



Senate Bill No. 287

REPORT TO THE LEGISLATIVE OVERSIGHT COMMISSION
ON EDUCATION ACCOUNTABILITY

WEST VIRGINIA
RESEARCH
TRUST FUND

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Higher Education Policy Commission

This report is provided in compliance with WV Code SS 18B-18A-1 et seq.
January 1, 2011



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RESEARCH

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REPORT ON THE RESEARCH TRUST FUND

This report on the agency level activities to implement and achieve the goals of WV Code §18B-18A-1 et seq., the Research Trust Fund (RTF) is hereby provided to the Legislative Oversight Commission of Education Accountability (LOCEA). Although periodic reports have been provided throughout the first two years of implementation, this report provides a comprehensive assessment in compliance with the authorizing legislation.

Background

The West Virginia Legislature created the RTF during the 2008 regular session to provide endowment funding to Marshall University and West Virginia University, the state's two doctoral-granting, public research universities, and to promote, educate and train researchers and research support staff in science, technology, engineering and mathematics (STEM) fields of study. All awards from the RTF require a 1:1 match from private gifts. The additional investment of both private donations and state funds is critical to recruiting world-class scientists, researchers, research staff, technicians and professional degree graduates, as well as providing sustained funding for laboratories and scientific equipment. The Legislature further determined that certain areas of emphasis including energy, national security technology, environmental sciences, health and biomedical sciences, biometrics, biotechnology, gerontology, transportation and nanotechnology should be targeted by endowments established by RTF investments. The Higher Education Policy Commission was charged to administer RTF public funds available to the state's two doctoral-granting public research universities to match qualified private donations and qualified private donation pledges upon successful demonstration that such qualified donations were made to the institutions.

The Legislature subsequently appropriated \$50 million to the RTF and designated that \$35 million would be available to West Virginia University and \$15 million would be available to Marshall University. All interest earned on the account prior to distribution of the corpus was designated to be distributed primarily to the state's baccalaureate colleges through a competitive process. In order to implement the Legislature's intent, the Higher Education Policy Commission (HEPC or Commission) was authorized to initiate rule making.

RTF Activities through November 2010

The Commission completed its initial implementation plan during the fall of 2008 which resulted in Title 133 Legislative Rules Series 48, subsequently approved by the legislature during the 2009 regular session. The rule establishes guidelines, procedures and documentation standards for the distribution of funds in the West Virginia Research Trust Fund. The rule designates the Vice Chancellor for Science and Research as the administrator of the program, under the general direction of the Chancellor and the Commission. The final rules are available at www.wvresearch.org and www.wvhepcnew.wvnet.edu.

Commission staff created an electronic "Match Request System" (MRS) in 2008 that allows secure transactions for RTF requests made by the universities. All requests, documentation and invoicing are permanently recorded in files that allow sorting, analysis and up-to-date balance information. The MRS was cross referenced with university records to ensure accuracy for this report.

Required "Research Plans" specified by the legislation and approved by institutional Boards of Governors' have been received from both West Virginia University and Marshall University. Both institutional plans are on file at the Commission and are found to be generally compliant with legislative requirements.

The RTF financial account was established in late June 2008 by the State Auditor and made accessible to Commission staff for distribution. This report provides all transaction activities on the RTF within the two and one-half years of its existence.

Interest funds generated by the RTF account have been separately tracked for distribution to State Colleges as defined by the Legislature. On May 15, 2009, the Commission released the first competitive request for proposals (attached) for RTF interest funds collected on the account specifically for state colleges and the WV School of Osteopathic Medicine in accordance with provisions of §18B-18A-10 of the code. A second request for proposals was issued on March 9, 2010. Proposals for up to \$100,000 each were received from eligible institutions and subsequently reviewed by external peers for program merit. Two awards were issued in 2009 and two in 2010 as a result.

Transaction Summary

West Virginia University

- Through 2009, combined funds matched by the RTF and transferred to WVU were \$3,489,235. This represented 9.97% of the total funds available to WVU.
- In 2010, new gifts of \$4,541,851 were submitted and matched by the Trust Fund.
- To date WVU has received \$8,031,084 or 22.95% of available funds.
- A total of 37 endowments have been created.

Marshall University

- Through 2009, combined funds matched by the RTF and transferred to Marshall are \$742,100. This represents 4.95% of the total funds available to MU.
- In 2010, new gifts of \$136,660 were reported but have not been submitted for RTF match.
- Total transfers to Marshall in 2010 are zero.
- A total of (2) endowments created.

Combined Disbursements

- Total combined distributions from the corpus of the RTF to date are \$8,773,185 or 17.5% of the total fund.
- RTF current account balance is \$41,226,816.
- Both universities recently provided updates on their respective fundraising activities that are in agreement with this total.

State Colleges

- Total "RTF Interest" accrued \$852,188.92 as of 9/17/10.
- An award of \$99,892.50 was made to Shepherd University on 9/17/10.
- An award of \$100,000 was made to Fairmont University on 9/17/10.
- The current available balance in the "RTF interest" account is \$452,296.42.

Plans for 2010

- A third State College competition is planned for Spring 2011 to further disburse RTF Interest funds.
- Commission staff plan to work with institutional leaders when joint fundraising opportunities are presented.
- A follow up plan is under development for pledge gifts to ensure that all such donor pledges are completed by March 8, 2013, the legislatively defined compliance date.
- Annual meetings with institutional leaders and foundations are planned.

Research Trust Fund

Approved Requests Summary as of 12/14/2009

2009	Gifts	Pledges	Total Gifts	Total Pledges	Total Request
WVU	104	14	\$2,214,908	\$1,274,327	\$3,489,233
Marshall	15	4	\$603,100	\$139,000	\$742,100
Combined	119	18	\$2,818,008	\$1,413,327	\$4,231,334

Approved Requests Summary as of 11/30/2010

2010	Gifts	Pledges	Total Gifts	Total Pledges	Total Request
WVU	134	64	\$3,061,857	\$1,480,000	\$4,541,851
Marshall	2*	0	\$136,660*	\$0	\$0
Combined	136	64	3,198,517*	1,480,000	4,541,851

To Date	\$8,773,185				
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* Although Marshall reported, this gift has not been submitted to the Commission for match.

RTF Milestones

January 9, 2008	Governor proposes program during State of the State Address
March 8, 2008	Legislation (SB 287) approved by Legislature
April 3, 2008	Legislation signed by Governor Joe Manchin
June 23, 2008	RTF Account established, \$50 million deposited
August 25, 2008	Agency-approved Emergency Rules filed
October 15, 2008	Electronic MRS (Match Request System) completed
April 6, 2009	Legislative Rules approved by Legislature (HB 2904)
April 11, 2009	Rules signed by Governor
April 16, 2009	Final Rules filed with Secretary of State's Office
May 18, 2009	Rules effective
May 15, 2009	Request for Proposals issued to State Colleges
March-December 2009	Match transfers to both West Virginia University and Marshall University
November 13, 2009	Awards to Concord University and West Liberty University
January 1, 2010	Statutory Report filed with Legislature
March 9, 2010	Second Request for Proposals made to State Colleges University
June - November 2010	Match transfers to West Virginia University
September 2010	Awards to Shepherd University and Fairmont University
December 2010	Report to Policy Commission
January 1, 2011	Statutory Report filed with Legislature

2010 RESEARCH TRUST FUND TRANSACTION HISTORY

Date	Recipient	Donor/Foundation Notes	Fund	Amount	Gift/Pledge	
2/22/2010	WVU	Raleigh County NAACP Charles Wendell Charleston Area Medical Center Sandra Schafer Lawrence Frail & Patricia Johnston James Hughes Emily Dempsey	100.00 200.00 100.00 100.00 50.00 140.00 10.00	Alan Susman Endowment for Cortico-basal Ganglionic Degeneration Research	\$ 760	G
2/22/2010	WVU	Estate of Blaine S. West, IRA Rollover 3R114 Estate of Blaine S. West, IRA Rollover Estate of Blaine S. West, IRA Rollover Estate of Blaine S. West, IRA Rollover	\$92,801.43 \$4,434.99 \$2,712.41 \$4,537.99	Blaine S. West Endowment for Civil and Environmental Engineering	\$104,486	G
5/18/2010	WVU	Capital Trust Coompany Foundation 2.12.10 Ref. George & Janette Taylor		James A. Kent Endowment for Biomedical Engineering	\$ 40,000	G
5/18/2010	WVU	Merck Partnership for Giving		Schoepp Neuroscience Research Student Spport Fund	\$ 5,000	G
5/18/2010	WVU	500,000 SBC Communications Inc. Bonds		George B. Bennett CEMR Research Opportunity Endowment	\$1,000,000	G
5/18/2010	WVU	Mr. & Mrs. Charles O. Davis, Jr.		Alan Susman Endowment for Cortico-basal Ganglionic Degeneration Research	\$ 500	G
5/18/2010	WVU	3R115 Pledge Installments 3/1/2010 3/1/2011	\$1,000,000 \$250,000 \$250,000	William J. Maier, Jr. Chair of Research	\$1,000,000	P
5/18/2010	WVU	Estate		E. Elizabeth Morgan Cancer Research Endowment	\$ 26,473	G
5/18/2010	WVU	Dr. & Mrs. George Williams		Oleg D. and Valentina P. Jefimenko Physics Fellowship	\$ 200	G
5/18/2010	WVU	3V859 Estate		James A. & Ruby Romano Department of Civil and Environmental Engineering Endowment	\$ 263,182	G
6/10/2010	WVU	3R116 Pledge of \$350,000. 12/14/2009		Branson-Maddrell Endowed Professorship in Orthodontics	\$ 68,849	G
6/10/2010	WVU	3R120		Ruth and Robert Kuhn Nursing Faculty Research Fund	\$ 25,234	G
6/10/2010	WVU	3R121		Hall - deGraff Endowment for Women in Science & Engineering	\$ 25,000	G
6/10/2010	WVU	3V858		Robert E. Pyle Chemical Engineering Graduate Fellowship	\$ 50,000	G
6/10/2010	WVU	3R119 \$20,000 pledge recorded May 5, 2010		Badzek Family Endowment for Nursing Research	\$ 20,000	P
6/10/2010	WVU	3R119		Badzek Family Endowment for Nursing Research	\$ 5,000	G
6/10/2010	WVU			William S. Clapper Mechanical & Aerospace Engineer Sch	\$ 12,500	G
6/23/2010	WVU	3R123 Installments 6/30/2010 1/31/2010 - \$125,000; 1/31/2012	\$50,000 \$175,000	WVU Hospitals Evidence Based Practice Research Professorship in Nursing	\$350,000	P
6/23/2010	WVU	Trust		James A. & Ruby Romano Department of Civil and Environmental Engineering Endowment	\$ 68,800	
6/23/2010	WVU	3R116Pledge of \$350,000. 12/14/2009		Branson-Maddrell Endowed Professorship in Orthodontics	\$10,000	G
6/23/2010	WVU	Exxon Mobil Foundation Matching Gift Program		Rita Radcliff-Deppe and Brian Deppe Fellowship Award	\$7,500	G

Date	Recipient	Donor/Foundation Notes	Fund	Amount	Gift/Pledge
6/23/2010	WVU 3V841		Oleg D. and Valentina P. Jefimenko Library Resources Fund	\$100,000	G
7/15/2010	WVU WVUF ID 3R107		Raymond Brooks Vanscoy Cancer Research Endowment	\$ 30,862	G
7/15/2010	WVU WVUF ID 3V824 Mr. & Mrs. Patrick Simms 5/25/2010 RN: 11739961		James A. Kent Endowment for Biomedical Engineering	\$ 6,000	G
7/15/2010	WVU Installments: 9/15/2010 9/15/2011 &nb	\$33,000.00 \$33,000.00	Fithian Family Fnd Endow #2 for Behavioral Medicine and Psychiatry	\$100,000	P
7/15/2010	WVU Payments received March 10, 2008 April 9, 2009; and March 31, 2010.		Quad/Graphics Research Chair in Internal Medicine	\$1,000,000	G
11/1/2010	WVU \$45,000 in Gifts Received \$10,000 in Pledges		Benjamin James Galford Research Scholarship	\$ 55,000	G
11/1/2010	WVU		Wells Fargo Energy Group Scholarship	\$ 28,000	G
11/1/2010	WVU		Branson-Maddrell Endowed Professorship in Orthodontics	\$ 20,000	G
11/1/2010	WVU		Allen S. Pack Endowment for Mining Engineering	\$ 10,000	G
11/1/2010	WVU		Raymond Brooks Vanscoy Cancer Research Endowment	\$ 8,505	G
11/1/2010	WVU		Oleg D. and Valentina P. Jefimenko Library Resources Fund	\$ 100,000	G
TOTAL				\$4,541,851	

Research Trust Fund - Total Disbursements to date (11-1-2010)

Doc ID	Item	FY	Date	Amount	Balance
				June 2008 opening balance	50,000,000.00
I009524271	Marshall Univ Research Corp	2009	3/4/09	-50,000.00	49,950,000.00
I009524237	Marshall Univ Research Corp	2009	3/4/09	-415,000.00	49,535,000.00
I009977397	WVU Foundation	2010	7/17/09	-918,453.00	48,616,547.00
I009977805	WVU Foundation	2010	7/17/09	-737,575.00	47,878,972.00
I010174294	WVU Foundation	2010	10/29/09	-1,149,672.00	46,729,300.00
I010264902	Marshall Univ Research Corp	2010	12/11/09	-277,100.00	46,452,200.00
I010279363	WVU Foundation	2010	12/17/09	-683,533.00	45,768,667.00
I010564851	WVU Foundation	2010	2/19/10	-105,246.00	45,663,421.00
I010846617	WVU Foundation	2010	4/7/10	-2,335,355.00	43,328,066.00
I011046825	WVU Foundation	2010	6/8/10	-206,583.00	43,121,483.00
I01199357	WVU Foundation	2010	6/28/10	-536,300.00	42,585,183.00
I011173548	WVU Foundation	2011	7/26/10	-1,136,862.00	41,448,321.00
I011319765	WVU Foundation	2011	10/14/10	-221,505.00	41,226,816.00
TOTAL				\$8,773,184	41,226,816

Investment Earnings on RTF Balance to date (11-1-2010)

Doc ID	Item	FY	Date	Amount	Balance
B000158553	Deposit	2008	6/23/08	72,848.46	72,848.46
B000159850	Deposit	2009	7/23/08	95,111.68	167,960.14
B000161742	Deposit	2009	8/27/08	103,432.45	271,392.59
B000162754	Deposit	2009	9/26/08	106,361.79	377,754.38
B000164313	Deposit	2009	10/28/08	97,418.28	475,172.66
B000165684	Deposit	2009	11/26/08	86,642.71	561,815.37
B000166737	Deposit	2009	12/29/08	56,745.14	618,560.51
B000168129	Deposit	2009	1/29/09	49,224.83	667,785.34
B000169146	Deposit	2009	2/25/09	29,732.46	697,517.80
B000170549	Deposit	2009	3/31/09	16,969.35	714,487.15
B000171926	Deposit	2009	4/27/09	11,943.43	726,430.58
B000172631	Deposit	2009	5/14/09	8,019.46	734,450.04
B000174613	Deposit	2009	6/23/09	16,106.39	750,556.43
B000176131	Deposit	2010	7/31/09	12,239.93	762,796.36
B000177787	Deposit	2010	8/28/09	8,877.13	771,673.49
B000178739	Deposit	2010	9/21/09	5,997.91	777,671.40
I010147485	Reviewer	2010	10/7/09	-472.00	777,199.40
B000180651	Deposit	2010	10/30/09	4,826.35	782,025.75
B000181939	Deposit	2010	11/30/09	3,716.87	785,742.62

Doc ID	Item	FY	Date	Amount	Balance
B000183168	Deposit	2010	12/30/09	3,731.29	789,473.91
B000184592	Deposit	2010	1/28/10	6,187.79	795,661.70
B000185766	Deposit	2010	2/25/10	5,311.82	800,973.52
B000186801	Deposit	2010	3/19/10	4,278.76	805,252.28
B000188288	Deposit	2010	4/28/10	4,852.94	810,105.22
B000189864	Deposit	2010	5/26/10	5,466.22	815,571.44
B000190758	Deposit	2010	6/16/10	6,663.01	822,234.45
B000192457	Deposit	2011	7/28/10	7,179.78	829,414.23
B000194204	Deposit	2011	8/27/10	7,897.86	837,312.09
B000194905	Deposit	2011	9/13/10	7,705.42	852,188.92
B000196953	Deposit	2011	10/26/10	7,171.41	852,188.92
Commitments/Balance				-399,892.50	452,296.42

Total Interest Fund Comittments

Comittments	
Shepherd	99,892.50
Fairmont	100,000.00
West Liberty	100,000.00
Concord	100,000.00
Total Awards	399,892.50

REPORT ON THE RESEARCH TRUST FUND

West Virginia University's Strategic Research Plan

in response to

Senate Bill 287, Research Trust Fund

June 6, 2008

Senate Bill 287 (copy attached as Appendix 1) established a state fund to be administered by the Higher Education Policy Commission to make available public moneys to match qualified private donations and pledges, thereby creating an incentive for donors to support certain priority areas of study consistent with the institution's strategic plan for research. The goal is to create, through an endowment, a sustainable source of funding for research initiatives. West Virginia has committed \$35 million to West Virginia University as a basis for a 1:1 match for private dollars. This will translate into an initial \$70 million investment in research at WVU over the next five years.

West Virginia University will focus its efforts on four initiatives, building on current expertise and capacity to expand:

- Energy and environmental sciences
- Nanotechnology and material science
- Biological, biotechnological, and biomedical sciences
- Biometrics, security, sensing and related identification technologies

The WVU Foundation will oversee the fundraising efforts to match the available state resources and will serve as the fiduciary agent to invest and administer the directed research endowment for this initiative.

Research at West Virginia University

Designated as a Research University (High Research Activity) by the Carnegie Foundation for the Advancement of Teaching, West Virginia University continues to develop interdisciplinary programs, form strategic partnerships, and build technology transfer and economic development infrastructure. Funding from external sources for total sponsored programs was \$138.6 million in fiscal year 2007, with \$87.4 million in research funding.

The Office of the Vice President for Research and Economic Development oversees all aspects of research at West Virginia University, providing guidance for individual researchers and managing the system-wide research enterprise (Research@mail.wvu.edu).

WVU's Strategic Research Plan for the Research Trust Fund

Process of Development

As this legislation was introduced, a committee of faculty, administrators, and members of the WVU Foundation was formed under the direction of the Provost to begin to discuss the institution's strategic plan if the legislation were to be enacted. That group met several times to identify the institution's areas of research, the use of the newly secured funds, the expected impacts of the infusion of funds, and the interdisciplinary nature of the research initiatives. The opportunity to raise matching funds for each research area also was discussed.

Research Areas for Investment

West Virginia University has identified four focused research areas for development under the Research Trust Fund; each is described below. Each is interdisciplinary and is supported by a critical mass of faculty, core facilities, and a history of experience. Each area has been assessed through various forms of external validation.

The amount of funding (both private and the equivalent state match) requested for each research area varies according to need. The total funding exceeds the \$35 million from the Research Trust Fund. Recognizing that private donations will reflect the interest of the donors, no research area may receive more than \$17.5 million in private donations within the first two years. Furthermore, the planned use of funds for each focus area assumes a 4% return on the endowment principle and the solicitation of gifts over the five year time frame of the Research Trust Fund Initiative.

After two years, the overall strategic research plan and the fiscal commitment to each research area may be modified in accordance with the pending Legislative Rule for the Research Trust Fund. That decision will be recommended to the Board of Governors by the Provost after consultation with the President, the Vice President for Research and Economic Development, the Vice President for Health Sciences and other affected constituents. The Provost will communicate directly on behalf of WVU with the Vice Chancellor for Science and Research of the Higher Education Policy Commission who is charged with overseeing this Initiative.

Energy and environmental sciences (Up to \$15 million state allocation to be matched with private funds)

Objective: West Virginia University has historically been a leader in the energy field. Over the past year, an interdisciplinary energy plan (the Advanced Energy Initiative) has been developed and is being externally reviewed. The vision is for WVU to become internationally recognized as a leading academic institution driving innovation in the socially and environmentally responsible production, management, and utilization of energy. The overall goals of the Advanced Energy Initiative (AEI) have been defined and listed below:

- Develop a strong R&D portfolio that targets key issues and places West Virginia University among the ranks of the most eminent public research universities engaged in energy and environmental research
- Strengthen interdisciplinary cooperation to bring the full capabilities and resources of the University together to compete for R&D funding
- Develop state-of-the-art research and development facilities, laboratories, and infrastructure that provide unique capabilities and that attract the best and brightest undergraduate and graduate students and faculty to the University
- Partner with private industry, government agencies and laboratories, and other research universities to enhance our capability to compete for research support to address important energy/environmental challenges
- Apply relevant knowledge and capabilities to provide input on important national and state policy issues to policy-makers

The AEI will focus on (1) Fossil Energy (Fossil Energy Resources, Conversion, Utilization, and Environmental Management), (2) Sustainable Energy (Energy Efficiency, Conservation, and Renewable Energy), and (3) Energy Policy (Analysis of Energy Policy, Carbon Management, Environmental, and Infrastructure Issues).

Plan of Action and Use of Funds: For the Advanced Energy Initiative, the following organizational steps have been established:

1. Appoint interim management structure by late 2008
2. Establish internal advisory board by 2009 and external board by late 2009
3. Establish \$0.5 million line of support through the WVU Research Corporation to fund new and interdisciplinary research by mid 2009
4. Develop procedural guidelines for the use, maintenance, and replacement of shared facilities for energy research equipment and facilities procurement by mid 2009

A state match of \$15 million to complement the equivalent support in private donations and pledges will be sought. This amount is expected to generate approximately \$1.2 million/year. These funds will be utilized to implement the organizational, integration and research goals that are needed to support the vision for the AEI:

1. Appoint a Director by early 2009 (\$225,000/year) and the necessary professional and administrative support for the Director's office (\$177,000/year)
2. Appoint three associate scientific directors, one for each focus area, by late 2009 (\$114,000/year in salary supplement and \$60,000 for office support)
3. Support for research infrastructure, shared facilities, equipment, and research related expenses by late 2010 (\$330,000/year)
4. Develop incentives, and recruitment strategies for new faculty (6 tenure track [base funding of positions by WVU] and 4 research faculty) beginning in early 2009 (\$300,000/year to provide salary supplements)

Expected Impact: It is anticipated that the Advanced Energy Initiative will further establish WVU as a national leader in energy research, thereby attracting new faculty, graduate students, and additional research funding to the institution. The results will contribute much needed solutions to the nation's energy crisis and address issues of national energy security and long-term energy sustainability. The AEI intends to increase the externally funded research activity in energy and environmental sciences at a rate of 7% per year over the near term.

Current Research Assessment: WVU currently has more than 100 faculty from various disciplines and several colleges who have expertise in the various areas of energy research. As such, these individuals have brought more than \$80 million of research support to the University over the past three years. Furthermore, WVU just initiated a consortia agreement with the University of Pittsburgh and Carnegie Mellon University to engage in a portfolio of research programs aimed at developing new technologies for fossil fuel utilization, and designing cleaner, more efficient uses of fossil fuel. The consortial institutions expect to be assigned tasks subcontracted through RDS of approximately \$26 million over the next two years. RDS provides research and development support services to the National Energy Technology Laboratory.

