom worked full-time. About 97 percent of these regular employees (46,128 people) worked at Johns Hopkins locations in Maryland, including its campuses in Baltimore, the Applied Physics Laboratory, the Columbia Center and Howard County General Hospital in Howard County, the Montgomery County Campus and Suburban Hospital in Montgomery County, and several other sites.

Table 4 shows the breakdown of jobs by location in Maryland as of the spring of 2010.

In addition to the Institutions’ regular full- and part-time employees, 6,050 students worked at Johns Hopkins University in the spring 2010 in a variety of part-time jobs. Most student employment is concentrated in Baltimore.

According to data published by the Maryland Department of Business and Economic Development, Johns Hopkins is by a wide margin the largest private employer in the state. Table 5 lists the state’s largest private-sector employers as of 2010.

Johns Hopkins is notable not only for its size, but for its growth. Employment at the Johns Hopkins Institutions has grown by nearly 40 percent since the fall of 2003.

The Johns Hopkins Institutions’ payroll in FY 2010 totaled $2.95 billion (including wages paid to student employees). The payroll for Johns Hopkins jobs based in Maryland totaled $2.78 billion. As Figure 3 illustrates, the Johns Hopkins Institutions’ payroll increased by 69 percent between FY 2003 and FY 2010.
Where Johns Hopkins employees live

As Figure 4 shows, 93 percent of the Johns Hopkins Institutions’ employees (excluding students) lived in Maryland in the spring of 2010. Salaries and wages paid to these employees totaled $2.59 billion (94 percent of the total payroll for non-student employees).

In addition to these regular employees, 4,852 of the University’s 6,050 student employees – about 80 percent of the total – lived in Maryland.

Diversity and quality of Johns Hopkins employment

Johns Hopkins offers a wide variety of high-quality jobs for residents of Maryland.

- At the University (including the School of Medicine), faculty account for 27 percent of total employment; administrative and other professionals, 46 percent; and clerical and support staff, 27 percent.
• At Johns Hopkins Health System, administrative and professional jobs (including non-faculty physicians) account for 24 percent of employment; nursing staff for 26 percent; and clerical and support staff for 50 percent.

The employment distribution for the University (including the Applied Physics Laboratory and the School of Medicine) and the Johns Hopkins Health System is shown in Figure 5.

Salaries and wages paid by Johns Hopkins are significantly higher than the average earnings of workers in Baltimore and Maryland. In 2009, the average salary for full-time, full-year employees in Baltimore was $53,501, and in Maryland, $50,596; while the average salary for full-time, full-year employees at Johns Hopkins University (excluding the School of Medicine) was $64,000 – 21 percent greater than the Baltimore average and 28 percent greater than the average for Maryland. The average salary for full-time, full-year employees at the School of Medicine was $75,500. The average salary for full-time, full-year Johns Hopkins Health System employees was $60,500.

Earnings are, of course, not the only factor that affects the quality of jobs. Johns Hopkins also provides a wide range of benefits to its employees. They include:

• Health, dental and vision insurance
• Flexible spending accounts
• Life, disability and long-term care insurance
• Staff and tax-deferred retirement plans
• Live Near Your Work, a program that provides incentives for employees to purchase homes near the Homewood and medical center campuses (described in Part Eight)

Johns Hopkins also provides its employees with opportunities for education. The University offers a tuition remission program that provides 100 percent of the tuition for employees and employees’ family members for part-time, credit and non-credit courses at the University up to $5,250 per calendar year. In fiscal year 2010, the University provided 1,145 employees with about $3.1 million worth of tuition under the program.

Employees may also take courses at other colleges and universities under the University’s tuition reimbursement program. The program reimburses up to $2,000 in tuition for each employee’s family per year. During the 2009-10 academic year, 370 employees took advantage of this program, totaling $504,920 in tuition reimbursements.

Educational benefits are not limited to employees themselves. The University also provides a tuition grant that provides 50 percent of full-time undergraduate tuition and mandatory academic fees to dependent children of employees for up to four years. In fiscal year 2010, 1,517 students took advantage of this program – a value of $19.7 million.

THE IMPACT OF PURCHASING AND CONSTRUCTION

In addition to the people it employs directly, Johns Hopkins generates jobs in Maryland through its purchases of goods and services from local companies, and through construction and renovation of its facilities.

Purchasing goods and services

Johns Hopkins spent $2.62 billion on the purchase of goods and services during fiscal year 2010. As shown in Figure 6, 38 percent of this total – $998 million – was spent on goods and services provided by Maryland companies.
Johns Hopkins spends a significant amount on purchases of goods and services from minority- and women-owned businesses, including many in Maryland. In FY 2010, payments by the University and School of Medicine to minority- and women-owned businesses (excluding construction contractors) totaled $141.6 million, including $42.6 million paid to companies in Maryland.

The leading categories of goods and services purchased from Maryland companies include:

- Professional and technical services
- Insurance
- Leasing of space
- Buildings and facilities support
- Temporary employment services
- Food and food services

Using the IMPLAN modeling system, we estimate that in FY 2010 Johns Hopkins purchases of goods and services from Maryland companies directly supported 5,433 full-time equivalent jobs.

**The impact of construction**

In addition to generating jobs and economic activity through its purchases of goods and services, Johns Hopkins also does so through its investments in its University and health care facilities. Between fiscal years 2003 and 2010, Johns Hopkins invested a total of $1.68 billion in facility construction and renovation – an average of $210 million annually.

**Broadway Services: Spinning off a growing business**

Baltimore-based Broadway Services was established in 1982 to provide security services to Johns Hopkins. In addition to security services, the company’s lines of business now include environmental services, parking/transportation and property management. The company employs more than 1,300 people and generated about $54 million in revenue in FY 2010. While most of the firm’s business continues to be with Johns Hopkins, a growing share is with other companies in the Baltimore area. In FY 2010, about 33 percent of the Broadway Services’ revenue (about $18 million) came from its other 150 customers in the Baltimore area.
Major projects completed or under way during fiscal year 2010 have included the following:

- On The Johns Hopkins Hospital campus in East Baltimore, work is under way on two new 12-story patient towers—the Charlotte R. Bloomberg Children’s Center at Johns Hopkins and the Sheikh Zayed bin Sultan Al Nabhyan Cardiovascular and Critical Care Adult Tower. The towers, totaling nearly 1.6 million square feet, will include 560 patient beds—355 for adults and 205 for children. This $1.1 billion project will be completed in 2012.

- After a three-year $85 million renovation, Gilman Hall reopened its doors to faculty, staff and students in August 2010. The building houses ten of the Krieger School of Arts and Sciences’ humanities departments and common spaces permitting increased interaction among faculty and students from different departments. The centerpiece of the building is a three-story sunlit atrium that will serve as the building’s central focal point and gathering space. The University is seeking LEED Gold certification.

- Johns Hopkins completed a 4.6 megawatt cogeneration plant on its Homewood campus in 2010, and plans to complete two more cogeneration plants totaling 15 megawatts on its East Baltimore campus by the end of 2011. The plants will reduce energy costs, while also substantially reducing the production of carbon dioxide emissions. The total cost of the three cogeneration plants is $43.1 million.

- In May 2010, the Bayview Medical Center received $7 million from the National Institutes of Health under an American Recovery and Reinvestment Act grant to renovate lab space in the Center for Translational Molecular Imaging (CTMI). The initial focus of the CTMI will be on neurology and oncology. The lab is expected to be completed by 2012.

- In 2009, the Applied Physics Laboratory began construction on a 200,000 square-foot, $60 million new building that will allow the Lab to bring together most of the staff of its Space Department, who are now scattered across several existing buildings. The new building, which will be completed in 2012, will include offices and technical facilities for about 550 scientists, engineers and support staff.
will provide space to accommodate the continued expansion of APL’s space programs, and at the same time free up space for other programs in existing buildings.

- In 2010 APL also started construction on an additional 47,500 square-foot, $30 million facility that will further enhance the Lab’s capacity to undertake complex space missions. The new building, which will be completed in 2012, will include laboratory space, mechanical assembly areas and high-bay clean rooms.

As Figure 8 shows, in fiscal year 2010, Johns Hopkins spent $257 million on construction and renovation of facilities. Of this total, $214 million (83 percent) was paid directly to Maryland-based contractors. On several projects however – most notably the new clinical building at The Johns Hopkins – the scale and complexity of construction resulting in significant portions of the work being performed by out-of-state subcontractors. After taking such subcontracts into account, we estimate that work done by Maryland firms accounted for approximately $170.9 million – about 67 percent of the Johns Hopkins Institutions’ spending on construction.

We estimate that in fiscal year 2010, spending by Johns Hopkins on construction directly supported about 985 FTE jobs with Maryland contractors.

A significant portion of the Johns Hopkins Institutions’ spending on construction in FY 2010 (and in the preceding five years) consisted of payments to minority- and women-owned businesses (MWBE’s). As Figure 9 shows, Johns Hopkins spent about $37.8 million with MWBE’s in FY 2010 – nearly 15 percent of its FY 2010 spending. Between FY 2005 and FY 2010, Johns Hopkins spent about $147 million with MWBE contractors.

As shown in Figure 10, over the next five years from 2011 to 2015, Johns Hopkins estimates it will spend an average of approximately $152 million per year on new construction and major renovation.

Based on the location of contractors used by Johns Hopkins in FY 2010, we estimate that about $101 million per year could be spent with Maryland-based contractors. Over the next five years, this spending could directly create about 2,900 person-years of employment in construction and related industries in Maryland.
(It should be noted that the estimate of $152 million in average annual construction spending during the next five years is based on current plans. Identification of new needs and opportunities – such as currently-unanticipated major gifts – could increase total investments in new construction and renovation beyond the level of the current five-year forecast. New investments over and above forecasted levels have been fairly common at Johns Hopkins in recent years.)

The impact of construction spending goes beyond the opportunities it creates for contractors and construction workers throughout Maryland. The Johns Hopkins Institutions’ investment in construction and renovation of facilities enhances its ability to fulfill its mission of education, research and patient care, which in turn leads to further growth in employment at Johns Hopkins and enhances its capacity to contribute to the ongoing development of the state’s economy.

**Indirect and induced effects**

The jobs and economic activity generated by the Johns Hopkins Institutions’ spending for payroll, purchasing and construction are not limited to the direct impacts cited above. Some of the money that Johns Hopkins pays to its local suppliers and contractors is used to buy goods and services from other local companies; and the latter companies in turn buy goods and services from other local businesses.

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**Figure 9:**
Construction spending with MWBE contractors, FY 2005-2010

**Figure 10:**
Projected construction spending, FY 2011-2015 ($ millions)
Johns Hopkins employees, and the employees of its suppliers and contractors, similarly use part of their earnings to buy a wide variety of goods and services – housing, utilities, food, personal services and other household needs – from local businesses; and the employees of those businesses do the same.

Using a tool of economic analysis called an input-output model, we can measure these “indirect and induced” (or “multiplier”) effects of Johns Hopkins Institutions’ spending. We estimate that in Maryland, Johns Hopkins’s spending on payroll, purchasing and construction in fiscal year 2010 indirectly generated:

- About $4.86 billion in economic activity, and
- 34,876 full-time-equivalent jobs in the state.

Table 6 summarizes the direct, indirect and induced impacts of Johns Hopkins’s spending in the state of Maryland. In addition to the 46,128 people Hopkins employed directly in Maryland (excluding students), the Johns Hopkins Institutions’ spending directly and indirectly generated 41,294 full-time equivalent jobs with other employers in Maryland, and generated about $6.03 billion in additional economic activity throughout the state.

<table>
<thead>
<tr>
<th>Entity</th>
<th>Direct spending</th>
<th>Indirect and induced impact of spending by vendors, contractors and employees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Payroll</td>
<td>Purchasing/construction</td>
</tr>
<tr>
<td>University</td>
<td>$1,867.2 million</td>
<td>$587.8 million</td>
</tr>
<tr>
<td></td>
<td>25,767 jobs</td>
<td>3,280 jobs</td>
</tr>
<tr>
<td>Health System</td>
<td>$1,081.5 million</td>
<td>$581.2 million</td>
</tr>
<tr>
<td></td>
<td>20,361 jobs</td>
<td>3,138 jobs</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$2,948.7 million</td>
<td>$1,169.0 million</td>
</tr>
<tr>
<td></td>
<td>46,128 jobs</td>
<td>6,418 jobs</td>
</tr>
</tbody>
</table>

Table 6: Direct, indirect and induced impacts of Johns Hopkins spending in Maryland, FY 2010

**Contributing to local and state revenues**

As shown in Table 7, Johns Hopkins paid $16.3 million in taxes and fees to a variety of local governments in FY 2010. This includes nearly $14 million in taxes and fees to the City of Baltimore in FY 2010, including about $4.3 million in property taxes on non-exempt properties, $1.8 million in water and sewer fees, $3.9 in parking taxes, and $3.5 million in energy taxes.

As shown in Table 8, Johns Hopkins paid nearly $175 million in taxes and fees to the State of Maryland in FY 2010, including about $171 million in income taxes withheld from the wages and salaries of Johns Hopkins employees.

**The impact of student spending**

In addition to the University’s own spending, off-campus spending by Johns Hopkins students also generates economic activity in the Baltimore area.

The impact of student spending is determined in part by whether students live on campus, in off-campus University housing, or elsewhere in Baltimore or the surrounding communities. In the fall of 2009, 5,831 undergraduate and 14,551 graduate students
### Table 7: Taxes and fees paid to local governments in Maryland, FY 2010

<table>
<thead>
<tr>
<th>City of Baltimore</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parking tax</td>
<td>$ 3,891,911</td>
</tr>
<tr>
<td>Property tax</td>
<td>$ 4,280,109</td>
</tr>
<tr>
<td>Water/sewer</td>
<td>$ 1,814,733</td>
</tr>
<tr>
<td>Energy taxes</td>
<td>$ 3,544,884</td>
</tr>
<tr>
<td>Telecom</td>
<td>$ 211,224</td>
</tr>
<tr>
<td>Licenses/permits/fees</td>
<td>$ 225,547</td>
</tr>
<tr>
<td><strong>SUBTOTAL</strong></td>
<td><strong>$ 13,968,408</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Howard County</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property taxes</td>
<td>$ 1,128,227</td>
</tr>
<tr>
<td><strong>SUBTOTAL</strong></td>
<td><strong>$ 129,246</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Baltimore County</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property taxes</td>
<td>$ 666,444</td>
</tr>
<tr>
<td>Other taxes/fees</td>
<td>$ 908</td>
</tr>
<tr>
<td><strong>SUBTOTAL</strong></td>
<td><strong>$ 129,246</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Montgomery County</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property taxes</td>
<td>$ 128,338</td>
</tr>
<tr>
<td>Other taxes/fees</td>
<td>$ 908</td>
</tr>
<tr>
<td><strong>SUBTOTAL</strong></td>
<td><strong>$ 129,246</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other counties/municipalities</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property taxes</td>
<td>$ 418,616</td>
</tr>
<tr>
<td>Other taxes/fees</td>
<td>$ 2,181</td>
</tr>
<tr>
<td><strong>SUBTOTAL</strong></td>
<td><strong>$ 420,797</strong></td>
</tr>
</tbody>
</table>

| **GRAND TOTAL**              | **$ 16,313,122** |

### Table 8: Taxes and fees paid to the State of Maryland, FY 2010

<table>
<thead>
<tr>
<th>Type of tax</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>State income taxes withheld</td>
<td>$ 170,946,533</td>
</tr>
<tr>
<td>Unemployment insurance taxes</td>
<td>$ 3,743,027</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$ 174,689,560</strong></td>
</tr>
</tbody>
</table>
were enrolled at Johns Hopkins University. Approximately 46 percent of undergraduate students lived on the Hopkins campus while most graduate students lived off-campus in Baltimore or the surrounding communities.

During the fall of 2010, Appleseed conducted an online survey to understand student spending. Questions captured residence location and type, program and degree status, and weekly expenditures on goods and services. A total of 2,827 undergraduate, graduate and professional students completed the survey. Based on their responses, we determined average annual expenditures on housing, transportation, books, supplies, food and personal expenses to be $12,782 for undergraduates living off-campus and $13,327 for graduate students, as shown in Table 9.

