



Research at the University of Michigan

A Report to the Regents

Stephen R. Forrest
Vice President for Research

January 18, 2007

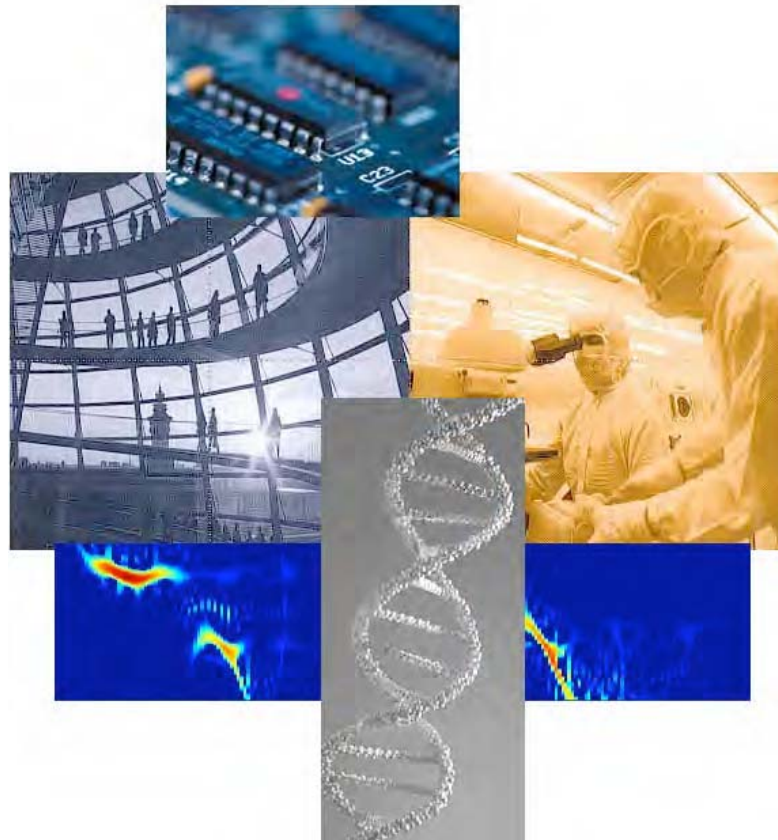


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Research at the University of Michigan



Annual Report to the Regents

Stephen R. Forrest
Vice President for Research



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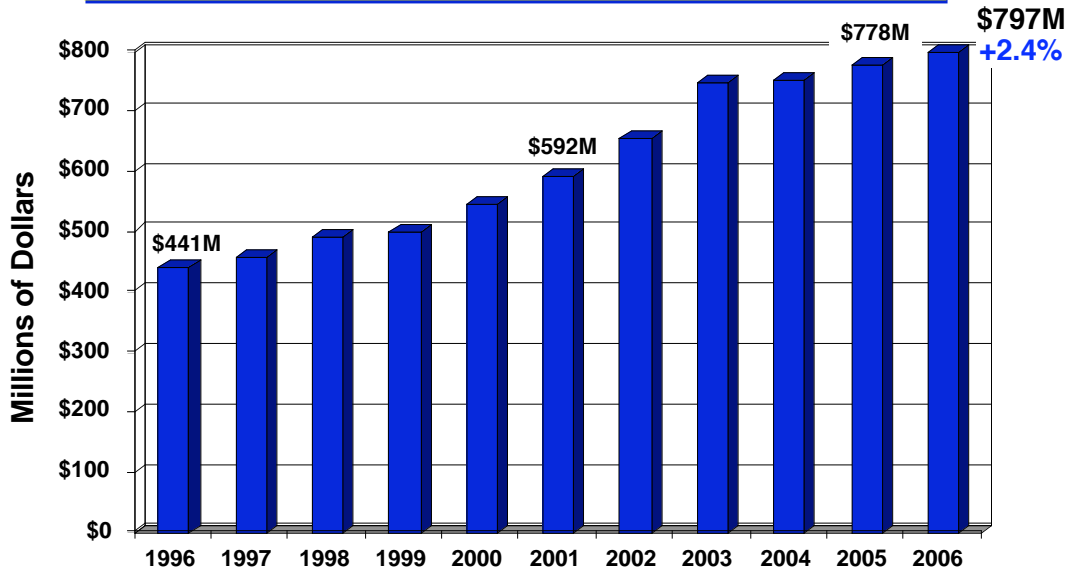
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Topics