Nanotechnology and materials science (Up to \$10.5 million state allocation to be matched with private funds)

Objective: Under this research area, WVU intends to build upon the current WV Nano Initiative, a National Science Foundation (NSF) EPSCoR externally reviewed and funded research effort. The goal is to further advance the institution's existing commitment to interdisciplinary research in nanoscale science, engineering, including bio-medical engineering, and education.

Plan of Action and Use of Funds: Funds will be sought to advance the WVNano Initiative on a trajectory towards being recognized as a university interdisciplinary research center and then a nationally recognized interdisciplinary center by building capacity in people, tools, and ideas. Support from the Research Trust Fund and private matching gifts will enable WVNano to increase national competitiveness and recognition as a university and then a national center in nanoscale science, engineering and education.

The income from the endowment and the time frame for completing the fundraising required for each step are indicated below:

1. A permanent scientific director with demonstrated expertise in nanosciences hired on a 9-month tenure-track appointment during academic year 2008-2009 at an initial cost of \$130,000/year (over the five year time frame)
2. An administrative supplement (\$90,000/year) for the director including an administrative assistant, travel and office expenses (over the five year time frame)
3. Shared facilities support at \$200,000/year including new and replacement equipment and technical support (over the five year time frame)
4. Five graduate student fellowships at \$28,000/year to increase the number of STEM PhD graduates (within years 1 and 2)
5. Ten undergraduate STEM scholarships at \$3,000/year to increase the retention and graduation rates of STEM students with an emphasis on broadening participation (within years 1 and 2)
6. Two endowed professor supplements at \$75,000/year to increase the number of critical STEM researchers in nanoscale science and engineering (within the five time frame)
7. Mission support at \$100,000/year to enhance the research capability and activities of WVNano faculty and students including funding for a visiting scholars program, a named lecture series, faculty exchanges, and graduate student travel to attend and participate in professional meetings (years 2 and 3)

WVU, the WVU Research Corporation, and/or externally funded grants will provide support for items 1, 2, 3, and portions of 7, above, at the onset of the fund raising effort. However, once endowments funds are in place, then these internal and grant funds will be redirected to support other STEM research initiatives and activities.

The use of endowment earnings will demonstrate to external agencies, including NSF the sustainability of the research infrastructure improvement funds that have been provided through NSF EPSCoR to initially start and build up the WVNano Initiative to a university interdisciplinary research center and to its projected goal of becoming a nationally recognized and funded research center through a federal agency such as the NSF.

Expected Impact: The goal for the WVNano Initiative is to compete and be awarded a federal agency center of excellence award such as a Department of Energy Center of Excellence or an NSF MRSEC (Materials Research Science and Engineering Center) within a 5- to 7-year time frame. The research outcomes are expected to lead to innovations in energy, biomedical, and identification technology applications.

The WVNano Initiative also furthers goals 1, 3, 11, and 12 of VISION 2015, The West Virginia Science and Technology Strategic Plan, specifically to increase: the number of critical STEM researchers, the number of PhDs awarded, the retention and completion rates of STEM students, and the creation of a nationally competitive research thrust.

Current Research Assessment: The WVNano Initiative currently has 25 faculty contributing to the interdisciplinary efforts of this research. These individuals have received competitive grants from federal agencies including the Department of Energy, the National Institutes of Health, and the National Science Foundation (NSF) amounting to nearly \$7 million in the past three years. As an example, the interdisciplinary work of our faculty in nanotechnology and those in cancer research has the potential to develop patents in breast cancer detection. WVU has committed to making the WVNano Initiative the focus of its next EPSCoR RII proposal. Several new research laboratories are being created to support the nanotechnology initiative.

Biological, biotechnological and biomedical sciences (up to \$17.5 million state allocation to be matched with private funds)

Objective: The Health Sciences Center (HSC) has adopted a strategy of letting 'patient populations guide programmatic growth' and 'building on strength'. Thus, research programs are focused on health disparities that disproportionately affect patient populations.

Research programs that are focused on discovery and translating discoveries to patient populations, which may offer improved or cutting edge care, require teamwork. At WVU research teams include faculty from the HSC and colleagues from three colleges within the general university – Arts and Sciences, Agriculture, Forestry and Consumer Sciences, and Engineering and Mineral Resources. These talented faculty conduct novel, federally funded research that is the engine for discovery. These research teams are dependent upon the diverse and complimentary talents of the faculty and their support staff. In addition, the success of research teams is dependant upon access to cutting edge technology and core facilities where technology can be managed, cared for, and be put to use either by the faculty and scientists directly or as a service.

WVU has several well established interdisciplinary collaborations between faculty of the Health Sciences Center and faculty of the general university, including faculty in biomedical engineering, biology, psychology, and nutrition. These collaborations include efforts within the nationally recognized cancer center as well as developing centers in cardiovascular and neurological research. Biomedical research in the Health Sciences

Center focuses on discovery and understanding the fundamental changes that occur during disease. The HSC seeks to augment their research programs by developing interdisciplinary research programs that translate discoveries to the clinic and assess whether these research discoveries can provide novel, state-of-the-art care options for patient populations. If successful, these new treatment strategies can be transferred to the clinic where they can be adopted as standard care and promote the health and well-being of our patient populations. Thus, patient populations help dictate biomedical research growth. To this end, the HSC interdisciplinary research programs are focused upon health disparities that are relevant to West Virginia and Appalachia.

The Cancer Center was supported under the Eminent Scholars Program, which provides funds to recruit talented research faculty and this commitment will continue under the Research Trust Fund Initiative. The neurosciences program recently acquired its first NIH T-32 Training grant involving faculty from the Health Sciences Center, biology, and psychology, building on previous NIH CoBRE (Center of Biomedical Research Excellence) support. This same team of faculty recently submitted another training grant to continue building a stronger interdisciplinary training program. A T-32 training grant for cardiovascular research was also recently awarded and WVEPSCoR has funded a training grant for cancer nanotechnology. These training grants will provide a new generation of trained neuroscientists to work in West Virginia and serve the needs of its citizens.

Plan of Action and Use of Funds: The Research Trust Fund initiative will provide funds to support (a) the recruitment of at least twelve new faculty who will augment growth of existing research programs, (b) state-of-the-art technology and infrastructure that foster discovery and support faculty research as well as clinical trials and the infrastructure which allow patient populations to access state-of-the-art care.

The Research Trust Fund will allow the HSC and the general university to recruit talented faculty who will complement existing research teams and improve the expertise and productivity of these teams. Some faculty may be bio-medical engineers as well as cellular and molecular biologists, neurobiologists and neuropsychologists. Permanent support through the Research Trust Fund, in combination with the Eminent Scholars program, will provide endowments that will attract talented faculty to West Virginia University. Such funding may also promote the recruitment of talented graduate students and post doctoral fellows. Further, these funds will provide support for the acquisition and maintenance of technology and the core facilities that oversee state of the art technology. These funds can support, but are not necessarily limited to equipment, supplies required for operation of technology, and scientific staff who offer expertise and assistance.

The Research Trust Fund would be used to support the following:

1. 12 endowed faculty positions in HSC and/or the general university (each at \$1.5 million) would provide \$60,000 in annual supplements for each position

2. Four (4) core facilities at \$2 million per facility would provide \$80,000 annually per facility to invest in technology
3. Support for students, post doctoral fellow, research staff totaling \$9 million aggregated from many smaller gifts, yielding \$360,000 annually

Expected Impact: There is an excellent standard of health care in West Virginia; however, there are no facilities that offer access to Phase I and Phase II clinical trials. Patients desire access to the best available care and desire access as close to home as possible. Support from the Research Trust Fund Initiative will foster the development of research programs that are based on discovery which will promote research grant funding – a hallmark of research excellence. These programs will benefit from the Research Trust Fund as these funds will assist WVU in attracting talented faculty who will have access to state-of-the-art technology. Further, by fostering the development of research programs with excellent faculty and technology, this will provide for an infrastructure that can support the development of translational research and clinical trials, which will benefit our institution, state, and most especially our patient populations. Lastly, economic impact is anticipated via federal funding, a rule of thumb is \$6 for every \$1 of research funding to the community, and 1 job (support job in the community) for every 4 jobs supported by federal funds. Further, the recent development of biotechnology companies in Morgantown (Protea Biosciences, for example, involving faculty from across the university) is evidence of direct, research-based economic impact.

Current Research Assessment: Over 150 tenured and tenure-track faculty and more than 30 research faculty in the HSC and general university provide support for this initiative. Research funding in the biomedical sciences is approximately \$50 million annually of which one-half is derived from federal sources (peer reviewed), including the NIH, DoD, NSF and AHRQ. Some of these programs are collaborative in nature involving researchers from across the WVU campus.

Research programs in cancer, cardiovascular and neurosciences are well-developed with a good foundation of NIH-funded basic research faculty focused on discovery and the understanding of fundamental changes associated with disease. Student training grants are also in place to ensure that we are developing future leaders for research in these fields. Lacking are faculty that can promote the translation of these findings to the clinic (translational research) and technology to foster discovery. Some programs also require the recruitment of key faculty who will help build and pull together research teams and promote programmatic development.

All of these research programs require faculty expertise in epidemiology (to identify at-risk patient populations and risk factors) and clinical and translational research (clinical trialists) in order to achieve our goals of addressing health disparities and patient populations in WV and Appalachia and translate our discoveries to patient populations. There are only a few faculty members who are competitive for NIH funding in the areas of epidemiology and translational research and there are no clinical trialists who conduct NIH funded research in the area of Phase I and Phase II clinical trials.

Biometrics, security, sensing and related identification technologies (up to \$8 million state allocation to be matched with private funds)

Objective: Building on the institution's past investment and current strength in biometrics, WVU intends to solidify and expand its leadership role in this field of study which is so critical to homeland security and national defense. The next generation of biometrics will enable the use of not only physiological characteristics of humans, but molecular characteristics for comprehensive identification of identities and intent within the envelope of human activity. In addition to technical complexity, one of the most challenging aspects of future biometrics research is the social and ethical aspects including the balancing of personal liberties, privacy, and security. WVU research across this spectrum of challenges leverages prior NSF RII investments in biometrics with current investments in nanoscale science and engineering. To be at the cutting edge of biometrics research requires a direct investment; WVU is committed to making this investment through the "Research Trust Fund" Program.

Plan of Action and Use of Funds: The primary need at this stage of development is for the increased numbers and quality of personnel to meet the increasing expectations of our external research sponsors and the transition of that research to practice.

Therefore, the targets for investment are:

1. One endowed chair supplement (at \$100,000/year)
2. Two endowed professorship supplements (at \$50,000/year or \$100,000 in total)
3. Three endowed postdoctoral fellowships (at \$90,000/year or \$270,000 in total)
4. Five graduate student fellowships (at \$30,000/year or \$150,000 in total)
5. Ten undergraduate fellowships (at \$2,000/year or \$20,000 in total)

These priorities will be adjusted to reflect donor's specific preferences. The expenditure outlined above anticipates \$8 million in private donations and \$8 million state match. The generated income of \$640,000 per year matches the outlined support needs.

Donors will be cultivated throughout the five year period for each of the five designated areas of need. It is anticipated that support for the undergraduate, graduate and postdoctoral fellowships will occur in the first two years and success for the endowed chair and professorship supplements will occur in the mid to later year time frame.

Expected Impact: Industry and federal agencies expect WVU to draw on the best intellectual capital in order to conduct not only research, but to be an effective partner in the transition of that research into systems that serve the national interest. The Research Trust Fund investments will enable WVU to expand its capacity for research by recruiting and retaining needed US students and key professionals. These personnel will enable the program to compete for projects spanning research and

transition to practice for which the capacity currently does not exist. These investments are essential for WVU to reach the next level of competitiveness.

Current Research Assessment: Although drawing from the activities of only seven faculty members, WVU has developed a national reputation in biometrics. This is evident in the recent signing of a Center of Excellence document between the Federal Bureau of Investigation and West Virginia University, identifying WVU as the Bureau's academic portal for research in biometrics. WVU also is a National Center of Excellence in Information Assurance as designated by the National Security Agency and Department of Homeland Security.

WVU is the lead and founding institution of CITeR, the NSF Center for Identification Technology Research an organization composed of over 30 academic, industry and government partners. CITeR is a known source of discovery and innovation at federal funding agencies including the Departments of Homeland Security, Defense, and Justice. CITeR has generated \$4.4 million in research funding over the last three years and already has \$2.2 million in awards pending in 2008. This investment to increase capacity will enable CITeR to meet the growing expectations placed upon it for research and education in biometrics and homeland security. Furthermore, new research space to support the biometrics focus area will become available in summer 2008.

Oversight/Annual Reporting

On behalf of the President, the Provost will be responsible for oversight of this initiative and will coordinate activities between and among the research initiatives, the academic deans and program directors, and the staff of the WVU Foundation. The Provost will report annually to the Board of Governors, keeping the members informed of the progress to-date as well as identifying areas of concern. The Provost will subsequently develop the institution's annual report to the Higher Education Policy Commission.

As required by the Higher Education Policy Commission, WVU will develop a business plan for each research focal area. As part of the business plan, WVU will report on other money raised in support of each research area that does not qualify for matching funds, including gifts in-kind, additional institutional commitments made to support each research area, and the amount of externally funded grants and contracts within each area.

Board of Governors Certification

The Board of Governors must certify the validity of each gift according to the strategic plan for research. The Provost will make a formal presentation to the Board seeking such certification using a form that will identify the donor, the amount of the gift, and the intended use. Also on the form will be three certification signatures – that of the Foundation certifying the validity of the commitment or pledge, that of the Provost

certifying that the gift fits with the strategic plan, and that of the Board confirming the acceptance of the gift in accordance with the strategic plan. Once a gift is certified by the Board, the Provost will send a formal request to the Vice Chancellor for Science and Research asking for release of the state funds.

Role of the WVU Foundation

The WVU Foundation will serve as the fiduciary agent to invest and administer the directed research endowment relative to this initiative. Appendix 2 contains the Executive Fundraising Summary prepared by the Foundation staff in collaboration and consultation with the administration of WVU.

REPORT ON THE RESEARCH TRUST FUND

MARSHALL UNIVERSITY RESEARCH ENDOWMENT PLAN

I-Executive Summary

Implementation of the Marshall University Strategic Initiatives⁴ endorsed by the Marshall University Board of Governors has been underway since early 2006. This vision establishes the University's foremost priorities and serves as the integrated roadmap for advancing the University. Furthering economic development in West Virginia, nationally, and internationally through entrepreneurial research is one of the fundamental expectations of this plan. To achieve this objective, the University will establish the Marshall Institute for Interdisciplinary Research (MIIR). The MIIR will catalyze and incubate the development of applied research from discovery-to-delivery (i.e., genesis of new business ventures). It is designed to operate as a self-sustaining and self-generating enterprise that will stimulate economic development, expand the intellectual infrastructure of WV and increase employment opportunities in the applied research sector.

The creation of MIIR through endowment proceeds (minimum endowment set at \$36MM dollars) and annual expenditures of interest earnings from that endowment will support a nucleus of non-tenured scientists in an earning and entrepreneurial culture in which external support will provide 50% of their funding for compensation after five years. Endowment proceeds recaptured at each five year interval will be redirected to create new endowed research scientist positions every five years, thus creating a mechanism for self-generating growth in the population of full-time research scientists dedicated to research-based economic development.

In addition, this research enterprise will incorporate and develop an advanced research infrastructure that is effective, efficient, responsive, agile and dynamic with respect to researcher- and market-driven environments, which interfaces and interacts with national and global partners. It will feature educational and occupational ladders in entrepreneurial research and business innovations. These opportunities will emanate from interdisciplinary and multidisciplinary research collaborations focused on breakthrough, patentable discoveries that have the potential to produce economic expansion, enterprise creation and job growth from intellectual property commercialization. Through the varied array of scientists attracted to MIIR, the Institute will promote the growth of diverse human and intellectual talent in the research enterprise, which will be further enriched by varied global perspectives that will catalyze increased breadth and depth of research opportunities for faculty, students, and staff.

The Institute will operate within the highest standards of ethics and integrity in research and incorporate recognized best practices for the management of an entrepreneurial research enterprise. In addition, its focus on applied scientific research will exploit intrinsic synergies among disciplines, while attracting students, especially women, to research careers in the S.T.E.M. disciplines (science, technology, engineering, and mathematics).

⁴ <http://www.marshall.edu/President/unitestrategicinitiaives.asp>

Interdisciplinary applied research will be concentrated in two of Marshall's areas of research strength (research clusters in biomedical/biotechnology/bioenergy/bionanotechnology, and transportation technology/logistics). This approach offers the greatest opportunity for the genesis of intellectual property and its commercialization, while building on existing strengths. The University and State of West Virginia will benefit from the development and expansion of the interdisciplinary research in these fields. Once fully operational, the Institute is projected to have a 10-year direct economic impact of 1000 new jobs with a \$25 MM enhancement in state tax revenues, not counting spin-off companies and their benefits to WV.

The plan for MIIR's development and the initial steps in its formation were approved in 2007 by the award of a \$5MM grant by the Office of Science and Technology's Eminent Scholars Research Enhancement (ESRE) program and Marshall's \$5MM private match. The creation of the West Virginia Research Trust Fund in March 2008 provides the opportunity to fully fund the establishment of the Institute as projected in the ESRE proposal. This Research Strategy Implementation Plan documents the application of the projected \$35-40MM available to Marshall through the State's investment of a minimum of \$15-MM in endowment funds, which will match dollar-for-dollar privately raised funds in support of the Institute.⁵

II-Background-Poised for Acceleration

Over the past ten years, Marshall has generated a steadily-increasing level of externally-funded research. Marshall's progress has been guided by focused integration and amplification of existing strengths within the School of Medicine and the College of Science, and now the College of Information Technology and Engineering. Infrastructure development grants from the State Office of Science and Technology, the National Science Foundation EPSCoR program and the NIH IDeA program have been used to hire and equip research faculty in these units and seed multidisciplinary centers. Successful scholarly and technology transfer results have been achieved in the biomedical/ biotechnological and nanobiology fields through cross-disciplinary efforts between the biomedical, biological and physical sciences. Five new business ventures have been launched by Marshall University's Research Corporation through patent licensing. These ventures include: Vandalia Research™, Inc.; Progenesis Technologies™, LLC; M.I.S.T.™ (Medical Information Systems Technologies); InSenSys™; and Ecer Technologies™, Inc.

A milestone in the development of this integrated multidisciplinary approach was the completion of the Robert C. Byrd Biotechnology Science Center in 2006. The construction of this state-of-the-art teaching and research resource facility located across the street from the College of Science has brought researchers and students from the Medical School and University into productive proximity measured in feet, rather than miles as was the case in previous facilities. The founding of a truly interdisciplinary research enterprise, the Marshall Institute for Interdisciplinary

⁵ Depending on availability, additional WV Trust Fund monies may be available after five years to match private gifts beyond \$15 MM to yield a 1:1 Trust Fund match.

Research, is the next important and fiscally responsible step in the growth of research at Marshall University.

Throughout the Marshall University Strategic Initiatives, specific objectives have been established for enhancing research and scholarship to evolve a sustainable platform for enhancing research productivity and funding, while elevating Marshall's stature and area-wide influence on economic development. Strategic investments have been made by the University, and Marshall is now poised to leverage these resource investments through the creation of the Marshall Institute for Interdisciplinary Research. Similar institutes are features of many successful research universities, and the formation of the Institute for Interdisciplinary Research at Marshall will have a dramatic, timely and strategic impact by developing a self-sustaining research enterprise that will spur economic development through the attraction of a cadre of nationally prominent, non-tenured researchers dedicated to producing breakthrough discoveries that will launch new business ventures. The Institute will catalyze interdisciplinary research activity across the University and generate revenue for the University through a commitment to commercializing viable intellectual property. Perhaps, as importantly, investments in MIRR and the hiring of experienced, successful researchers within the Institute will have significant collateral benefits for research-active, tenure-track faculty members within the University and accelerate their competitiveness for future external grant funding.

III-Narrative Review of Ongoing Research Initiatives

As described in several portions of this document, Marshall's strategy for research excellence and growth has focused on the integration of strengths across the School of Medicine and the College of Science, and now, the College of Information Technology and Engineering.

A. Biomedicine, Biotechnology and Nanobiology

In the School of Medicine, the Biomedical Sciences graduate (Ph.D.) research program has been organized around five interdisciplinary clusters:

- [Cancer Biology](#)
- [Cardiovascular Disease, Obesity and Diabetes](#)
- [Molecular Mechanisms of Pathogenesis](#)
- [Neuroscience and Developmental Biology](#)
- [Toxicology and Environmental Health Sciences](#)

These research clusters are centered in the new Robert C. Byrd Biotechnology Center and extend to research collaborations elsewhere on-campus and within the medical school. Several of these clusters involve nanobiology applications and approaches. Marshall's Nanobiology focus has been enabled by the NSF WVEPSCoR program's Research Infrastructure Improvement Grants, and the Biomedicine focus has been supported through NIH COBRE/INBRE programs. These initiatives have spawned several research thrusts, which either are active and productive, or will be shortly following additional funding.

Through the NSF EPSCoR Research Infrastructure Improvement Grant, Marshall University has provided funding for an interdisciplinary team of five chemistry and biology researchers in the area of nanobiology, and the hiring of two experienced faculty members. Competitive external funding from the NIH and Army Research Office has been a successful outcome of this project, and the collaboration has directly resulted in the development of the initiative in Cellular Differentiation and Development described below.

The Cellular Differentiation and Development Center has recently commenced with support from a Research Challenge Grant. As a result of the aforementioned infrastructure building, research-active faculty in molecular/cellular biology, genomics, physiology, genetics, embryology, development, and biophysics have been attracted to campus. The recognition that all share a common interest in epigenetic mechanisms underlying cell differentiation and development and the diseases or abnormalities that result when these mechanisms malfunction led to the search for a mechanism to develop interdisciplinary collaborative thrust in this critical area. This goal was accomplished by funding and chartering the CDDC to provide (a) targeted recruitment of faculty and postdoctoral trainees; (b) a mechanism for generating preliminary data supporting grant applications; and (c) an administration that will provide oversight and accountability. Commencing its second year of operation, the Center has already attracted an NIH-funded senior researcher to provide leadership and direction for the Center's further development.

The NIH Centers of Biomedical Research Excellence (COBRE) grant at Marshall University has focused on the creation of a critical mass of cancer researchers supported by key capabilities. The project has created a genomics core, providing microarray-based gene expression profiling and comparative genome hybridization, automated DNA sequencing and DNA/RNA sequence analysis software and real time PCR. The statewide NIH-INBRE program, led by Marshall, also makes use of this facility and has focused on developing the Appalachian Cardiovascular Research Network and a Bioinformatics core. Through these efforts, fourteen research-oriented biomedical faculty members have served as a base for attracting an additional five cardiovascular and cancer researchers. In the very near future, through the auspices of the West Virginia Higher Education Policy Commission's Division of Science and Research Eminent Scholars Recruitment and Enhancement (ESRE) program, an ESRE Professor of Diabetes and Cardiovascular Disease will be hired to bring critical missing research expertise to the Biomedical cluster.

A significant increase in peer-reviewed publications, NIH and other external funding awards and patentable inventions are key positive outcomes observed from these efforts. Two other key initiatives are underway. One will provide the bridge between biomedical research output and commercialization of the derived therapeutics, and the second seeks to integrate advances in Nanosensing to provide for the critical needs in rural health care that confront West Virginia and the surrounding areas.

The Center for Biotechnology /Biomufacturing Commercialization will capitalize on a growing but lucrative area of the national economy, which transforms biomedical research and harness bio-systems to generate viable therapeutic products. The Center will provide quality research, development and small-scale production capability to the pharmaceutical and biotechnology industries in West Virginia and the surrounding region.