After discounting student payrolls (which were analyzed as part of the employee spending impacts discussed above), we calculated that spending by Hopkins students in FY 2010 totaled about $140.5 million in Maryland. This figure excludes housing costs of students who resided in on-campus housing, and excludes spending by part-time graduate students (as we assume they would have been in Maryland regardless of their enrollment

<table>
<thead>
<tr>
<th>Expense</th>
<th>Undergraduate, off-campus</th>
<th>Graduate students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room and board</td>
<td>$7,814</td>
<td>$7,557</td>
</tr>
<tr>
<td>Books, supplies, food and personal expenses</td>
<td>$4,510</td>
<td>$5,153</td>
</tr>
<tr>
<td>Transportation</td>
<td>$458</td>
<td>$617</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$12,782</td>
<td>$13,327</td>
</tr>
</tbody>
</table>

Table 10: Impact of student spending in Maryland, FY 2010

<table>
<thead>
<tr>
<th>Maryland</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output</strong></td>
</tr>
<tr>
<td>Direct</td>
</tr>
<tr>
<td>Indirect/induced</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
</tr>
<tr>
<td><strong>Employment</strong></td>
</tr>
<tr>
<td>Direct</td>
</tr>
<tr>
<td>Indirect/induced</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
</tr>
<tr>
<td><strong>Employee compensation</strong></td>
</tr>
<tr>
<td>Direct</td>
</tr>
<tr>
<td>Indirect/induced</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
</tr>
</tbody>
</table>
at Hopkins). We further discounted spending by in-state undergraduate students by 8 percent, and spending by in-state graduate students by 25 percent, to reflect the percentage of in-state residents who indicated that they would have attended another college or university in Maryland if they did not attend Johns Hopkins.

Using IMPLAN, we estimate that this spending directly supported approximately 1,026 FTE jobs in Maryland. Through the multiplier effect, off-campus student spending generated an additional $102.6 million in economic activity and 751 FTEs in the state.

### Spending by visitors

Visitors to the Johns Hopkins Institutions also have an economic impact on the state of Maryland. During their stay, they spend money off-campus in hotels, restaurants, retail stores, and on entertainment and transportation.

As shown in Table 11, we estimate that about 218,000 non-Hopkins visitors came to one of the Hopkins campuses in FY 2010. As the table shows, we estimate that about 110,000 of those visitors (about 50 percent of them) came from outside the state of Maryland.

Using data compiled by the Baltimore Visitors and Convention Bureau on spending by visitors to Baltimore, we estimate that these visitors spent about $26.6 million on off-site purchases of hotel accommodations, food shopping, entertainment and transportation.

The four Johns Hopkins hospitals also bring patients’ companions and other patient visitors to the state. As Table 12 shows, there were 128,898 outpatient visits to the four hospitals from outside Maryland. The number of visitors per patient can vary widely. As shown in the table, we estimate one visitor per patient for outpatients from elsewhere in the U.S. and 3 visitors per outpatient for those from outside the U.S. In total, we estimate that outpatients’ visitors accounted for 175,178 visitor-days in Maryland in FY 2010.

In FY 2010, there were 9,906 inpatient discharges from the four Johns Hopkins hospitals of patients who reside outside the state of Maryland. As in the case of outpatient visits, the number of visitors accompanying patients can vary widely. We conservatively

<table>
<thead>
<tr>
<th>Type of visitor</th>
<th>Total visitors</th>
<th># outside Baltimore</th>
<th># outside Maryland</th>
<th># of days</th>
<th>Outside Baltimore visitor-days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alumni visitors</td>
<td>13,451</td>
<td>4,630</td>
<td>3,704</td>
<td>2</td>
<td>9,260</td>
</tr>
<tr>
<td>Vendors</td>
<td>4,829</td>
<td>4,291</td>
<td>4,291</td>
<td>1</td>
<td>4,291</td>
</tr>
<tr>
<td>Admissions visitors</td>
<td>35,284</td>
<td>33,520</td>
<td>24,699</td>
<td>1-3</td>
<td>40,502</td>
</tr>
<tr>
<td>Commencement visitors</td>
<td>10,000</td>
<td>8,500</td>
<td>6,000</td>
<td>3</td>
<td>25,500</td>
</tr>
<tr>
<td>Peabody concerts</td>
<td>5,073</td>
<td>761</td>
<td>507</td>
<td>1</td>
<td>761</td>
</tr>
<tr>
<td>Charles Commons Center</td>
<td>11,832</td>
<td>2,366</td>
<td>1,183</td>
<td>2</td>
<td>4,733</td>
</tr>
<tr>
<td>Summer events</td>
<td>5,254</td>
<td>3,863</td>
<td>1,932</td>
<td>3</td>
<td>11,589</td>
</tr>
<tr>
<td>Athletics visitors</td>
<td>26,375</td>
<td>5,708</td>
<td>2,854</td>
<td>1</td>
<td>5,708</td>
</tr>
<tr>
<td>APL visitors</td>
<td>105,561</td>
<td>64,589</td>
<td></td>
<td>1</td>
<td>64,589</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>217,659</strong></td>
<td><strong>63,639</strong></td>
<td><strong>109,759</strong></td>
<td><strong>135,654</strong></td>
<td></td>
</tr>
<tr>
<td><strong>AVERAGE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>1.61</strong></td>
</tr>
</tbody>
</table>
estimated two visitors per out-of-state patient and 3 visitors per patient from outside the U.S. Using data from Johns Hopkins on the average length of stay of patients, we estimate that those visitors accounted for 81,637 visitor-days in Maryland in FY 2010.

As with other visitors to the Health System and University campuses, we use data from the Baltimore Convention and Visitors Bureau to estimate spending by visitors in Maryland. As Table 13 shows, we estimate that patients’ companions spent about $25.4 million in Maryland in FY 2010, including about $9.1 million on food, $10.2 million on lodging, and $9.1 on shopping and transportation costs.

Using IMPLAN, we estimate that spending by visitors to the University and the four Maryland hospitals of $52.1 million directly created 494 FTE jobs in Maryland in FY 2010 in restaurants, shops, hotels, gas stations and other local businesses.

### Table 12:
Analysis of number of patients’ visitors, and visitor-days, FY 2010

<table>
<thead>
<tr>
<th></th>
<th>Johns Hopkins Hospital</th>
<th>Bayview Medical Center</th>
<th>Howard County and Suburban</th>
<th>TOTAL</th>
<th>Average length of stay</th>
<th>Visitors per patient</th>
<th>Maryland visitor-days</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outpatient visits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>From outside Baltimore</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Maryland/DC</td>
<td>328,535</td>
<td>184,047</td>
<td>n/a</td>
<td>512,582</td>
<td>0.5</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Elsewhere in US</td>
<td>101,867</td>
<td>12,812</td>
<td>17,800</td>
<td>114,679</td>
<td>1.0</td>
<td>132,479</td>
<td></td>
</tr>
<tr>
<td>Outside US</td>
<td>11,895</td>
<td>2,324</td>
<td>14</td>
<td>14,219</td>
<td>3.0</td>
<td>42,699</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>442,297</td>
<td>199,183</td>
<td>17,814</td>
<td>641,480</td>
<td>175,178</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inpatient visits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>From outside Baltimore</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Maryland/DC</td>
<td>22,577</td>
<td>12,206</td>
<td>n/a</td>
<td>34,783</td>
<td>3.6</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Elsewhere in US</td>
<td>8,172</td>
<td>854</td>
<td>979</td>
<td>9,026</td>
<td>3.6</td>
<td>2.0</td>
<td>72,036</td>
</tr>
<tr>
<td>Outside US</td>
<td>698</td>
<td>182</td>
<td>9</td>
<td>880</td>
<td>3.6</td>
<td>3.0</td>
<td>9,601</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>31,447</td>
<td>13,242</td>
<td>988</td>
<td>44,689</td>
<td></td>
<td></td>
<td>81,637</td>
</tr>
</tbody>
</table>

### Table 13:
Spending by patients’ companions in Maryland

<table>
<thead>
<tr>
<th>Category</th>
<th>Spending</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>$ 9,075,849</td>
</tr>
<tr>
<td>Lodging</td>
<td>$ 10,164,951</td>
</tr>
<tr>
<td>Shopping</td>
<td>$ 5,445,510</td>
</tr>
<tr>
<td>Other transport</td>
<td>$ 2,904,272</td>
</tr>
<tr>
<td>Gasoline</td>
<td>$ 726,068</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>$ 25,412,378</td>
</tr>
</tbody>
</table>
As Table 14 shows, we estimate that in FY 2010:

- Johns Hopkins directly employed 46,128 people in Maryland, plus 6,050 students who worked part-time for the University, with a payroll of $2.95 billion; and through its payments of $1.17 billion to Maryland vendors and contractors, directly supported about 6,418 additional FTE jobs.

- Institutions affiliated with Johns Hopkins (listed in Part One of the report) directly employed 3,874 people, with a payroll of $244.0 million; and through payments of $78.0 million to Maryland vendors and contractors, supported 2,932 additional FTE jobs. (Employment at these institutions is discussed in Part Seven.)

- About $192.6 million in local spending by students and visitors directly supported 1,520 FTE jobs.

- Through the multiplier effect, spending by Johns Hopkins, by its employees, vendors and contractors, by students and visitors, by affiliated institutions and by their employees and suppliers indirectly generated $5.35 billion in economic activity in the state, and 38,523 FTE jobs.

In total Johns Hopkins directly and indirectly accounted for 96,861 FTE jobs – about 3.8 percent of all wage-and-salary jobs in the state – and $9.98 billion in output in Maryland in FY 2010.
During the past 20 years, a growing body of research has confirmed the role of human capital – the accumulated knowledge, skills and experience of a nation’s, a region's or a city’s people – as perhaps the single most important contributor to economic growth. At the individual level, of course, the impact of education on earnings is widely understood. In 2009, as Figure 11 shows, the median earnings of employed Maryland residents who had four-year college degrees ($55,503) were 80 percent higher than the median earnings of those who had only a high school diploma ($30,914); and the median earnings of those with graduate or professional degrees ($76,161) were 146 percent higher. The benefits of higher education are not limited to those who earn degrees. For example, economist Edward Glaeser has found that between 1960 and 1990, population and income growth in U.S. cities was closely correlated with levels of human capital, as measured by the percentage of the cities’ residents who were college graduates in 1960. The relationship between human capital and urban economic growth persisted through the 1990s.4

In a recent paper published by the New York Federal Reserve Bank, Jaison Abel and Todd Gabe similarly found that “a one percentage point increase in the proportion of residents with a college degree is associated with a 2.3 percent increase in metropolitan-area GDP per capita.” Summarizing the results of previous studies, Abel and Gabe cite two explanations for the powerful link between human capital and economic growth.

First, human capital increases individual-level productivity and idea generation. Second, the concentration of human capital within a region facilitates knowledge spillovers, which further enhance productivity and fuel innovation. Indeed, Glaeser suggests that human capital is a key predictor of urban success because “high skilled people in high skilled industries may come up with more new ideas.” In addition, a region’s stock of human capital has been shown to lead to more rapid reinvention and increases in the long-term economic vitality of cities.5

Abel and Gabe’s work echoes that of other economists who had found similar spillover effects. Even non-college educated workers benefit from this effect. Enrico Moretti has shown that a 1 percentage-point increase in the percentage of a city’s workers who have college degrees is associated with a 1.6 percent increase in the earnings of workers who have a high school education; and a 1.9 percent increase in the earnings of those who have not completed high school.6

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Johns Hopkins University contributes to the development of Maryland’s supply of human capital in several ways:

- By providing a high-quality education for thousands of Maryland residents
- By attracting talented students from around the world, some of whom remain in Maryland after they graduate
- By preparing both undergraduates and graduate students for careers in fields that are critical to the future of Maryland’s economy
- By providing opportunities for working professionals to upgrade their skills
- By helping to improve the quality of elementary and secondary education in Maryland

STUDENTS AND ALUMNI

In the fall of 2009, a total of 20,483 students were enrolled in undergraduate and graduate degree and for-credit certificate programs at Johns Hopkins. Table 15 provides data on undergraduate and graduate/professional enrollment by school.

<table>
<thead>
<tr>
<th>School</th>
<th>Undergraduate</th>
<th>Graduate/professional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Academic Programs</td>
<td>-</td>
<td>2,482</td>
</tr>
<tr>
<td>Krieger School of Arts and Sciences</td>
<td>3,512</td>
<td>1,025</td>
</tr>
<tr>
<td>Carey Business School</td>
<td>159</td>
<td>1,517</td>
</tr>
<tr>
<td>School of Education</td>
<td>73</td>
<td>1,933</td>
</tr>
<tr>
<td>Whiting School of Engineering</td>
<td>1,486</td>
<td>759</td>
</tr>
<tr>
<td>Engineering Part-Time Programs</td>
<td>-</td>
<td>2,056</td>
</tr>
<tr>
<td>School of Nursing</td>
<td>360</td>
<td>339</td>
</tr>
<tr>
<td>Bloomberg School of Public Health</td>
<td>-</td>
<td>2,056</td>
</tr>
<tr>
<td>Peabody Institute</td>
<td>342</td>
<td>340</td>
</tr>
<tr>
<td>SAIS</td>
<td>-</td>
<td>717</td>
</tr>
<tr>
<td>School of Medicine</td>
<td>-</td>
<td>1,378</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>5,932</strong></td>
<td><strong>14,551</strong></td>
</tr>
</tbody>
</table>
As Figure 12 shows, about 19 percent of all undergraduates and 52 percent of all graduate and professional students in the fall of 2009 were residents of Maryland.

Between 2003 and 2010, enrollment at Johns Hopkins grew by 9 percent – an increase of about 1,600 students. Undergraduate enrollment grew by 600 (about 11 percent), and graduate and professional enrollment grew by more than 1,000 (about 8 percent).

In 2009-2010, the University granted a total of 1,586 undergraduate, 4,352 graduate and professional degrees, 219 medical degrees, and 532 certificates. About 25 percent of all undergraduate degrees and 49 percent of all graduate and professional degrees were awarded to Maryland residents.

Many of those who earn degrees at Hopkins stay in Maryland after they graduate. As of the summer of 2010, 59,146 Hopkins graduates – 37 percent of all living alumni – lived in Maryland.
PREPARING JOHNS HOPKINS STUDENTS FOR TOMORROW’S ECONOMY

Johns Hopkins offers its students opportunities for learning in a number of fields that have a major impact on Maryland’s economy, or that could be important sources of future growth.

• The Whiting School of Engineering offers undergraduate, master’s and doctoral programs in **biomedical engineering**. Concentrations are offered in several areas, including biological systems, computational biology, cell and tissue engineering, and sensors and micro-devices.

• The Whiting School’s **Center for Bioengineering Innovation and Design** (BID) offers an undergraduate program in which teams of biomedical engineering students design innovative medical devices aimed at solving specific problems identified by clinicians or industry participants. The Center reports that over a five-year period, student teams have completed 58 device designs, secured eight provisional patents and two licensing agreements, and started two new companies. The Center also offers a one-year MSE in bioengineering innovation and design.

• The Whiting School also offers an MS in **security informatics**, designed for students pursuing careers in the fast-growing field of information security. The program combines studies in technology, management, health policy and security policy, with courses offered at the Homewood and East Baltimore campuses, and at the Applied Physics Laboratory in Laurel. The Whiting School also offers a combined BS/MS program in security informatics, to which students can apply after their second year of undergraduate studies; it gives students the option of earning both a bachelor’s degree and a master’s degree in five years.

• In addition to training physicians, the Johns Hopkins School of Medicine offers graduate programs in other areas critical to Maryland’s continued leadership in biomedical research and health care delivery. For example, the School offers two master’s degrees in *health sciences informatics* – a two-year program for those interested in the use of information technology, solutions and services in biomedical research, and a one-year program focused on applications in areas such as public health and health systems management.

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7 Training of physicians is discussed in Part Five of the report.
• Undergraduates in the Krieger School of Arts and Sciences can earn a bachelor's degree in neuroscience through a rigorous program aimed at preparing students for graduate study, medical school or work in industry. Students can specialize in cognitive, molecular and cellular, or systems neuroscience; and can also earn a joint BA/MS degree through a fifth year of advanced seminars and research in their chosen specialty.