- **Where we are:** Research numbers
- **Initiatives:** Michigan Memorial Phoenix Energy Institute
- **A significant challenge:** Partnerships with Industry

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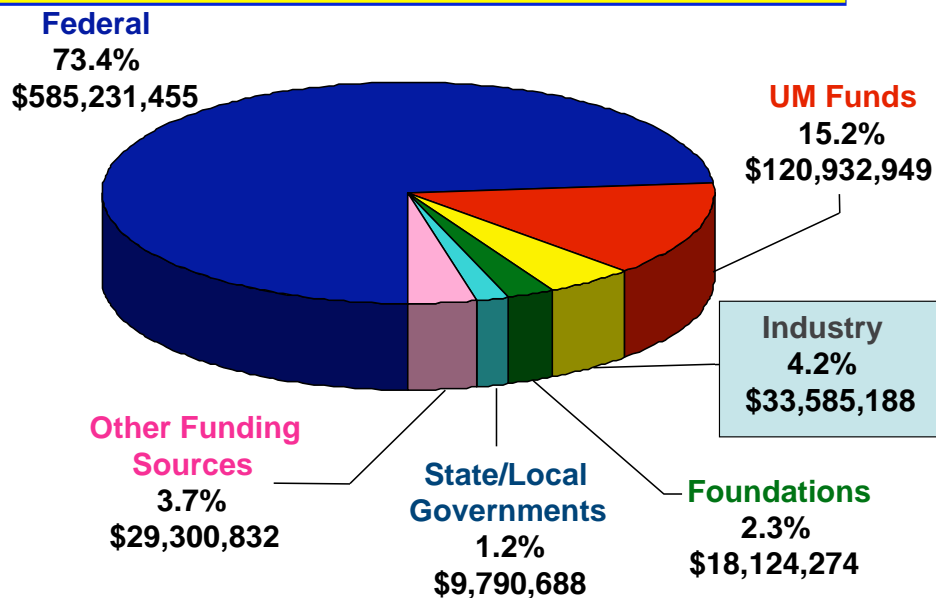
UM Total Research Expenditures (FY 1996-2006)



- Funding visibility into future unclear
- Expenditure outlook in FY 07 “guardedly optimistic”
- Long term prospects for growth are not above average

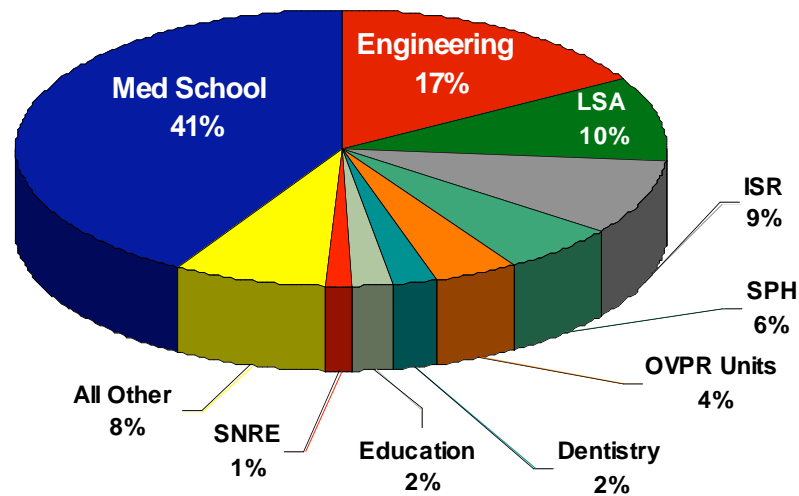
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UM Research Expenditures, by Sponsor FY2006: \$796,965,386



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UM Research Expenditures, by Unit FY2006: \$796,965,386



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Snapshot of OVPR Accomplishments in 2006