Employing the best scientific and engineering practices, the Center for Diagnostic Nanosystems focuses on novel molecular-based diagnostic tests that can be used by individuals and public health systems to facilitate personalized medicine and preventative health care management. Focusing on the creation of new ways to diagnose disease, monitor health, and build enabling electronics, the Center will merge new technologies from nanoscience, microelectromechanical systems (MEMS) with genomics and molecular biology. The Center will capitalize on the vast potential of nanobioscience through the integration of interdisciplinary research developments in biologics and technological devices to deliver commercially-viable products. Included among them will be new classes of personal diagnostic nanosensor systems capable of integration into telemedicine networks. These systems will use emerging bionanotechnology capabilities to detect abnormal conditions at the molecular scale and at their earliest stages, *particularly within rural populations where routine access to state-of-the-art medical facilities is greatly lacking.*

MIR will accelerate and intensify the productivity of these initiatives. Through the sustainable business model and cadre of non-tenured researchers, MIR will address critical need for resourcefulness and celerity in today's rapidly changing research environment.

B. Intelligent Transportation Systems and Logistics

Intelligent Transportation Systems (ITS) combines computers and sensors in integrated systems to assist in making our transportation system safer and more efficient. On one end of the spectrum ITS will facilitate crash avoidance technologies for the typical motorists on our highways, and allow all types of transport vehicles to use less fuel helping to reduce our nation's dependence upon foreign oil. At the other end of the spectrum, ITS technology steers visitors to tourist spots, ambulances to 911 calls, and commuters to parking spots in busy downtown districts or around College campuses.

Marshall University is leveraging the capability of the Rahall Transportation Institute's designation as a national University Transportation Center and its proximity to the nation's largest inland river port and some of the busiest freight rail lines in the Appalachian Region. Through attraction of prominent faculty focused on the significant deployment and customization challenges in transferring urban highway ITS technologies into rural America and the rail and water modes of our nation's ground transportation system, Marshall endeavors to develop a significant research cluster in this significant and growing area of technological enterprise that will be critical in the nation meeting the energy and logistics needs of the future.

CITF's engineering program is augmenting the Rahall Transportation Institute's efforts to create a Center of Excellence in Intelligent Transportation by providing the expertise of its faculty to the research and development efforts of RTI. New faculty members have been hired who are recognized experts in the areas of infrastructure and transportation engineering. The expertise that these faculty members possess includes not only ITS, but advanced testing and monitoring techniques for various transportation structures, as well as the application of modern materials and techniques used in the construction of transportation systems.

IV-Marshall University Research Endowment Plan: Specific Goals

Plan Goal 1: *Increase the number of full-time, grant funded researchers at Marshall University by a minimum of nine scientists within the next five years.*

Potential Outcome(s):

- Establish MIIR as a non-profit 501 (c) 3 entity within the Marshall University Research Corporation;
- Increase in full-time research-active scientists directly employed by MIIR and the Marshall University Research Corporation;
- Increase the number of research-active faculty holding traditional academic appointments within the University;
- Increase in the number of competitive grants submissions and grant-funded researchers
- Increase in total competitive grant funding for Marshall University;
- Increase in overall research funding for programs and facilities at Marshall University
- Increase in patent filings;
- Increase in licensed patents and new business start-ups;
- Collateral (indirect) research productivity gains in departments and colleges elsewhere in the University.

Strategies for Achieving Goal:

- Recruit and hire a research-active MIIR Senior Scientist/Director who will have the following responsibilities:
 - ✓ Recruit, hire and build an interdisciplinary team of top-tier research scientists required to fulfill the mission of MIIR;
 - ✓ Recruit, select, charter and chair a Council of Scientific Advisors (a "RAND-like" entity of national and international innovators) to serve MIIR;
 - ✓ Develop and implement the scientific vision and plan for the Institute, consistent with its financial development;
 - ✓ Develop the Institute policies for reinvestment of recaptured compensation and indirect cost distribution generated by research activities within the Institute;

- ✓ Work with the President, the Senior Vice President for Development/CEO of the Marshall University Foundation and the Vice President for Research to increase the MIIR endowment fund;
- ✓ Maintain a vigorous externally-funded research program;
- ✓ Manage the goals and performance of the Institute staff
- Foster research collaboration between MIIR and faculty within the University.
- Increase the competitiveness of research-active faculty for grant funding by leveraging the resources (e.g., scientific expertise, equipment, etc.) developed within MIIR.
- Focus the majority of research investments in applied areas of research that have the potential to yield patentable discoveries.
- Retain the services of a research/technology transfer expert to improve/accelerate discovery disclosure reporting, provide patent assistance for scientists, develop external technology partnerships and accelerate new venture start-ups.

Progress Measures:

- Hiring of MIIR Senior Scientist/Director;
- Number of new full-time research-active scientists directly employed by MIIR and the Marshall University Research Corporation on an annual basis and the number of new scientists added;
- Recruitment of Council of Scientific Advisors members and the constitution and activation of the Council;
- Number and value of successful competitive grant submissions by year; number of grant-funded researchers by year; and the trend for both metrics over the previous five years;
- Total value of competitive grant funding within MIIR and the trend over the previous five years;
- Overall research funding for programs and facilities involving MIIR by year and the trend over five years;
- Increase in the number of new MIIR patent disclosures and filings per year over a five year continuum;
- Increase in the number of MIIR patents licensed and the number of new business start-ups on an annual basis and over a five year continuum.
- Growth in similar metrics for the University *per se* that reflect collateral (indirect) research productivity gains in departments and colleges elsewhere in the University.
- Number of new research-active faculty holding traditional academic appointments that have been added annually to the University and the net retained.

Time Interval for Assessing Progress: 2008-2013 with annual summaries of progress.

Plan Goal 2: *Develop interdisciplinary research clusters and focus endowment investments in research areas that:*

- ⓐ *Build on existing institutional strengths and add to the critical mass of researchers;*
- ⓑ *Involve multiple grant funding agencies/sources with reasonable probability for the awarding of funding on an ongoing, competitive basis;*
- ⓒ *Offer the potential for breakthrough, patentable discoveries that will enhance research-based economic development.*

Potential Outcome(s):

- Assuming private donor gifts will support the development of two research clusters, the University's directed research endowment plan will be concentrated initially on one or two areas of interdisciplinary research, which are strengths at Marshall: research clusters in biomedical/biotechnology/bionanotechnology, or/and transportation technology/logistics);
- Characterization of the complex interactions between environmental and genetic factors (both genomic and epigenetic) responsible for the chronic diseases in Appalachia;
- Increased product development in one or more of the following areas: biomanufacturing and niche areas of applied biomolecular research and bionanotechnology, which include the development of nanostructured, nanocrystalline and advanced electronic materials (DNA and RNA), nanostructured materials for cellular energy capture and delivery, bioenergy processes that yield alternative fuels/energy production, functionalized nanostructured materials for chemical-biosensor applications, nanomaterials in environmental pollution detection, monitoring and remediation, and functionalized nanostructures for targeted therapeutic agent delivery in medicine.

Strategies for Achieving Goal:

- Cultivate donors interested in gifting to one or both of these research areas;
- Attract and hire core research scientists with the expertise and commitment to contributing to research advances in these priority areas;
- Build and advance the development of strong, interdisciplinary research teams within MIIR and the University, and develop advantageous collaborations across the University and with researchers at other institutions both domestically and internationally.

Progress Measures:

- Annual private gift totals supporting research at Marshall University and matched by the WV Research Trust Fund;
- Total endowment funds dedicated to research in biomedical/biotechnology/bio-nanotechnology/bioenergy;
- Total endowment funds dedicated to transportation technology/logistics research;

- Hiring and retention of new full-time research scientists working in these areas;
- Productivity of assembled interdisciplinary research teams as measured by grant activity, personnel hiring, peer-reviewed publications and patent applications.

Time Interval for Assessing Progress: 2008–2013 with annual summaries of progress.

Plan Goal 3: *Increase the overall non-base budget for research and the number of non-base funded positions within Marshall University's research enterprise, while increasing the retention and employment of college graduates.*

Potential Outcome(s):

- Increase in redirected F & A (Administrative and Facilities) funding generated by MHR scientists to support research within MHR;
- Increased employment of college-educated research technicians and research support personnel;
- Increased employment of research associates and postdoctoral fellows
- Increased employment of postdoctoral fellows;
- Increased employment of personnel skilled in business, financial and entrepreneurial aspects of new venture start-ups emanating from licensed research patents;
- Increased graduate (Master's and Ph.D.) student employment (paid tuition/fee waivers and enhanced stipend support);
- Increased undergraduate student participation in research;
- Increased internal competitive mini-grant funding for undergraduate students engaged in research;
- Increase overall direct and indirect employment within the Bioscience Sector through research conducted by Marshall University.

Strategies for Achieving Goal:

- To generate greater discretionary revenues to invest in employing additional research personnel, seventy-five percent (75%) of F & A funds earned from grants will be returned to MHR scientists for investment in needed personnel and equipment and 100% of recaptured salaries from grants will be returned to MHR scientists for the same purpose;
- Increase personnel support from grants and contracts;
- Participate in the growth/expansion of existing private sector businesses through intellectual capital creation and retention;
- Attract new business investment in research-related enterprises;
- Increase philanthropic support for research through endowment and non-endowment gifts.

Progress Measures:

- Level of annual discretionary revenues for research investment;
- Formulation of five-year business plans with defined accountability measures for making strategic and sustainable research development investments;
- Direct and indirect employment growth attributed to the University's research enterprise

Time Interval for Assessing Progress: 2008-2013 with annual summaries of progress.

Plan Goal 4: *Increase the number of Ph.D. programs at Marshall University by at least one program.*

Potential Outcome(s):

- One or more new Ph.D. programs in high demand fields.

Strategies for Achieving Goal:

- Generate a self-sustaining funding base for the operation of one or more new Ph.D. programs;
- Examine areas of opportunity, evaluate and prioritize them;
- Assemble the core faculty and physical resources required to deliver a program of excellence.

Progress Measures:

- Funding, leadership, a comprehensive business plan and an action plan for the start-up and operation of the program;
- Curriculum development and approval;
- Implementation of the program and Ph.D.-student enrollment;
- Graduation of degree candidates and engagement of graduates in research-related career paths.

Time Interval for Assessing Progress: 2013-2015 with annual summaries of progress.

Plan Goal 5: *Improve technological digital reference support for internationally competitive research programs.*

Potential Outcome(s):

- Campus Internet-2 access for inter-institutional database sharing
- Campus-wide access to National Supercomputing Resources
- Increase data warehousing and cataloging capacities;
- Increase digital research journal subscriptions in priority fields;
- Improve the MORC service platform and the array of automated/integrated electronic services (e.g., e-purchasing, e-PAR's, etc.).

Strategies for Achieving Goal:

- Increase annual and one-time funding available for technology resource and infrastructure development through a combination of grants, public and private funding;
- Increase annual and one-time funding available for digital information (e.g., library holdings) and resources through a combination of grants, public and private funding;
- Continue efforts to expand the integrated database capabilities and utilities provided by Marshall's enterprise software platform.

Progress Measures:

- Amount of increases in annual and one-time funding available for technology resource and infrastructure development through a combination of grants, public and private funding;
- Annual funding increases in base and one-time funding available for digital information (e.g., library holdings) and resources through a combination of grants, public and private funding;
- Evidence of expanded database capabilities and services provided within MURC by Marshall's enterprise software platform.

Time Interval for Assessing Progress: 2009–2015 with annual summaries of progress.

Plan Goal 6: *Expand the physical infrastructure available to support research in these and related fields.*

Potential Outcome(s):

- New ~\$60-million academic and research building (Marshall University Applied Engineering and Advanced Technology Research Complex);
- Increase in state-of-the-art research laboratory space to support the continued development of the research enterprise;
- Expansion in bioengineering and biomedical engineering research base

Strategies for Achieving Goal:

- Location of the building – current thinking is that this new building will be located between the Robert C. Byrd Biotechnology Science Center and the Engineering Laboratory Building on the Huntington Campus;
- Funding for planning this capital project will need to be obtained;
- Funding for the construction of this capital project will need to be obtained through a combination of grant, public (federal and state) and private sources.

Progress Measures:

- Acquisition of funds for planning;
- Acquisition of funds for building construction;
- Acquisition of base funds for opening and operating this building;

Time Interval for Assessing Progress: 2011–2015 with annual summaries of progress.

V-The Plan for Establishing the Marshall Institute for Interdisciplinary Research (MIIR)

A-Concept and Guiding Principles

MIIR is the principal research priority of the University. It is based on a concept constructed by President Stephen Kopp following an extensive review of institutional strengths, state and national research priorities, and an economic impact analysis.

Conceptually, MIIR is a significant departure from conventional university research development approaches. It is designed to develop a research enterprise predicated on an earning and entrepreneurial culture. MIIR will be ultimately staffed by a core group of endowed, nationally-competitive non-tenured researchers focused on applied, interdisciplinary research leading to new discoveries that have commercial potential. A core group of nine research scientists is targeted as the critical mass for full programmatic development. Additional scientists will be added as salary support is adjusted from full endowment support to partial endowment support for positions after the first five years of employment. The initial year salaries and start-up packages for the first two senior members of this core group have been provided by the ESRE grant program. Marshall University will utilize the additional state and private funds available from the WV Research Trust Fund to support the remaining seven members.

The institute charter stipulates that:

- Appointments of MIIR research scientists are exclusively within the Institute (a 501(c)3 subsidiary of MURC) - no appointments in traditional academic departments or colleges;
- Performance-based appointment contracts using funds derived from a portion of the interest earned on each endowment (4.5% spending rate) will be used in lieu of tenure eligibility with twelve month appointments, as opposed to traditional academic year timeframes;
- Contract renewals/extensions will be merit and performance based;
- All endowed research scientist positions will be required to generate 50% of their compensation from externally funded grants/contracts by Year 5 and then each year thereafter;
- After the initial five years, recaptured endowment earnings of each of the two positions will be combined to create new endowed research scientist positions;
- Research scientists will focus on the generation of commercially viable intellectual property (IP);
- Research scientists will be responsible for involving undergraduate and graduate students actively in biotechnology research with the goal of preparing the next generation of entrepreneurial researchers, who will

contribute to the economic growth of West Virginia within MIIR and elsewhere;

- MIIR research scientists will foster collaborative research projects with Marshall University and serve as mentors for less experienced researchers, as appropriate

B-Economic Impact of MIIR

A comprehensive economic impact study of this plan was conducted by Marshall University's Center for Business and Economic Research⁶. A two decade synopsis of the economic impact of MIIR is as follows:

- ❖ 3,365 new jobs (high wage/career opportunities for area residents, increased demand for and retention of educated knowledge workers and increased employment throughout the state)
- ❖ With a minimum of nine core scientists, first year direct employment growth from MIIR is 75 positions, all supported either from endowment earnings or external grants/contracts. Demand created by income and investment in equipment/supplies supporting these positions will add an additional 39 first year jobs.
- ❖ Over the next two decades, total employment created by the Institute will increase by 3,365 (employment of 231 people in MIIR creates a total additional direct employment of 1,984 people, indirect new employment of 641 and induced employment of 509 new workers).
- ❖ By year 5, the State will receive an estimated \$2 million annually in additional tax revenue.
- ❖ Tax revenues increase to \$5.3 million annually in year 10 with a total of \$137 million over the first two decades.
- ❖ Payback through increased tax revenues for the state's portion of the endowment investment in MIIR (\$26 million) will be approximately 5 years
- ❖ Increase in total in-State spending of \$284 million
- ❖ \$9.9 million in additional spending per year.
- ❖ \$36 million initial endowment generates \$7.89 for every \$1 of endowment funds expended.

These projections neither include new research/grant activity collateral to the Institute, nor royalty, nor equity revenues expected from ventures resulting from the successful commercialization of intellectual property developed by MIIR researchers. As such, the anticipated revenue growth, job creation and overall benefits projected on behalf of the State of West Virginia, which will result from the establishment of this institute, are highly conservative projections.

⁶ "The Economic Impact of the Marshall Institute for Interdisciplinary Research Endowed Professorship Program in West Virginia", Cathy Kent and Jennifer L. Peice, November 16, 2005

C-Scientific Focus of MIR

The MIR will focus on interdisciplinary research and development involving targeted areas of biotechnology/bio-nanotechnology. This particular focus was selected because it builds on the existing state-of-the-art research facilities and the interdisciplinary strengths of Marshall University, as described above. Within the broad field of biotechnology, MIR investigators will concentrate on the characterization of the complex interactions between environmental and genetic factors (both genomic and epigenetic) responsible for the chronic diseases in Appalachia. The initial spectrum of diseases under study will be cancer and cardiovascular disease, including obesity and diabetic components because (1) they are the most prevalent maladies contributing to regional morbidity and mortality; (2) the availability of considerable federal funding; (3) the core capabilities at Marshall both in terms of existing faculty expertise and facility resources; and (4) access to a unique and extremely stable genetic population.

The value of the aforementioned niche population extends well beyond the obvious inheritance or genetic damage implications. Recent findings⁷ suggest a person's health is influenced by ancestral lifestyles (e.g., dietary habits, smoking, etc.). These genetic effects appear to be gender specific and cause semi-permanent alterations to the germ-line across multiple generations of descendants (e.g., grandchildren). These environmentally-induced "epigenetic changes" are the result of chemical modifications in the DNA, rather than direct genetic mutations. Another element of the Appalachian population is its comparatively and historically low socioeconomic status. In a fascinating article in *Scientific American* entitled, "Sick of Poverty", Sapolsky⁸ points to an array of intriguing inheritance manifestations of poverty, which appear to challenge the common environmental assumptions and explanations – i.e., limited health care access, low health care utilization, and increased exposure to risk factors. Based on previous experimental results, Sapolsky posits that the pathogenesis of poverty is the result of chronic stress of "feeling" poor. The psychosocial stressors and behavioral habits of the stable, multigenerational, family-oriented population that typifies the Appalachian population proximal to this university provide a unique opportunity to study this hypothesis.

The Institute's genomics thrust takes advantage of the information made available through the Human Genome Project and the anticipated future demand for individualized health care through patient genomic and phenomic (physical phenotypic traits resulting from instructions encoded in the genome) information records. Church⁹ has described a futuristic view of medicine as follows:

⁷ Perissi, E; Food, Tobacco, and Future Generations. *Science* 310:1760-1761, 2005.

⁸ Sapolsky, R; Sick of Poverty. *Scientific American*, pages 94-99, Dec. 2005, www.sciam.com.

⁹ Church, G; Genomes for All; *Scientific American*, pages 47-54, January, 2006;

<http://www.sciam.com/article.cfm?ci=3&aid=sa000&colID=1&articleID=00046059-19CD-19A7-59C0R3414B7FD124>

"The '\$1,000 genome' has become shorthand for the promise of DNA-sequencing capability made so affordable that individuals might think the once-in-a-lifetime expenditure to have a full personal genome sequence read to a disk for doctors to reference is worthwhile."

D-Building on Regional Strengths

Regional biotechnology development is proving to be one of the most effective ways Marshall can build a platform of externally funded research and academic programs that offer substantial opportunities for students, while enhancing job creation and the retention of graduates in the state workforce. Clear evidence of the local economic impact of Marshall's biotechnology research is the fact that three biotechnology companies have been launched by the University within the last two years – Vandalia Research, Inc, Medical Information Service Technology and ProgenesisTM, LLC. All have attracted full rounds of initial equity and Vandalia has recently received second round financing.

Marshall's focus on biotechnology, biomedicine, bionanotechnology and bioenergy reflects a deliberate strategy of building on strengths within the Medical School and College of Science, but also reflects an emphasis related to the region's commercial activity in Biosciences. A recent study sponsored by the Pharmaceutical Research and Manufacturing Association¹⁰ highlighted important facts which validate this focus:

- Bioscience employment accounts for nearly 7,000 jobs across the state
- These bioscience jobs pay an average of \$55,220 per year, compared to a statewide average of \$37,894.
- One third of these bioscience companies and nearly half of the total jobs reside within the Advantage Valley Corridor of Cabell, Wayne, Putnam and Kanawha Counties.
- Cabell County's bioscience employment grew 20% between 2001 and 2006 to account for 15% of the statewide total bioscience employment

The establishment of MIR clearly will be consonant with developing and growing this dynamic cluster in West Virginia's "new economy". It will provide technology input to drive further venture development, offer area firms a source of expert collaboration, and train the future entrepreneurs, scientists and employees that will be necessary to continue the bioscience sector's trajectory of rapid growth

E-MIR's Impact on the University

While the MIR is a separate and distinct entity of the University, it will be constructed in a way so that it will serve as a bridge, catalyst and accelerant for collaborative research with the SOM, COS, and eventually, with the rapidly growing

¹⁰ "An Economic Profile of the Biosciences Industry in West Virginia", Anthony C. Gregory and Tom S Witt, February 2008.

College of Information Technology and Engineering (CITE). (A new \$3.5M, 16,000 ft² engineering laboratory building will be opened in the fall of 2008 and a second, \$50M engineering facility is currently being programmed.)

There are many examples of potential connections between MIIR and existing Marshall University research initiatives. For example, the Institute's genomics thrust will lead to bioenergy research and "ecogenomics" research – a new field, which applies the tools of genomics, proteomics, etc. to ecology and environmental sciences. Marshall's location on the Ohio River, its existing faculty expertise in DNA-based bacterial source tracking and other ecological indices of this river (and its contributing waterways), and the national need for a knowledge-based solution of competing commercial, recreational and water quality demands on the River offer an exceptional niche opportunity for collaborative research between MIIR and its parent institution, Marshall University.

MIIR's focus will also complement joint efforts of the SOM and COS to establish a Cell Differentiation and Development Center (CDDC). With funding from the State's Research Challenge Grant, a group of seven faculty from these two units will work to identify the epigenetic events essential for normal cell differentiation and development and to determine how alterations in these activities can lead to cancer and cardiovascular disease. The institution has committed one of the new MIIR hires to an individual with nationally-competitive research credentials in cell differentiation and development.

MIIR will increase Marshall's opportunities to expand and intensify collaborations with other West Virginia institutions building on existing infrastructure development programs of the NIH (INBRE and COBRE) and NSF (EPSCoR). The Institute will significantly advance Marshall's INBRE's Appalachian Cardiovascular Research Network (ACoRN)¹¹ – a multidisciplinary team of over 20 people from Marshall University (physicians, molecular geneticists, mathematicians, computer scientists, etc.), WVU Health Science Center (physicians and research nurses), Charleston Area Medical Center (physicians and research nurses), Fairmont State University (molecular biologists and students), West Liberty State College (molecular biologists and students) and several rural health clinics (physicians and research nurses). ACoRN's access to a largely rural population has already attracted attention and collaborative research offers from out-of-state research institutions.

MIIR will undoubtedly enhance both the quality and productivity of STEM (Science/Technology/ Engineering/Math) research at Marshall University, its entrepreneurial emphasis will lead directly to additional invention disclosures and technology-based economic development in southern West Virginia. The nationally-competitive stature of MIIR faculty will both increase the opportunity for high quality undergraduate and graduate research training at Marshall and enhance the level of research leadership in the University and the State. While a separate and unique organization, MIIR is intimately linked to the research and educational

¹¹ Bonette, L. Critical Connections; NCIIR Reporter; pages 4-9, spring 2007. www.ncir.nih.gov

missions of Marshall University and reaches its greatest capacity through complete integration with the simultaneous growth of the other STEM units of the University.