• The Krieger School’s Center for Financial Economics offers a minor in finance to undergraduate students majoring in other disciplines, designed to give students a better understanding of the financial dimensions of their principal areas of interest – from biomedical engineering and public health to government and the arts.

• The Master of Arts degree offered by the School of Advanced International Studies allows students to pursue specialized studies in functional areas such as international development or energy and natural resources, or in regional areas such as China, Latin America or the Middle East. The SAIS program is unusual among graduate programs in international relations for its strong focus on international economics, with all students required to take at least six courses in areas such as international trade and finance and the economics of development.

• Starting in 2010, the Bloomberg School of Public Health is offering a new master’s degree in health economics, aimed at giving students the tools they need to understand the economics of health care, and to promote a more “efficient and equitable allocation of health care resources.”

• In addition to a traditional BS/RN program, the Johns Hopkins School of Nursing offers an accelerated, 13-month nursing degree program for students who have already completed a bachelor’s degree.

• Through a combined BS/MSN program, the School of Nursing allows students to earn a master’s degree in nursing, with opportunities for specialization in fields such as health systems management.

• The Peabody Institute offers both four-year and graduate degrees for musicians, conductors and composers. The Institute also offers a bachelor’s degree in recording arts and sciences – a five-year program that combines courses in music and engineering with practical training in recording technology.

Preparing students for careers in global business

In August 2010, the Carey Business School welcomed its first entering class of 89 students into the Johns Hopkins Global MBA program. Described as “an MBA with a mission,” this full-time, two-year program combines a solid grounding in areas such as finance, marketing, management and operations with engagement in a broader range of issues and concerns. The program has several innovative features.

In their first year, students are required to participate in the Innovation for Humanity Project, through which they engage directly in the creation and growth of sustainable businesses in developing countries. Starting in their second semester, the Discovery to Market Project engages students in the process of translating scientific discoveries and new technologies into commercially viable products and services.
Engagement with the world outside the U.S. is an important part of the process of preparing students to live and work in an increasingly integrated global economy. In 2009-2010, 379 Johns Hopkins undergraduates earned academic credit through participation in international programs; and more than 200 others participated in research or service projects in other countries.

American students at Johns Hopkins also benefit from the opportunity to live and work with students from other countries. In the fall of 2009, 1,900 undergraduate and graduate students from other countries were enrolled at Johns Hopkins – about 9 percent of the University’s total enrollment. Both by bringing international students to Maryland and by providing U.S. students with opportunities for international experience, Johns Hopkins is developing a web of ongoing global relationships that benefits the University, its students – and Maryland as well.

BUILDING THE SKILLS OF MARYLAND’S PROFESSIONAL WORKFORCE

Johns Hopkins is unusual among leading American research universities in the extent of its commitment to providing educational opportunities for working professionals.

Engineering for Professionals

The most extensive of the University’s part-time graduate programs is the Whiting School’s Engineering for Professionals (EP) program. EP offers master’s degrees and graduate certificates in nineteen fields, ranging from traditional disciplines such as chemical, civil, electrical and systems engineering to emerging fields such as biomedical engineering, bioinformatics, nanotechnology, information assurance and photonics. EP also offers advanced certificate programs in several specialized areas for students who already have at least a master’s degree – for example, a new six-course program in climate change, energy and environmental sustainability.

EP courses are offered at the Homewood campus, the Applied Physics Laboratory, the Montgomery County Campus and the D.C. Center and at four other locations:

- The Whiting School’s Microwave Engineering Lab in Elkridge, Maryland
- The state’s Southern Maryland Higher Education Center in California, Maryland
- The Higher Education and Applied Technology (HEAT) Center in Aberdeen, Maryland
- The Crystal City complex in Arlington, Virginia

A growing number of EP courses are also available on-line.

In the fall of 2009, 2,005 part-time students (including 1,604 residents of Maryland) were enrolled in EP courses, making Engineering for Professionals one of the largest part-time graduate engineering programs in the U.S.

Advanced Academic Programs

Through its Advanced Academic Programs (AAP), the Krieger School of Arts and Sciences also offers an array of part-time master’s degree and certificate programs geared to the needs of working professionals. These courses are offered at the Homewood and Montgomery County campuses and the D.C. Center. For example:

The Krieger School’s Center for Biotech Education offers master’s degrees in biotechnology, bioinformatics and bioscience regulatory affairs, and a dual-degree MS in biotechnology/MBA offered jointly with the Carey Business School. Classes are held in the evening and on Saturdays at the Homewood and Montgomery County campuses. Other areas in which AAP offers master’s degrees include:

- Environmental science and policy
- Energy policy and climate
• Global security studies

• Writing, with concentrations in fiction, non-fiction, poetry and science writing, offered in Baltimore and D.C.

In the fall of 2009, 2,482 students – including 928 Maryland residents – were enrolled in the Krieger School’s Advanced Academic Programs.

Other programs

Other schools at Johns Hopkins also offer programs geared to the needs of working professionals. We will cite here just a few examples.

• The Carey School’s Flexible MBA allows students to earn a degree via classes held on weekday evenings and on weekends. The Carey School also offers graduate certificates in areas such as finance, investment and the business of medicine.

• The School of Education’s Division of Public Safety Leadership offers a 60-credit bachelor’s degree in management for public safety professionals who have already completed two years of college, as well as a 45-credit master’s degree in management, designed specifically for those who have been identified by their agencies as future leaders. To date, 609 students have enrolled in the program, including employees of local police and sheriffs’ departments, state law enforcement agencies, and federal agencies such as the Capitol Police, the Secret Service and the DEA. Classes are held at the Johns Hopkins Columbia Center in Howard County.

• The Peabody Institute offers an artists diploma in music, designed for those who have already embarked on careers as professional performers. The curriculum includes lessons, recitals and one classroom course per semester.

STRENGTHENING ELEMENTARY AND SECONDARY EDUCATION

The development of Maryland’s human capital depends not only on the strength of its colleges and universities, but on the quality of its educational system from pre-kindergarten through high school. Johns Hopkins has long been involved in efforts to strengthen pre-school, elementary and secondary education in Maryland – through the training of teachers and other school professionals, research, engagement with schools in Maryland, and expansion of educational opportunities for young Maryland residents.

Training teachers and other school professionals

The Johns Hopkins School of Education provides a variety of options for Maryland residents who want to earn a Master of Arts degree in teaching (MAT).

• The School Immersion MAT is an intensive, one-year 39-credit program that combines full-time summer study with a full-time teaching internship and late-afternoon and evening classes during the school year.

• The Flexible MAT is designed for working professionals in other fields who want to become teachers. Students can take anywhere from two to five years to complete the program, which includes an internship requirement.

• The Accelerated MAT allows undergraduate students to begin working toward teacher certification and a master’s degree after they have earned at least 60 undergraduate credits. Students can earn up to 12 graduate credits during their undergraduate years (of the 39 required) and can complete the remaining requirements – including an internship at a Johns Hopkins partnership school – in anywhere from one to five years after completing a bachelor’s degree.
• The Professional Immersion MAT (PRO-MAT) is a joint program of the School of Education and the Montgomery County Public Schools, aimed at recruiting and training teachers for high-need areas in Montgomery County. The program focuses on candidates who already have a strong academic background in specific content areas. After a summer session combining classroom studies with field experience, participants in the program are employed full-time as teachers in the Montgomery County schools, while working part-time toward completion of the MAT.

Johns Hopkins also offers graduate certificate programs for teachers and other school professionals in 14 areas such as adolescent literacy, English as a second language, educational technology and data-based decision-making for school administrators.

Under the Maryland Redesign for Teacher Education, each of the state’s teacher training programs maintains ongoing partnerships with several “professional development schools.” There are elementary and high schools with which the colleges and universities collaborate on professional development services for teachers and other school improvement initiatives, and where undergraduate and graduate students are placed in teaching internships. In 2009-10, the Johns Hopkins School of Education worked with 14 professional development schools in Maryland. The schools are listed in Table 16.

The School of Education’s work with Dunbar High School illustrates the value of these partnerships in improving school performance. In 2005, Johns Hopkins and Dunbar created the Algebra Academy, a Saturday program aimed at building the math skills of both students and teachers. By 2007, the percentage of 9th grade students at Dunbar who passed Maryland’s statewide algebra assessment doubled – from 43 to 86 percent; and by 2009 the pass rate reached 100 percent.

### Table 16: Professional development schools collaborating with Johns Hopkins

<table>
<thead>
<tr>
<th>Professional development school</th>
<th>County in which school is located</th>
<th># of student interns</th>
<th># of participating teachers/other professionals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albert Einstein High School</td>
<td>Montgomery</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>James H. Blake High School</td>
<td>Montgomery</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Gaithersburg High School</td>
<td>Montgomery</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>John F. Kennedy High School</td>
<td>Montgomery</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Bonnie Branch Middle School</td>
<td>Howard</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Gorman Crossing Elementary School</td>
<td>Howard</td>
<td>11</td>
<td>22</td>
</tr>
<tr>
<td>Oakland Mills High School</td>
<td>Howard</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>Oakland Mills Middle School</td>
<td>Howard</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Pointers Run Elementary School</td>
<td>Howard</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>Swansfield Elementary School</td>
<td>Howard</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>Paul Laurence Dunbar High School</td>
<td>Baltimore City</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>George Washington Elementary School</td>
<td>Baltimore City</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Arundel Middle School</td>
<td>Anne Arundel</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Four Seasons Elementary School</td>
<td>Anne Arundel</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>49</strong></td>
<td><strong>128</strong></td>
</tr>
</tbody>
</table>
The support provided by Johns Hopkins for Maryland's public schools is not limited to the University’s School of Education. Other schools and institutions are also engaged in a variety of ways in efforts to enhance the quality of public education. For example:

- The Johns Hopkins *Takes Time for Schools* program makes University staff members eligible for up to two paid days per fiscal year to pursue service opportunities in Baltimore schools. In part because of this program, Johns Hopkins employees are the single largest source of volunteers working in the Baltimore Public Schools. In 2010, 193 Johns Hopkins employees regularly worked as volunteers at 13 public schools – 37 percent of all registered volunteers in the city's school system.

- Under a grant from the National Science Foundation, the Whiting School of Engineering’s *BIG STEP* program trains engineering graduate students to work in several of Baltimore’s public schools. Through a curriculum that is organized around the environment and environmental processes, Johns Hopkins students seek to help disadvantaged students develop a better understanding of math, the physical sciences and technology.

- In 2009, software engineers from the Applied Physics Laboratory developed a *Virtual Learning Environment* at Chesapeake High School in Baltimore County – the first facility of its kind at any U.S. high school. The VLE is based on a similar facility at the Lab called ARENA – the Augmented Reality Environment at APL. It includes an array of ten 72-inch high-definition 3D video screens, as well as 30 individual work stations that can run the same programs as the larger display. The APL team also developed the simulation software used in the VLE; and the University’s Center for Technology in Education (CTE) worked with the Baltimore County Public School System to develop the VLE curriculum and to train teachers in its use.

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**Applying the lessons of brain science**

During the past twenty years, advances in neuroscience have greatly enhanced our understanding of how the brain functions. Until recently, however, relatively little had been done to translate new insights from neuroscience into the school environment and the practice of teaching. The School of Education’s Neuro Education Initiative is designed to bridge this gap. This initiative includes the development of research partnerships among education and neuroscience faculty, the development of new teaching methods and professional development programs.

Dr. Mariale Hardiman, a professor at the School of Education, has developed a “Brain Targeted Teaching Model” that includes insights into how changes in the school environment can help set the stage for more effective learning, as well as guidance for teachers on how to structure lessons and classroom activities to take advantage of what the field of brain science is discovering about how children learn. The model is now being used in several Baltimore schools.

Since 2008, the School of Education has also offered a 15-credit graduate certificate in Mind, Brain and Teaching, designed to equip teachers and other school professionals with the knowledge and tools they need to translate advances in neuroscience from university labs to elementary and high school classrooms.
Programs developed to date for the VLE have included a detailed simulation of Mount St. Helens and the surrounding area in Washington, and a simulation of the lunar South Pole. While the initial focus in the use of VLE is on science and mathematics, the facility can be used in other areas as well, including the social science.

Expanding educational opportunity
In addition to training teachers and other school professionals, Johns Hopkins contributes to the quality of education in Maryland, and to the expansion of educational opportunity, through programs that directly serve students in grades K through 12. We cite here just a few examples.

- The **Johns Hopkins Tutorial Program**, founded in 1958, is administered by the University’s Center for Social Concerns (described further in Part Eight of the report). During the fall and spring semesters, the Program brings about 120 to 150 Baltimore elementary school students to the Homewood campus for two one-on-one, hour-long tutoring sessions. The assistance provided is tailored to each student’s needs in reading and math, based on individual assessments conducted at the beginning of the semester. In the fall of 2009, 150 JHU student volunteers participated in the program.

- The **Harriet Lane Tutorial Project**, sponsored by the Harriet Lane Clinic – The Johns Hopkins Hospital’s principal pediatric outpatient service – provides after-school tutoring in reading and math to elementary school students in East Baltimore.

- The Peabody Institute’s **Peabody Preparatory** is Baltimore’s largest community education program in the performing arts. The school offers individual and group instruction in music and dance to young Baltimore residents from preschool through high school, and to adults as well.

- The **Center for Biotechnology Education** in the School of Arts and Sciences offers several programs for elementary and secondary school students, including a lab where groups of visiting students can engage in hands-on learning in the life sciences.

- The **APL Mentor program**, a partnership with the Howard County Public Schools, gives high school students an opportunity to work one-on-one with an APL scientist over the course of an academic year.

- Each year, the **Frontiers in Science and Medicine** program provides one-day, hands-on experiences in science to about 600 seventh grade students at the Montgomery County Campus.

- **Engineering Innovation**, a four-week summer program, gives high school students an opportunity to learn how engineers think about and solve the problems involved in projects such as building a bridge or designing a robotic car. The program is offered on the Homewood and Montgomery County campuses, in D.C. and at two sites in California.

- For high school students, work experience is an important complement to classroom learning. The **Johns Hopkins Summer Jobs Program** provides students in Baltimore City schools aged 15 and older with six-week, paid internships in various departments at the University and at JHHS. Students work a five-day, 30-hour week and also participate in educational sessions on topics such as job readiness, financial literacy and post-secondary education. During the summer of 2010, 275 students worked at Johns Hopkins in areas such as administration, information technology, maintenance and patient care, and were paid a total of $388,000.
The Economic Impact of Johns Hopkins in Maryland

Creating opportunity for graduates of Baltimore’s public schools

In 2004, Johns Hopkins reinforced its commitment to expanding educational opportunity for young residents of Baltimore by creating the Baltimore Scholars Program. The program provides full-tuition scholarships to all graduates of Baltimore public high school who are accepted as full-time undergraduate students at Johns Hopkins. (To be eligible, students must have lived in Baltimore for at least three years and attended a public high school in the city for at least three years.)

From the program’s inception in 2005 through 2009-10, 729 Baltimore high school students had applied to Johns Hopkins under the program and 173 had been accepted, of whom 91 had enrolled and 36 Baltimore Scholars from the classes of 2009 and 2010 have graduated. In the spring of 2010, 23 Baltimore public school graduates were accepted at Johns Hopkins, of whom 21 qualified as Baltimore Scholars and 9 enrolled. To date, the value of scholarships awarded under the program has totaled $13.6 million.
For more than sixty years, scientific discovery and technological innovation have been among the most important sources of economic growth – in the U.S., and increasingly throughout the world. America’s research universities play an important role in this process. Universities – with strong financial support from the federal government – account for about 55 percent of all spending on basic scientific research in the U.S.8

Scientific discovery, of course, does not directly drive economic growth. Economic growth occurs only as new knowledge is translated into new technologies, and new products, processes and services – and then into new businesses and new jobs. Since the 1970’s, universities have increasingly become involved in this part of the process as well. In a study for the Information Technology and Innovation Foundation, Fred Block and Matthew Keller note that in 1975, academic institutions accounted for only fifteen of the year’s 100 “most technologically significant new products,” as selected annually by R&D Magazine. But over time, academic institutions’ share of these promising new technologies has increased dramatically; in 2006, academic institutions accounted for 70 of the innovations listed in the R&D 100.9

Research at Johns Hopkins contributes in several ways to the vitality of Maryland’s economy.