- Launch of *Search & Discovery*
- Distinguished Innovator Award
- New policies for OTT approved
- New AVP for Social Sciences & Humanities
- Arts & Humanities Funding Group Established
- Instituted effort to manage HPC resources & growth
- Improved IRB Processes in Health & Behav. Sci.
- eResearch & grants.gov Transition

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Michigan Memorial Phoenix Energy Institute

*Supporting and Growing
Research & Education for a
Clean, Affordable Energy Future*



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Defining Energy Research at UM

- **Established strengths are the core of the Institute**
 - Automotive Engineering
 - Nuclear Engineering
 - Solar
 - Low power/solid state electronics
 - Hydrogen
- **Priority areas for growth and coordination**
 - **Policy, economics and societal impact of the energy challenge**
 - Carbon-free energy sources
 - Transportation systems and fuels
 - Energy storage
 - Energy utilization

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Resources

- **Phoenix Memorial Lab Renovation**
 - \$11M from State and UM for facilities upgrade and partial renovation
 - 3rd floor for Hydrogen Energy Technology Lab (~\$2M)
- **Schools and Colleges**
 - Commitment for over 4 chaired positions from LSA & CoE
 - 4+ graduate fellowships from/to Rackham
- **Operating budget**

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Status Highlights

- **Director** (Prof. Gary Was) and **Assoc. Director for Outreach** (James MacBain) appointed
- **Deans of COE, LSA, Public Policy, ISR engaged**
- “Nano-hire” merged with energy mission
- **Development** identifying prospects for support
- Several major **corporations** engaged
- **Partnership with MSU**
- **RFP for cross-disciplinary energy projects**
- **Energy Symposium & Internal Workshop**

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Industry Partnerships: Why Universities Do It

– Academic Mission

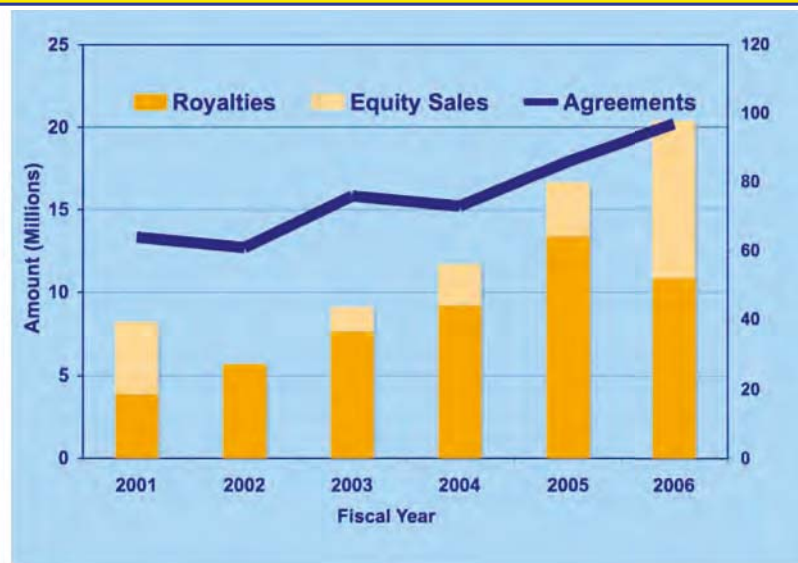
- Dissemination of knowledge to the public
- Test concepts and face challenges in the “real world”
- Encourage partnerships that promote student learning & employment opportunities

– Resources

- Create new jobs in a changing economy
- Supplement and enable federal research support
- Generate licensing income for research and education

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U-M Tech Transfer Performance



We are doing well, but...