F-The Business Plan for MIR

Steps have already been taken to incorporate MIR as a 501(c)3 subsidiary of the Marshall University Research Corporation. Its growth and sustainability will be provided by the following sources of funds which are summarized in Table 1:

- \$3MM in expendable cash from the Eminent Scholars Research Enhancement grant
- Spending at 4.5% from an initial \$5MM allotment to the MIR endowment provided by Marshall's private match to the ESRE grant
- Marshall fundraising to earn the \$15MM state contribution is targeted at \$20MM. The contributions will accumulate over 5 years, and the overmatch will be available to draw down any remaining funds in the Trust fund after year 5. As the state and private funds accumulate in the MIR endowment, the spending rate on endowment proceeds will be reviewed and adjusted annually to ensure that the principal is not invaded. The endowment proceeds spending rate is estimated to average 4.5% annually.
- At the projected grant activity levels, return of 65% of the F&A to MIR will make significant additional funding available

MIR staffing will commence with the hiring of a MIR Director/Lead Research Scientist and the first Staff Scientist. The Director will be responsible for advancing their own nationally recognized research program and have the primary responsibility of developing the scope and stature of MIR through the recruitment of additional research scientists and personnel. The focus will be on hiring a nationally prominent researcher with a proven track record in entrepreneurship and research development for this position.

In years 3 and 4, the balance of the initial nine members of the scientific staff will be hired. By year 5, the MIR endowment will have reached the \$36 MM target, and hiring of additional scientists will be possible, while preserving the principal of the endowment.

REPORT ON THE RESEARCH TRUST FUND

West Virginia University **Research Trust Fund** Annual Report

August 13, 2010

Introduction

This second annual report describes the activities and achievements for 2009-2010 regarding WVU's Strategic Research Plan relative to the State of West Virginia's Research Trust Fund initiative. This document also responds directly to the reporting requirements outlined in Series 48 (§ 133-48-14).

In addition, an update on the Eminent Scholars Recruitment and Enhancement Program is included.

Eminent Scholars Recruitment and Enhancement Program (2007-2008)

The predecessor to the Research Trust Fund was the Eminent Scholars Recruitment and Enhancement (ESRA) Program. Under this program, WVU successfully matched the available \$5 million commitment from the State for a total investment of \$10 million to enhance its research and outreach efforts in the areas of cancer and stroke. These initiatives directly enhance WVU's efforts to respond to patient needs in two critical areas of health care. Each is reviewed below.

CANCER PROJECT

To recruit and retain eminent scholars in the areas of breast cancer, lung cancer, and gynecological cancer.

1. The Jo and Ben Statler Chair and Eminent Scholar in Breast Cancer Research, Fund 3V805 - \$1.5 million
2. The Bonnie Wells Wilson Distinguished Professor and Eminent Scholar in Breast Cancer Research, Fund 3V804 - \$1 million
3. ESRE Program Matching Funds - \$2.5 million

Fund Purpose Statements:

\$1.5 million from Ben and Jo Statler will support a Chair in Breast Cancer Research to benefit the Mary Babb Randolph Cancer Center (MBRCC), West Virginia University. The Fund's spend is designated to be used annually by the MBRCC to support the Chair, including salary and/or fringe benefits, teaching/research assistants, travel expenses, conference attendance, secretarial and other support staff, and to otherwise support the scholarly activities of a regionally, nationally or internationally recognized outstanding scholar in the field of breast cancer research.

\$1 million from Ben and Jo Statler will support a Distinguished Professorship to benefit the Mary Babb Randolph Cancer Center, West Virginia University. The Fund's spend shall be used annually by the MBRCC to support the Distinguished Professorship, including salary and/or fringe benefits, teaching/research assistants, travel expenses, conference attendance, secretarial and other support staff, and to otherwise support the scholarly activities of a regionally, nationally or internationally recognized outstanding scholar in the field of cancer research.

\$2.5 million from ESRE will support the recruitment and start-up of three physician-scientists in the area of lung, breast and gynecological cancers to conduct Phase I and II clinical trials.

Funding Impact:

The impact of these funds toward growing the research portfolio of the MBRCC has been significant. It is precisely the type of investment that is needed to develop a future application for a Cancer Center Support Grant (CCSG) and to achieve an NCI-designation for the State of West Virginia.

¹ Address questions and requests for additional information to Dr. Curt M. Peterson, Vice President for Research and Economic Development, West Virginia University at curt.peterson@mail.wvu.edu

- **Michael Ruppert, MD PhD** – joined our faculty in December 2008 from the University of Alabama – Birmingham and their NCI-designated Cancer Center. He is the inaugural holder of the Jo and Ben Statler Chair and Eminent Scholar in Breast Cancer Research, Professor of Biochemistry, and Co-Leader of our Breast Cancer Program in the MBRCC. He has two NIH R01 grants, with research focusing on tumor oncogenes in breast and skin cancer.
- **Jame Abraham, MD** – in October 2009 following a national recruiting process, Dr. Abraham, our current Chief of the Section of Hematology/Oncology and Medical Director of the MBRCC was installed as the Bonnie Wells Wilson Distinguished Professor and Eminent Scholar in Breast Cancer Research. He is an Associate Professor of Medicine and also appointed Co-Leader of our Breast Cancer Program in the MBRCC. He is the Principal Investigator on our institutional grant for the National Surgical Adjuvant Breast and Bowel Project (NSABP) and is a nationally recognized breast cancer expert. Dr. Abraham is building our statewide clinical trials network.
- **William Tse, MD** – joined our faculty in October 2009 from the University of Colorado and their NCI-designated Cancer Center. He is the Eminent Scholar in Hematological Malignancies Research, Associate Professor of Medicine and Co-Leader of the Osborn Hematopoietic Malignancy and Transplantation Program in the MBRCC. He is finishing an ASCO Young Investigator Award, is an expert clinical trialist in hematological malignancies, and is developing novel compounds for treating stem cell disorders in leukemia and brain tumors.
- **Associate Center Director for Clinical Research** – at the time of this report last year we submitted a highly competitive offer to recruit a nationally recognized medical oncologist, clinical trialist and expert lung and head and neck cancer physician. This investigator was from a nationally recognized NCI cancer center and unfortunately turned down the offer. Recruitment for this position is ongoing.
- **Associate Center Director for Translational Research** – currently the MBRCC is in the midst of recruiting for this position. This individual will have NIH funding and a preferred research focus in tumor microenvironment and hematological malignancies. Eminent Scholar funds will be directed toward the recruitment of this individual. Candidates from Harvard, University of Louisville and University of Pennsylvania have visited campus. We hope to finalize the selection process over the Fall 2010 Semester after second and third visits have commenced.

Questions and/or requests for additional information should be directed to Dr. Scot Remick [scot.remick@hsc.wvu.edu], Director of the Mary Babb Randolph Cancer Center.

STROKE PROJECT

To recruit eminent scholars to enhance new interventions to prevent and treat stroke and enhance recovery of brain function

1. West Virginia University Hospital (WVUH) Private Gift, Fund 2R338 - \$2.5 million
2. ESRE Program Matching Funds - \$2.5 million

Fund Purpose Statements:

\$1.5 million from WVUH will support the recruitment of a Stroke Medical Director. This person will be a clinician-scientist with board certification in stroke neurology who will bring extensive experience with stroke clinical trials and the ability to design new trials based upon research at WVU and other research institutions.

\$1.0 million from WVUH will support the recruitment of a clinician-scientist with board certification in stroke neurology and neuro-intensive care. S/he will bring experience in the design and conduct of clinical trials and the necessary credentials to classify the WVU clinical stroke unit as a comprehensive stroke center.

\$1.5 million from the ESRE Program will support recruitment of a Stroke Translational and Basic Science Research Director. This person will be a clinician-scientist with credentials as both a stroke neurologist and laboratory-based scientist. S/he will guide a research team investigating biological mechanisms that underlie stroke events, new diagnostics of stroke, the neuro-vascular response to stroke and neural repair.

\$1.0 million from ESRE will support the recruitment of an expert in regenerative medicine who uses stem cells or other means to regenerate \ neurons and neural circuits. This person will develop therapeutic approaches that will be tested in clinical trials.

Funding Impact:

This fund has provided the resources for the work of Dr. David Libell, Stroke Director. Through his leadership, Ruby Memorial Hospital, the WVU School of Medicine and the WVU Health Sciences Center have collaborated to create the new WVU Stroke Center. The Center provides a multidisciplinary and comprehensive approach to stroke. An emergency response team is available 24 hours a day to evaluate and treat stroke patients quickly to help minimize lasting damage. Treatment teams include experts in neurology, neurosurgery, interventional radiology, emergency medicine, neuro-imaging, physical therapy and others who collaborate on care for and rehabilitation of patients. This collaborative approach is extremely effective and our current mortality statistics are better than the top 20 programs in the country. The number of patients treated through the Stroke Center increased by 6.7% over the past year.

The WVU Stroke Center outreach efforts involve making West Virginians aware of the warning signs of stroke and working with providers and first responders throughout the state to ensure standards of care. Research groups are working to develop new strategies for treatment, including new diagnostic and therapeutic approaches, as well as monitoring the effectiveness of new therapies. Three National Institutes of Health (NIH) stroke trials are currently active in the Center which was recognized by the NIH as the “role model” for a rural comprehensive stroke program in their publications. Most recently, the Center’s program received Joint Commission of American Healthcare Organizations (JCAHO) accreditation for stroke and had no citations, the first for any WVU Hospitals program. The success and impact of this program can be measured through our risk-adjusted mortality and length of stay (LOS) rates which are better than any University Hospital across America. The Center’s transient ischemic attack (TIA) mortality is extremely small compared to our peers. Our mortality and length of stay for TIA, as well as for ischemic and hemorrhagic stroke are all substantially lower than established norms for peer American academic medical centers.

Dr. Libell recently stepped down as the Director and Laurie Gutmann, MD assumed his role. Dr. Gutmann is board-certified in Stroke, a long-standing and respected member of the WVU faculty, and prepared to accept the role by attending the National Stroke Conference for training and certification.

The recruitment committee is currently searching for a Stroke Translational and Basic Science Research Director. The ideal candidate will be a clinician-scientist with credentials as both a stroke neurologist and laboratory-based scientist. The successful candidate will be charged with guiding a research team investigating biological mechanisms that underlie stroke events, new diagnostics of stroke, the neuro-vascular response to stroke and neural repair.

Continuing recruitment efforts will address filling the positions of clinician-scientist with board certification in stroke neurology and neuro-intensive care, and of regenerative medicine expert.

Questions and/or requests for additional information should be directed to Dr. John Brick [jfbbrick@hsc.wvu.edu], Chair of Neurology, School of Medicine.

Research Trust Fund (2008-2009)

In March 2008, the West Virginia Legislature enacted Senate Bill 287, commonly referred to as the Research Trust Fund, as an effort to build a critical mass in selected areas of research and thus lay the groundwork for future economic development. Specifically, the State committed \$35 million to West Virginia University as a basis for a 1:1 match for private dollars to create endowments that would provide a sustainable source of funds for research and development. West Virginia University's approved Strategic Research Plan identified four areas for investment:

- Energy and environmental sciences
- Nanotechnology and material science
- Biological, biotechnological, and biomedical sciences
- Biometrics, security, sensing and related identification technologies

A brief description of each research area is available at

http://research.wvu.edu/home/research_trust_of_west_virginia_university

These areas build on the expertise of WVU's faculty, are critical issues of importance to the public, and lie at the core of WVU's land-grant mission.

Efforts Over 2009-2010

WVU's Commitment to Research Development

West Virginia University continues to balance its tripartite responsibilities for teaching, research, and service in fulfillment of its land-grant mission. This past year, President Clements initiated a comprehensive strategic planning process. As the institution's current 2010 Strategic Plan is coming to closure, President Clements chose to push the 2020 horizon with respect to campus-wide thinking and planning. In this process, Discover and Innovation (other terms for research) was one area highlighted for special review and analysis. While the 2020 Plan is not yet complete, it is clear that research will play a prominent role in WVU's future.

To this end, the total funding for sponsored programs at WVU rose by more than \$25 million this past year, from \$152.3 million in FY09 to \$177.7 in FY10. In addition, 14 new faculty positions in STEM disciplines have been authorized by the Office of the Provost for fiscal year 2011.

Furthermore, WVU is in the process of implementing a new electronic Research Administration system at a cost of more than \$2 million. When fully operational, this system will assist research faculty as they submit grants and implement the post award process.

Through new hires, support for their start-up needs, and investments into the research infrastructure, WVU continues to make tangible commitments to its research agenda.

Energy and environmental sciences. As reported last year, West Virginia University developed a "Strategic Plan for its Advanced Energy Initiative," see http://research.wvu.edu/home/research_trust_of_west_virginia_university

In October, 2009, the Washington Division of URS was awarded the Research and Engineering Services Contract for DOE's National Energy and Technology Laboratory (NETL). This award was significant for two reasons: First, URS in collaboration with NETL has developed the Regional University Alliance (RUA) as a significant contributor to the future energy research programs of DOE NETL. RUA is an alliance of five universities including WVU and WVU will benefit from this alliance. Second, Dr. Terri Marts, formerly the Interim Director of the Advanced Energy Initiative (AEI), was designated as the Program Manager for the URS Contract. In advance of Dr. Marts' move to URS, Mr. Joseph Kozuch was hired as the Interim Director of AEI. Mr. Kozuch has nearly 40 years of experience in the strategic management of energy, defense, water treatment and service programs for federal agencies and private corporations.

Also, during fiscal year 2010 the AEI organization added two consultants with expertise in program management and sustainable energy. Efforts are underway to develop a business plan that will take this initiative to a new level of activity and provide national recognition of the institution's efforts and commitment to be the energy university in America's energy state. The economic vitality of West Virginia is clearly tied to energy and WVU continues to invest so as to be a leader in area.

An on-line brochure was developed to publicize the multiple dimensions of the work being done in advanced energy by the institution's faculty (<http://researchoffice.wvu.edu/r/download/64880>). This brochure identifies the multiple areas of activity under this initiative, lists

contact persons for the various activities, and is readily available to potential donors to the Trust Fund. An AEI Advisory Board, composed primarily of representatives from national companies, was formed in 2009 (see AEI brochure for list of names). The Board has met twice and is helping to shape the direction of the AEI.

WVU participated in four large multi-institutional, interdisciplinary energy proposals during 2010. For the US-China Clean Energy Research Center proposal, WVU is the lead organization. Three of these proposals are still in the evaluation stage.

Seven new faculty members were hired in support of the energy and environmental research area. Total funding from the US Department of Energy increased from \$6.1 M in FY 2009 to \$13.6 M in FY 2010. Of this amount, \$11.9 M was competitive funding.

Nanotechnology and material science.

Dr. David Lederman serves as the Interim Director of the WVNano Initiative, a state-wide organization designed to accelerate nanoscale science, engineering and education. The focus of the research efforts is in fundamental science and engineering with applications in public health (environmental threats and early disease detection), energy (solar energy conversion and carbon sequestration), and biometrics, areas of fundamental interest to West Virginia.

A national search for a permanent director is ongoing; two qualified persons have been identified, an offer has been made to one of the candidates, and final hiring plans are progressing.

Dr. Lederman led efforts in Fall 2009 to obtain a major state NSF EPSCoR grant. Word was received in June, 2010 that the grant will be funded; a total of \$9.6 M over the next five years will help support WVNano research, education, and outreach activities. This amount will be complemented by almost \$3.5M in matching funds from WVU and the WV Higher Education Policy Commission. The research efforts of 29 faculty from three West Virginia institutions of higher education continue to undergird this research area, and approximately 18 graduate students were supported at WVU as part of this effort. Education and outreach activities included summer research programs for 31 undergraduate students, including an international experience at Jilin University in China; a 4-H camp nanoscience module; and a one-week middle school camp. Shared facilities administered by WVNano are open to all WVU researchers and outside industrial collaborators, thus enhancing the research and development capabilities of the University and the State of West Virginia.

Four new faculty were hired for the 2009-2010 academic year. A \$2 million investment to support the EPSCoR WVNano Initiative, including \$1 million in cost share, was made by WVU to support these new faculty.

Biological, biotechnological, and biomedical sciences.

This past year marked a significant change in leadership in the Health Sciences at WVU. After two national searches, Dr. Christopher C. Colenda was hired as Chancellor and Dr. Arthur J. Ross III was hired as Dean of Medicine. These individuals will provide the leadership for implementing the recommendations for the Research Strategic Plan for the Health Sciences (see below).

Chancellor Colenda commissioned a comprehensive evaluation of the research infrastructure at Health Sciences. A 2010 Research Evaluation and Future Strategies Report (<http://www.hsc.wvu.edu/RESOFF/Research/2010EvalStrategiesReport/default.aspx>) sets the Research Strategic Plan for the Health Sciences for 2016. With respect to the Research Trust Fund, potential donors can readily see the commitment from the Health Sciences leadership to build the physical and operational infrastructure that will provide the underpinnings for growing strong research and graduate education programs.

A new biomedical research facility is forthcoming with the support of a \$14.5 million grant from the National Institutes of Health. WVU will use this grant to construct a 22,000 square-foot building to meet the infrastructure needs of current and future biomedical researchers who use laboratory animal models to study human diseases and their treatments.

As noted in Table 2, external funding for the biomedical sciences was nearly \$70 million during fiscal 2010.

Biometrics, security, sensing and related identification technologies. The research foundation for both basic discovery and innovation in human Identification research has continued to grow over the past year. The Lane Department of Computer Sciences and Electrical Engineering is home to the Center for Identification Technology Research (CITeR) (www.citer.wvu.edu), a National Science Foundation Industry/University Cooperative Research Center (I/UCRC), with CSEE faculty members Bojan Cukic and Larry Hornak serving as co-directors. The Center is supported by the NSF and over 20 federal government and industry affiliates and conducts research defined by participating

aculty from several academic disciplines and universities. CITeR provides WVU national and international visibility via the scale and scope of its cooperative research.

Over the past year, CITeR's research has continued to grow as a result of the value-based relationships developed through the Center. CITeR continues to serve as the academic lead for the FBI Biometric Center of Excellence, and partners with the University of Arizona in the DHS Center of Excellence in Border Security and Immigration. Relationships with the Office of Naval Research and the Department of Defense have grown based on successful outcomes from funded research. New awards are pending from both organizations. The Center has received a \$1M award from the National Institute of Justice (NIJ) supporting the establishment of the Transition Readiness Assessment Center (TRAC) to facilitate transition of CITeR discoveries into systems of national interest.

Center activities have completely filled the additional 3600 sq ft of research space provided in the new Engineering Science Building. The second of two new faculty positions was filled in 2010 with the top candidate from over 100 applicants. Our success in recruiting speaks to the reputation being built for WVU in this area.

Compliance with Legislative Rule for Research Trust Fund

Three specific reporting requirements are identified in Series 48 (§ 133-48-14), the Research Trust Fund Program.

14.1. By August 15, 2009, and annually thereafter, each participating institution shall provide an annual report to the Commission that includes a full accounting of the trust funds, endowment proceeds, and adherence to the objectives established by the research plan.

14.2. Each participating institution shall detail in its annual report to the Commission the total amount of qualified donations received, the investment earnings realized and any anticipated expenditures of the research endowment proceeds in its annual operating budget.

The data in Table 1 summarize much of the information requested by the Legislative Rule. Thirty-seven (37) endowments were created during the first two years (ending June 30, 2010) of the Research Trust Fund initiative. Each endowment was qualified by the West Virginia University Board of Governors.

For fiscal year 2011, approximately \$300,000 will be available to spend to support a variety of research activities under the Trust Fund initiative (Table 1). Eight endowments will have investment earnings from their principle; four endowments (see Table Note) will have cash gifts that can be spent; and 28 funds will have the interest earned on the State matching money available for distribution. Those funds without any spend did not earn interest because, most often, they were established late in the fiscal year. The funds for each endowment are being distributed according to the intent of the respective endowment.

Through June 30, 2010 the following results have been achieved.

- **FY10 Market Value for all the Private RTF Endowments**
The market value of Directed Research Endowments established with private gifts invested in the Research Trust Fund Program of the WVU Foundation Endowment for fiscal year ending June 30, 2010 is \$6,298,285.
- **FY11 Spend Available for the open Private RTF Endowments**
The available proceeds from Directed Research Endowments established with private gifts invested in the Research Trust Fund Program of the WVU Foundation Endowment for fiscal year 2011 are \$45,258.
- **FY10 Market Value for all the State RTF Endowments**
The market value of Directed Research Endowments established with trust distributions (state funds) to the Research Trust Fund Program of the WVU Foundation Endowment for fiscal year ending June 30, 2010 is \$6,267,939.
- **FY11 Spend Available for the Open State RTF Endowments**
The available proceeds from Directed Research Endowments established with trust distributions to the Research Trust Fund Program of the WVU Foundation Endowment for fiscal year 2011 are \$136,848.
- **FY10 Total Number and Amount of Gifts Received that Qualified for State Funds**
During fiscal year 2010, the WVU Foundation received 132 qualified private gifts (donations and pledges) totaling \$3,935,416, an amount that was requested for Research Trust Fund.

- **FY 10 Total Number and Amount of Gifts Received from the State for Matching Funds**
During fiscal year 2010, the WVU Foundation received six (6) distributions from the state’s Research Trust Fund of \$6,136,417 to match 196 qualified gifts (donations and pledges) to Directed Research Endowments.
 - **Total Number and Amount of Gifts Received since Inception that Qualified for a State Match**
During the period from March 08, 2008 to June 30, 2010, the WVU Foundation received 221 qualified private gifts (donations and pledges) totaling \$7,809,579 that were requested for Research Trust Fund.
 - **Total Number and Amount of Gifts Received since Inception from the State for Matching Funds**
During the period from March 08, 2008 to June 30, 2010, the WVU Foundation received six (6) distributions from the Research Trust Fund totaling \$6,136,417 to match 196 qualified gifts (donations and pledges) to Directed Research Endowments.
- 14.4.** Each participating institution's research corporation and/or foundation shall provide the Commission with an audited financial statement annually. These statements shall be treated as confidential.

A copy of the audited financial statements for years ending June 30, 2009 and 2008 for the WVU Foundation has been forwarded to the Policy Commission through Chancellor Noland under separate cover. Because of timing of submission of this report relative to the receipt of the audited financial statement, the audited financial statement of the WVU Foundation, Inc. will always be a year in arrears.

Additional Reporting from West Virginia University

Marketing Plans

West Virginia University’s marketing plans for each of the four strategic areas within the Research Trust Fund were included with last year’s report. As noted above, a special brochure on energy was developed this past year as part of the institution’s effort to move proactively with solicitations in the area of energy and the environment.

Grants and Contracts

Faculty at WVU were successful in obtaining \$77.5 million in external grants and contracts in 2008-09 in the four research areas identified within WVU’s Strategic Research Plan. That number increased by \$30.9 million to \$108.4 million in 2009-2010 (Table 2).

TABLE 2. Summary of the Funding Received by WVU in 2009-10 through External Grants and Contracts in each Research Area.

	Total Number of Awards*	Total Amount Awarded (million)
Energy and the environment	114	\$28.3
Nanotechnology and material sciences	25	\$ 2.8
Biomedical sciences	452	\$69.5
Biometrics, security and identification technologies	30	\$ 7.8

*Includes renewals and new awards

Partnership with the WVU Foundation

The WVU Foundation has been a significant partner in the University's efforts to meet the goal established by the Trust Fund. Besides the assistance provided in the cultivation and solicitation of gifts, the Foundation plays a critical role in the management of the private and state endowment funds.