- Each year, Johns Hopkins attracts more external (primarily federal) research funding than any other university or academic medical center in the U.S., a substantial part of which is spent in Maryland.

- Research conducted by Johns Hopkins faculty, staff and students expands the boundaries of knowledge in areas that in the years ahead are likely to be continuing sources of innovation and economic growth.

- The “intellectual capital” created by Johns Hopkins researchers provides a foundation for the creation of new products and services, new businesses and new jobs.

- Opportunities to participate in significant research projects enhance the education of Johns Hopkins students – and the ability of the University’s graduates to participate in the continued development of the state’s economy.

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TRENDS IN RESEARCH SPENDING

In 2009-2010, Johns Hopkins spent a total of $2.384 billion on research and related activities – a total that reinforced the University’s position as the nation’s leading research institution. As Figure 15 shows, total research spending at JHU has grown from $1.502 billion in fiscal year 2003 to $2.384 in 2010 – a total increase of about 59 percent, equating to an average increase of about 6.8 percent annually over seven years.

As Figure 16 shows, the Applied Physics Laboratory (APL), located in Laurel, Maryland (and described below) accounted for about 44 percent of all University research and related spending in fiscal year 2010; the School of Medicine accounted for about 29 percent; and all other divisions of the University for 27 percent. The APL was also the fastest-growing part of the University’s research enterprise, with the Lab’s research spending growing by 78 percent between 2003 and 2010, for an average annual increase of about 8.5 percent.
Table 17 shows how research spending at Johns Hopkins compared with spending at some of its peer institutions in 2008 (the last year for which comparable data are available for all institutions).

Table 17: Research spending, top ten institutions*, 2008 ($000s)

<table>
<thead>
<tr>
<th>Rank</th>
<th>School</th>
<th>Research Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Johns Hopkins University</td>
<td>$1,680,927</td>
</tr>
<tr>
<td>2</td>
<td>University of California, San Francisco</td>
<td>$885,182</td>
</tr>
<tr>
<td>3</td>
<td>University of Wisconsin-Madison</td>
<td>$881,777</td>
</tr>
<tr>
<td>4</td>
<td>University of Michigan</td>
<td>$876,390</td>
</tr>
<tr>
<td>5</td>
<td>University of California, Los Angeles</td>
<td>$871,478</td>
</tr>
<tr>
<td>6</td>
<td>University of California, San Diego</td>
<td>$842,027</td>
</tr>
<tr>
<td>7</td>
<td>Duke University</td>
<td>$766,906</td>
</tr>
<tr>
<td>8</td>
<td>University of Washington</td>
<td>$765,135</td>
</tr>
<tr>
<td>9</td>
<td>University of Pennsylvania</td>
<td>$708,244</td>
</tr>
<tr>
<td>10</td>
<td>Ohio State University</td>
<td>$702,592</td>
</tr>
</tbody>
</table>

*Source: National Science Foundation

The lower research spending total for Johns Hopkins shown in Table 17 as compared to Figure 16 reflects both the growth of research spending at Johns Hopkins between FY 2008 and FY 2010, and the fact that the National Science Foundation uses a somewhat narrower definition of research spending in its ranking of universities. The $2.384 billion total for fiscal year 2010 that is cited above includes several types of spending not included in the NSF data, such as research in areas other than science, engineering and medicine, and research-related educational and outreach programs. Under either definition, Johns Hopkins leads all U.S. universities in research spending.

Figure 17 provides a breakdown of research spending in fiscal year 2010 by source of funding. The Department of Health and Human Services was the leading source of funding, accounting for 35 percent of total research spending at Johns Hopkins.
Johns Hopkins is also a major recipient of funding from the Department of Defense, with 34 percent of its research funding coming from that agency in FY 2010. NASA was the source of about 9 percent of the University’s research expenditures in FY 2010, and NSF and other federal agencies accounted for about 11 percent of the University’s research expenditures.

CREATING A FOUNDATION FOR FUTURE ECONOMIC GROWTH

Research conducted at Johns Hopkins can provide a foundation for future growth in some of Maryland’s leading industries. Here we cite just a few examples.

- The Sidney Kimmel Comprehensive Cancer Center, founded in 1973, has been designated by the National Cancer Institute as a “center of excellence,” and is the only NCI-designated comprehensive cancer center in Maryland. It is widely recognized as one of the world’s leading centers of cancer research. The Center conducts basic research in areas such as the biology of cancer, immunology and viral oncology, and applied research on the treatment of a wide range of cancers. It is named for Sidney Kimmel, a leading philanthropist who in 2001 donated $150 million – the single largest gift in Johns Hopkins history – to support its work.

- The Johns Hopkins Engineering in Oncology Center, a joint effort of the Whiting School of Engineering and the School of Medicine supported by the National Cancer Institute, is exploring mechanical forces within the body that affect the growth of tumors.

- The Howard Hopkins Program – a joint program of the Kimmel Center and the Howard University Cancer Center in Washington DC – works to understand and address disparities in the incidence of cancer and in survival rates among minority populations.

- The Johns Hopkins Institute for Cell Engineering, established in 2001 with a gift from an anonymous donor, conducts research aimed at achieving a better understanding of “how cells’ fates are determined,” and using that knowledge to select, modify and mobilize cells for use in treating diseases such as Parkinson’s, ALS and diabetes. Since 2001, Johns Hopkins has emerged as one of the world’s leading centers for research on the therapeutic use of both adult and embryonic stem cells.

- The Institute for NanoBiotechnology (IBNT), established in 2006, brings together researchers from the School of Medicine, the Whiting School of Engineering, the Krieger School of Arts and Sciences, the Bloomberg School of Public Health and the Applied Physics Laboratory both to create new knowledge and develop new technologies at the interface of nanoscience and medicine. IBNT researchers, for example, are developing nanoscale devices that could be used within the body to identify cancer cells, transmit diagnostic information, and directly deliver treatment at the cellular level.

- The Welch Center for Prevention, Epidemiology and Clinical Research, a joint program of the School of Medicine and the School of Public Health, focuses on “promoting the health of the public by generating knowledge required to prevent disease and its consequences.” Current areas of research include epidemiology, lifestyle and behavioral factors, outcomes research and cost-effectiveness, as well as disease-specific research on problems such as obesity and diabetes.

- The Johns Hopkins Institute for Clinical and Translational Research provides a wide range of support services for faculty members and others at Johns Hopkins Medicine who are engaged in clinical research and in other work aimed at moving the findings of laboratory research “from bench to bedside.” The Institute’s services include:
Assistance in recruiting and retaining participants in clinical trials

A clinical research management system

Two-year post-doctoral research fellowships in clinical research

One-year grants of up to $100,000 to jump-start new translational research projects

Johns Hopkins research is not, however, limited to the life sciences and health care. Examples of research in other areas include the following:

- The Laboratory for Computational Sensing and Robotics is an interdisciplinary center engaged in robotics science and engineering research. Recent projects have included collaborating with Woods Hole Oceanographic Institute on development, deployment and operation of a deep-sea robotic vehicle that has been used to explore the deepest parts of the world’s oceans, at depths of more than 35,000 square feet.

- The Johns Hopkins Information Security Institute (ISI) conducts both basic and applied research on problems related to securing cyberspace and the nation’s information infrastructure, covering such areas as information warfare, e-commerce security and electronic voting.

- The ISI’s Center for the Study of Preparedness and Catastrophic Event Response (PACER), located on the Mount Washington campus, was created in 2005 with support from the Department of Homeland Security. The center conducts research on topics such as how emergency response agencies can more effectively harness the power of informal networks, especially when there is a need for “surge capacity.”

- The Advanced Technology Laboratory, located about a mile from the Homewood campus, seeks to foster collaboration among scientists and engineers at JHU and APL, government sponsors and industry in solving a variety of problems. Recent projects have for example included the development of a ceramic coating for a planned NASA solar probe that could protect the spacecraft and its instruments from the intense heat of the sun, and (for DARPA) the development of a ceramic foam for use in building inflatable satellites.

- The Johns Hopkins Microscopy Center, located on the Montgomery County Campus, houses facilities and equipment for advanced microscopy used in a wide range of research applications. These tools are available not only to University researchers, but also to government, corporate and other research partners in the area.

THE JOHNS HOPKINS UNIVERSITY APPLIED PHYSICS LABORATORY (JHU/APL)

The Johns Hopkins University Applied Physics Laboratory (JHU/APL), located in Laurel, Maryland, is one of the largest university-affiliated research centers in the United States – and the largest private employer in Howard County. The Laboratory’s primary mission is to help its sponsors – America’s defense and space agencies – solve critical challenges.

JHU/APL’s history dates back to the Second World War when scientists and engineers at Johns Hopkins developed an electronic proximity fuse that greatly increased the effectiveness of anti-aircraft fire. It was cited as being among the most important innovations in military technology developed during the war. Since then, the Laboratory has continued to play a leading role in the development of new defense technologies, in homeland protection and in space exploration.
Undergraduate research at Johns Hopkins

University research, as noted above, is valuable not only for the knowledge it produces but also for what it can contribute to the educational process. Active participation in faculty research has long been an important part of graduate education in the U.S.; but research experience is increasingly seen as an important part of undergraduate education as well. Substantial involvement in significant research can deepen undergraduates’ understanding of their chosen fields of study – and just as important, provide opportunities for students to get experience and develop their skills in areas such as proposal-writing, project planning and management, investigation and communications.

Johns Hopkins encourages its students to undertake their own research projects, under faculty supervision. In the Whiting School of Engineering, for example, undergraduates can earn up to three credits per semester for research projects approved by a faculty member. The University also provides material support. Through the Provost’s Undergraduate Research Awards (a program launched in 1993), students can obtain grants of up to $2,500 to support their research. Examples of projects completed in 2009-2010 include:

- A study of the relationship between family dynamics and residential mobility in poor neighborhoods in Mobile, Alabama;
- Research into the causes of heart rhythm disorders in patients who suffer from a genetic disease called Brugada Syndrome; and
- A study of the impact of MP3 players on hearing loss.

The JHU/APL 399-acre campus in Laurel, Maryland, includes approximately 2 million square feet of research, operations and support space. In fiscal year 2010 the Laboratory employed nearly 5,000 people at its Laurel campus and generated more than $1 billion in total revenues.

JHU/APL’s work encompasses a wide range of activities – basic and applied scientific research; the development, testing and evaluation of new defense systems; development and management of space missions; strategic analyses and national security policy. Most of the Laboratory’s work is concentrated in several major areas, including:

- Theater air defense and power projection
- Biomedical research and development
- Space science and engineering

- Homeland security
- Information technology and security
- Combat and guided missile systems
- Strategic systems test and evaluation
- Submarine security and survivability

The following examples highlight the diversity of the Laboratory’s work.

- For the U.S. military, JHU/APL is exploring the development of network-enabled air-to-air missile systems. Rather than operating independently, aircraft participating in such a system would work together as nodes on a network, providing greater efficiency and effectiveness in engaging with multiple rapidly moving targets.
• Recently, the Laboratory developed a solution to a global challenge in Mission Burnt Frost, quickly conceiving and executing in six weeks a means to destroy an errant satellite that threatened to impact populated areas and release toxic hydrazine. The long-standing expertise JHU/APL holds in aerodynamics, propulsion, guidance, navigation and control, as well as deep operational understanding of the nation’s defense system play a critical part in this success.

• For many decades, JHU/APL has researched fundamental physics to understand the limits of technologies needed to allow our submarines to operate stealthily and to protect our nations. The Deep Water Active Distributed System, a network of undersea sensors that will improve the Navy’s ability to detect even the quietest submarines, continues the tradition of bringing the best systems developments to the nation’s defense needs.

• JHU/APL is developing a prototype of a Chemical/Biological Distributed Early Warning System. By integrating advanced sensors and surveillance technology with analytic systems and command and control networks, the new system will provide the capability to detect chemical and biological threats at a distance, assess the threat they represent and help users determine how to respond most effectively.

• JHU/APL is a major player in the exploration of space. Since 1958 JHU/APL has designed and built 65 spacecraft, and developed instrumentation used in more than 150. Missions currently being managed by JHU/APL include:
  » MESSENGER, a spacecraft that has flown by the planet Mercury several times and in 2011 will begin orbiting the planet;
  » New Horizons, a mission now under way that is scheduled to reach Pluto in 2015; and
  » STEREO, two spacecraft that provide ongoing, close-up three-dimensional imaging of the sun, allowing scientists to study phenomena such as solar flares in far greater detail than has ever before been possible.

• In 2010, JHU/APL developed a prototype “Cyber Range,” a test bed for the development and testing of new cyber security technologies. JHU/APL is in the forefront of protecting our cyberspace – millions of interconnected computers, servers, routers, switches and cables – that connect our global society supporting critical areas of economy, civil infrastructure, public safety and national security.

• The Revolutionizing Prosthetics project has developed an artificial limb capable of engaging in a full range of complex motions, along with implantable neural devices that will encode and transmit brain signals, thus allowing users to control the prosthesis with their thoughts. These devices also transmit sensory data from the prosthesis to the brain – in effect restoring the user’s sense of touch and his or her ability to control the prosthesis. The project team is led by JHU/APL staff and includes scientists, engineers, designers and other specialists from more than thirty participating organizations from around the world.

HEADQUARTERS FOR A GLOBAL RESEARCH ENTERPRISE

While much of the work associated with the University’s research enterprise is concentrated either in Baltimore or at the Applied Physics Laboratory in Howard County, Johns Hopkins faculty, students and other staff are also engaged in both basic and applied research – and in applying the lessons of their research – in countries around the globe.
Building on its strengths in medicine and public health, Johns Hopkins has become a leader in global health research. According to the University’s Center for Global Health – created in 2006 to coordinate and integrate the global engagement of the schools of Medicine, Nursing and Public Health – as of the fall of 2010 Johns Hopkins faculty, students and staff were engaged in health research projects in 111 countries in the Americas, the Caribbean, Europe, the Middle East, Asia and Oceania.

The challenges the Applied Physics Laboratory staff address have also similarly taken JHU/APL scientists and engineers to multiple locations around the world. For example:

- Field testing of technologies developed by JHU/APL for its DoD clients may be done anywhere in the world – from the Arctic to the Caribbean, and from the Pacific to the Mediterranean.

- JHU/APL scientists and engineers have worked side-by-side with military experts in Iraq and Afghanistan to develop more effective defenses against improvised explosive devices (IED’s).

- At the request of the Department of Defense, JHU/APL is working with Japan’s Maritime Self-Defense Force to improve its capacity to protect its vessels against missile attacks.

Taking into account the full range of research conducted overseas – including health care, international studies, the arts and sciences and work done overseas by the Applied Physics Laboratory – we estimate that in fiscal year 2010 the Johns Hopkins Institutions spent approximately $220 million on research projects and related activities outside the U.S. – about 9 percent of total University research spending. While in an immediate sense this may represent money that is not being spent in Maryland, in the long run the benefits that Maryland derives from the global reach of Johns Hopkins research are considerable. Every year, the work that Johns Hopkins researchers do in and outside the U.S. adds to the institutions’ collective knowledge of conditions and needs in – and helps build relationships with – countries around the world. In an increasingly integrated global economy, that knowledge and those relationships are important assets.

NEW PRODUCTS, NEW BUSINESSES AND NEW JOBS

Research conducted at Johns Hopkins also contributes to the growth of Maryland’s economy through the development of new products, and the creation of new businesses, based on technologies first developed in University labs. This dimension of the Johns Hopkins Institutions’ economic impact is discussed in Part Six of the report.
In addition to being one of Maryland’s largest employers, and its leading center of higher education and research, Johns Hopkins is one of the state’s leading providers of medical care. This part of the report describes the role of Johns Hopkins Medicine in:

- Providing health care services
- Educating the next generation of physicians and other health professionals
- Bringing health services into underserved communities
- Providing health insurance coverage
- Addressing critical public health issues

PROVIDING HEALTH CARE TO MARYLAND RESIDENTS

Johns Hopkins is a major provider of health care services to Maryland residents, through its four major hospitals – The Johns Hopkins Hospital, Johns Hopkins Bayview Medical Center, Howard County General Hospital and Suburban Hospital – and through several other subsidiaries of the Johns Hopkins Health System.