- Licensing income is not a clear indicator of success with industry partnerships
- To the extent that partnerships contribute, it is far-trailing indicator
- Agreements=Partnerships

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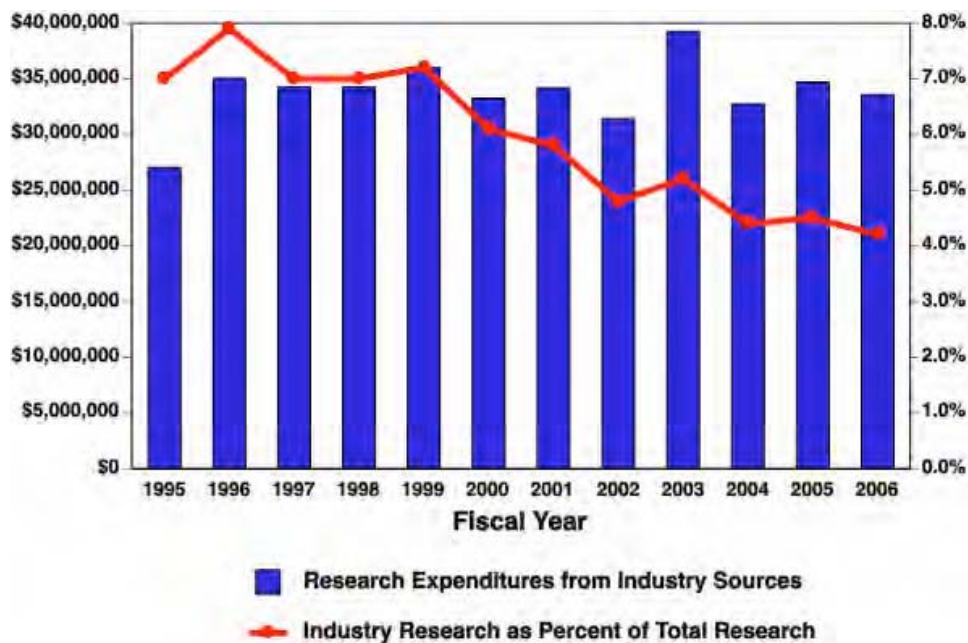
Recent BIG Events



- **Google** - selects Ann Arbor for new business center
- **NanoBio** - UM faculty spin-off receives \$30 M investment, one of largest biotech investments ever in Michigan
- **OncoMed** - company based on UM technology raises \$33 M in new investment
- Others are coming

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UM Research Sponsored by Industry (FY1995-2006)



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Challenges Exist to Improving Our Engagement with Industry

- **Culture** - No deep tradition of industrial research & tech transfer at UM
- **Location** - Lack of high population density, robust technical & funding infrastructure
- **Knowledge** – Limited understanding of how to engage with industry
- **Reputation** – Some view UM as unsupportive of engagement

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ADVANCING INNOVATION

UM INDUSTRIAL RELATIONS, RESEARCH, AND TECHNOLOGY TRANSFER A PLAN FOR PROGRESS

- Faculty Advisory Committee
- Professional & Administrative Staff Group
 - Charged to formulate objectives, specific plans, metrics, and a path forward
- Consultation with committed external partners

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Critical Elements of OVPR Proposal

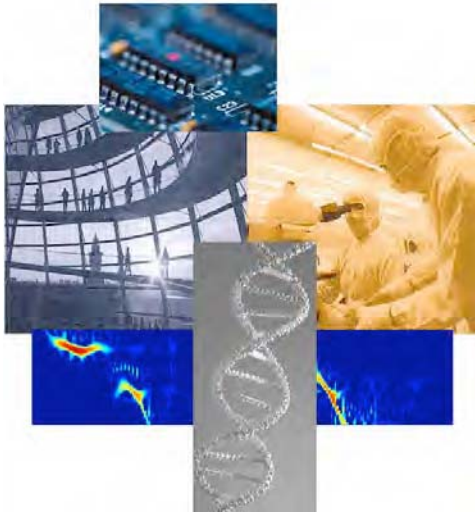
- **Change the culture**
- Make long term strategic investments
- Experiment with solutions: be entrepreneurial
- Measure success
- Manage resources

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Next Steps

- We must define the **Michigan Difference**
 - Determine what makes us unique
 - Determine the opportunity
 - Rise fully to the challenge
 - Success is not obtained by a single “silver bullet”, it is through getting multiple solutions to work in sync.

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Thank You!