WVU and the WVU Foundation established an important operating protocol – namely, the private donor that contributes funds for each endowment in the Research Trust Fund has the option of dedicating the matching state funds for one of four purposes: for the same purpose, for general support to the department, for general support to the same area, and for general support to an alternative area. To date, all state matching endowments have been for the same purpose as the gift outlined in the private endowment.

Business Plan

In addition to the legislatively mandated reporting requirements, the Higher Education Policy Commission required a business plan for each research area. Table 1 reflects the anticipated use of the money available to spend in fiscal year 2011.

Concluding Remark

The Research Trust Fund has made an impact on the research initiatives at West Virginia University. Thirty-seven endowments have been established to date. Some \$300,000 in money, generated through the new endowments established under the Trust Fund, are available to spend in fiscal year 2011 for scholarships, fellowships, prominent scholars, and in support of ongoing research initiatives.

The Research Trust Fund Program grew out of the strategic planning that began in 2005 with the development and release of Vision 2015, the West Virginia Strategic Plan for Science and Technology. Vision 2015 called for a significant investment in human and physical infrastructure in STEM related disciplines at the two research universities in the state. The Eminent Scholars Recruitment and Enhancement Program began the process of infusing state funds into building this infrastructure. WVU's Cancer Center and Stroke Center are stronger because of the ESRE Program. The Research Trust Fund Program continues that visionary support and another \$300,000 is available to support the institution's research agenda. WVU looks forward to the significant and sustained impact that these two programs will have on addressing some of the nation's most important issues in energy, health care and security.

West Virginia University **Research Trust Fund**

TABLE 1. Endowments established in the West Virginia University Foundation under the Research Trust Fund program and their anticipated use in Fiscal Year 2011.

Fund Name	Brief Description	FY 2011 Spend			Anticipated Use
		Private	State	Total	
Schoepp Neurosciences Research Student Support	Graduate Fellowships and Support for Research		\$1,240	\$1,240	Support for student research activities
Verizon WV for Biometrics	Broad-based Biometrics Research	\$2,543	\$13,591	\$16,134	Operational support for ongoing research
Raymond Brooks Vanscoy Cancer Research Endowment	Broad-based Cancer Research				
Allen S. Pack Endowment for Mining Engineering	Energy Research in Mining Engineering		\$256	\$256	Operational support for ongoing research
L. Zane Shuck Laboratory Endowment in Nanobiotechnology	Facilities Support in Nano-biotechnology	\$1,605	\$2,159	\$3,764	Supplies and equipment for a shared facility
Foundation Coal Corporation Endowment for Energy Research	Energy and Environmental Research	\$4,924	\$1,984	\$6,908	Supplies and equipment for two new faculty
John V. Linberg, MD Research Endowment	Eye Research				
Alan Susman Cortico-basal Ganglionic Degeneration Research	Degenerative Neurological Research	\$3,461	\$1,856	\$5,317	Projects that lead to extramural funding
Blaine S. West Endowment for Civil and Environmental Engineering	Broad-based Research Support	\$4,235	\$1,672	\$5,907	Part of start-up packages for two new faculty
William J. Maier, Jr. Chair of Research	Create a Chair in Biomedical Research (Charleston Division)		\$1,362	\$1,362	Hold until Chair is appointed
Branson-Maddrell Endowed Professorship in Orthodontics	Create a Professorship in Dentistry		\$375	\$375	Hold until Prefssorship is created
George B. Bennett Dean's Research Opportunity Endowment	Broad-based Research Support		\$14,646	\$14,646	Develop new research opportunities
E. Elizabeth Morgan Cancer Research	Broad-based Research Support		\$388	\$388	Operational support for ongoing research
Badzek Family Endowment for Nursing Research	Nursing Research to Support Quality of Life				
Ruth and Robert Kuhn Nursing Faculty Research	Broad-based Research Support		\$137	\$137	Seed grant for new research effort
Hall - de Graaf Endowment for Women in Science & Engineering	Research Support for Women, Faculty and Students, in STEM Disciplines		\$136	\$136	Operational support for ongoing research
Fithian Family Foundation #2/ Behavioral Medicine-Psychiatry	Research Support in Behavioral Medicine				
WVUH Evidence Based Practice Research Professorship/Nursing	Create a Professorship				
Quad/Graphics Chair in Internal Medicine, Eastern Division	Create a Research Chair	\$1,205		\$1,205	Hold until Chair is appointed
James H. Walker Chair of Pediatric Cardiology	Create a Research Chair	\$123,433	\$15,174	\$138,607	Support for the Walker Chair, Dr. William Neal
James A. Kent Endowment for Biomedical Engineering	Broad-based Research Support	\$3,600	\$4,618	\$8,218	Supplies and equipment for recently hired faculty

Fund Name	Brief Description	FY 2011 Spend			Anticipated Use
		Private	State	Total	
Osborn Professorship in Hematological Malignancies Research	Create a Research Professorship	\$3,232	\$34,248	\$37,480	Support for the Osborn Professorship, Dr. Laura Gibson
BrickStreet Neurology Fellowship	Create a Graduate Student Fellowship		\$2,718	\$2,718	Create a student fellowship
Robert E. Murray Chairmanship Mining Engineering Department	Create a Named Department Chairmanship		\$12,497	\$12,297	Support for the Chair of Mining Engineering
Rita Radcliff-Deppe & Brian Deppe Fellowship Award	Create a Graduate Student Fellowship				
Energy Materials Science & Engineering Facilities Support	Broad-based Research Support		\$544	\$544	Operational support for ongoing research
Oleg D. and Valentina P. Jefimenko Library Resources	Library Resources Endowment				
Oleg D. and Valentina P. Jefimenko Physics Fellowship	Create a Graduate Student Fellowship				
Professor Oleg D. Jefimenko Professorship in Physics	Create a Research Professorship				
Bowlby Wood Science Graduate Research Fellowship	Create a Graduate Student Fellowship		\$1,795	\$1,795	Create a student fellowship
Robert E. Pyle Chemical Engineering Graduate Fellowship	Create a Graduate Student Fellowship		\$272	\$272	Support for a graduate student
James & Ruby Romano Civil & Environmental Engineering Endow.	Energy and Environmental Research Support		\$3,854	\$3,854	Operational support for ongoing research
Wells Fargo Energy Group Scholarship	Create a Student Scholarship		\$1,249	\$1,249	1 undergraduate student scholarship
Carl Del Signore Foundation Graduate Fellowship	Create a Graduate Student Fellowship		\$863	\$863	Support for a graduate student
George M. & Mary Freda Vance Medical Scholarship-Fellowship	Create a Student Scholarship/ Graduate Student Fellowship	\$23,467	\$17,626	\$41,093	Create 1 prestigious graduate
William S. Clapper Mechanical & Aerospace Engineering Scholarship	Create Undergraduate Student Scholarships	\$2,462	\$1,060	\$3,522	5 undergraduate student scholarships
Everette C. Dubbe Research Scholarship	Create a Undergraduate Student Scholarship	\$1,423	\$449	\$1,872	3 undergraduate student scholarships

NOTES

Funds for the Walker Chair, the Kent Endowment, Quad/Graphics Chair, and the Clapper Scholarship come from cash gifts so those accounts can be used while the endowments are being funded.

The absence of a dollar amount in the private or state column indicates that no money is available to spend in FY 2011.

Only accounts with more than \$100 are listed.

REPORT ON THE RESEARCH TRUST FUND

Marshall University **Research Trust Fund** Annual Report **2009-2010**

Submitted to the Vice Chancellor of Science and Research of the West Virginia Higher Education Policy Commission
Marshall University Research Trust Fund Report for 2009-2010

I- Research Trust Fund Plan

Marshall University has submitted its Board of Governor's-approved Research Trust Endowment Plan to the Higher Education Policy Commission directing donations to:

The endowment of the Marshall Institute for Interdisciplinary Research (MIIR), continuing with the plan laid out in Marshall's Eminent Scholar Research Enhancement (ESRE) application and

The advancement of Intelligent Transportation Systems Research at the Rahall Transportation Institute (RTI).

Based on the successful initiation of these endowments foci and informational discussions with the broader donor community, an expansion of the Marshall University Research Trust Fund Plan has been drafted to include qualifying endowments in other key departments in basic sciences and engineering. This will be submitted to the Vice Chancellor pending approval by the Marshall University Board of Governors.

II- Fundraising Progress

During the first year of the Research Trust Fund (ending June 30, 2009), the Marshall University Foundation pursued a vigorous fundraising plan in difficult economic circumstances and \$415,000 in qualifying cash donations were received and matched for MIIR, and \$50,000 in qualifying cash donations were received and matched for RTI. An additional \$258,000 of cash and pledges was received for MIIR and was the basis of a second match application.

During the second reporting year the difficult economy made fundraising especially difficult. \$50,000 was received for Intelligent Transportation Research at RTI.

Several donations are in the final stages of being prepared for match early in the first quarter of FY2011 pending donor finalization and/or expansion of the Marshall University Research Trust Fund Plan. We hope these applications will be submitted by mid-September 2010.

The plan for the fiscal year ahead is to continue to build the RTF accounts through donations, match and earnings, but to forego expenditures.

III- Research Trust Fund Plan Goal Progress

MIIR

In the first reporting period, the \$5 MM of ESRE state funds, which are non-endowed, and partially dedicated to MIIR were employed to recruit and hire the following MIIR scientific personnel:

Dr. Eric Kmiec, the Scientific Director

Dr. Joan Wilson, Senior Scientist, RNA core

In this second reporting period, those funds have continued to be used to recruit two junior scientists and start the recruiting process for a nanobiologist and bioinformaticist.

The first two research cores at MIIR have been developed in gene repair and non-coding RNA applications. Federal funding and research relationships with private industry are being actively pursued. The first private sector research contract has been implemented, and the second has been approved by the partner and is in the final stages of negotiation and implementation.

Collaborative grant applications have been submitted with the School of Medicine and the College of Science at Marshall, and MIIR has also been a collaborator on statewide NIH and NSF infrastructure grant applications.



Marshall University
Research Endowment Plan Annual Report
2009-2010

Submitted to the Vice Chancellor for Science and Research
West Virginia Higher Education Policy Commission

Amended November 2010

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I. Research Endowment Plan: Summary of Goals and Update on Status

A. Summary

With the help of the Eminent Scholars Recruitment and Enhancement (ESRE) initiative and the Research Trust Fund program, Marshall University's research activities achieved significant advances in FY2010. For the first time, research funding levels at the University (minus construction) exceeded \$50 million. This increase was comprised of new competitive activity from standard programs, and seven major competitive American Recovery and Reinvestment Act awards. Dramatic progress also was made in research faculty development, centers and initiatives, facilities and infrastructure.

The overall direction of Marshall's research enterprise is set by the University's Strategic Initiatives¹. Furthering economic development in West Virginia as well as and nationally and internationally through entrepreneurial research is one of the fundamental expectations of this strategy. Marshall's Research Endowment Plan (Appendix One), approved by the University's Board of Governors in 2008, lays out how the institution will focus the unique opportunity presented by the Research Trust Fund to achieve this end.

Marshall University's Research Endowment Plan directs donations to:

Endowment of the Marshall Institute for Interdisciplinary Research (MIR), continuing with the plan laid out in Marshall's application to the Eminent Scholars Recruitment and Enhancement (ESRE) initiative; and

Advancement of Intelligent Transportation Systems research at the Rahall Transportation Institute (RTI).

The plan laid out the following specific goals. The progress toward those goals is addressed in the Expected Outcome(s) and Progress-To-Date section of each goal.

B. Progress Toward Goals

Plan Goal 1: *Increase the number of full-time, grant-funded researchers at Marshall University by a minimum of nine scientists within the next five years.*

¹ <http://www.marshall.edu/headlines/strategies/mibillresearch>

Strategies for Achieving Goal:

- Recruit and hire a research-active MIIR Senior Scientist/Director who will have the following responsibilities:
 - ✓ Recruit, hire and build an interdisciplinary team of top-tier research scientists required to fulfill the mission of MIIR;
 - ✓ Recruit, select, charter and chair a Council of Scientific Advisors (a “RAND-like” entity of national and international innovators) to serve MIIR;
 - ✓ Develop and implement the scientific vision and plan for the Institute, consistent with its financial development;
 - ✓ Develop the Institute policies for reinvestment of recaptured compensation and indirect cost distribution generated by research activities within the Institute;
 - ✓ Work with the President, the Senior Vice President for Development/CEO of the Marshall University Foundation and the Vice President for Research to increase the MIIR endowment fund;
 - ✓ Maintain a vigorous externally-funded research program; and
 - ✓ Manage the goals and performance of the Institute staff.
- Foster research collaboration between MIIR and faculty within the University.
- Increase the competitiveness of research-active faculty for grant funding by leveraging the resources (e.g., scientific expertise, equipment, etc.) developed within MIIR.
- Focus the majority of research investments in applied areas of research that have the potential to yield patentable discoveries.
- Retain the services of a research/technology transfer expert to improve/accelerate discovery (disclosure reporting, provide patent assistance for scientists, develop external technology partnerships and accelerate new venture startups).

Progress Measures:

- Hiring of MIIR Senior Scientist/Director;
- Number of new full-time research-active scientists directly employed by MIIR and the Marshall University Research Corporation (MURC) on an annual basis and the number of new scientists added;
- Recruitment of Council of Scientific Advisors members and the constitution and activation of the Council;
- Number and value of successful competitive grant submissions by year; number of grant-funded researchers by year; and the trend for both metrics over the previous five years;
- Total value of competitive grant funding within MIIR and the trend over the previous five years;

- Overall research funding for programs and facilities involving MIIR by year and the trend over five years;
- Increase in the number of new MIIR patent disclosures and filings per year over a five-year continuum;
- Increase in the number of MIIR patents licensed and the number of new business startups on an annual basis and over a five-year continuum.
- Growth in similar metrics for the University *per se* that reflect collateral (indirect) research productivity gains in departments and colleges elsewhere in the University;
- Number of new research-active faculty holding traditional academic appointments that have been added annually to the University and the net retained.

Time Interval for Assessing Progress: 2008–2013 with annual summaries of progress.

Expected Outcome(s) and Progress-To-Date:

- **Establish MIIR as a non-profit 501(c)3 entity within the Marshall University Research Corporation;** MIIR was established as a 501(c)3 entity in late 2008. A Board of Directors has been named and meets regularly to oversee the establishment and progress of the enterprise.
- **Increase in full-time research-active scientists directly employed by MIIR and the Marshall University Research Corporation;** In the first year-and-a-half of MIIR's existence, four research-active scientists have been hired within MIIR and one has been hired in an affiliated position in the University's new Center for Diagnostic Nanosystems.
- **Increase the number of research-active faculty holding traditional academic appointments within the University;** During the past three years there has been significant activity in hiring research-active faculty members in traditional academic appointments. Five new faculty members have been hired in the Joan C. Edwards School of Medicine, including the Eminent Scholar in Diabetes and Cardiovascular Disease. All of these faculty members are currently funded extramurally. The College of Science has been even more active, with 15 new faculty members hired. These faculty members are making excellent progress with seed funding programs such as the NASA Space Grant, the Marshall ADVANCE and the Center for Cellular Differentiation and Development. They are transitioning into highly competitive external startup programs like the Cottrell College and Dreyfus awards, and more mature faculty are achieving funding from the National Science Foundation (NSF), National Institutes of Health (NIH) and the Army Research Office.
- **Increase in the number of competitive grant submissions and grant-funded researchers; Increase in total competitive grant funding for Marshall University;** Marshall's research funding has been increasing steadily, doubling over the last seven years, as shown in Figure 1. This reflects a proportionate increase in the number of submissions and their

value. The Eminent Scholars recruited thus far have been experienced faculty and have brought with them significant patent portfolios and grant awards.

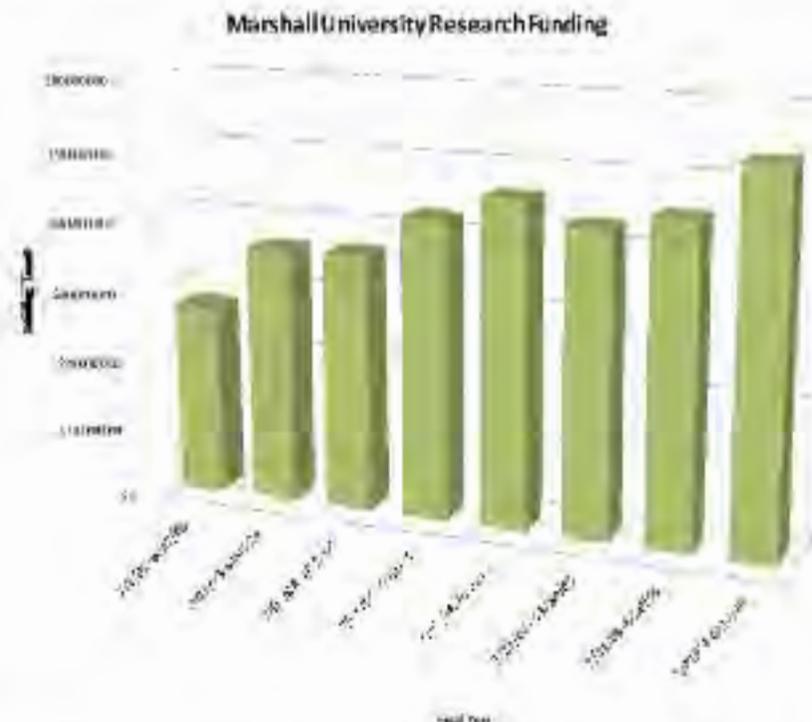


Figure 1 Research funding at Marshall University has more than doubled since FY2002.

Plan Goal 2: *Develop interdisciplinary research clusters and focus endowment investments in research areas that:*

- *Build on existing institutional strengths and add to the critical mass of researchers;*
- *Involve multiple grant funding agencies/sources with reasonable probability for the awarding of funding on an ongoing, competitive basis; and*
- *Offer the potential for breakthrough, patentable discoveries that will enhance research-based economic development.*

Strategies for Achieving Goal:

- Cultivate donors interested in gifting to one or both of these research areas.
- Attract and hire core research scientists with the expertise and commitment to contributing to research advances in these priority areas.

- Build and advance the development of strong, interdisciplinary research teams within MIIR and the University, and develop advantageous collaborations across the University and with researchers at other institutions both domestically and internationally.

Progress Measures:

- Annual private gift totals supporting research at Marshall University and matched by the West Virginia Research Trust Fund;
- Total endowment funds dedicated to research in biomedical/biotechnology/bio-nanotechnology/bioenergy;
- Total endowment funds dedicated to transportation technology/logistics research;
- Hiring and retention of new full-time research scientists working in these areas;
- Productivity of assembled interdisciplinary research teams as measured by grant activity, personnel hiring, peer-reviewed publications and patent applications.

Time Interval for Assessing Progress: 2008–2013 with annual summaries of progress.

Expected Outcome(s) and Progress-To-Date:

- **Assuming private donor gifts will support the development of two research clusters, the University's directed research endowment plan will be concentrated initially on one or two areas of interdisciplinary research that are strengths at Marshall: research clusters in biomedical/biotechnology/bionanotechnology, or/and transportation technology/logistics);**
- **Characterization of the complex interactions between environmental and genetic factors (both genomic and epigenetic) responsible for the chronic diseases in Appalachia;**
- **Increased product development in one or more of the following areas: biomanufacturing and niche areas of applied biomolecular research and bionanotechnology, which include the development of nanostructured, nanocrystalline and advanced electronic materials (DNA and RNA), nanostructured materials for cellular energy capture and delivery, bioenergy processes that yield alternative fuels/energy production, functionalized nanostructured materials for chemical-biosensor applications, nanomaterials in environmental pollution detection, monitoring and remediation, and functionalized nanostructures for targeted therapeutic agent delivery in medicine.**

MIR has developed the following three research cores, each led by a senior scientist:

- Gene editing, led by Dr. Eric Kmiec, which conducts an R01 NIH program and has developed a sponsored project with a major global pharmaceutical company (Pfizer);
- Noncoding RNA, led by Dr. Joan Wilson, which has a contract with a major diagnostics company (IDT); and
- Bionanotechnology, which will be led by Dr. Jingwei Xie, and will collaborate with the new Marshall Center for Diagnostic Nanosystems.

Plan Goal 3: *Increase the overall non-base budget for research and the number of non-base funded positions within Marshall University's research enterprise, while increasing the retention and employment of college graduates.*

Strategies for Achieving Goal:

- To generate greater discretionary revenues to invest in employing additional research personnel, 75 percent of Facilities and Administration (F&A) funds earned from grants will be returned to MIR scientists for investment in needed personnel and equipment and 100 percent of recaptured salaries from grants will be returned to MIR scientists for the same purpose.
- Increase personnel support from grants and contracts.
- Participate in the growth/expansion of existing private sector businesses through intellectual capital creation and retention.
- Attract new business investment in research-related enterprises.
- Increase philanthropic support for research through endowment and non-endowment gifts.

Progress Measures:

- Level of annual discretionary revenues for research investment;
- Formulation of five-year business plans with defined accountability measures for making strategic and sustainable research development investments;
- Direct and indirect employment growth attributed to the University's research enterprise.

Time Interval for Assessing Progress: 2008-2013 with annual summaries of progress.

Expected Outcome(s) and Progress-To-Date:

- **Increase in redirected F&A funding generated by MIR scientists to support research within MIR;**
- **Increased employment of college-educated research technicians and research support personnel;**

- **Increased employment of research associates and postdoctoral fellows;**
- **Increased employment of personnel skilled in business, financial and entrepreneurial aspects of new venture startups emanating from licensed research patents;**
- **Increased graduate (master's and Ph.D.) student employment (paid tuition/fee waivers and enhanced stipend support);**
- **Increased undergraduate student participation in research;**
- **Increased internal competitive mini-grant funding for undergraduate students engaged in research;**
- **Increase overall direct and indirect employment within the Bioscience Sector through research conducted by Marshall University.**

The increase in hiring associated with the creation and development of MIIR is now well under way. By early 2011, it is anticipated that four senior and one junior scientist will be on staff, with a search under way for a bioinformaticist.

This hiring and the partnership of MIIR with the NSF's Research Infrastructure Improvement program in the development of next-generation sequencing capability will bring the total employment of bachelor's, master's and Ph.D. scientists and support personnel to 14, with additional growth expected as the new scientists' programs get under way.

The novel F&A return to MIIR has been implemented successfully and is providing the necessary discretionary funds for the organization to react quickly and with agility to partnering and contract opportunities. As the value of grants continues to increase, this source of funds will be a major engine of seed funding.

Plan Goal 4: *Increase the number of Ph.D. programs at Marshall University by at least one program.*

Strategies for Achieving Goal:

- Generate a self-sustaining funding base for the operation of one or more new Ph.D. programs.
- Examine areas of opportunity, evaluate and prioritize them.
- Assemble the core faculty and physical resources required to deliver a program of excellence.

Progress Measures:

- Funding, leadership, a comprehensive business plan and an action plan for the start-up and operation of the program;
- Curriculum development and approval;
- Implementation of the program and Ph.D. student enrollment;
- Graduation of degree candidates and engagement of graduates in

research-related career paths.

Time Interval for Assessing Progress: 2013–2015 with annual summaries of progress.

Expected Outcome(s) and Progress-To-Date:

- **One or more new Ph.D. programs in high-demand fields.**

The options for creation of a new Ph.D. program are under active study by the University.