**Hospital inpatient and outpatient services**

*The Johns Hopkins Hospital* provides a wide range of acute care and specialty services to Maryland residents. It is consistently ranked at or near the top among U.S. hospitals in neurology and neurosurgery, cancer care, eye surgery, gynecology, orthopedics, psychiatry, pediatrics, rheumatology, urology, the treatment of diabetes and several other areas. Johns Hopkins is also home to the only state-designated level-1 pediatric trauma center in Maryland.

Of the more than 49,200 inpatients discharged from The Johns Hopkins Hospital in fiscal year 2010, 39,745 – about 81 percent of the total – were residents of the state of Maryland. During the same year, clinics at The Johns Hopkins Hospital handled nearly 716,000 outpatient visits, including 595,370 (about 83 percent of all outpatient visits) that involved Maryland residents. Whether measured by number of patients served or by total patient care revenues, Johns Hopkins is Maryland’s largest hospital.11

Johns Hopkins Bayview Medical Center is similarly a provider of high-quality health care, with particular strengths in geriatric medicine, alcohol and substance abuse, and neonatal intensive care, and serves as Maryland’s only adult burn center. Of the 22,400 inpatients discharged from Bayview Medical Center in 2010, more than 21,100 – 95 percent of the total – were state residents. Bayview also handled nearly 379,000 outpatient visits – about 96 percent of which involved residents of Maryland.

Howard County General Hospital, the county’s only acute care hospital, provides comprehensive inpatient and outpatient care to residents of Howard County and surrounding communities, with particular strengths in women’s and children’s health, emergency care, cardiology, cancer care and several other areas. Of the 18,900 inpatients discharged from Howard County General Hospital in 2010, nearly 18,500 – 98 percent of the total – were state residents. Howard County General also handled about 109,500 outpatient visits – about 97 percent of which involved residents of Maryland.

Suburban Hospital similarly provides both inpatient and outpatient care for residents of Montgomery County and surrounding areas, with strengths in cardiology, cancer care, orthopedics and other areas. Of the 13,700 inpatients discharged from Suburban Hospital in 2010, about 12,400 – 91 percent of the total – were Maryland residents. Suburban also handled about 140,000 outpatient visits – about 81 percent of which involved residents of Maryland.

In November 2010, JHHS added another institution to its network – Sibley Hospital, a 328-bed acute care facility in Washington, D.C. Because this acquisition occurred after the end of fiscal year 2010, Sibley is not included in our analysis of the Johns Hopkins Institutions’ economic impact.

Table 18 summarizes the four hospitals’ inpatient discharges and outpatient visits in fiscal year 2010.

In addition to the institutions that are part of the JHHS network, Johns Hopkins owns a 50 percent interest in Mount Washington Pediatric Hospital in Baltimore, which is governed by a board that includes representatives of Johns Hopkins and the facility’s other co-owner, the University of Maryland Medical System. In FY 2009, the 102-bed hospital provided 23,122 inpatient days of service and 29,559 outpatient visits. Johns Hopkins Medicine also maintains affiliations with two other non-JHHS institutions – the Greater Baltimore Medical System and the Anne Arundel Medical Center.

Johns Hopkins estimates that in fiscal year 2010, the cost of health care that was provided to Maryland residents who lack health insurance (or otherwise lack the resources needed to pay for health care) by the four hospitals, and for which the hospitals were not compensated, totaled $128.6 million – about 79 percent of all uncompensated care provided by the four hospitals.

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Inpatient discharges</th>
<th>% Maryland residents</th>
<th>Outpatient visits</th>
<th>% Maryland residents</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Johns Hopkins Hospital</td>
<td>49,185</td>
<td>81%</td>
<td>715,856</td>
<td>83%</td>
</tr>
<tr>
<td>Bayview Medical Center</td>
<td>22,365</td>
<td>95%</td>
<td>378,887</td>
<td>96%</td>
</tr>
<tr>
<td>Howard County General Hospital</td>
<td>18,916</td>
<td>98%</td>
<td>109,511</td>
<td>97%</td>
</tr>
<tr>
<td>Suburban Hospital</td>
<td>13,696</td>
<td>91%</td>
<td>139,866</td>
<td>81%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>104,162</strong></td>
<td><strong>88%</strong></td>
<td><strong>1,344,120</strong></td>
<td><strong>88%</strong></td>
</tr>
</tbody>
</table>
Johns Hopkins also operates the Bayview Care Center, a 276-bed long-term care facility located on the Bayview campus in Baltimore. The Care Center offers chronic care, rehabilitation services, specialized wound therapy and palliative care; and serves as the principal site for teaching and research in geriatric medicine at Johns Hopkins. Maryland residents account for about 94 percent of all those served at the Bayview Care Center.

Primary care and home care services

Hospital-based inpatient and outpatient services are not the only means through which Johns Hopkins Medicine provides health care to Baltimore residents. Johns Hopkins Community Physicians – a subsidiary of the Johns Hopkins Health System – operates primary care centers in 26 locations around the state. In fiscal year 2010, these centers handled more than 400,000 patient visits.
In addition to services provided in hospital outpatient clinics or at JHCP’s primary care centers, School of Medicine faculty members also provide services to state residents through the Johns Hopkins Clinical Practice Association – an organization that provides administrative support and billing services for Johns Hopkins faculty physicians. During fiscal year 2010, the Clinical Practice Association billed for more than 177,000 patient encounters that took place outside the four hospitals.

In fiscal year 2010, the four hospitals’ outpatient clinics, JHCP’s primary care centers and Johns Hopkins faculty physicians together handled approximately 1.75 million visits involving residents of Maryland.

Johns Hopkins is also a major provider of home care in Maryland. Johns Hopkins Home Care provides a range of in-home health services – including skilled nursing and home health aide services, physical therapy and the provision of medication and medical equipment in Baltimore and the six-county Greater Baltimore area. They also provided a more limited range of services in six other Maryland counties. In fiscal year 2010, JHHC served nearly 36,600 Maryland residents.

EDUCATING PHYSICIANS, NURSES AND OTHER HEALTH CARE PROFESSIONALS

Maryland also benefits from Johns Hopkins Medicine’s role in the education of medical professionals. During the fall of 2009, 1,378 students were enrolled in the Johns Hopkins School of Medicine, including 382 who were residents of Maryland.

In the fall of 2009, the School of Medicine introduced a new curriculum called Genes to Society, designed to provide students with a better understanding of all of the factors that can affect an individual patient’s health and well-being, from genetic, molecular and cellular levels to family, community, societal and environmental factors. The new curriculum also represents a break from the past in that students get to interact with patients in a variety of settings from their very first days at JHSOM, rather than having to wait until their third year as most medical schools in the country prescribe.

In 2010, 1,684 graduates of the Johns Hopkins School of Medicine – about 22 percent of all School of Medicine alumni – lived in the state of Maryland.

The state also benefits from Johns Hopkins Medicine’s role in graduate medical education. In 2009-2010, 786 residents were enrolled in graduate medical education at Hopkins, including 728 who worked at Johns Hopkins Hospital and 58 at Bayview. Residents represent a valuable addition to Maryland’s physician workforce – one that only a major academic medical center can provide.

Johns Hopkins also contributes to the ongoing development of Maryland’s physician workforce through its continuing medical education (CME) programs. These programs seek to help medical professionals develop their skills and provide better outcomes for their patients by providing the most up-to-date information in a variety of formats, including intensive, on-site short courses, on-line courses and grand rounds. In fiscal year 2010, the School of Medicine offered a total of 864 CME programs and events, with enrollment totaling 62,658.

The Johns Hopkins School of Nursing also contributes to the development of the state’s health care work force. In the fall of 2009, 360 students were enrolled in undergraduate degree programs in the School of Nursing, of whom 144 were Maryland residents; and 339 students were enrolled in graduate degree programs, of whom 249 were Maryland residents. And as with the School of Medicine, some of those who graduate from the School of Nursing continue to work in Maryland after graduation.
The Institute for Johns Hopkins Nursing – a partnership between the School of Nursing and The Johns Hopkins Hospital – is also a major provider of continuing education for nurses in Maryland and from other states. Advanced training for nurses is offered in a variety of formats, including one-day workshops, week-long courses, on-line programs and clinical experience at The Johns Hopkins Hospital.

The Bloomberg School of Public Health – one of America’s leading schools of public health – enrolled 2,056 graduate students in the fall of 2009, including 382 Baltimore residents. The Bloomberg School has initiated a number of programs specifically aimed at meeting the public health needs of communities in Baltimore; several of these are described below.

In addition to the role that Johns Hopkins University plays in training Baltimore’s health care workforce, the institutions of the Johns Hopkins Health System play an important role as sites for clinical training of students enrolled in nursing and allied health programs at other institutions in the Baltimore area. The Johns Hopkins Hospital is also home to a leading training program for training medical imaging technologists (described below).

**MEETING COMMUNITY NEEDS**

Even as it has grown into a major global health care institution, Johns Hopkins Medicine remains strongly committed to the communities where it operates. That commitment takes several forms.

- **East Baltimore Medical Center**, which first opened in 1975, is (as noted above) one of 26 primary care centers operated by Johns Hopkins Community Physicians. EBMC provides comprehensive health care services to residents of East Baltimore. For fiscal year 2010, EBMC provided more than 70,000 patient visits – making it the busiest primary care facility in the JHCP network.
• The School of Nursing operates Community Nursing Centers at three locations in East Baltimore. These centers are staffed by undergraduate and graduate student nurses and clinical faculty, and by other Johns Hopkins physicians and nurses who work on a volunteer basis.

  » The Lillian Wald Community Nursing Center, which provides a variety of health care and wellness services to neighborhood residents, located at the Rutland Center;

  » The Isaiah Wellness Center, which provides health education programs for the elderly residents of Apostolic Towers; and

  » The health suite at the House of Ruth, a shelter for victims of domestic violence and their children.

• The Harriet Lane Clinic at The Johns Hopkins Hospital is both a center for teaching and research in pediatrics and a major provider of primary care and wraparound services to children and adolescents in East Baltimore and surrounding communities. The Clinic cared for more than 8,000 children in 2009-10, with a total of more than 20,000 patient visits.

• The John Hopkins Hospital’s Case Management Unit in Community Psychiatry provides intensive case management services for Medicaid recipients in Baltimore age 16 and older who suffer from serious mental illness.

• In 2009, Johns Hopkins Medicine launched The Access Partnership (TAP), a new initiative that aims to improve uninsured or under-insured neighborhood residents’ access to the full range of specialty care that is available at Johns Hopkins and Bayview. The program is currently open to residents of five ZIP codes near the East Baltimore and Bayview campuses. Because participating Hopkins specialists donate their services, TAP is able to minimize the cost of these services to uninsured neighborhood residents. Eligible patients who are referred by their primary care physicians to specialists at Hopkins pay a one-time fee of $20.00; there are no other charges for any services provided as a result of the referral.

• ElderPlus, a service of Johns Hopkins Bayview Medical Center, is a comprehensive program aimed at supporting elderly residents of a sixteen-ZIP-Code area in Baltimore who qualify medically for nursing home care but would prefer to keep living in the community. The program provides physician services, nursing care, home aide services, medications and medical equipment, rehabilitative services, a day program, transportation, social work and other services, delivered in accord with individual care plans that are prepared for each participant.

• Howard County General Hospital offers a wide range of wellness programs for County residents at its Wellness Center, and at other locations throughout the community. Those services include pre-pregnancy classes and cancer support groups at the Wellness Center, blood pressure screenings at senior centers and quarterly health clinics held at The Mall at Columbia, focusing on areas such as cardiovascular health, children’s health and cancer detection. In 2009, these and other community programs served about 40,000 people.

• Through its HeartWell program, Suburban Hospital’s Community Health and Wellness Department conducts free heart health clinics several days each week at senior centers in Montgomery County. At Suburban’s heart clinic, volunteers from Suburban and from NIH also provide uninsured patients with access to cardiologists, diagnostic tests and even heart surgery.
Each year, hospitals in Maryland submit to the state an accounting of the unreimbursed costs they incur in providing a specified set of services to their communities.\textsuperscript{12}

As Table 19 shows, JHHS estimates that the unreimbursed cost incurred by the four institutions in providing these services in fiscal year 2010 totaled about $219.4 million, including more than $66 million in charity care, $94 million for education of health professionals and nearly $44 million for community and mission-driven health care.

\textsuperscript{12} The categories of service identified by the Health Services Cost Review Commission are:

1. \textit{Community health services}, such as health screenings, mobile health services and wellness education programs provided at no or low cost;
2. \textit{Health professions education}, such clinical training of medical and nursing students, scholarships and school partnerships;
3. \textit{Mission-driven health services} – neighborhood health centers or clinics that operate primarily as a service to the community, and that are part of the hospital's ongoing operations;
4. \textit{Research}, including community-based and clinical research on problems affecting the health of the community, and research on innovations in health care delivery;
5. \textit{Financial contributions}, in-kind support for and grants to community organizations;
6. \textit{Community-building} – cash or in-kind support for affordable housing, economic development, job training for local residents and other community improvement projects;
7. \textit{Community benefit operations}, including the cost of managing and administering community programs;
8. \textit{Charity care} – regular inpatient or outpatient care provided free or at a substantial discount to indigent or low-income people.
PROVIDING HEALTH CARE COVERAGE FOR MARYLAND RESIDENTS

As noted in Part One, Johns Hopkins HealthCare LLC (JHHC) – a joint venture of the School of Medicine and the Johns Hopkins Health System created in 1995 – manages three health care plans.

- **Priority Partners Managed Care Organization** provides health care for recipients of Medicaid and other publicly funded health care programs in Maryland.

- **Johns Hopkins Employer Health Programs** provides health care for employees of the Johns Hopkins Health System and several partner institutions.

- **Johns Hopkins U.S. Family Health Plan** provides health care to military families living in Maryland and in adjoining areas in several other states.

JHHC provides a variety of services for these plans, including member outreach and enrollment, ongoing development of provider networks, management of both provider and customer relations, and claims processing.

JHHC also provides a range of health care management services for members. These range from information and assistance to members who want to adopt healthier lifestyles to individualized case management for members with chronic health conditions such as diabetes or shorter-term issues such as a high-risk pregnancy.

At the end of fiscal year 2010, enrollment in JHHC’s three plans totaled 262,246 – including 233,725 members who were residents of Maryland. Overall, in 2010 about 4.0 percent of all Maryland residents were members of a JHHC health plan. As Figure 20 shows, Priority Partners accounted for about 77 of the three plans’ membership in Maryland.

PUBLIC HEALTH: IMPROVING HEALTH AND WELL-BEING AT THE COMMUNITY LEVEL

Improving Baltimore’s health means focusing not just on the needs of individual residents, but on broader issues that affect the health and well-being of entire communities. At Johns Hopkins, the Bloomberg School of
The Economic Impact of Johns Hopkins in Maryland

Public Health is deeply involved in efforts to address these issues. We cite here just a few examples.

- The Center for Adolescent Health – one of 33 prevention research centers nationwide that are funded by the Centers for Disease Control – seeks to help young people in Baltimore develop into healthy and productive adults. The center conducts research on topics such as youth violence and substance abuse, and works with local partners such as Casey Family Services and the Julie Community Center to develop and test strategies for improving the lives of inner-city youth.

- The Center on Aging and Health conducts research that aims to prevent disease, disability and frailty among older adults, and improve their health and well-being. Research topics range from the biology of aging to public policies affecting older adults. The center is also co-sponsor of the Baltimore Experience Corps – a program that seeks to mobilize the energy and experience of older Baltimore residents to address the needs of children in inner-city elementary schools. In 2007-2008, 325 Experience Corps volunteers worked in nineteen Baltimore schools.

- The Lighthouse Center at Peer Point, located in East Baltimore, collaborates with local agencies and community groups on research and pilot projects aimed at improving the health of local residents. For example, the center's STEP program trains community residents to work as health educators, with a particular focus on HIV/AIDS prevention; and its B-Quest program is working with several city agencies to improve emergency response capabilities in Baltimore.