University of Michigan Research Expenditures By Sponsor (FY2005 & FY2006)

SOURCE	FY 2005	PERCENT OF TOTAL	FY 2006	PERCENT OF TOTAL	PERCENT CHANGE
FEDERAL SOURCES					
Health and Human Services					
Centers for Disease Control	5,245,680	0.7%	6,494,379	0.8%	23.8%
Food and Drug Administration	797,320	0.1%	785,943	0.1%	-1.4%
Health Resources & Services Administration	1,025,924	0.1%	1,012,950	0.1%	-1.3%
Centers for Medicare & Medicaid Administration	1,500,457	0.2%	2,398,163	0.3%	59.8%
National Institutes of Health	362,368,568	46.6%	388,341,125	48.7%	7.2%
Substance Abuse and Mental Health Services	815,206	0.1%	616,166	0.1%	-24.4%
Other HHS	4,283,747	0.6%	2,610,065	0.3%	-39.1%
Total Health and Human Services	376,036,902	48.3%	402,258,791	50.5%	7.0%
National Science Foundation	68,062,430	8.7%	63,663,033	8.0%	-6.5%
Department of Defense					
Army	26,558,361	3.4%	25,217,986	3.2%	-5.0%
Air Force	7,299,411	0.9%	5,982,346	0.8%	-18.0%
Navy	6,996,519	0.9%	7,198,061	0.9%	2.9%
Other	19,084,617	2.5%	13,843,299	1.7%	-27.5%
Total Department of Defense	59,938,908	7.7%	52,241,692	6.6%	-12.8%
Energy	19,242,840	2.5%	17,569,419	2.2%	-8.7%
N.A.S.A.	16,732,514	2.2%	16,635,867	2.1%	-0.6%
Transportation	9,480,253	1.2%	6,917,453	0.9%	-27.0%
Commerce	5,077,822	0.7%	6,289,628	0.8%	23.9%
Education	5,336,965	0.7%	5,411,580	0.7%	1.4%
Environmental Protection Agency	2,447,804	0.3%	2,933,752	0.4%	19.9%
Social Security Administration	2,018,663	0.3%	2,404,122	0.3%	19.1%
Justice	1,664,471	0.2%	1,494,572	0.2%	-10.2%
General Services Administration	450,503	0.1%	1,176,416	0.1%	161.1%
Homeland Security	691,640	0.1%	1,172,367	0.1%	69.5%
Agriculture	1,294,424	0.2%	1,089,530	0.1%	-15.8%
Interior	961,807	0.1%	1,022,998	0.1%	6.4%
Central Intelligence Agency	343,600	0.0%	812,911	0.1%	136.6%
Agency for International Development	247,301	0.0%	343,745	0.0%	39.0%
Smithsonian Institution	302,713	0.0%	317,133	0.0%	4.8%
State	18,627	0.0%	244,207	0.0%	1211.0%
Veterans Affairs	158,843	0.0%	130,244	0.0%	-18.0%
National Endowment for the Humanities	189,396	0.0%	99,979	0.0%	-47.2%
Museum and Library Services, Institute of	85,014	0.0%	73,895	0.0%	-13.1%
Federal Reserve System	191,145	0.0%	68,274	0.0%	-64.3%
District Courts, U.S.	185,889	0.0%	61,610	0.0%	-66.9%
Other Federal	347,860	0.0%	798,237	0.1%	129.5%
Total Federal Government	571,508,335	73.5%	585,231,455	73.4%	2.4%
NON-FEDERAL SPONSORS					
Industry	34,702,641	4.5%	33,585,188	4.2%	-3.2%
Foundations	19,902,948	2.6%	18,124,274	2.3%	-8.9%
Other (includes Universities & Gifts)	7,774,819	1.0%	7,582,775	1.0%	-2.5%
Public Charities	10,745,800	1.4%	10,549,039	1.3%	-1.8%
State of Michigan & Local Michigan Authorities	12,136,369	1.6%	9,790,688	1.2%	-19.3%
Endowment	4,849,532	0.6%	4,837,267	0.6%	-0.3%
Trade and Professional Associations	6,810,927	0.9%	5,597,769	0.7%	-17.8%
International Organizations	62,024	0.0%	545,576	0.1%	779.6%
Foreign National Governments	162,392	0.0%	188,406	0.0%	16.0%
Total Non-Federal Sponsors	97,147,452	12.5%	90,800,982	11.4%	-6.5%
Total Sponsored Research	668,655,787	85.9%	676,032,437	84.8%	1.1%
UNIVERSITY OF MICHIGAN SOURCES					
University of Michigan Funds	109,405,940	14.1%	120,932,949	15.2%	10.5%
TOTAL RESEARCH EXPENDITURES	778,061,728	100.0%	796,965,386	100.0%	2.4%