Plan Goal 5: *Improve technological digital reference support for internationally competitive research programs.*

Strategies for Achieving Goal:

- Increase annual and one-time funding available for technology resource and infrastructure development through a combination of grants, public and private funding.
- Increase annual and one-time funding available for digital information (e.g., library holdings) and resources through a combination of grants, public and private funding.
- Continue efforts to expand the integrated database capabilities and utilities provided by Marshall's enterprise software platform.

Progress Measures:

- Amount of increases in annual and one-time funding available for technology resource and infrastructure development through a combination of grants, public and private funding;
- Annual funding increases in base and one-time funding available for digital information (e.g., library holdings) and resources through a combination of grants, public and private funding;
- Evidence of expanded database capabilities and services provided within MURC by Marshall's enterprise software platform.

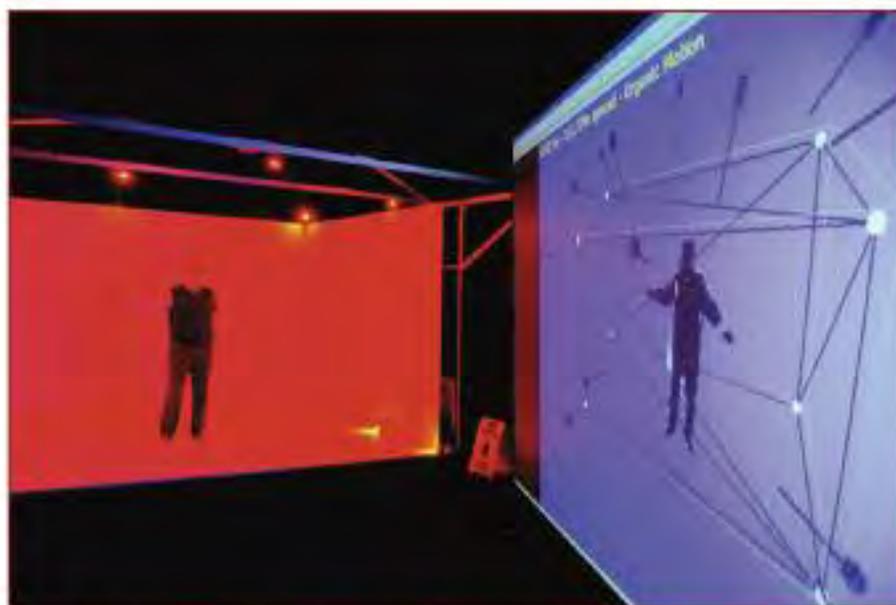
Time Interval for Assessing Progress: 2009–2015 with annual summaries of progress.

Expected Outcome(s) and Progress-To-Date:

- **Campus Internet2 access for inter-institutional database sharing;**
- **Campus-wide access to National Supercomputing Resources;**
- **Increase data warehousing and cataloging capacities;**
- **Increase digital research journal subscriptions in priority fields;**
- **Improve the MURC service platform and the array of automated/integrated electronic services (e.g., e-purchasing, e-PARs, etc.).**

FY2010 was an extremely active one for cyberinfrastructure at Marshall University. The Virtual Interaction Simulation Environment (VISE) has

continued to advance the state-of-the-art in mine safety training through a U.S. Economic Development Authority grant. The facilities, incorporating state-of-the-art motion capture and 3D HD visualization capabilities, offer a significant resource to the Marshall scientific community for visualization and simulation to augment laboratory-based programs.



Marshall University Virtual Interaction Simulation Environment

This group was successful in an application with the University of Arkansas to the NSF for a Track 2 Cyberinfrastructure grant, which allowed installation of further visualization capability and a High Performance Cluster on campus.

Marshall gained access to Internet2 connectivity for the first time, enabling campus access to supercomputing resources through the TeraGrid and other national supercomputing resources. An NSF RII C2 grant will further support that access.

Another important building block in research-oriented cyberinfrastructure is electronic access to copyrighted scientific journals. Electronic subscriptions to Science Direct have allowed University researchers access to a broad array of scientific journals online, and these subscriptions have been supported by a portion of the ESRE grant.

Plan Goal 6: *Expand the physical infrastructure available to support research in these and related fields.*

Strategies for Achieving Goal:

- Location of the building – current thinking is that this new building will be located between the Robert C. Byrd Biotechnology Science Center and the Engineering Laboratory Building on the Huntington Campus.
- Funding for planning this capital project will need to be obtained.
- Funding for the construction of this capital project will need to be obtained through a combination of grant, public (federal and state) and private sources.

Progress Measures:

- Acquisition of funds for planning;
- Acquisition of funds for building construction;
- Acquisition of base funds for opening and operating this building.

Time Interval for Assessing Progress: 2011–2015 with annual summaries of progress.

Expected Outcome(s) and Progress-To-Date:

- **New ~\$60-million academic and research building (Marshall University Applied Engineering and Advanced Technology Research Complex);**
- **Increase in state-of-the-art research laboratory space to support the continued development of the research enterprise;**
- **Expansion in bioengineering and biomedical engineering research base.**

A planning grant for the Applied Engineering and Advanced Technology Research facility has been applied for and received from the U.S. Department of Housing and Urban Development and has been used to generate conceptual plans for the facility.

Bonding authority has been received from the state for a portion of the facility's cost, and development of the rest of the financing is under way.

Additional space for biomedical research is being prepared in Cabell-Huntington Hospital. A Health Resources and Services Administration grant has been received to build out shell space on the top floor of the Edwards Comprehensive Cancer Center. This space will house the Institute for Translational Genomics and laboratory space for translational research. It is anticipated this space will be finished and ready for occupancy in late fall 2010.

C. Narrative of MIIR Development

In the first reporting period, the \$5 million of ESRE state funds, which are non-endowed, and partially dedicated to MIIR were employed to recruit and hire the following MIIR scientific personnel:



Dr. Eric Kmiec, Senior Scientist/Director



Dr. Joan Wilson, Senior Scientist (RNA core)

Dr. Kmiec has continued to submit and be successful with NIH grant applications, and is running his ongoing program in gene editing. This program has also been the basis of a recently consummated commercial contract, described below.

In this second reporting period, funds have also been used to recruit a junior scientist, Wensheng Li, from the Department of Neuroscience, Mayo Clinic, in Jacksonville, Florida.



Dr. Juewei Xie

The recruiting process was also initiated for a nanobiologist member of the senior scientific staff. This appointment will be joint with the newly created Center for Diagnostic Nanosystems, which has received seed funding from the U.S. Department of Energy. The Center seeks to apply advances in nanosensor technology to improve the accessibility and capability of rural health care. The top candidate in the search, Dr. Juewei Xie, will join MIRR from Washington University in St. Louis.

The first two research cores at MIRR have been developed in gene repair and noncoding RNA applications. Federal funding and research relationships with academia and private industry are being actively pursued.

Collaborative grant applications have been submitted with the School of Medicine and the College of Science at Marshall, and MIRR has also been a collaborator on statewide NIH and NSF infrastructure grant applications:

- MIRR has partnered with Marshall's cohort in the recently awarded NSF Research Infrastructure Improvement grant to help acquire and staff a next-generation sequencer.
- MIRR has been an important part of Marshall's recent Clinical and Translational Science Award (CTSA) application to NIH with the University of Kentucky. According to NIH, CTSA's are intended to transform how clinical and translational research is conducted, ultimately enabling researchers to provide new treatments more efficiently and quickly to patients. The consortium will ultimately link 60 institutions together to energize the discipline of clinical and translational science. The presence of MIRR has allowed Marshall access to this strong network.

The MIRR strategy of maintaining scientific excellence through peer-reviewed federal grants while building contractual relationships with industry has borne fruit. Research contracts have been signed with:

- IDT, a major DNA testing reagents company, in the noncoding RNA sector, and
- Pfizer, a global pharmaceutical giant, in the gene editing sector.

The high level of scientific activity in MIRR is reflected in the publications, grant submissions and invention disclosures filed during FY2010, and shown in Table 1 on the next page.

Table One - MIIR Scholarly Activity (2009-2010)

Publications

- Iliazzi J, Yerkes S, Parekh-Olmado H and **Kmiec EB** (2009) Expression of mutant huntingtin leads to DNA breakage and the activation of the DNA damage response pathway. *J Neurosci Res*, Feb 15, 87(3):733-47.
- Maguire K, Suzuki T, Dimitrova D, Parekh-Olmado H and **Kmiec EB** (2009) Genetic correction of spliced site mutation in purified and enriched myoblasts isolated from mdx^{crj} mice. *BMC Molecular Biology* Feb 23, 10:13
- Engstrom J and **Kmiec EB** (2009) Regulation of targeted gene repair by intrinsic cellular processes. *Bioessays* Feb; 31(2):159-68
- Cristofalo AB, Liu RA, DeLamata VM, Parekh-Olmado H, **Kmiec EB**, Nones LM, Aoki SM and Fernando Garcia J (2009) Targeted nucleoside exchange in myostatin gene. *Animal Biotechnology*, 20: 15-27.
- Yerkes S, Wesenka J and **Kmiec EB** (2009) A stable G-quartet binds to a huntingtin protein fragment containing expanded polyglutamine tracks. *J Neurosci Res*, 2009 Aug 24.
- Bonner M and **Kmiec EB** (2009) DNA breakage associated with targeted gene alteration directed by DNA oligonucleotides. *Mutat Res*. Oct 2,659(1-2):85-94. Epub 2009 May 20.

Grants

- National Institutes of Health (R01CA89325; R01 supplement award) Regulation of targeted gene repair. \$517,000; 09/03/09-03/11. Principal Investigator: Eric B. Kmiec, Ph.D.
- Activation of Exposed Grant CHDF Foundation, Early Discovery Initiative. DNA aptamers as therapeutics for HD. \$75,000/year. 08/01/09-07/31/11. Principal Investigator: Eric B. Kmiec, Ph.D.
- NIH Grant Supplement Submission National Institutes of Health (R01CA89325; R01 supplement award) Regulation of targeted gene repair. \$250,000. Submitted 2/5/2010.
- National Institutes of Health (priority score 103, revised version submitted) (R21NS066077) Genetic correction of SMN2 as a treatment for Spinal Muscular Atrophy. 04/01/10-03/31/13. Principal Investigator: Eric B. Kmiec, Ph.D.
- National Institutes of Health (HD110605842) Mechanistic studies in *C. elegans* for functional genomics. \$800,000, direct costs. 07/01/2010-06/30/2014. Principal Investigator: Eric B. Kmiec, Ph.D.
- CHDF Foundation, Early Discovery Initiative. DNA aptamers as therapeutics for HD. \$75,000/year. 08/01/09-07/31/11. Principal Investigator: Eric B. Kmiec, Ph.D.

Invention Disclosures

- Yerkes S, Falgowski K, **Kmiec, EB**. "Binding of Poly Q rich proteins by G-quadruplex DNA" May 2009.
- Falgowski K, Falgowski C, **Kmiec, EB**. "Creation of a single-copy integrated model system to evaluate gene editing in *C. elegans*." Dec. 2009-Jan. 2010.
- Falgowski K, Falgowski C, **Kmiec, EB**. "Creation of an extrachromosomal model system to evaluate gene editing in *C. elegans*." Dec. 2009-Jan. 2010.

II. Research Endowment Plan Addendum

Based on the successful initiation of these endowments (a) and informational discussions with the broader donor community, an expansion of the Marshall University Research Endowment Plan has been drafted to include qualifying endowments in other key departments in bioenergy and environmental research, and basic sciences and engineering.

This plan will be submitted to the Vice Chancellor pending approval by the Marshall University Board of Governors. Approval is expected at the December Board of Governors meeting.

III. Research Endowment Plan Fundraising Progress

During FY2009, the first year of the Research Trust Fund (ending June 30, 2009), the Marshall University Foundation pursued a vigorous fundraising plan in difficult economic circumstances. During that time, \$415,000 in qualifying cash donations were received and matched for MHR, and \$50,000 in qualifying cash donations were received and matched for RTI.

In FY2010, an additional \$258,000 of cash and pledges was received for MHR and were the basis of a second match application. An additional \$86,600 of cash donations for MHR and \$50,000 for RTI were received in FY2010 and will be part of the next match application.

In addition, \$270,000 in donations requiring amendment of the Research Trust Fund plan will be submitted shortly after the amended plan receives approval by the University's Board of Governors².

The plan for FY2011 is to continue to build the Research Trust Fund accounts through donations, match and earnings, but to forego expenditures.

² These new endowments will be for a) a fresh water resource research, b) an endowed rotating professorship and student fellowship for summer undergraduate research, and c) safety engineering research.

IV. ESRE Update

A. Financial

The \$5 million match was certified by the Marshall University Foundation on September 20, 2007, and the grant agreement was signed by MURC on September 27, 2007. All draw downs have been completed.

The \$5 million in state match is being expended consonant with Marshall's externally reviewed, HEPC-approved ESRE application, and the \$5 million in private match is being kept in an endowed account within the Marshall University Foundation.

As of the end of FY2010, \$1,924,515.04 of state match funds had been expended, on track with milestone accomplishment. The vast majority of these funds have been expended towards the first year salary and laboratory startup funds of the three hires described below.

Recruiting is on track to bring on two additional scientists—one in bionanotechnology and a second noncoding RNA expert.

B. Progress on Major Initiatives

Recruitment of Eminent Scholars/Startup of Their Laboratory Operations

The initial focus of activities has been the recruitment and laboratory startup of the ESRE scientists:

- 1) Senior Scientist/Director in MHR
- 2) Senior Scientist in MHR
- 3) ESRE Professor of Diabetes and Cardiovascular Disease in the Joan C. Edwards School of Medicine
- 4) Eminent Scholar in the College of Science

A review of each of these recruitment activities is provided on the following pages:

1) Senior Scientist/Director in MIIR



Dr. Eric Kmiec

After an extensive search, the hiring of Dr. Eric B. Kmiec as MIIR Senior Scientist/Director was announced. Dr. Kmiec is an internationally recognized researcher in the field of biomedicine, particularly in the area of gene repair. He moved his laboratory staff of eight researchers and equipment from the University of Delaware in December 2008, and commenced his appointment at MIIR in January 2009.

Dr. Kmiec brings the ideal mix of experience and scientific excellence to create the entrepreneurial culture envisioned for MIIR. He is the recipient of an NIH R01 award, inventor on more than 60 patents and author of more than 120 publications. He has been involved in spinning out several companies related to his technologies, and has served on a diverse slate of NIH and NSF grant and study panels.

In the 20 months he has been at Marshall, he has begun the implementation of the plan for further growth of MIIR laid out in Marshall's Research Endowment Plan, submitted to the HEPC in 2008 with program and grant development activities.

Three scientific core operations are being developed in genome modification, RNA profiling and nanobiotechnology.

Six laboratories and an office complex in the Robert C. Byrd Biotechnology Science Center were lightly renovated and repurposed to the interdisciplinary work of MIIR with startup funds from ESRE, and these funds also provided the equipment to facilitate these laboratories. So far, 10 scientific support staff members have been hired and a junior scientist and additional senior scientist have been hired in the area of bionanotechnology.

2) Senior Scientist in MIIR (Noncoding RNA)



Dr. Joan Wilson

In August 2009 Dr. Joan E. Wilson was hired as the second Senior Scientist in MIIR. Her group at MIIR focuses on identifying noncoding RNA disease biomarkers and developing noncoding RNA-based tools for gene regulation and genome manipulation.

Dr. Wilson most recently was a researcher at System Biosciences LLC (SBI), a high-tech company based in Mountain View, California. At SBI, she managed a fast-growing product portfolio that contributed 40 percent of the company's total sales revenue. Prior to that, she was a senior applications scientist and product manager with Panomics (now Affymetrix) and a research fellow at the Harvard Institute of Proteomics.

Dr. Wilson has a bachelor's degree in biology from the College of William and Mary. She went on to complete a doctorate in biological sciences at Stanford University, supported by a National Science Foundation pre-doctoral fellowship. Her thesis work, in the lab of Dr. Paul Macdonald, focused on elucidating molecular mechanisms underlying specification of the embryonic body pattern in the model genetic organism *Drosophila*.

Her postdoctoral work, with Dr. Peter Sarnow, also at Stanford, characterized a novel mechanism of initiation of protein synthesis in a polio-like virus, and was supported by a Jane Coffin Childs Fellowship.

3) ESRE Professor of Diabetes and Cardiovascular Disease in the Joan C. Edwards School of Medicine



Dr. Jung Han Kim

The search for this position began in September 2007 with the faculty appointment within the Department of Pharmacology, Physiology and Toxicology at the Joan C. Edwards School of Medicine. Dr. Jung Han Kim was recruited from the University of Tennessee and began her appointment with Marshall in July 2009.

Dr. Kim studies the link between gene dysfunction and type 2 diabetes and obesity, a major health issue for Appalachia. She has major NIH R01 funding, along with funding from foundation sources.

Dr. Kim has performed extensive work on the link between obesity and Type 2 diabetes, and has over \$1 million in NIH funding over the next several years to develop a new animal model for studying this important problem.

ESRE funds have facilitated the transfer of her laboratory activities to the Robert C. Byrd Biotechnology Science Center and provided the major equipment funds to facilitate the laboratories.

Her long-term research interest "is in understanding the etiology and mechanisms underlying type 2 diabetes and obesity, concomitantly related diseases. Type 2 diabetes is the most common form of human diabetes, accounting for over 90% of cases and affecting 250 million people worldwide. Obesity at such epidemic proportions creates serious public health problems. Both diseases, furthermore, are associated with chronic complications and cardiovascular disease, increasing morbidity as well as mortality.

There is substantial evidence demonstrating that genetic factors are strongly involved in the development of type 2 diabetes and obesity, and I have focused my attention on the link between gene dysfunction and these diseases."

Her continued research will include "gene discovery, genetic resource development, and related biochemical and physiological studies associated with type 2 diabetes and obesity."³

³ http://bms.marshall.edu/research_group/code/kim.aspx, October 2010

4) Eminent Scholar in the College of Science

The hiring of the Eminent Scholar in the College of Science has not occurred, mainly as a result of the search for a new Dean of the College of Science. With the appointment of Dr. Chuck Somerville as Dean, this search is a high priority. The search announcement was published in *Science* recently and targets an Eminent Scholar in Phycology, the study of algae.

This Eminent Scholar will spearhead the development of a strong research cluster in freshwater resources, particularly in the scientific focus areas of Energy and the Environment.

The job advertisement is reproduced below:

The Department of Biological Sciences at Marshall University, as part of the State of West Virginia's Eminent Scholars Recruitment and Enhancement (ESRE) Initiative, invites applications for a tenure-track, Associate or Full Professor position in Phycology. The successful candidate will lead an interdisciplinary team of faculty members focused on research and economic development activities associated with West Virginia's extensive water and energy resources.

Special note: The Department of Biological Sciences is seeking an eminent scholar that will provide extensive research and scholarly mentorship, as well as grant activity, that will enhance Marshall's Watershed Resource Sciences vision.

Duties will include establishing an extramurally funded research program, mentoring junior faculty members, and participating in courses serving the department's Watershed Resource Sciences area of emphasis.

Candidates must possess a Ph.D. in biology or a closely related discipline, and show evidence of research productivity and extramural funding in freshwater phycology.

Qualified applicants should send a cover letter, current curriculum vitae, statement of research interests and goals, teaching philosophy, and up to three selected reprints. Applicants should also arrange for three letters of reference to be sent directly to the department.

Application materials may be submitted electronically (preferred) to phycologysearch@marshall.edu or by mail to:

Dr. Charles Somerville, Dean, College of Science, re: Physiology
Search, Marshall University, One John Marshall Drive,
Huntington, WV 25755. Review of applications begins
immediately

APPENDIX ONE- Marshall University's Research Trust Fund Plan

INDEX OF MARSHALL'S RESEARCH ENDOWMENT PLAN TO LEGISLATIVE REQUIREMENTS

Rule Section	Required Content	Section in the Marshall Research Endowment Plan
	An assessment of the participating institution's current research initiatives in STEM fields, including any initiatives falling within disciplines or areas of research specified by this rule.	III-Narrative Review of Ongoing Research Initiatives
5.5.2	An assessment of the potential outcomes of specific research lines proposed for enhancement by the institution,	IV-Marshall University Research Endowment Plan: Specific Goals C-Scientific Focus of MHR III-Narrative Review of Ongoing Research Initiatives
5.5.3	A narrative describing the current or proposed collaborations, particularly with other institutional partners, that play or will play a significant collaborative role in achieving institutional objectives,	V-E-MHR's Impact on the University
5.5.4	A narrative describing the centers, institutes or other academic units proposed, currently under development, or currently operating, that play or will play a significant role in achieving institutional research objectives.	III-Narrative Review of Ongoing Research Initiatives IV-Marshall University Research Endowment Plan: Specific Goals V-The Plan for Establishing the Marshall Institute for Interdisciplinary Research (MHR)
5.5.5	An analysis of possible strategies to enhance current research initiatives;	IV-Marshall University Research Endowment Plan: Specific Goals

Rule Section	Required Content	Section in the Marshall Research Endowment Plan
5.5.6.	An outline of the participating institution's proposed uses of endowment proceeds, including the anticipated costs associated with each proposed use and identification of any specific disciplinary hires.	V-The Plan for Establishing the Marshall Institute for Interdisciplinary Research (MIIR)
5.5.7.	A narrative describing major research equipment acquisitions currently under consideration that will contribute substantially to the plan.	VI-Narrative Review of Ongoing Research Initiatives Plan Goal 6:
5.5.8.	A cost analysis for achieving research goals with a comparison to the expected endowment proceeds available to the institution.	V-F-The Business Plan for MIIR
5.5.9.	An evaluation of how the research plan furthers the purposes of: the trust fund's goals ⁴ , the state's strategic plan for science and technology ⁵ and the research needs of the institution ⁶	V-B-Economic Impact of MIIR V-D-Building on Regional Strengths

⁴ (a) The Legislature finds that the continued expansion of the nation's economy is dependent upon the ability of its institutions of higher education to increase the quality, quantity and productivity of its citizens who are engaged in scientific and technical fields of study. Failure of the United States to compete in these areas may lead to lower standards of living, dependence upon foreign intellectual capital and international insecurity. The economic future of West Virginia is equally dependent upon the ability of Marshall University and West Virginia University, the state's two doctoral-granting, public research universities, to promote, educate and train researchers and research support staff in these diverse fields of study.

The Legislature further finds that a recent emphasis on the creation of innovative curricula and the receipt of significant private donations by Marshall University and West Virginia University has led to major expansions in certain areas of study, including energy, national security technology, environmental science, health and biomedical sciences, biometrics, biotechnology and nanotechnology. Despite these expansions, the additional investment of both private donations and state revenues is critical to recruiting world-class scientists, researchers, research staff, technicians and professional degree graduates, as well as providing funding for laboratories and scientific equipment.

(b) The purpose of the Legislature in enacting this article is to establish a state fund to be administered by the Higher Education Policy Commission to address the findings outlined in subsection (a) of this section. The fund will make public money available to the state's two doctoral-granting public research universities to match qualified private donations and qualified private donation pledges, directly creating an incentive for donors to support certain priority areas of study consistent with each participating institution's long-range strategic plan for research. Creation of this fund promotes strategic private donations targeted at specific areas of research and creates a sustainable source of funding for research initiatives that are critical to achieving long-term goals including, but not limited to, the following:

- (1) Research-based economic development and economic diversification; and
- (2) Increased potential for mentoring, licensing and related technology transfer and commercialization of scientific and technological research in the state.