- The Center for a Livable Future was founded on the idea that human health and nutrition, food production and distribution, environmental protection and social equity are all inseparable aspects of a single system. Its work encompasses research, education and community action. In 2009, for example, the Center conducted a “community food assessment” in Southwest Baltimore, mapping how and where neighborhood residents buy food, and developing strategies for improving residents’ access to healthier food. The center also worked with African-American churches in Baltimore to promote healthier eating among members of their congregations.

HEALTH CARE AS AN INTERNATIONAL BUSINESS

Health care has long been viewed as essentially a local service. Hospitals and physicians in Baltimore cared for residents of Baltimore, those in Boston cared for Bostonians, those in Singapore cared for residents of Singapore – and health care providers competed only within narrowly defined local markets. But today, while most services are still delivered locally, health care is increasingly a global business – a trend that presents significant opportunities both for Johns Hopkins and for Maryland.

Johns Hopkins Medicine attracts patients to Maryland from around the world. In fiscal year 2010, the four Johns Hopkins hospitals provided inpatient care to 890 patients from outside the U.S., and handled more than 14,200 outpatient visits involving non-U.S. patients. Services provided to non-U.S. patients generated about $33.6 million in revenues in fiscal year 2010.

Johns Hopkins International – a for-profit joint venture of the University and the Johns Hopkins Health System, founded in 1999 – manages all aspects of international patients’ engagement with Johns Hopkins, from initial referral and consultations to arranging transportation, making hotel reservations for family members and monitoring follow-up care. (Johns Hopkins International also provides similar services to patients coming...
to Baltimore from elsewhere in the U.S.) The company also has a growing business in the provision of remote second opinions, with patient records transmitted to Baltimore and Hopkins physicians providing comments in writing, by telephone or via videoconference.

Johns Hopkins International also provides management and consulting services to health care institutions and organizations overseas. In 2010, Johns Hopkins International managed five hospitals overseas: The Johns Hopkins Singapore International Medical Center in Singapore, Punta Pacifica Hospital in Panama, and three hospitals in the United Arab Emirates. Johns Hopkins International also provided consulting and educational support to hospitals and other health care organizations in Canada, Mexico, Trinidad, Italy, Portugal, Turkey and Lebanon. More than 350 Johns Hopkins faculty members and other professionals participated in Johns Hopkins International’s consulting services during the course of the year.

In 2010, Johns Hopkins International employed 200 people (150 in Baltimore and 50 overseas) and generated more than $200 million in total revenues (including patient care revenues passed through to The Johns Hopkins Hospital, Bayview and other Johns Hopkins institutions).

The Johns Hopkins Institutions’ engagement in the delivery of health care overseas is not limited to its involvement in the management of major institutions. Founded in 1973 as the Johns Hopkins Program for International Education in Gynecology and Obstetrics, Jhpiego (pronounced je-pie-go) is a non-profit organization affiliated with Johns Hopkins that is dedicated to improving the delivery of health care services to women and their families in low-income communities worldwide.

From its headquarters in Baltimore’s Fells Point neighborhood and field offices in 26 countries, Jhpiego oversees projects in more than fifty countries in Africa, Asia, the Middle East, the Caribbean and Latin America, as well as the U.S. Jhpiego conducts research on and designs low-cost, practical solutions to health problems that affect some of the most vulnerable communities in these countries and works to get these solutions into the hands of frontline health workers. Areas in which it is particularly active include maternal and child health, reproductive health, and the prevention and treatment of HIV/AIDS, malaria and cervical cancer.

Jhpiego’s operating budget has increased rapidly during the past decade, growing from $39.5 million in 2003 to $105.5 million in 2010. In 2003 the organization employed 198 people; in 2010, it employed a total of 795, including 165 in its Baltimore headquarters, 18 elsewhere in Maryland and D.C. and 612 in offices and at project sites around the world.

A CORNERSTONE OF MARYLAND’S ECONOMY

Health care is one of Maryland’s leading industries, and one of its largest employers. But high-quality health care and public health programs are important to the state’s economy in other ways as well. Much like improvements in education and the expansion of educational opportunity, improving the health of Maryland’s people enhances the quality of the state’s human capital and the overall productivity of its economy. High-quality health care also enhances the overall quality of life in Maryland’s communities – and thus helps make them more attractive to the highly skilled workers on whom the state’s future depends.
The Economic Impact of Johns Hopkins in Maryland
One of the most critical factors affecting a university’s impact on a community’s or a state’s economy is how effectively the university, local entrepreneurs, and the broader community support the translation of new knowledge into new products, new businesses, and new jobs.

Although it is widely acknowledged to be one of the world’s great research institutions, Johns Hopkins has in the past had a reputation for being less interested than some of its peers in practical or commercial applications of the results of its research. During the past decade, however, Johns Hopkins has significantly increased its support for efforts aimed at moving the results of University research from the lab to the marketplace – or, in the case of biomedical research, “from bench to bedside.”

Johns Hopkins Technology Transfer – the office that manages the process of commercializing University research – has increased its staff, and expanded the range of services it provides. Outreach to faculty and other researchers has been expanded, and JHTT has offered a number of programs for those interested in exploring the creation of new ventures – such as an “Entrepreneur’s Boot Camp” that drew 200 participants. The Applied Physics Laboratory’s Technology Transfer Office provides similar services relating to the commercial use of technologies developed at APL.

TECHNOLOGY TRANSFER

The most formal way in which the University promotes the translation of its research into new products and businesses is by securing patents on the results of its research, and then entering into licensing agreements with private companies for commercial use of its “intellectual property.”

As Table 20 shows, the pace of technology transfer activity at Johns Hopkins (including the Applied Physics Laboratory) increased between 2003 and 2010. The number of invention disclosures faculty members and other researchers filed with Johns Hopkins Technology Transfer rose by 47 percent, the number of patent applications filed rose by 47 percent, and the number of licensing and option agreements completed rose by 46 percent.

In fiscal year 2010, Johns Hopkins (including APL):

- Reported the disclosure of 482 inventions by faculty members and other researchers;
- Filed 461 new U.S. patent applications;
- Was awarded 65 new U.S. patents;
- Entered into 140 new license and option agreements with private companies and institutions for use of Johns Hopkins intellectual property; and
• Assisted in the creation of 5 new companies started specifically to bring to the marketplace technologies initially developed at Johns Hopkins.

As a result of the growth of technology transfer activity, as of 2009 there were more than 300 products on the market based on technologies developed at Johns Hopkins and APL, including diagnostic and therapeutic products, medical devices, software, defense electronics and other products.

STARTING NEW BUSINESSES IN MARYLAND

As Table 20 shows, 37 start-up companies have been created during the past eight years to bring to market technologies initially developed at Johns Hopkins. Several of these companies – as well as others started prior to 2002 – are located in Maryland. For example:

• **Biofortis, Inc.**, founded in 2002, is a biomedical informatics company, based in Columbia, that provides systems for use both in life sciences research and in the management of clinical data.

• **Corridor Pharmaceuticals** (formerly Arginetix) is engaged in the development of small-molecule inhibitors of arginase and serotonin, for use in treating vascular diseases. The company, which was founded in 2007 based on technologies licensed from Johns Hopkins and the University of Pennsylvania, is based in Lutherville.

• **Dot 21 Real-Time Systems** is a defense electronics firm that was founded in 1999 to bring to market technology first developed at APL. The company, which is based in Columbia, develops systems for processing and displaying data from radar signals.

• **FASgen, LLC**, formed in 1999 by four Hopkins researchers, James D. Dick, Frank P. Kuhadja, Albert H. Owens Jr., and Craig A. Townsend, to access diagnostic and therapeutic technologies targeting the role of fatty acid biosynthesis in health and disease. FASgen primarily develops therapeutic applications for cancer, infectious diseases and metabolic disorders.

• **Fyodor Biotechnologies Corporation** specializes in biotechnology and biopharmaceutical products that diagnose and treat malaria. Fyodor Biotechnologies recently acquired an exclusive license with Johns Hopkins to administer a urine-based malaria test that will be useful in emerging economies. Fyodor was founded by Johns Hopkins scientists Dr. Atul Bedi and Dr. Rajani Ravi.

• Baltimore-based **IATRICA, Inc.**, founded in 2007, is a biotechnology company that is engaged in the development of an exclusive new class of biological molecules for prophylaxis and targeted immunotherapy of cancers and infectious diseases. IATRICA’s technology platform enables the creation of a diverse spectrum of immunoconjugates that are capable
of activating potent targeted immune responses against various tumors or pathogens.

- **Sensics, Inc.** a company that develops head-mounted virtual reality displays, was founded in 2003 by Larry Brown, a Ph.D. graduate of Johns Hopkins, using technology licensed from APL. The company is located in Columbia.

- **Simmersion LLC**, founded in 2002, develops human simulation models and devices that indicate detection deception. Dr. Dale Olsen developed many of the technologies while working for the APL in the 1990s.

- **Surgi-Vision, Inc.**, founded in 1998, is an emerging technology company that develops and markets novel imaging products based on research conducted at Johns Hopkins. Surgi-Vision develops sighting and visualization systems, such as MRI coils, that allow magnified stereoscopic vision for minimally invasive surgical procedures, such as heart, blood vessel and esophageal imaging.

The role of Johns Hopkins in the development of new businesses in Maryland is not limited to companies that have formal licensing agreements with the University or with APL. Other companies started by Johns Hopkins faculty members, other researchers and students have also contributed to the development of new businesses in the state. For example:

- **Biomarker Strategies**, founded in 2006, is developing a platform for rapid, automated testing of live tumor biopsy samples. The Baltimore-based company’s chairman and chief science officer is a professor at the Johns Hopkins School of Medicine. The company is located in the Science + Technology Park at Johns Hopkins, adjacent to the East Baltimore campus.

- **CellOptic, Inc.**, a company engaged in the development of 3D bio-imaging systems, was co-founded by Gary Brooker, a professor at the Whiting School of engineering. The company is located in Rockville.

- **Exceptional Software Strategies**, founded in 1996, is an information technology services company based in Linthicum. The company’s co-founder is a graduate of Johns Hopkins.

- **Infinite Biomedical Technologies**, founded in 1997 by Johns Hopkins researchers, makes bedside patient monitoring devices.

- **Intelligent Substrates, Inc.**, founded in 2007, is developing next-generation tools for in vitro cell culture. The company’s founder is a Johns Hopkins graduate and faculty member.

- **Lentigen**, based in Gaithersburg, is developing ways to treat a variety of diseases by using lentiviral vectors to reprogram cells, through the targeted delivery of new genetic information. The company was founded by a former School of Medicine faculty member with a Johns Hopkins MBA.

- **Pangia Technologies**, located in Fulton, provides software and information technology services to U.S. intelligence and national security agencies, and to commercial customers. Pangia was founded in 1999 by two Johns Hopkins engineering graduates.

- **Therataxis**, co-founded in 2004 by a former Johns Hopkins faculty member, develops brain imaging and simulation software for use in both surgical and pharmaceutical treatment of a variety of brain conditions.

- **Vision Multimedia Technologies** founded in 1998, provides technology consulting for a wide range of clients, such as hospitals, manufacturers, retailers and universities. Brian Razzaque, the founder and CEO, is an alumnus and former teaching assistant at Hopkins. The firm employs 12 people.
Table 21:  
Selected Maryland-based companies founded by Hopkins University alumni or faculty, or licensing Hopkins technology

<table>
<thead>
<tr>
<th>Company</th>
<th>Location</th>
<th>Relationship</th>
<th>Number of employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexander &amp; Tom, Inc.</td>
<td>Baltimore</td>
<td>Founder is a JH alum</td>
<td>12</td>
</tr>
<tr>
<td>Arcion Therapeutics</td>
<td>Baltimore</td>
<td>Founder and CEO is JHSOM faculty</td>
<td>3</td>
</tr>
<tr>
<td>Applied Imagery LLC</td>
<td>Silver Spring</td>
<td>Licensed APL technology</td>
<td>8</td>
</tr>
<tr>
<td>Bamvet Laboratories</td>
<td>Baltimore</td>
<td>Licensed JH technology</td>
<td>2</td>
</tr>
<tr>
<td>Biodefense Research Group</td>
<td>Columbia</td>
<td>Licensed APL technology</td>
<td>n/a</td>
</tr>
<tr>
<td>BioFortis</td>
<td>Columbia</td>
<td>Licensed JH technology</td>
<td>n/a</td>
</tr>
<tr>
<td>Brassica Protection Products LLC</td>
<td>Baltimore</td>
<td>Co-founded by JH faculty</td>
<td>5</td>
</tr>
<tr>
<td>Brijen Biotech LLC</td>
<td>Baltimore</td>
<td>Co-founders are JHSOM faculty</td>
<td>2</td>
</tr>
<tr>
<td>Cangen Biotechnologies</td>
<td>Baltimore</td>
<td>Founder is a JH faculty member and alum</td>
<td>n/a</td>
</tr>
<tr>
<td>Cangene bioPharma</td>
<td>Baltimore, Frederick</td>
<td>Acquired Chesapeake Biological Laboratories whose co-founder was a researcher at JH</td>
<td>120</td>
</tr>
<tr>
<td>Canton Group</td>
<td>Baltimore</td>
<td>Co-founder is a JH alum</td>
<td>20</td>
</tr>
<tr>
<td>CellOptic, Inc.</td>
<td>Rockville</td>
<td>Co-founder is a JH faculty member</td>
<td>n/a</td>
</tr>
<tr>
<td>CervoCheck</td>
<td>Baltimore</td>
<td>Founders are JH students</td>
<td>n/a</td>
</tr>
<tr>
<td>Circulomics</td>
<td>Baltimore</td>
<td>Founder is a JH alum</td>
<td>1</td>
</tr>
<tr>
<td>Champions Biotechnology</td>
<td>Baltimore</td>
<td>JH faculty</td>
<td>11</td>
</tr>
<tr>
<td>cmdLabs</td>
<td>Baltimore</td>
<td>Founder is a JH instructor</td>
<td>10</td>
</tr>
<tr>
<td>Corridor Pharmaceuticals</td>
<td>Lutherville</td>
<td>Licensed JH technology</td>
<td>12</td>
</tr>
<tr>
<td>Dot 21 Real-Time Systems</td>
<td>Columbia</td>
<td>Licensed APL technology</td>
<td>n/a</td>
</tr>
<tr>
<td>Eisai, Inc.</td>
<td>Baltimore</td>
<td>Originally Guilford Pharmaceuticals, founded by a JH faculty member</td>
<td>289</td>
</tr>
<tr>
<td>Emagination Network LLC</td>
<td>Baltimore</td>
<td>CEO is a JH alum</td>
<td>10</td>
</tr>
<tr>
<td>Exceptional Software Strategies</td>
<td>Linthicum</td>
<td>Co-founder is a JH alum</td>
<td>125</td>
</tr>
<tr>
<td>FASgen, LLC</td>
<td>Baltimore</td>
<td>Researchers are JH alumni</td>
<td>n/a</td>
</tr>
<tr>
<td>Fyodor Biotechnologies</td>
<td>Baltimore</td>
<td>Founder a JH research fellow, licensed JHU technology</td>
<td>4</td>
</tr>
<tr>
<td>IATRIca</td>
<td>Baltimore</td>
<td>Licensed JH technology</td>
<td>2</td>
</tr>
<tr>
<td>Intelligent Substrates Inc.</td>
<td>Baltimore</td>
<td>Founded by JH faculty</td>
<td>2</td>
</tr>
<tr>
<td>Lentigen Corporation</td>
<td>Gaithersburg</td>
<td>Founder is a former JH faculty/alum</td>
<td>n/a</td>
</tr>
<tr>
<td>Oak Clinical Systems</td>
<td>Baltimore</td>
<td>Licensed JH technology</td>
<td>2</td>
</tr>
<tr>
<td>Pangia Technologies</td>
<td>Fulton</td>
<td>Co-founders are JH alums</td>
<td>95</td>
</tr>
<tr>
<td>PCI Strategic Management</td>
<td>Columbia</td>
<td>Co-founder is a JH alum</td>
<td>90</td>
</tr>
<tr>
<td>Phillips Visicu</td>
<td>Baltimore</td>
<td>Co-founders/key leaders were/on JHSOM faculty</td>
<td>70</td>
</tr>
<tr>
<td>Quantum Medical Metrics</td>
<td>Arbutus</td>
<td>Licensed JH/APL technology; co-founder is a JH faculty member</td>
<td>4</td>
</tr>
<tr>
<td>Company</td>
<td>Location</td>
<td>Relationship</td>
<td>Number of employees</td>
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<td>-----------------------------</td>
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<td>---------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Seguro Surgical</td>
<td>Columbia</td>
<td>JH technology</td>
<td>n/a</td>
</tr>
<tr>
<td>Sensics, Inc.</td>
<td>Columbia</td>
<td>APL technology; founder is a former APL researcher</td>
<td>7</td>
</tr>
<tr>
<td>Sensing Machines</td>
<td>Baltimore</td>
<td>Founder is a JH alum and current PhD student</td>
<td>2</td>
</tr>
<tr>
<td>Shimadzu Scientific Instruments</td>
<td>Baltimore</td>
<td>Partner with JH to develop new technologies</td>
<td>20</td>
</tr>
<tr>
<td>SLMmersion LLC</td>
<td>Columbia</td>
<td>APL technology; founder is a former APL researcher</td>
<td>18</td>
</tr>
<tr>
<td>SmartLogic Solutions</td>
<td>Baltimore</td>
<td>Co-founders are JH alumni</td>
<td>9</td>
</tr>
<tr>
<td>Spectrum Bioscience</td>
<td>Baltimore</td>
<td>President/CEO is a JH faculty member and alum</td>
<td>2</td>
</tr>
<tr>
<td>Sun Automation</td>
<td>Baltimore</td>
<td>Founded by a JH alum</td>
<td>100</td>
</tr>
<tr>
<td>Syntonics</td>
<td>Columbia</td>
<td>Licensed APL technology</td>
<td>12</td>
</tr>
<tr>
<td>Therataxis</td>
<td>Baltimore</td>
<td>President was a JH faculty member</td>
<td>3</td>
</tr>
<tr>
<td>Tutela Industries</td>
<td>Clarksville</td>
<td>In the process of licensing APL technology</td>
<td>2</td>
</tr>
<tr>
<td>Vision Multimedia Technologies LLC</td>
<td>Baltimore</td>
<td>Founder is a JH alum</td>
<td>15</td>
</tr>
<tr>
<td>Vision Technologies</td>
<td>Glen Burnie</td>
<td>Founder/CEO is a JH alum</td>
<td>325</td>
</tr>
</tbody>
</table>