Volume of Research by Major University Units

UNIT	FY 2003	FY 2004	FY 2005	FY2006	Average Percent Change
Architecture & Urban Planning, Taubman Total	471,817	704,231	675,270	1,129,078	37.50%
External Research Support	277,600	459,968	346,546	424,478	21.20%
Internal Research Support	194,217	244,263	328,724	704,600	58.20%
Art and Design Total	125,021	283,343	107,418	103,728	20.40%
External Research Support	31,352	190,626	-2,089	-616	112.10%
Internal Research Support	93,670	92,717	109,507	104,344	4.10%
Business Administration Total	6,612,487	5,298,858	5,588,887	7,357,726	5.80%
External Research Support	778,185	1,553,759	1,689,296	3,168,869	65.30%
Internal Research Support	5,834,303	3,745,099	3,899,591	4,188,858	-8.10%
Dentistry Total	13,285,984	14,193,178	17,346,895	18,467,027	11.80%
External Research Support	11,772,382	11,707,888	15,153,868	15,979,378	11.40%
Internal Research Support	1,513,602	2,485,289	2,193,027	2,487,649	22.00%
Education Total	14,020,236	12,553,966	13,694,446	13,994,542	0.30%
External Research Support	12,860,450	11,742,060	12,806,925	13,113,405	0.90%
Internal Research Support	1,159,787	811,906	887,521	881,137	-7.10%
Engineering Total	137,945,748	135,659,608	131,798,174	131,246,439	-1.60%
External Research Support	116,425,104	114,466,401	111,316,627	110,235,468	-1.80%
Internal Research Support	21,520,644	21,193,207	20,481,547	21,010,971	-0.80%
Graduate School, Rackham Total	4,049,725	3,454,034	4,624,578	3,740,837	0.00%
External Research Support	1,385,083	2,157,317	2,422,734	1,364,156	8.10%
Internal Research Support	2,664,642	1,296,717	2,201,843	2,376,681	8.80%
Information Total	3,370,335	3,592,698	4,251,989	5,268,352	16.30%
External Research Support	2,797,506	3,120,727	4,003,241	4,329,088	16.00%
Internal Research Support	572,829	471,970	248,748	939,264	70.90%

Volume of Research by Major University Units

UNIT	FY 2003	FY 2004	FY 2005	FY2006	Average Percent Change
Kinesiology Total	1,342,085	1,747,089	2,608,825	2,720,699	27.90%
External Research Support	894,073	1,182,336	1,749,038	2,327,688	37.80%
Internal Research Support	448,011	564,753	859,787	393,011	8.00%
Law Total	1,621,946	1,506,196	1,631,737	1,657,526	0.90%
External Research Support	1,311,459	1,479,872	1,539,559	1,583,258	6.60%
Internal Research Support	310,487	26,324	92,178	74,268	46.40%
Literature Science, and the Arts Total	61,642,886	67,059,033	73,256,629	77,139,838	7.80%
External Research Support	47,598,975	52,242,056	55,245,318	55,846,090	5.50%
Internal Research Support	14,043,911	14,816,977	18,011,311	21,293,748	15.10%
Medical School Total	284,371,638	295,508,606	321,341,382	333,282,755	5.50%
External Research Support	265,510,197	272,897,544	295,400,292	301,141,183	4.30%
Internal Research Support	18,861,441	22,611,062	25,941,090	32,141,573	19.50%
Music Total	291,049	326,140	226,556	277,386	1.30%
External Research Support	10,017	47,961	-1,101	0	58.80%
Internal Research Support	281,032	278,180	227,656	277,386	0.90%
Natural Resources and the Environment Total	9,683,598	7,809,171	10,077,732	11,503,070	7.90%
External Research Support	7,345,302	6,990,752	8,817,170	10,435,801	13.20%
Internal Research Support	2,338,297	818,420	1,260,561	1,067,269	-8.80%
Nursing Total	4,981,069	4,602,890	5,320,405	4,834,449	-0.40%
External Research Support	4,623,562	4,134,437	4,811,459	4,352,987	-1.20%
Internal Research Support	357,508	468,454	508,947	481,463	11.40%