Rule Section	Required Content	Section in the Marshall Research Endowment Plan
5.5.9	An evaluation of how the research plan furthers the purposes of the trust fund's goals. <i>continued</i>	V-E-MMR's Impact on the University
5.5.10.	Identification of the proposed uses for which alternative funding sources may be sought to enhance the comprehensive research initiatives contemplated by the participating institution. Alternative funding sources exclude qualified donations, matching moneys from the trust fund, and the endowment proceeds generated from the trust fund, and	<u>V-F-The Business Plan for MMR</u>
5.5.11	How the amount allocated for distribution to the participating institution will be directed within institutional goals.	<u>V-F-The Business Plan for MMR</u>

⁷ Increase the number of critical science, technology, engineering and mathematics (STEM) researchers at WVU and MU by 20% by 2018. Build at least one new science and engineering facility at MU and WVU or up to 100,000 net assignable square feet each by 2010, and develop a long-term plan to continue creation of new research facilities. Create five nationally competitive research laboratories by 2010. Develop at least four new, in-state emerging technologies businesses by 2010. Double non-competitive funding from federal agencies every five years. Increase by 10% per year the number of doctorates awarded in STEM fields through 2013.

⁸ <http://www.marshall.edu/Research/Research/2009-2010/2009-2010.htm>

Interdisciplinary applied research will be concentrated in two of Marshall's areas of research strength (research clusters in biomedical/biotechnology/bioenergy/bio nanotechnology, and transportation technology/logistics). This approach offers the greatest opportunity for the genesis of intellectual property and its commercialization, while building on existing strengths. The University and State of West Virginia will benefit from the development and expansion of the interdisciplinary research in these fields. Once fully operational, the Institute is projected to have a 10-year direct economic impact of 1000 new jobs with a \$25 MM enhancement in state tax revenues, not counting spin-off companies and their benefits to WV.

The plan for MIIR's development and the initial steps in its formation were approved in 2007 by the award of a \$5MM grant by the Office of Science and Technology's Eminent Scholars Research Enhancement (ESRE) program and Marshall's \$5MM private match. The creation of the West Virginia Research Trust Fund in March 2008 provides the opportunity to fully fund the establishment of the Institute as projected in the ESRE proposal. This Research Strategy Implementation Plan documents the application of the projected \$35-40MM available to Marshall through the State's investment of a minimum of \$15-MM in endowment funds, which will match dollar-for-dollar privately raised funds in support of the Institute.⁶

II-Background-Poised for Acceleration

Over the past ten years, Marshall has generated a steadily-increasing level of externally-funded research. Marshall's progress has been guided by focused integration and amplification of existing strengths within the School of Medicine and the College of Science, and now the College of Information Technology and Engineering. Infrastructure development grants from the State Office of Science and Technology, the National Science Foundation EPSCoR program and the NIH IDEA program have been used to hire and equip research faculty in these units and seed multidisciplinary centers. Successful scholarly and technology transfer results have been achieved in the biomedical/ biotechnological and nanobiology fields through cross-disciplinary efforts between the biomedical, biological and physical sciences. Five new business ventures have been launched by Marshall University's Research Corporation through patent licensing. These ventures include: Vandalia Research™, Inc.; Progenesis Technologies™, LLC; M.I.S.T.™ (Medical Information Systems Technologies); InSenSys™; and Ecer Technologies™, Inc.

A milestone in the development of this integrated multidisciplinary approach was the completion of the Robert C. Byrd Biotechnology Science Center in 2006. The construction of this state-of-the-art teaching and research resource facility located across the street from the College of Science has brought researchers and students from the Medical School and University into productive proximity measured in feet, rather than miles as was the case in previous facilities. The founding of a truly interdisciplinary research enterprise, the Marshall Institute for Interdisciplinary

⁶ Depending on availability, additional WV Endowment monies may be available after five years to match private gifts beyond \$15 MM to yield a 1:1 Trust Fund match.

Research, is the next important and fiscally responsible step in the growth of research at Marshall University.

Throughout the Marshall University Strategic Initiatives, specific objectives have been established for enhancing research and scholarship to evolve a sustainable platform for enhancing research productivity and funding, while elevating Marshall's stature and area-wide influence on economic development. Strategic investments have been made by the University, and Marshall is now poised to leverage these resource investments through the creation of the Marshall Institute for Interdisciplinary Research. Similar institutes are features of many successful research universities, and the formation of the Institute for Interdisciplinary Research at Marshall will have a dramatic, timely and strategic impact by developing a self-sustaining research enterprise that will spur economic development through the attraction of a cadre of nationally prominent, non-tenured researchers dedicated to producing breakthrough discoveries that will launch new business ventures. The Institute will catalyze interdisciplinary research activity across the University and generate revenue for the University through a commitment to commercializing viable intellectual property. Perhaps, as importantly, investments in MIR and the hiring of experienced, successful researchers within the Institute will have significant collateral benefits for research-active, tenure-track faculty members within the University and accelerate their competitiveness for future external grant funding.

III-Narrative Review of Ongoing Research Initiatives

As described in several portions of this document, Marshall's strategy for research excellence and growth has focused on the integration of strengths across the School of Medicine and the College of Science, and now, the College of Information Technology and Engineering.

A. Biomedicine, Biotechnology and Nanobiology

In the School of Medicine, the Biomedical Sciences graduate (Ph.D.) research program has been organized around five interdisciplinary clusters:

- [Cancer Biology](#)
- [Cardiovascular Disease, Obesity and Diabetes](#)
- [Molecular Mechanisms of Pathogenesis](#)
- [Neuroscience and Developmental Biology](#)
- [Toxicology and Environmental Health Sciences](#)

These research clusters are centered in the new Robert C. Byrd Biotechnology Center and extend to research collaborations elsewhere on-campus and within the medical school. Several of these clusters involve nanobiology applications and approaches. Marshall's Nanobiology focus has been enabled by the NSF WVEPSCoR program's Research Infrastructure Improvement Grants, and the Biomedicine focus has been supported through NIH COBRE/INBRE programs. These initiatives have spawned several research thrusts, which either are active and productive, or will be shortly following additional funding.

Through the NSF EPSCoR Research Infrastructure Improvement Grant, Marshall University has provided funding for an interdisciplinary team of five chemistry and biology researchers in the area of nanobiology, and the hiring of two experienced faculty members. Competitive external funding from the NIH and Army Research Office has been a successful outcome of this project, and the collaboration has directly resulted in the development of the initiative in Cellular Differentiation and Development described below.

The Cellular Differentiation and Development Center has recently commenced with support from a Research Challenge Grant. As a result of the aforementioned infrastructure building, research-active faculty in molecular/cellular biology, genomics, physiology, genetics, embryology, development, and biophysics have been attracted to campus. The recognition that all share a common interest in epigenetic mechanisms underlying cell differentiation and development and the diseases or abnormalities that result when these mechanisms malfunction led to the search for a mechanism to develop interdisciplinary collaborative thrust in this critical area. This goal was accomplished by funding and chartering the CDC to provide (a) targeted recruitment of faculty and postdoctoral trainees; (b) a mechanism for generating preliminary data supporting grant applications; and (c) an administration that will provide oversight and accountability. Commencing its second year of operation, the Center has already attracted an NIH-funded senior researcher to provide leadership and direction for the Center's further development.

The NIH Centers of Biomedical Research Excellence (COBRE) grant at Marshall University has focused on the creation of a critical mass of cancer researchers supported by key capabilities. The project has created a genomics core, providing microarray-based gene expression profiling and comparative genome hybridization, automated DNA sequencing and DNA/RNA sequence analysis software and real time PCR. The statewide NIH-INBRE program, led by Marshall, also makes use of this facility and has focused on developing the Appalachian Cardiovascular Research Network and a Bioinformatics core. Through these efforts, fourteen research-oriented biomedical faculty members have served as a base for attracting an additional five cardiovascular and cancer researchers. In the very near future, through the auspices of the West Virginia Higher Education Policy Commission's Division of Science and Research Eminent Scholars Recruitment and Enhancement (ESRE) program, an ESRE Professor of Diabetes and Cardiovascular Disease will be hired to bring critical missing research expertise to the Biomedical cluster.

A significant increase in peer-reviewed publications, NIH and other external funding awards and patentable inventions are key positive outcomes observed from these efforts. Two other key initiatives are underway. One will provide the bridge between biomedical research output and commercialization of the derived therapeutics, and the second seeks to integrate advances in Nanosensing to provide for the critical needs in rural health care that confront West Virginia and the surrounding areas.

The Center for Biotechnology /Biomanufacturing Commercialization will capitalize on a growing but lucrative area of the national economy, which transforms biomedical research and harness bio-systems to generate viable therapeutic products. The Center will provide quality research, development and small-scale production capability to the pharmaceutical and biotechnology industries in West Virginia and the surrounding region.

Employing the best scientific and engineering practices, the Center for Diagnostic Nanosystems focuses on novel molecular-based diagnostic tests that can be used by individuals and public health systems to facilitate personalized medicine and preventative health care management. Focusing on the creation of new ways to diagnose disease, monitor health, and build enabling electronics, the Center will merge new technologies from nanoscience, microelectromechanical systems (MEMS) with genomics and molecular biology. The Center will capitalize on the vast potential of nanobioscience through the integration of interdisciplinary research developments in biologics and technological devices to deliver commercially-viable products. Included among them will be new classes of personal diagnostic nanosensor systems capable of integration into telemedicine networks. These systems will use emerging bionanotechnology capabilities to detect abnormal conditions at the molecular scale and at their earliest stages, *particularly within rural populations where routine access to state-of-the-art medical facilities is greatly lacking.*

MHR will accelerate and intensify the productivity of these initiatives. Through the sustainable business model and cadre of non-tenured researchers, MHR will address critical need for resourcefulness and celerity in today's rapidly changing research environment.

B. Intelligent Transportation Systems and Logistics

Intelligent Transportation Systems (ITS) combines computers and sensors in integrated systems to assist in making our transportation system safer and more efficient. On one end of the spectrum ITS will facilitate crash avoidance technologies for the typical motorists on our highways, and allow all types of transport vehicles to use less fuel helping to reduce our nation's dependence upon foreign oil. At the other end of the spectrum, ITS technology steers visitors to tourist spots, ambulances to 911 calls, and commuters to parking spots in busy downtown districts or around College campuses.

Marshall University is leveraging the capability of the Rahall Transportation Institute's designation as a national University Transportation Center and its proximity to the nation's largest inland river port and some of the busiest freight rail lines in the Appalachian Region. Through attraction of prominent faculty focused on the significant deployment and customization challenges in transferring urban highway ITS technologies into rural America and the rail and water modes of our nation's ground transportation system, Marshall endeavors to develop a significant research cluster in this significant and growing area of technological enterprise that will be critical in the nation meeting the energy and logistics needs of the future.

CITE's engineering program is augmenting the Rahall Transportation Institute's efforts to create a Center of Excellence in Intelligent Transportation by providing the expertise of its faculty to the research and development efforts of RTI. New faculty members have been hired who are recognized experts in the areas of infrastructure and transportation engineering. The expertise that these faculty members possess includes not only ITS, but advanced testing and monitoring techniques for various transportation structures, as well as the application of modern materials and techniques used in the construction of transportation systems.

IV-Marshall University Research Endowment Plan: Specific Goals

Plan Goal 1: *Increase the number of full-time, grant funded researchers at Marshall University by a minimum of nine scientists within the next five years.*

Potential Outcome(s):

- Establish MIIR as a non-profit 501 (c) 3 entity within the Marshall University Research Corporation;
- Increase in full-time research-active scientists directly employed by MIIR and the Marshall University Research Corporation;
- Increase the number of research-active faculty holding traditional academic appointments within the University;
- Increase in the number of competitive grants submissions and grant-funded researchers
- Increase in total competitive grant funding for Marshall University;
- Increase in overall research funding for programs and facilities at Marshall University
- Increase in patent filings;
- Increase in licensed patents and new business start-ups;
- Collateral (indirect) research productivity gains in departments and colleges elsewhere in the University.

Strategies for Achieving Goal:

- Recruit and hire a research-active MIIR Senior Scientist/Director who will have the following responsibilities:
 - ✓ Recruit, hire and build an interdisciplinary team of top-tier research scientists required to fulfill the mission of MIIR;
 - ✓ Recruit, select, charter and chair a Council of Scientific Advisors (a "RAND-like" entity of national and international innovators) to serve MIIR;
 - ✓ Develop and implement the scientific vision and plan for the Institute, consistent with its financial development;
 - ✓ Develop the Institute policies for reinvestment of recaptured compensation and indirect cost distribution generated by research activities within the Institute;

- ✓ Work with the President, the Senior Vice President for Development/CEO of the Marshall University Foundation and the Vice President for Research to increase the MIIR endowment fund;
- ✓ Maintain a vigorous externally-funded research program;
- ✓ Manage the goals and performance of the Institute staff
- Foster research collaboration between MIIR and faculty within the University;
- Increase the competitiveness of research-active faculty for grant funding by leveraging the resources (e.g., scientific expertise, equipment, etc.) developed within MIIR.
- Focus the majority of research investments in applied areas of research that have the potential to yield patentable discoveries.
- Retain the services of a research/technology transfer expert to improve/accelerate discovery disclosure reporting, provide patent assistance for scientists, develop external technology partnerships and accelerate new venture start-ups.

Progress Measures:

- Hiring of MIIR Senior Scientist/Director;
- Number of new full-time research-active scientists directly employed by MIIR and the Marshall University Research Corporation on an annual basis and the number of new scientists added;
- Recruitment of Council of Scientific Advisors members and the constitution and activation of the Council;
- Number and value of successful competitive grant submissions by year; number of grant-funded researchers by year; and the trend for both metrics over the previous five-years;
- Total value of competitive grant funding within MIIR and the trend over the previous five years;
- Overall research funding for programs and facilities involving MIIR by year and the trend over five years;
- Increase in the number of new MIIR patent disclosures and filings per year over a five year continuum;
- Increase in the number of MIIR patents licensed and the number of new business start-ups on an annual basis and over a five year continuum.
- Growth in similar metrics for the University *per se* that reflect collateral (indirect) research productivity gains in departments and colleges elsewhere in the University.
- Number of new research-active faculty holding traditional academic appointments that have been added annually to the University and the net retained.

Time Interval for Assessing Progress: 2008–2013 with annual summaries of progress.

Plan Goal 2: *Develop interdisciplinary research clusters and focus endowment investments in research areas that:*

- ⓐ *Build on existing institutional strengths and add to the critical mass of researchers;*
- ⓑ *Involve multiple grant funding agencies/sources with reasonable probability for the awarding of funding on an ongoing, competitive basis;*
- ⓒ *Offer the potential for breakthrough, patentable discoveries that will enhance research-based economic development.*

Potential Outcome(s):

- Assuming private donor gifts will support the development of two research clusters, the University's directed research endowment plan will be concentrated initially on one or two areas of interdisciplinary research, which are strengths at Marshall: research clusters in biomedical/biotechnology/bionanotechnology, or/and transportation technology/logistics);
- Characterization of the complex interactions between environmental and genetic factors (both genomic and epigenetic) responsible for the chronic diseases in Appalachia;
- Increased product development in one or more of the following areas: bio-manufacturing and niche areas of applied biomolecular research and bionanotechnology, which include the development of nanostructured, nanocrystalline and advanced electronic materials (DNA and RNA), nanostructured materials for cellular energy capture and delivery, bioenergy processes that yield alternative fuels/energy production, functionalized nanostructured materials for chemical-biosensor applications, nanomaterials in environmental pollution detection, monitoring and remediation, and functionalized nanostructures for targeted therapeutic agent delivery in medicine.

Strategies for Achieving Goal:

- Cultivate donors interested in gifting to one or both of these research areas;
- Attract and hire core research scientists with the expertise and commitment to contributing to research advances in these priority areas;
- Build and advance the development of strong, interdisciplinary research teams within MIIR and the University, and develop advantageous collaborations across the University and with researchers at other institutions both domestically and internationally.

Progress Measures:

- Annual private gift totals supporting research at Marshall University and matched by the WV Research Trust Fund;
- Total endowment funds dedicated to research in biomedical/biotechnology/bio-nanotechnology/bioenergy;
- Total endowment funds dedicated to transportation technology/logistics research;
- Hiring and retention of new full-time research scientists working in these

areas:

- Productivity of assembled interdisciplinary research teams as measured by grant activity, personnel hiring, peer-reviewed publications and patent applications.

Time Interval for Assessing Progress: 2008–2013 with annual summaries of progress.

Plan Goal 3: *Increase the overall non-base budget for research and the number of non-base funded positions within Marshall University's research enterprise, while increasing the retention and employment of college graduates.*

Potential Outcome(s):

- Increase in redirected F & A (Administrative and Facilities) funding generated by MIIR scientists to support research within MIIR;
- Increased employment of college-educated research technicians and research support personnel;
- Increased employment of research associates and postdoctoral fellows
- Increased employment of postdoctoral fellows;
- Increased employment of personnel skilled in business, financial and entrepreneurial aspects of new venture start-ups emanating from licensed research patents;
- Increased graduate (Master's and Ph.D.) student employment (paid tuition/fee waivers and enhanced stipend support);
- Increased undergraduate student participation in research;
- Increased internal competitive mini-grant funding for undergraduate students engaged in research;
- Increase overall direct and indirect employment within the Bioscience Sector through research conducted by Marshall University.

Strategies for Achieving Goal:

- To generate greater discretionary revenues to invest in employing additional research personnel, seventy-five percent (75%) of F & A funds earned from grants will be returned to MIIR scientists for investment in needed personnel and equipment and 100% of recaptured salaries from grants will be returned to MIIR scientists for the same purpose;
- Increase personnel support from grants and contracts;
- Participate in the growth/expansion of existing private sector businesses through intellectual capital creation and retention;
- Attract new business investment in research-related enterprises;
- Increase philanthropic support for research through endowment and non-endowment gifts.

Progress Measures:

- Level of annual discretionary revenues for research investment;
- Formulation of five-year business plans with defined accountability measures for making strategic and sustainable research development investments;
- Direct and indirect employment growth attributed to the University's research enterprise

Time Interval for Assessing Progress: 2008–2013 with annual summaries of progress.

Plan Goal 4: *Increase the number of Ph.D. programs at Marshall University by at least one program.*

Potential Outcome(s):

- One or more new Ph.D. programs in high demand fields.

Strategies for Achieving Goal:

- Generate a self-sustaining funding base for the operation of one or more new Ph.D. programs;
- Examine areas of opportunity, evaluate and prioritize them;
- Assemble the core faculty and physical resources required to deliver a program of excellence.

Progress Measures:

- Funding, leadership, a comprehensive business plan and an action plan for the start-up and operation of the program;
- Curriculum development and approval;
- Implementation of the program and Ph.D.-student enrollment;
- Graduation of degree candidates and engagement of graduates in research-related career paths.

Time Interval for Assessing Progress: 2013–2015 with annual summaries of progress.

Plan Goal 5: *Improve technological digital reference support for internationally competitive research programs.*

Potential Outcome(s):

- Campus Internet-2 access for inter-institutional database sharing
- Campus-wide access to National Supercomputing Resources
- Increase data warehousing and cataloging capacities;
- Increase digital research journal subscriptions in priority fields;
- Improve the MURC service platform and the array of automated/integrated electronic services (e.g., e-purchasing, e-PAR's, etc.).

Strategies for Achieving Goal:

- Increase annual and one-time funding available for technology resource and infrastructure development through a combination of grants, public and private funding;
- Increase annual and one-time funding available for digital information (e.g., library holdings) and resources through a combination of grants, public and private funding;
- Continue efforts to expand the integrated database capabilities and utilities provided by Marshall's enterprise software platform.

Progress Measures:

- Amount of increases in annual and one-time funding available for technology resource and infrastructure development through a combination of grants, public and private funding;
- Annual funding increases in base and one-time funding available for digital information (e.g., library holdings) and resources through a combination of grants, public and private funding;
- Evidence of expanded database capabilities and services provided within MURC by Marshall's enterprise software platform.

Time Interval for Assessing Progress: 2009-2015 with annual summaries of progress.

Plan Goal 6: *Expand the physical infrastructure available to support research in these and related fields.*

Potential Outcome(s):

- New ~\$60-million academic and research building (Marshall University Applied Engineering and Advanced Technology Research Complex);
- Increase in state-of-the-art research laboratory space to support the continued development of the research enterprise;
- Expansion in bioengineering and biomedical engineering research base

Strategies for Achieving Goal:

- Location of the building – current thinking is that this new building will be located between the Robert C. Byrd Biotechnology Science Center and the Engineering Laboratory Building on the Huntington Campus;
- Funding for planning this capital project will need to be obtained;
- Funding for the construction of this capital project will need to be obtained through a combination of grant, public (federal and state) and private sources.

Progress Measures:

- Acquisition of funds for planning;
- Acquisition of funds for building construction;
- Acquisition of base funds for opening and operating this building;

Time Interval for Assessing Progress: 2011-2015 with annual summaries of progress.

V-The Plan for Establishing the Marshall Institute for Interdisciplinary Research (MIIR)

A-Concept and Guiding Principles

MIIR is the principal research priority of the University. It is based on a concept constructed by President Stephen Kopp following an extensive review of institutional strengths, state and national research priorities, and an economic Impact analysis.

Conceptually, MIIR is a significant departure from conventional university research development approaches. It is designed to develop a research enterprise predicated on an earning and entrepreneurial culture. MIIR will be ultimately staffed by a core group of endowed, nationally-competitive non-tenured researchers focused on applied, interdisciplinary research leading to new discoveries that have commercial potential. A core group of nine research scientists is targeted as the critical mass for full programmatic development. Additional scientists will be added as salary support is adjusted from full endowment support to partial endowment support for positions after the first five years of employment. The initial year salaries and start-up packages for the first two senior members of this core group have been provided by the ESRE grant program. Marshall University will utilize the additional state and private funds available from the WV Research Trust Fund to support the remaining seven members.

The Institute charter stipulates that:

- Appointments of MIIR research scientists are exclusively within the Institute [a 501(c)3 subsidiary of MURC] – no appointments in traditional academic departments or colleges;
- Performance-based appointment contracts using funds derived from a portion of the interest earned on each endowment (4.5% spending rate) will be used in lieu of tenure eligibility with twelve month appointments, as opposed to traditional academic year timeframes;
- Contract renewals/extensions will be merit and performance based;
- All endowed research scientist positions will be required to generate 50% of their compensation from externally funded grants/contracts by Year 5 and then each year thereafter;
- After the initial five years, recaptured endowment earnings of each of the two positions will be combined to create new endowed research scientist positions;
- Research scientists will focus on the generation of commercially viable intellectual property (IP);
- Research scientists will be responsible for involving undergraduate and graduate students actively in biotechnology research with the goal of preparing the next generation of entrepreneurial researchers, who will contribute to the economic growth of West Virginia within MIIR and elsewhere;

- MIIR research scientists will foster collaborative research projects with Marshall University and serve as mentors for less experienced researchers, as appropriate

B-Economic Impact of MIIR

A comprehensive economic impact study of this plan was conducted by Marshall University's Center for Business and Economic Research³. A two decade synopsis of the economic impact of MIIR is as follows:

- ⊕ 3,365 new jobs (high wage/career opportunities for area residents, increased demand for and retention of educated knowledge workers and increased employment throughout the state)
- ⊕ With a minimum of nine core scientists, first year direct employment growth from MIIR is 75 positions, all supported either from endowment earnings or external grants/contracts. Demand created by income and investment in equipment/supplies supporting these positions will add an additional 39 first year jobs.
- ⊕ Over the next two decades, total employment created by the Institute will increase by 3,365 (employment of 231 people in MIIR creates a total additional direct employment of 1,984 people, indirect new employment of 641 and induced employment of 509 new workers).
- ⊕ By year 5, the State will receive an estimated \$2 million annually in additional tax revenue.
- ⊕ Tax revenues increase to \$5.3 million annually in year 10 with a total of \$137 million over the first two decades.
- ⊕ Payback through increased tax revenues for the state's portion of the endowment investment in MIIR (\$26 million) will be approximately 5 years.
- ⊕ Increase in total in-State spending of \$284 million
- ⊕ \$9.9 million in additional spending per year.
- ⊕ \$36 million initial endowment generates \$7.89 for every \$1 of endowment funds expended.