In several cases, businesses started by Johns Hopkins faculty members or other researchers have since been acquired by larger companies, but still have a significant presence in Maryland. For example:

- Chesapeake Biological Laboratories was co-founded in 1980 by Dr. William Tew, based in part on research he had conducted at the School of Medicine, and during the next twenty years grew into a substantial contract manufacturing firm serving pharmaceutical and other life sciences companies. CBL was acquired in 2001 by Cangene Corporation and, in 2009, was renamed Cangene bioPharma; it has kept its operations in Baltimore.

- Dr. Craig Smith of the Johns Hopkins School of Medicine co-founded Guilford Pharmaceuticals in 1993 to develop innovative treatments for brain cancer and other neurological disorders. The company was acquired by Minnesota-based MGI Products in 2005; and MGI was in turn acquired in 2009 by Eisai, Inc., the U.S. arm of a major Japanese pharmaceutical firm, which has kept the company’s operations in Baltimore.

- Baltimore-based Visicu was founded in 1998 by Dr. Brian Rosenfeld and Michael Breslow, intensive care specialists at Johns Hopkins, who developed a patented model for remote management of intensive care units (eICU). Visicu was acquired by Philips Electronics in 2008 and renamed Philips Visicu, and has remained as one of the largest bioinformatics companies in the Baltimore area.

A partial listing of Maryland-based companies that licensed Johns Hopkins technology, or were founded by Johns Hopkins faculty, students or graduates, is shown in Table 21.
LAYING THE GROUNDWORK FOR FUTURE INNOVATION

Johns Hopkins is also laying the groundwork for future economic growth in Maryland by helping to prepare the next generation of innovators and entrepreneurs. The Carey School’s new Global MBA program, described in Part Three, includes a continuing focus on entrepreneurial development.

Other programs as well help students develop the knowledge, skills and experience they will need to create new businesses. The Center for Leadership Education houses the W.P. Carey Program in Entrepreneurship & Management, which offers a minor in entrepreneurship that is open to undergraduate students throughout the University.

The center also oversees Hopkins Student Enterprises, a program that helps students gain valuable hands-on experience as entrepreneurs by starting and managing new on-campus businesses, and the Johns Hopkins Business Plan Competition, which helps teams of students develop and then showcase ideas for new products and businesses. Winners of the 2010 competition included two ventures developed by students in the University’s biomedical innovation and design program:

- **Cortical Concepts**, started by a team of students who developed an anchor that can more effectively hold screws used in spinal surgery – a potentially valuable device in the treatment of patients suffering from osteoporosis, whose bones may be too brittle for conventional surgical screws.

- **CervoCheck LLC** has developed a device that can detect early signs of the onset of pre-term labor, allowing women and their physicians to take steps to avert premature birth.

PROVIDING SPACE FOR NEW AND GROWING COMPANIES

In addition to providing the intellectual and human capital that drives Maryland’s innovation economy, Johns Hopkins is also helping to develop the physical capital needed to accommodate its growth.

**Space for emerging technology companies**

Through a partnership with Johns Hopkins, the Baltimore Development Corporation makes space available for start-up businesses at its [Emerging Technology Center @ Johns Hopkins Eastern](#). One of two such centers created by BDC (the other is in Canton), the 45,000 square-foot ETC is located at 1101 East 33rd Street. The recently renovated building was formerly Eastern High School. Now owned by Johns Hopkins, it is located just a few blocks east of the University’s Homewood campus.

The ETC @ JH Eastern is designed to provide flexible space and a variety of supportive services to technology start-up companies, particularly those with roots at Johns Hopkins and other local universities. Companies...
listed in Table 21 that are (or in the past have been) ETC tenants include CervoCheck, cmd Labs, Smart Logic Solutions, SurgiVision, and Therataxis.

Developing a life sciences cluster in East Baltimore

Johns Hopkins is also partnering with Forest City in the development of the Science + Technology Park at Johns Hopkins. A major element in the City’s (and the community’s) strategy for revitalizing East Baltimore, the Science + Technology Park is being developed on a 31-acre site adjacent to the main campus of Johns Hopkins Medicine. The plan for the site currently calls for the phased development of about 1.1 million square feet of research and office space in five buildings – with land being available to support further development beyond this level as needed – along with parking, retail, restaurants and other amenities.

The first building on the site – the 300,000 square-foot John Rangos Research Building – was completed in 2009 and is now 80 percent occupied. The Building’s tenant roster highlights the role that Johns Hopkins Medicine plays in the development of the Park – as simultaneously an anchor, a generator of tenant start-up companies, and a magnet that draws companies from elsewhere to East Baltimore. Tenants include:

- Two Johns Hopkins research institutes – the Institute for Basic Biomedical Science and the Brain Science Institute;
- The Howard Hughes Medical Institute;
- Six for-profit life sciences companies, including two start-ups that have licensed technology from Johns Hopkins, and three others founded or co-founded by Johns Hopkins faculty members;
- The Lieber Brain Development Institute, an independent non-profit research organization that in 2010 chose to locate a new research center in Baltimore, in part because of the opportunity to collaborate with researchers at Johns Hopkins.

As of the fall of 2010, these tenants employed more than 400 people at the Rangos Building.

Supporting the growth of Montgomery County’s life sciences sector

At the University’s Montgomery County Campus (MCC), Johns Hopkins similarly collaborated with Jones Lang Lasalle on the development of a 115,000 square-foot building (9605 Medical Center Drive). MCC leases 50,000 square feet in the building; this space includes:

- The Whiting School of Engineering’s Microscopy Lab;
- The MCC Start-Up Center, which provides space for entrepreneurs in the earliest stage of starting a business, as well as other organizations seeking to establish a presence in the area; as of the fall of 2010, seven fledgling companies and organizations were using this space;
- About 23,000 square feet of space that is subleased to 11 other technology companies; and
- About 20,000 square feet of classroom space.

Johns Hopkins has also worked closely with Montgomery County in the planning of the Shady Grove Life Sciences Center – an ambitious long-term plan aimed at doubling the size of the county’s already-strong life sciences sector. One of the major elements of the plan is development of the Belward Research Campus – a vacant, 108-acre site owned by Johns Hopkins that is envisioned as a site for academic, corporate and government research labs and offices, and possibly for health care facilities as well. The site could ultimately accommodate several million square feet of new development.

A master plan for the Shady Grove Corridor was approved in May 2010, and more detailed planning for the Belward Research Campus is now under way.
The impact of Johns Hopkins on the Maryland economy includes not only the impact of the Johns Hopkins Institutions themselves, but also the impact of several other institutions that, but for the presence of Johns Hopkins, might not be located in Maryland. Part One identified seven such institutions; this part of the report describes these seven in more detail, and analyzes their impact on the Maryland economy.

SEVEN AFFILIATED INSTITUTIONS

All of the affiliated institutions identified in Part One are engaged in scientific research – but they vary substantially in terms of the scale and scope of their activities and their relationship to Johns Hopkins.

Kennedy Krieger Institute

The Kennedy Krieger Institute, founded in 1937, serves children and adolescents with disorders of the brain, spinal cord and musculoskeletal system. The Institute provides health care, rehabilitation and educational services; operates schools for children and adolescents with developmental and other disabilities in East Baltimore, in the city’s Greenspring neighborhood and in Montgomery County; and provides specialized training for about 400 professionals who come to Baltimore each year for specialized training in caring for disabled children. The Institute’s principal facilities are adjacent to the Johns Hopkins East Baltimore campus.

Kennedy Krieger is also a leading center of research in neurodevelopmental disabilities, with research spending totaling $34.9 million in fiscal year 2010. Many of the Institute’s senior faculty members hold joint appointments at Johns Hopkins.

In fiscal year 2010, Kennedy Krieger employed 2,274 people – an increase of 23 percent since 2003.
Space Telescope Science Institute

The Space Telescope Science Institute (STScI) manages scientific research, education and public outreach programs for NASA’s Hubble Space Telescope and its successor, the new James Webb Space Telescope (scheduled to be launched in 2014). The Institute, which was founded in 1981, is managed by a consortium of major universities (the Association of Universities for Research in Astronomy) under a contract with NASA.

In 2010, STScI – which is located on the Johns Hopkins Homewood campus – employed 397 people. In fiscal year 2009 (the last full year for which data is available), research spending at the Institute totaled $84.7 million.

Howard Hughes Medical Institute

The Howard Hughes Medical Institute, a non-profit foundation created by the legendary billionaire in 1953, is one of the world’s leading biomedical research organizations. The Institute employs about 345 senior scientists and 700 post-doctoral researchers, who along with about 1,000 graduate students work primarily in laboratories located at 70 leading U.S. universities, hospitals and other research centers. HHMI’s headquarters is located in Chevy Chase, Md.

In fiscal 2010, the Institute employed 15 principal investigators and “early career scientists” at Johns Hopkins, along with 48 non-faculty researchers and 17 administrative, clerical and other support staff. Its spending at Johns Hopkins totaled $5.4 million.

Carnegie Institution for Science’s Department of Embryology

The Carnegie Institution for Science, founded by Andrew Carnegie in 1902, is an independent non-profit research organization with strengths in astronomy, geophysics, developmental biology, plant biology and global ecology. Its headquarters are in Washington D.C.

The Carnegie Institution’s Department of Embryology was founded in 1913 in collaboration with the Johns Hopkins School of Medicine’s Department of Anatomy, and moved to the University’s Homewood campus in 1960, where its researchers work closely with the Johns Hopkins Department of Biology. The Department’s focus is on understanding developmental biology, starting at the molecular and cellular level.

The Department Embryology moved into a new home on the Homewood campus, the Maxine Singer research building, in 2005. In fiscal year 2010, the Department of Embryology employed 79 researchers and support staff; its expenditures totaled $7.0 billion.

National Institute on Aging

The National Institute on Aging (NIA), one of 27 entities that comprise the National Institutes of Health, conducts and supports research aimed at better understanding the nature of aging and diseases (such as Alzheimer’s) associated with aging, and how to help older Americans live healthy, active lives. The agency conducts most of its in-house research at two NIA centers that are located on the Johns Hopkins Bayview campus – the Biomedical Research Center and the Gerontology Research Center.
In fiscal year 2010, the operating budget for these two centers totaled $108.0 million. Together they employed 557 people in 2010.

**National Institute on Drug Abuse**

The National Institute on Drug Abuse (NIDA) conducts and supports research into the mechanisms of drug abuse and addiction, and seeks as to disseminate its findings and translate them into practice. NIDA's Addiction Research Center – the agency’s principal in-house research center – is located on the Johns Hopkins Bayview campus. Its work focuses on developing a better understanding of the mechanisms of addiction, from the molecular and cellular level to clinical research, and on development of more effective treatment methods.

In fiscal year 2010 the Addiction Research Center employed 468 people, including federal employees and contractors, and had an operating budget of $87.8 million.

**Lieber Institute for Brain Development**

The Lieber Institute for Brain Development – which became the newest Johns Hopkins affiliate in 2010 – is a non-profit research foundation that focuses on abnormalities in brain development and their role in a variety of diseases, such as schizophrenia.

In June 2010, the Lieber Institute announced that it will be establishing its headquarters at the Rangos Building, in the new Science + Technology Park in East Baltimore – a location that the Institute chose in part due to the opportunities it offers for collaboration with researchers at Johns Hopkins. The Institute expects to initially employ 60 scientists and support staff, growing to 100 within the next three to five years.

As Table 22 shows, the six affiliated institutions that were operating in Baltimore in 2010 (that is, all of those described above, except the Lieber Institute) together employed 3,874 people with a combined total payroll of about $244 million, and spent an estimated $327.8 million on research.

<table>
<thead>
<tr>
<th>Affiliate</th>
<th>Number of employees</th>
<th>Research spending ($ millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kennedy Krieger Institute</td>
<td>2,274</td>
<td>$34.9</td>
</tr>
<tr>
<td>Space Telescope Science Institute</td>
<td>416</td>
<td>$84.7</td>
</tr>
<tr>
<td>Howard Hughes Medical Institute</td>
<td>80</td>
<td>$5.4</td>
</tr>
<tr>
<td>Carnegie Institute/Embryology</td>
<td>79</td>
<td>$7.0</td>
</tr>
<tr>
<td>National Institute on Aging</td>
<td>557</td>
<td>$108.0</td>
</tr>
<tr>
<td>National Institute on Drug Abuse</td>
<td>468</td>
<td>$87.8</td>
</tr>
<tr>
<td>TOTAL</td>
<td>3,874</td>
<td>$327.8</td>
</tr>
</tbody>
</table>

Table 22: Employment and research spending at affiliated institutions, 2010
Based on data provided by the institutions, we estimate that of these 3,874 employees, 3,686 – about 95 percent of the total – were residents of Maryland. We further estimate that about $220 million in wages and salaries was paid to residents of Maryland by these institutions.

We estimate that the six affiliates withheld about $18 million in Maryland state income taxes from employees in FY 2010.

**IMPACT OF SPENDING BY AFFILIATED INSTITUTIONS**

As with Johns Hopkins itself, the impact of the affiliated institutions’ spending on payroll and purchasing goes beyond their role as major employers.

Using data provided by the institutions, we estimate that they spent about $168.0 million on purchases of goods, services and construction in FY 2010 – about $78.2 million of which was spent with Maryland-based vendors and contractors. We estimate that this spending directly created 397 FTE jobs in Maryland in FY 2010.

In addition to the direct spending impact cited above, spending by the affiliates also generated indirect and induced impacts in Maryland. As summarized in Table 23 below, through the multiplier effect, we estimate the six affiliates’ spending on payroll, purchasing and construction generated another 2,534 FTE jobs and $350 million in economic output in Maryland.

In total, we estimate that spending by the six affiliates directly and indirectly generated 6,806 FTE jobs and $672.1 million in economic output in Maryland.