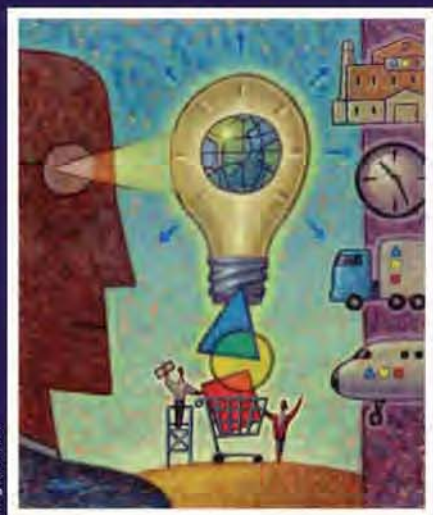
Volume of Research by Major University Units

UNIT	FY 2003	FY 2004	FY 2005	FY2006	Average Percent Change
Pharmacy Total	5,502,315	7,154,799	5,882,782	6,670,773	8.50%
External Research Support	4,426,247	6,409,604	4,969,778	5,494,865	11.00%
Internal Research Support	1,076,068	745,195	913,004	1,175,908	6.90%
Public Health Total	38,275,272	45,019,318	50,175,621	46,951,482	7.50%
External Research Support	36,539,618	42,700,780	47,887,395	44,635,100	7.40%
Internal Research Support	1,735,654	2,318,538	2,288,226	2,316,382	11.20%
Public Policy, G Ford Total	1,287,479	2,505,572	2,851,440	2,592,389	33.10%
External Research Support	933,369	2,123,793	2,486,507	2,229,068	44.80%
Internal Research Support	354,110	381,779	364,933	363,321	1.00%
Social Work Total	4,213,733	5,228,715	5,755,231	6,342,344	14.80%
External Research Support	2,617,363	3,307,332	3,752,132	4,067,295	16.10%
Internal Research Support	1,596,370	1,921,382	2,003,099	2,275,049	12.70%
Institute of Social Research	94,500,711	77,634,225	72,307,456	72,122,740	-8.30%
External Research Support	78,128,417	55,646,067	57,629,648	57,639,979	-8.40%
Internal Research Support	16,372,294	21,988,158	14,677,808	14,482,761	-0.10%
OVPR Research Units	43,029,345	41,843,713	32,699,971	31,826,033	-9.10%
External Research Support	33,815,583	33,263,686	25,124,327	23,291,113	-11.10%
Internal Research Support	9,213,762	8,580,026	7,575,644	8,534,920	-2.00%
Other Units Total	2,152,531	5,770,780	8,888,453	12,415,653	87.30%
External Research Support	1,273,182	5,380,400	7,306,664	9,766,671	130.70%
Internal Research Support	879,349	390,380	1,581,789	2,648,982	105.70%