These projections neither include new research/grant activity collateral to the Institute, nor royalty, nor equity revenues expected from ventures resulting from the successful commercialization of intellectual property developed by MIIR researchers. As such, the anticipated revenue growth, job creation and overall benefits projected on behalf of the State of West Virginia, which will result from the establishment of this institute, are highly conservative projections.

³ "The Economic Impact of the Marshall Institute for Interdisciplinary Research Endowed Professorship Program in West Virginia", Calvin Keel and Jennifer L. Price, November 16, 2005

C-Scientific Focus of MIIR

The MIIR will focus on interdisciplinary research and development involving targeted areas of biotechnology/bio-nanotechnology. This particular focus was selected because it builds on the existing state-of-the-art research facilities and the interdisciplinary strengths of Marshall University, as described above. Within the broad field of biotechnology, MIIR investigators will concentrate on the characterization of the complex interactions between environmental and genetic factors (both genomic and epigenetic) responsible for the chronic diseases in Appalachia. The initial spectrum of diseases under study will be cancer and cardiovascular disease, including obesity and diabetic components because (1) they are the most prevalent maladies contributing to regional morbidity and mortality; (2) the availability of considerable federal funding; (3) the core capabilities at Marshall both in terms of existing faculty expertise and facility resources; and (4) access to a unique and extremely stable genetic population.

The value of the aforementioned niche population extends well beyond the obvious inheritance or genetic damage implications. Recent findings¹⁰ suggest a person's health is influenced by ancestral lifestyles (e.g., dietary habits, smoking, etc.). These genetic effects appear to be gender specific and cause semi-permanent alterations to the germ-line across multiple generations of descendents (e.g., grandchildren). These environmentally-induced "epigenetic changes" are the result of chemical modifications in the DNA, rather than direct genetic mutations. Another element of the Appalachian population is its comparatively and historically low socioeconomic status. In a fascinating article in *Scientific American* entitled, "Sick of Poverty", Sapolsky¹¹ points to an array of intriguing inheritance manifestations of poverty, which appear to challenge the common environmental assumptions and explanations – i.e., limited health care access, low health care utilization, and increased exposure to risk factors. Based on previous experimental results, Sapolsky posits that the pathogenesis of poverty is the result of chronic stress of "feeling" poor. The psychosocial stressors and behavioral habits of the stable, multigenerational, family-oriented population that typifies the Appalachian population proximal to this university provide a unique opportunity to study this hypothesis.

The Institute's genomics thrust takes advantage of the information made available through the Human Genome Project and the anticipated future demand for individualized health care through patient genomic and phenomic (physical phenotypic traits resulting from instructions encoded in the genome) information records. Church¹² has described a futuristic view of medicine as follows:

¹⁰ Pennisi, E; Food, Tobacco, and Future Generations; *Science* 310:1760-1761, 2005.

¹¹ Sapolsky, R; Sick of Poverty; *Scientific American*, pages 94-99, Dec. 2005, www.sciam.com.

¹² Church, G; Genomes for All; *Scientific American*, pages 47-54, January, 2006;

<http://www.sciam.com/article.jsp?id=88086&colID=18&colID=00046059-19CD-1BA7-99C0B3414B7F0124>

"The '\$1,000 genome' has become shorthand for the promise of DNA-sequencing capability made so affordable that individuals might think the once-in-a-lifetime expenditure to have a full personal genome sequence read to a disk for doctors to reference is worthwhile."

D-Building on Regional Strengths

Regional biotechnology development is proving to be one of the most effective ways Marshall can build a platform of externally funded research and academic programs that offer substantial opportunities for students, while enhancing job creation and the retention of graduates in the state workforce. Clear evidence of the local economic impact of Marshall's biotechnology research is the fact that three biotechnology companies have been launched by the University within the last two years – Vandalia Research, Inc., Medical Information Service Technology and Progenesis™, LLC. All have attracted full rounds of initial equity and Vandalia has recently received second round financing.

Marshall's focus on biotechnology, biomedicine, bionanotechnology and bioenergy reflects a deliberate strategy of building on strengths within the Medical School and College of Science, but also reflects an emphasis related to the region's commercial activity in Biosciences. A recent study sponsored by the Pharmaceutical Research and Manufacturing Association¹³ highlighted important facts which validate this focus:

- Bioscience employment accounts for nearly 7,000 jobs across the state
- These bioscience jobs pay an average of \$55,220 per year, compared to a statewide average of \$37,894.
- One third of these bioscience companies and nearly half of the total jobs reside within the Advantage Valley Corridor of Cabell, Wayne, Putnam and Kanawha Counties.
- Cabell County's bioscience employment grew 20% between 2001 and 2006 to account for 15% of the statewide total bioscience employment.

The establishment of MIIR clearly will be consonant with developing and growing this dynamic cluster in West Virginia's "new economy". It will provide technology input to drive further venture development, offer area firms a source of expert collaboration, and train the future entrepreneurs, scientists and employees that will be necessary to continue the bioscience sector's trajectory of rapid growth.

E-MIIR's Impact on the University

While the MIIR is a separate and distinct entity of the University, it will be constructed in a way so that it will serve as a bridge, catalyst and accelerant for collaborative research with the SOM, COS, and eventually, with the rapidly growing College of Information Technology and Engineering (CITE). (A new \$3.5M, 16,000 ft²

¹³ "An Economic Profile of the Biosciences Industry in West Virginia", Anthony C. Gregory and Tom S. Witt, February 2008.

engineering laboratory building will be opened in the fall of 2008 and a second, \$50M engineering facility is currently being programmed.)

There are many examples of potential connections between MIIR and existing Marshall University research initiatives. For example, the Institute's genomics thrust will lead to bioenergy research and "ecogenomics" research – a new field, which applies the tools of genomics, proteomics, etc. to ecology and environmental sciences. Marshall's location on the Ohio River, its existing faculty expertise in DNA-based bacterial source tracking and other ecological indices of this river (and its contributing waterways), and the national need for a knowledge-based solution of competing commercial, recreational and water quality demands on the River offer an exceptional niche opportunity for collaborative research between MIIR and its parent institution, Marshall University.

MIIR's focus will also complement joint efforts of the SOM and COS to establish a Cell Differentiation and Development Center (CDDC). With funding from the State's Research Challenge Grant, a group of seven faculty from these two units will work to identify the epigenetic events essential for normal cell differentiation and development and to determine how alterations in these activities can lead to cancer and cardiovascular disease. The institution has committed one of the new MIIR hires to an individual with nationally-competitive research credentials in cell differentiation and development.

MIIR will increase Marshall's opportunities to expand and intensify collaborations with other West Virginia institutions building on existing infrastructure development programs of the NIH (INBRE and COBRE) and NSF (EPSCoR). The Institute will significantly advance Marshall's INBRE's Appalachian Cardiovascular Research Network (ACoRN)¹⁴ – a multidisciplinary team of over 20 people from Marshall University (physicians, molecular geneticists, mathematicians, computer scientists, etc.), WVU Health Science Center (physicians and research nurses), Charleston Area Medical Center (physicians and research nurses), Fairmont State University (molecular biologists and students), West Liberty State College (molecular biologists and students) and several rural health clinics (physicians and research nurses). ACoRN's access to a largely rural population has already attracted attention and collaborative research offers from out-of-state research institutions.

MIIR will undoubtedly enhance both the quality and productivity of STEM (Science/Technology/ Engineering/Math) research at Marshall University. Its entrepreneurial emphasis will lead directly to additional invention disclosures and technology-based economic development in southern West Virginia. The nationally-competitive stature of MIIR faculty will both increase the opportunity for high quality undergraduate and graduate research training at Marshall and enhance the level of research leadership in the University and the State. While a separate and unique organization, MIIR is intimately linked to the research and educational

¹⁴ Bonette, L. Critical Connections: NCRR Reporter, pages 4-9, spring 2007, www.ncrr.nih.gov

missions of Marshall University and reaches its greatest capacity through complete integration with the simultaneous growth of the other STEM units of the University.

F-The Business Plan for MIRR

Steps have already been taken to incorporate MIRR as a 501(c)3 subsidiary of the Marshall University Research Corporation. Its growth and sustainability will be provided by the following sources of funds which are summarized in Table 1:

- \$3MM in expendable cash from the Eminent Scholars Research Enhancement grant
- Spending at 4.5% from an initial \$5MM allotment to the MIRR endowment provided by Marshall's private match to the ESRE grant
- Marshall fundraising to earn the \$15MM state contribution is targeted at \$20MM. The contributions will accumulate over 5 years, and the overmatch will be available to draw down any remaining funds in the Trust fund after year 5. As the state and private funds accumulate in the MIRR endowment, the spending rate on endowment proceeds will be reviewed and adjusted annually to ensure that the principal is not invaded. The endowment proceeds spending rate is estimated to average 4.5% annually.
- At the projected grant activity levels, return of 65% of the F&A to MIRR will make significant additional funding available

MIRR staffing will commence with the hiring of a MIRR Director/Lead Research Scientist and the first Staff Scientist. The Director will be responsible for advancing their own nationally recognized research program and have the primary responsibility of developing the scope and stature of MIRR through the recruitment of additional research scientists and personnel. The focus will be on hiring a nationally prominent researcher with a proven track record in entrepreneurship and research development for this position.

In years 3 and 4, the balance of the initial nine members of the scientific staff will be hired. By year 5, the MIRR endowment will have reached the \$36 MM target, and hiring of additional scientists will be possible, while preserving the principal of the endowment.

Table One- Sources of Funds for MIR

Year	Beginning Endowment Balance	RTF Pledges Received	RTF Match	Corpus earnings at 6%	Earnings on Pledges Received	Available Funds For Ongoing Activities at 4% Spend Rate	Grant Year End Endowment Balance Activity	F&A Return to MIR	Total Funds Available from Endowment and F&A Return
0	5,000,000	0		300,000	0	200,000	5,100,000		200,000
1	5,100,000	2,000,000	2,000,000	306,000	120,000	204,000	9,322,000	70,000	282,000
2	9,322,000	3,000,000	3,000,000	559,320	180,000	372,880	15,688,440	104,000	476,880
3	15,688,440	5,000,000	5,000,000	941,306.4	300,000	627,537.6	26,302,209	208,000	835,537.6
4	26,302,209	5,000,000	5,000,000	1,578,132.53	300,000	1,052,088.35	37,128,253	312,000	1,364,088.352
5	37,128,253	5,000,000		2,227,695.18	150,000	1,485,130.12	43,020,818	416,000	1,901,130.119
6	43,020,818		5,000,000	2,581,249.08	150,000	1,720,832.72	49,031,234	520,000	2,240,832.721
7	49,031,234		0	2,941,874.06	0	1,961,249.38	50,011,859	520,000	2,481,249.375
8	50,011,859		0	3,000,711.55	0	2,000,474.38	51,012,096	650,000	2,650,474.363
9	51,012,096		0	3,060,725.78	0	2,040,483.85	52,032,338	720,000	2,768,483.851
10	52,032,338		0	3,121,940.29	0	2,081,293.53	53,072,885	832,000	2,813,293.528
11	53,072,985		0	3,184,179.1	0	2,122,919.4	54,134,445	910,000	3,032,919.398
12	54,134,445		0	3,248,066.68	0	2,165,377.79	55,217,134	910,000	3,075,377.786



FY 2010 PROGRAM ANNOUNCEMENT and Request for Proposals

RTF.10.01S

RESEARCH TRUST FUND STEM GRANT PROGRAM FOR STATE COLLEGES AND UNIVERSITIES

Proposal Due Date: May 26, 2010

Summary of Program Requirements

- **Program Title:** RTF for State Colleges and Universities
- **Program Officer:** Jan R. Taylor, Ph.D., Director of Research Programs
jan.taylor@wvresearch.org
304.558.4128 x. 3

Eligibility Limits

- **Organization:** West Virginia School of Osteopathic Medicine, Bluefield State College, Concord University, Fairmont State University, Glenville State College, Shepherd University, West Liberty State University or West Virginia State University. Institutions awarded in the first round of competition are ineligible.
- **Principal Investigator:** President, Provost or Vice President for Research
- **Limit on Number of Proposals:** One per institution

2010

Research Trust
Fund

Award Information

- **Anticipated Type of Award:** Standard
- **Estimated Number of Awards:** up to 4
- **Anticipated Funding Amount:** \$400,000 – maximum award \$100,000; minimum \$50,000

Background

The mission of the West Virginia Higher Education Policy Commission Division of Science and Research (DSR) is to increase West Virginia's competitive research infrastructure through investments in people, tools and ideas within the state's institutions of higher education. Enhancement of the research environment may also include research infrastructure and mission support directly linked to research activities, including equipment, materials and supplies, start-up packages and research-related expenses permitted by university policy. Pursuant to West Virginia Code §18B-18A-1 et seq., the Research Trust Fund (RTF) was created by the West Virginia Legislature to fund science, technology, engineering and mathematics (STEM) research and development at institutions of higher education, to increase competitiveness for extramural funding and to build tech-based economic development.

Program Description

The RTF for State Colleges and Universities is intended to provide funds to build the STEM research capacity of eligible institutions. DSR will provide RTF awards specifically targeted toward recruiting scholars and enhancing the research environment on state college and university campuses. The purpose of an RTF award is to provide support for lasting improvements in an institution's research capacity and to build toward increasing the institution's role in technology-based economic development. Institutional RTF plans submitted in response to this RFP must focus on building core research strengths needed to develop efforts for the successful pursuit of significant regional opportunities in science and engineering that also have economic development potential.



Institutional Research Plans

Institutional Research Plans (IRPs) should describe, in general terms, the broad vision of the institution for its STEM research enterprise. In addition to this broad vision, the IRP must provide a more detailed description of the specific research enhancements requested through this program.

Applications must describe strategy and implementation mechanisms to sustain the scientific foci of the proposed research enhancements. Institutions should describe the STEM improvements that will enhance the institution's competitiveness position with federal agencies in **specific disciplinary or cross-disciplinary areas**.

Strategies for placement of positions or research enhancements must be clearly articulated with projected outcomes over time. Each institution's IRP must include defined strategies and research enhancements, including a plan for sustaining the enhancements.

Plans shall include descriptions of how faculty and researchers hired or supported with these funds and other research enhancements such as equipment will:

- Enhance the quality and productivity of research in STEM fields;
 - Build entrepreneurial activity that leads directly to economic development;
 - Provide service and leadership to the university and the state in STEM research, education and policy;
 - Improve the quality of instruction at the undergraduate and graduate levels in STEM fields; and
 - Improve the quality of student advising (including service on thesis or capstone committees and mentoring student research experiences) in STEM fields.
- Eligible research areas include the scientific disciplines or interdisciplinary STEM fields available at state colleges or in collaboration with West Virginia University or Marshall University. Preference will be given to scientific disciplines and goals established in *Vision 2015*, the state strategic plan for science and technology or the core RTF disciplines of energy and environmental sciences; nanotechnology and materials science; biological, biotechnological and biomedical sciences; transportation technology and logistics; biometrics, security, sensing and related identification technologies; or gerontology. *Vision 2015* is available in the Library on the DSR website, www.wvresearch.org.

Plans shall also include a strategy to attract qualified gifts and pledges needed to draw down the RTF match. Qualified gifts and pledges must be donations and pledges from external sources to be eligible for state match. External source contributions are those that originate outside the institution and its affiliated foundation or research corporation. Eligible sources of external funding include, but are not limited to, businesses, non-governmental foundations, corporations and alumni or other individuals. Funds received from federal, state and local government sources are not eligible for state match.

Pledges, or promises of future payment, are eligible for state match provided they are based on a written contract or agreement and include a payment schedule that does not go past the **statutory deadline of March 8, 2013**.

All proposals shall be institutional infrastructure-building in nature, not individual researcher projects. Each institution shall seek to create "areas of distinction" or "centers of excellence" or strengthen one or two areas of talent and expertise for capacity building in STEM fields that are unique strengths. Partnerships, consortia and research alliances with other institutions with common or complementary interests are encouraged.

Eligible Research Enhancement Activities

Faculty: New STEM faculty positions and associated expenses for those positions, including start-up costs, salaries, benefits, travel and other professional expenses permitted by university policy.

Salary Supplements: Existing faculty positions that exhibit meritorious achievement and scholarship in STEM fields. Under a faculty retention plan, salaries, benefits, travel and other professional expenses as permitted by university policy are allowed.

Start-up Support: Packages of support used to attract and recruit outstanding STEM faculty. Start-ups should be limited to supplies, instruments, laboratory renovations and support, and student assistantships as may be required to initiate a high-caliber research program.

High-end Instrumentation: RTF funds may be used to purchase instrumentation to be used by faculty researchers and students. Instrumentation to be purchased with these funds should be beyond the reach of other state grant programs or normal institutional budgets.

Stipend Support for Students: Stipends for outstanding STEM undergraduate and graduate students at regionally competitive rates. Stipend support should primarily be used to attract excellent undergraduate and graduate students but may also be used to raise the stipends of current STEM students.

Scientific Literature and Digital Resources: To acknowledge the importance of researchers' access to appropriate digital resources and relevant scholarly journals, publications and literature, as well as the positive correlation between this access and research quality and productivity, institutions may propose to allocate funds for library materials in STEM fields.

Ineligible Activities

- Program funds may not be used for positions that are primarily administrative.
- Capital construction projects are not eligible.
- Indirect cost recovery is not permitted.

Application Instructions

Proposals must be submitted via the Grant Opportunity (GOI) system. To apply, register at <http://www.wvresearch.org/data/go/login.php>. Choose your own user name and password. DSR is unable to retrieve a forgotten password, so be sure to remember by choosing a memorable password. After registration is approved, log in to the system. When logging on to the system the first time, provide contact data by clicking on the Basic Data tab and demographic data by clicking the Demographics tab. Upload or copy and paste the PI's NSF-style or other brief biographical sketch in the tab labeled Biographic. These data take the place of the traditional cover sheet.

Submitting an Institutional Plan: Log in to the Research Trust Fund section of GOI by clicking here: <https://www.wvresearch.org/data/go/login.php?sc=y&f=x>. Under the IRP section of the Trust Fund section, click on Add/Update Institution Research Plan. The Institutional Research Plan should contain the following sections.

- **Summary:** Provide a one-page summary of the plan. It should include a heading and the plan abstract. The heading should include the title of the proposed endeavor and the names of the submitting institution and Principal Investigator.
- **Detailed Plan:** The detailed plan should contain the information described above in the Program Description and should not exceed 10 pages of single-spaced type in a legible font such as 10-point Arial or 12-point Times New Roman. The detailed plan should focus on one or more specific actions or targets for enhancing STEM research capacity.
An Evaluation Plan must also be included. The Evaluation Plan is limited to three (3) pages and is in addition to the 10 pages of the Detailed Plan. This plan must describe the metrics, milestones, and other accountability measures that will demonstrate achievement of primary objectives.
- **Biographical Sketches** for each key personnel member must be included. Each sketch is limited to two (2) pages and should be sufficiently detailed to demonstrate the necessary expertise to manage and execute the plan.
- **Budget:** A budget should be provided for the proposed research enhancements and should reflect the enhancements described in the Detailed Plan.

Institutional research plans may be edited until the end of the submission window. Uploading a new document will replace the existing document. When the final document has been uploaded, click the Submit button. This finalizes the submission and notifies DSR that your proposal has been submitted and may be reviewed.

Due Date

Proposals must be received by May 26, 2010.

Review and Award Procedures

This competition is rigorous and selective. Proposals will be reviewed for scientific merit and competitiveness by expert external review. Proposals will be further assessed for economic development, academic, and scientific potential by the State Science and Research Council. The Council will approve awards to the successful applicants. The Council retains the right to conduct interviews of applicants or solicit additional information in reaching a final funding decision.

Award Administration

Notification: Notification of the award is made to the submitting organization by the DSR with a copy to the Principal Investigator.

Award Conditions: All award packages consist of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which DSR has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; and (4) the applicable award conditions generally pursuant to West Virginia regulations. Awardees may adjust budget line items up to 10% without receiving prior written approval from DSR after the effective date of issuance.

Cost Sharing: Matching of an equal or greater amount is required for each research enhancement proposed. Matching funds may be secured through **March 8, 2013** via qualified gifts and pledges. The positive impact of leveraging additional external support (beyond the base requirement) in the overall consideration of each proposal will be considered. Leveraging external support for STEM growth is a major component of West Virginia's long-range strategy. As a requirement to receive state funds, universities must provide dollar-for-dollar matching within proposed budgets. Only newly-generated contributions, received after **March 8, 2008**, are eligible.

Reporting Requirements

Although state RTF funds are available for disbursement during fiscal year 2011, matching funds may be provided until **March 8, 2013**. Therefore, annually awardees must provide a detailed report describing the implementation of recruitment and enhancement plans and programs. Each report must include the numbers, demographics, services, financial details and milestones for each component projected by the original plan. A financial report that clearly identifies matching pledges and the sources of external funding must also be filed. Annual reports must be filed via GO! 60 days before the end of the performance period and a final report will be due no later than 60 days after the end of the grant period.

Contact Information

Programmatic questions should be directed to:

Jan R. Taylor, Ph.D., Director of Research Programs
Division of Science and Research
WV Higher Education Policy Commission

1018 Kanawha Blvd, East | Suite 1101 | Charleston, WV 25301
304.558.4128 x.3 | email: jan.taylor@wvresearch.org

Questions about GO! should be directed to: **Jonathan Caldwell**, Cyberinfrastructure Coordinator
jonathan.caldwell@wvresearch.org | 304.558.4128 x.5.

REPORT ON THE RESEARCH TRUST FUND

RESEARCH TRUST FUND FOR STATE COLLEGES

The newest awards supported by interest earned on the state's "Bucks for Brains" Research Trust Fund were announced on September 23, 2010. Fairmont State University and Shepherd University are set to launch programs in two rising science, technology, engineering and mathematics (STEM) areas, while actively working to raise funds to match the state's investment.

Fairmont State University received \$100,000 for the "New Media Assessment Project," which will enable the university's Open Source Intelligence Exchange to create a process that allows the university to capture large amounts of content from new media applications such as Twitter, social networking sites and discussion boards, and to consequently generate new knowledge about national security and law enforcement threats.

Fairmont's program is anticipated to enhance the university's competitiveness with federal agencies, its status as a leader in quality STEM research, its ability to incubate entrepreneurial economic development, and the quality of instruction and advising provided to students.

Shepherd University received \$99,892.50 to develop an "Undergraduate Research and Experiments in Robotics-Based Accomplishments for STEM Students" project. Through this robotics initiative, the university will seek to improve the recruitment and retention of STEM students and better prepare them for careers in robotics engineering and science.

Robotics is an emerging multi-disciplinary STEM area that combines mechanical, electrical and computer engineering in the design and construction of robots to perform specific tasks, in addition to emphasizing mathematics and computer science.



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Senate Bill No. 207

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