**Table 23:**
Economic impact of affiliated institutions’ spending in Maryland, FY 2010

<table>
<thead>
<tr>
<th>Geography</th>
<th>Direct spending</th>
<th>Indirect and induced impact of spending by vendors, contractors and employees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Payroll</td>
<td>Purchasing/ construction</td>
</tr>
<tr>
<td>Maryland</td>
<td>$244.0 million</td>
<td>$78.0 million</td>
</tr>
<tr>
<td></td>
<td>3,874 jobs</td>
<td>397 jobs</td>
</tr>
</tbody>
</table>
The Economic Impact of Johns Hopkins in Maryland
Parts Three and Five highlighted several ways in which Johns Hopkins is engaged in efforts to improve the quality of elementary and secondary education in Maryland and to meet the health care needs of its residents. The Johns Hopkins Institutions’ engagement with communities in Maryland is not, however, limited to these areas. This part of the report highlights the variety of ways in which Johns Hopkins helps to strengthen the state’s communities and improve the lives of its residents. It is not meant to be a comprehensive account of the institutions’ engagement with their communities, but rather to illustrate the scope and diversity of that engagement.

**STRENGTHENING COMMUNITIES**

Johns Hopkins has long been involved in efforts to strengthen the neighborhoods in which it operates. For example:

- The **Greater Homewood Community Corporation** is a grass-roots community organization that seeks to strengthen the neighborhoods of north central Baltimore, an ethnically and economically diverse area that is home to 70,000 people. The Corporation’s work spans youth development, adult literacy and ESOL programs, neighborhood economic development, and engagement of the community’s older residents through the Baltimore Experience Corps. John Hopkins has been involved in GHCC’s work since its founding in 1969. Johns Hopkins supports the Corporation financially, and University employees serve on its board. Johns Hopkins students work as volunteers in several GHCC programs, and several University departments and research centers provide technical assistance.

- The **Historic East Baltimore Community Action Coalition (HEBCAC)** was founded in 1994 by Johns Hopkins, city and state governments, local community organizations and residents of a 220-block area in East Baltimore. The Coalition has a dual focus – physical improvements to the neighborhoods it serves and programs that help build the community’s “social capital.” HEBCAC has rehabilitated 50 homes for local residents, acquired and rehabilitated two vacant industrial buildings, and is working to revitalize East Monument Street, the community’s principal shopping area. HEBCAC’s Youth Opportunity Center provides GED classes, job training and placement, counseling and other services for young East Baltimore residents; and its Technology Resource Center provides computer access and training – and sells low-cost refurbished computers – to neighborhood residents.
Johns Hopkins (along with other partners) provides continuing financial support for HEBCAC, and also provides an organizational home as all of the coalition’s staff are hired as Johns Hopkins employees.

• Since its establishment in 1994, Johns Hopkins has provided financial, technical, in-kind, and board members to the Charles Village Community Benefits District, which provides supplemental sanitation and safety/security services to a 100-block area with over 14,000 residents.

• Johns Hopkins University is a founding member of the Central Baltimore Partnership. Formally established in 2008, the Partnership is an alliance of neighborhood organizations, city agencies and institutions (including the University of Baltimore and the Maryland Institute College of Art) that is seeking to develop and implement a comprehensive community development strategy for an area in central Baltimore that stretches from the University’s Homewood campus on the north to Mt. Royal Avenue on the South.

Johns Hopkins has also sought to strengthen these neighborhoods through its Live Near Your Work program, which provides grants to employees as an incentive to purchase homes in Baltimore. Recipients also receive a small matching grant from the City. In fiscal year 2010, Johns Hopkins awarded 70 Live Near Your Work grants, totaling about $416,000, to employee homebuyers.

VOLUNTEER AND SERVICE LEARNING PROGRAMS

Baltimore neighborhoods and their residents also benefit from the engagement of Johns Hopkins students in various forms of community service – either as volunteers or through “service learning” courses, which combine classroom learning with practical experience in the provision of community services.

• The Center for Social Concern (CSC) is the primary focal point on the Homewood campus for student engagement with and service to Baltimore communities. In addition to the Johns Hopkins Tutorial Project (described in Part Three), the Center provides a home for 50 student groups that provide a wide variety of services. For example:

  » Project Health operates a Family Help Desk at The Johns Hopkins Hospital, which provides information and assistance to families of incoming patients, informing them about available benefits, connecting them with needed services and providing follow-up when needed. In 2009-10, 75 students performed approximately 14,900 of volunteer work under this program.

  » The Johns Hopkins Jail Tutorial provides GED preparation and conducts reading groups with female inmates at the Baltimore City Prison. In 2009-10, 59 students provided more than 6,300 hours of volunteer work.

  » The Johns Hopkins Chapter of Habitat for Humanity works with local affiliates to build housing for Baltimore families. In 2009-10, 40 students performed about 2,600 hours of volunteer work on Habitat projects.

Overall, more than 1,500 students performed more than 79,700 hours of volunteer work in programs based at CSC.

• At the East Baltimore campus, SOURCE – the Student Outreach Resource Center – provides a focal point for community engagement students in the School of Medicine, the School Nursing and the School of Public Health. The following are examples of SOURCE’s programs:
The Connection Community Consultant Group assists community organizations with a variety of short-term projects. In 2009-10, for example, the Group helped the Baltimore American Indian Center design a survey on the health status and service needs of the city’s Native American population. In 2009-10, student volunteers provided about 800 hours of volunteer consulting work.

Bienestar Baltimore focuses on helping to meet the health needs of the city’s Latino community, through services such as prenatal education, tuberculosis screening and prevention programs, and diabetes screening.

SOURCE volunteers provide confidential HIV Testing and Counseling Services at several locations in Baltimore.

In addition to these volunteer programs, all three schools on the East Baltimore campus offer a number of service learning courses. For example:

- In 2009-10, 120 student nurses participated in the School of Nursing’s Community Clinics service learning course, recording 3,800 hours of service to about 1,000 members of the community.

- The 16 students who participated in the School of Public Health’s Baltimore community practicum course performed 1,280 hours of work in the community.

During 2009-10, SOURCE estimates that between its volunteer programs and service learning programs such as those described above, students at the three schools provided about 19,500 hours of service to the community – primarily but not exclusively in East Baltimore.

Medicine, Nursing and Public Health are not the only schools at Johns Hopkins offering service learning courses.

- At the Carey Business School, for example, MBA students are required to complete a “capstone” project, in which teams of students work as consultants to a company or a non-profit organization, helping its leaders address a real-world business problem. In 2009-10, 635 Carey Business School students completed capstone projects with non-profit-organizations, institutions and local businesses. We estimate that Johns Hopkins students provided more than 16,000 hours of consulting services to these organizations.

- In 2009-10, 1,742 students enrolled in four service learning courses in the School of Education, including courses on special education, teacher training and public safety leadership. The School estimates that these students performed approximately 17,700 hours working in schools and with other community partners during the year.

Community engagement is not limited to Johns Hopkins students. As noted in Part Three, Johns Hopkins employees make up the largest single group of volunteers working in the Baltimore Public Schools through its Johns Hopkins Takes Time for Schools program and other efforts, accounting for 37 percent of all registered volunteers. Other examples of employee engagement include the following:

- Since 2007, Johns Hopkins employees have managed and participated in a fundraising campaign for the Johns Hopkins Neighborhood Fund, which provides funding to non-profit organizations that seek to strengthen the neighborhoods in which Johns Hopkins operates. The Fund focuses its support in five areas – community revitalization, education, employment, health and public safety. In 2010, the Fund contributed a total of $169,500 to 17 neighborhood organizations.
• At Project Heal, a joint venture of the Children’s Center at Johns Hopkins Hospital and Maryland Volunteer Lawyers, medical staff and attorneys work together to assist patients and their families and to advocate on behalf of the community on issues such as housing, education and access to public benefits.

• Through Healthy Families Howard County, employees at Howard County General provide parent education and other support services to first-time parents throughout the County. The program starts with prenatal education and continues for as long as five years after birth, with home visits provided by Family and Children’s Services of Central Maryland. The program was started in 2001 and has been supported by Howard County, the Columbia Foundation and the Freddie Mac Foundation.

During fiscal year 2010, the four Johns Hopkins Health System hospitals reported that more than 1,000 employees contributed more than 143,000 hours of volunteer work in the communities in which they operate.

JOHNS HOPKINS AS A CULTURAL RESOURCE

Johns Hopkins also contributes to the life of Baltimore communities through its role as a major cultural institution, with music, dance and theater performances, museums and lectures that are open to members of the university community and to neighborhood residents as well. For example:

• The Peabody Institute – one of the anchor institutions in the city’s Mount Vernon cultural district – provides instruction in music to community residents both young and old through its Peabody Prep program (described in Part Three). The Institute stages numerous performances during the course of the year that are open to the community at low or no cost. During 2009-10, the Institute staged 54 performances, with attendance totaling more than 12,000 – including more than 5,000 people from the surrounding community and elsewhere in the Baltimore area.

• The annual Shriver Hall Concert Series – one of the leading chamber music programs in the U.S. – started in 1965 as a university-sponsored concert series. SHCS became an independent non-profit organization in 1970 – but continues to present its concerts on the Homewood campus.

• The JHU Theatre, affiliated with the School of Arts and Sciences, stages several plays each year. Those presented during 2009-10 included plays by Lanford Wilson, John Guare and Tom Stoppard, along with several new works.

• The Homewood Museum (located on the University campus) and the Evergreen Museum (north of the Homewood campus) are open to the public. Each of these museums also stages an annual concert series.

• The Johns Hopkins Foreign Affairs Symposium (FAS) is a lecture and discussion series on global issues that began in 1998. About a dozen FAS events are held each spring, giving members of the University community an opportunity to interact with international leaders and experts, and with each other. Speakers in the spring of 2010 included New York Times columnist Nicholas Kristof, former White National Security Advisor Zbigniew Brzezinski, EPA Administrator Lisa Jackson and historian Niall Ferguson.

• At the Montgomery County Campus, the Arts Partnership sponsors an ongoing series of on-campus exhibits by Maryland artists.
PROMOTING SUSTAINABILITY

Like many other institutions, Johns Hopkins is committed to reducing its impact on the environment and participating efforts to address the challenge of climate change. The Johns Hopkins Institutions can contribute to this effort in three ways:

- As the largest enterprise in Baltimore, Johns Hopkins can contribute to the quality of the local environments – and also help address the broader problem of climate change – by responsibly managing its own assets and operations. Johns Hopkins has, for example, set a goal of reducing carbon emissions by 50 percent by 2025.

- As a leading university, Johns Hopkins can help develop greater capacity to address these issues more effectively through its mission of teaching and research.

- As a partner, Johns Hopkins can help community organizations and local residents develop and implement their own responses to these challenges.

The following are just a few examples of the Johns Hopkins Institutions’ activities in this area.

- As noted in Part Two, Johns Hopkins completed a 4.6-megawatt cogeneration plant on its Homewood campus in 2010, and plans to complete two more cogeneration plants totaling 15 megawatts on its East Baltimore campus by the end of 2011. The plants will reduce energy costs, while also substantially reducing carbon dioxide emissions.

- In partnership with the city, Johns Hopkins created the Climate Showcase Project, which works with local non-profit organizations to help them identify and implement ways to reduce energy and water consumption. During the summer of 2010, teams of students recruited and trained by the University’s Office of Sustainability worked with twenty Baltimore non-profits.

- The Office of Sustainability has also sponsored a community-supported agriculture program at the Homewood campus, through which members of the University community and others can purchase up front shares of the produce grown over the course of the season at One Straw Farm, an organic farm located in Baltimore County. The Office markets the program locally and provides a pick-up site on the Homewood campus.

In an era when prosperity depends in part on the ability to attract, develop and retain talent, states are only as strong as the communities of which they are comprised. Through the programs described here and many others, Johns Hopkins is helping to improve the communities in which it operates.
Johns Hopkins is in many ways a major contributor to Maryland’s economy – it’s the state’s largest private employer, a leading educational institution and a leading provider of health care, the state’s largest center of research and one of its leading sources of innovation. As both the U.S. and the state continue to emerge from the recession of 2008-2009, the next ten years are likely to present new opportunities for growth. Johns Hopkins can be a valuable partner as Maryland seeks to take advantage of those opportunities.

1) MAINTAINING MARYLAND’S POSITION AS A MAJOR RESEARCH CENTER

While the need to reduce the federal budget deficit will no doubt constrain the growth of federal spending on research and the development of new technologies, there are some areas that could in the years ahead be targeted for increased federal investment in research and development, such as cyber security, disaster preparedness and selected areas of medical, defense and space research. As one of the nation’s leading research institutions, Johns Hopkins should be well-positioned to help Maryland maintain its position as one of the nation’s leading centers of federally-funded research.

2) EDUCATING MARYLAND’S PROFESSIONAL WORKFORCE

In an era in which investments in human capital are among the most important determinants of which states and cities flourish and which do not, the University’s role as a leading center for undergraduate, graduate and professional education – and in particular, for the education of working professionals – can help ensure continued investment in the knowledge and skills of Maryland’s college-educated workforce.

3) STRENGTHENING NEIGHBORHOODS

Attracting, developing and keeping highly skilled workers also means making the state’s communities and neighborhoods attractive places to live. Through its participation in and support for the work of organizations such as the Greater Homewood Community Corporation, East Baltimore Development Inc and the Central Baltimore Partnership – and through its Live Near Your Work program, which provides incentives for employees to buy homes near its campuses – Johns Hopkins is helping to strengthen the communities where it operates – in Baltimore and elsewhere.
4) IMPROVING SCHOOLS AND EXPANDING EDUCATIONAL OPPORTUNITY

Johns Hopkins can similarly be a partner in strengthening Maryland’s elementary and secondary schools, and in expanding the range of educational opportunities available to young residents of the state – through partnerships between the School of Education and public schools in Baltimore and several counties, through the work of volunteers in programs such as the Johns Hopkins Tutorial Project, and the Baltimore Scholars Program.

5) SUPPORTING INNOVATION AND ENTREPRENEURSHIP

With a growing research base and a stronger focus on the commercialization of technologies first developed in University labs, Johns Hopkins is an increasingly important source of technological innovation and entrepreneurial growth in Maryland. Over time, the Johns Hopkins Institutions’ collaboration with Forest City and East Baltimore Development, Inc. on the development of the Science + Technology Park – and the University’s collaboration with Montgomery County in the development of the Belward Research Campus – should also reinforce Maryland’s existing strengths in this area, by making it easier and more attractive for start-up companies based on Johns Hopkins technology to stay in the state, and by also attracting to Maryland science and technology-based companies with potential for future growth.

6) REFORMING HEALTH CARE

The next ten years are likely to see far-reaching changes in the financing, management and delivery of health care in the U.S. With its unique combination of strengths in medical research and education – in the provision of high-quality primary care, hospital care, skilled nursing care and home care – in health systems planning and management – and in the administration of managed care plans – Johns Hopkins Medicine is well positioned both to play a leading role in this transformation and to take advantage of the opportunities it offers. Over time, leadership in health care reform can translate into better care for Maryland residents, more effective control of health care costs – and new business opportunities for Maryland.

7) CONNECTING MARYLAND TO THE GLOBAL ECONOMY

In the twenty-first century, cities and regions that are effectively integrated into the world economy are more likely to succeed economically than those that are not. Over the course of several decades, the Johns Hopkins Institutions have developed – and each year continue to expand – a dense network of relationships that now connect Maryland to more than 100 countries around the world. These relationships clearly benefit the University and the Johns Hopkins Health Care System – and they benefit Maryland as well.

It is important to recognize that the benefits of the Johns Hopkins Institutions’ partnership with Maryland do not run just one way. Johns Hopkins can be an invaluable partner in Maryland’s efforts to strengthen both its economy and its communities. At the same time, if it is to maintain in the long run its leading position in research, education and health care, Johns Hopkins needs those efforts to succeed.
We would like to thank the many staff and faculty at Johns Hopkins University, the Johns Hopkins Health System and the Applied Physics Laboratory for helping us better understand the economic and community impacts of their institutions in Baltimore and Maryland. We would especially like to thank the Office of Government, Community and Public Affairs, including Tom Lewis, Sharon Tiebert-Maddox and Dennis O’Shea.

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