Volume of Research by Major University Units

UNIT	FY 2003	FY 2004	FY 2005	FY2006	Average Percent Change
UM Dearborn Total	2,447,131	3,399,944	3,432,357	3,547,762	14.40%
External Research Support	1,407,179	2,099,913	2,291,582	2,208,082	18.20%
Internal Research Support	1,039,951	1,300,032	1,140,774	1,339,680	10.10%
UM Flint Total	1,022,878	876,362	1,178,568	1,124,140	5.20%
External Research Support	757,552	647,236	951,553	870,356	8.00%
Internal Research Support	265,326	229,126	227,016	253,784	-0.90%
University Administration Total	1,961,880	845,739	936,961	810,929	-19.90%
External Research Support	1,515,879	0	39,130	150,305	92.10%
Internal Research Support	446,002	845,739	897,831	660,624	23.10%
Unassignable Services Total	11,135,598	7,948,850	1,401,965	-162,314	-74.20%
External Research Support	2,369,186	-340,010	542,081	1,533,629.18	-63.60%
Internal Research Support	8,766,412	8,288,860	859,884	-1,695,943.00	-130.80%
All Activities Total	749,344,497	752,527,056	778,061,728	796,965,385	2.10%
External Activities Support	637,404,821	635,612,504	668,279,682	676,187,696	2.00%
Internal Activities Support	111,939,676	116,914,552	109,782,046	120,777,689	2.80%

University of Michigan Symposium



Energy Science, Technology and Policy

FACING THE CHALLENGE

The University of Michigan launched an energy research initiative in September 2006 with the establishment of the Michigan Memorial Phoenix Energy Institute. This symposium brings together many influential people from government, industry and academia to present their views on science, technology and policy topics in the energy field.

Organized by the Office of the Vice President for Research and the Michigan Memorial Phoenix Energy Institute.

Sponsored by

DTE Energy



8:00 AM - 4:30 PM, February 13-14, 2007
Horace H. Rackham Amphitheatre
915 E. Washington, Ann Arbor 48109-1070

KEYNOTE ADDRESS

Samuel W. Bodman
U.S. Secretary of Energy

Speakers Include:

- Dennis N. Assanis, University of Michigan • advanced powertrains
- Rosina M. Bierbaum, University of Michigan • climate change science & policy
- J. Christopher Brown, DTE Energy • addressing consumer needs
- Lawrence D. Burns, General Motors • transportation & sustainability
- John R. Dearborn, Dow Chemical • challenges for the chemical industry
- James J. Duderstadt, Univ. of Michigan • energy futures in the Great Lakes region
- Stephen R. Forrest, University of Michigan • advances in lighting
- Kenneth G. Keegstra, Michigan State University • future of biofuels
- Gregory A. Keoleian, University of Michigan • energy sustainability metrics
- Nathan S. Lewis, CalTech • sustainable energy technology
- Thomas P. Lyon, Univ. of Michigan • carbon constraints & energy investments
- William McDonough, Wm. McDonough & Partners • design for sustainability
- Ernest J. Moniz, Massachusetts Institute of Technology • nuclear options
- Margo T. Oge, Environmental Protection Agency • energy and pollution
- James E. Rogers, Duke Energy • fuel diversity for utilities
- Gerhart Schmidt, Ford Motor Company • environment & energy security
- Daniel Sperling, University of California-Davis • new fuels & vehicles
- Levi T. Thompson, University of Michigan • hydrogen technologies
- Gary S. Was, University of Michigan • UM approach to the energy challenge

Symposium attendance is free to all
Registration at www.mmpei.umich.edu/symposium.html



University of Michigan
WORKSHOP ON ENERGY

Thursday, January 18, 2007 • Michigan League

All-day workshop where you can hear short presentations by faculty from Engineering, Natural Resources & Environment, Public Policy, LSA, Business, Architecture, Law and UMTRI on a variety of energy-related research projects at Michigan.

8:30 AM	Plenary Session (UM Tech, Environment, Business Overview)		
<i>Concurrent Presentations (including one policy talk per block)</i>			
9:30 AM	Fuels	Utilization	Enabling Technologies
11:15 AM	Production	Utilization	Enabling Technologies
12:30 PM	LUNCH & Session summaries		
1:30 PM	Production	Utilization	Sustainability
3:00 PM	Transportation	Vehicles/Fuels	Sustainability
4:15 PM	Session summaries		
4:45 PM	Reception & Announcement of MMPEI seed grants		
<i>Details, including speakers at www.mmpei.umich.edu/workshop.html</i>			

Workshop Co-Sponsors

Michigan Memorial
Phoenix Energy Institute



Graham Environmental
Sustainability Institute



Erb Institute for Global
Sustainable Enterprise



