

Confidential Report to the Steering Committee
University Research Organization Exploration Committee
1 November 2011

Committee

David Carter, Professor, School of Criminal Justice; Lawrence Drzal, University Distinguished Professor, Department of Chemical Engineering and Material Science; Paul Hunt, Senior Associate Vice President for Research and Graduate Studies (*ex officio*); Leo Kempel, Associate Dean for Research, College of Engineering, chair; Debra Nails, Professor, Department of Philosophy; James Tiedje, University Distinguished Professor, Departments of Crop and Soil Sciences, and of Microbiology and Molecular Genetics; Karin Wurst, Dean, College of Arts and Letters

Charge

The Executive Committee on Academic Governance, predecessor to the current Steering Committee, chartered an *ad hoc* committee with investigating the potential for Michigan State University to establish an organization focused on applied research and development activities not generally consistent with the mission of conducting basic and applied research and education in an academic setting. This committee was constituted in May 2011 with instructions to report to the Steering Committee during the fall 2011 semester. John Powell wrote: “The URO Working Committee’s charge is to identify recommendations for the development and implementation of an information program to engage MSU faculty in the discussion of an MSU-URO.”

Recommendation

The University Research Organization Exploration Committee recommends that Michigan State University proceed with plans to establish an university research organization (URO) that will enable faculty to pursue research in areas of national importance that are challenging or impossible under current policies, particularly when review or restrictions on publication or considerations of citizenship status are involved. The committee makes its recommendation with reservations on principled and financial grounds but in the belief that, on balance, there is likely more to be gained than lost by the action. The recommendation assumes the following core principles:

1. MSU general funds will not be used to establish the URO.
2. Classified research will not be conducted at an MSU affiliated URO.
3. No breach in the integrity of the campus and its buildings that would unnecessarily jeopardize the University’s commitment to inclusiveness will be permitted.
4. Research conducted in the URO will be allowed only if this research cannot be undertaken in an academic unit.
5. The current MSU research publication policy will be preserved or strengthened for projects that can be conducted in the units, and the administration will ensure that research is conducted in appropriate venues, whether in units or the URO.
6. Undergraduate students, graduate students and junior faculty involved in URO projects will receive written documentation and a verbal explanation of any limitations or implications to their current or future academic standing prior to URO participation.

Further, the committee recommends that the URO should operate in a mode which allows for identification and promotion of main areas of expertise (core competencies) but retains some flexibility to allow for initiation and incubation of new and emerging areas over time. It is

envisaged that the core competencies could change over time to promote not only the necessary flexibility and nimbleness, but also the viability and stability of the organization. A goal of the URO could be to establish a core competency that is supported by a UARC agreement with a department of the state or Federal Government. Such an agreement would lend stability to the organization.

The committee did not take it upon itself to make a recommendation between the MSU affiliated and MSU corporately independent models for the URO but offers consideration to both in its report.

Executive Summary

Process:

The committee reviewed the URO proposals and FAQs provided by Research & Graduate Studies as well as the University's mission statement and policies on academic freedom and inclusiveness. The committee also considered accounts of the difficulties faced currently by faculty colleagues whose research has been in various ways hindered by changing policies and practices at the national level, funding trends, and the state's economic problems. The committee undertook a review of information on academy-government cooperation and the research policies of other universities (Appendix III), and of existing UROs, then developed a list of peer institutions that have operating UROs and engaged in a process of discovery regarding their operations and impact on the institutions. This involved a search of publically available information coupled with telephone interviews with both administrators and faculty at the various universities.

Summary Findings:

1. In general, the presence of a university research organization (URO) facilitates research and development funded by Departments of the Federal Government (Defense, Homeland Security, Justice, etc.) because the UROs' operating policies and procedures are aligned with the requirements of those agencies.
2. UROs that are affiliated with the university experience a higher level of faculty and student participation than corporately independent UROs.
3. UROs that are corporately independent have some advantages with respect to operational and administrative flexibility and the regulations governing state-supported institutions.
4. The majority of the UROs contacted are self-sustaining and have been in existence for several decades. Focused research areas (core competencies) form the base of their operations and their financial foundation.
5. The largest UROs, in terms of research expenditures or personnel, are designated by a Federal department as a University Affiliated Research Center (UARC).
6. Some UROs perform classified as well as unclassified but sensitive research programs.

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Abbreviations and Definitions of Terms

ACP: Access Control Plan

Classified: Research and development that has been classified (Confidential, Secret, or Top Secret) by a cognizant authority. Basic research is excluded from classified research.

Citizenship restrictions: For purposes of this document, citizenship restrictions are contract, grant, or cooperative agreement clauses that either (i) preclude or (ii) require advance funder approval of project participation by individuals at MSU who (a) are neither U.S. citizens nor lawful permanent residents, or (b) are citizens of certain specified foreign countries. Vis-à-vis anti-discrimination policies, it is important to note that citizenship and national origin are distinct concepts. Absent an exigency of national defense, MSU does not accept citizenship restrictions in research funding awards. Moreover, acceptance of a contract or grant citizenship restriction would preclude the University from asserting for the project the “Fundamental Research Exclusion” from export control that is otherwise afforded to American higher education institutions under ITAR and EAR.

EAR: Export Administration Regulations. In the U.S. Department of Commerce, the “Bureau of Industry and Security is charged with the development, implementation and interpretation of U.S. export control policy for dual-use commodities, software, and technology. Dual-use items subject to BIS regulatory jurisdiction have predominantly commercial uses, but also have military applications.” See 15 CFR 7, and <http://www.bis.doc.gov/policiesandregulations/index.htm>.

IP: Intellectual Property

ITAR: International Traffic in Arms Regulations. “The U.S. Government views the sale, export, and re-transfer of defense articles and defense services as an integral part of safeguarding U.S. national security and furthering U.S. foreign policy objectives. The Directorate of Defense Trade Controls (DDTC), in accordance with 22 U.S.C. 2778-2780 of the Arms Export Control Act (AECA) and the International Traffic in Arms Regulations (ITAR) (22 CFR Parts 120-130), is charged with controlling the export and temporary import of defense articles and defense services covered by the United States Munitions List (USML).” [Source: <http://www.pmdtc.state.gov/index.html>.]

Publication Restrictions: A clause in the terms and conditions of a contract, grant, or cooperative research agreement that potentially precludes publication of results. A typical clause is DFARS 252.204-7000 (Disclosure of Information). Classified programs typically include publication restrictions. Unclassified projects may also carry restrictions imposed by the Federal Government or its agencies. Absent an exigency of national defense, MSU does not accept publication restrictions in research funding awards. Moreover, acceptance of a contract or grant publication restriction would preclude the University from asserting for the project the “Fundamental Research Exclusion” from export control that is otherwise afforded to American higher education institutions under ITAR and EAR. See Table 1.

Publication Review: A clause in the terms and conditions of a contract or cooperative research agreement that require Government review of publications prior to release. Such clauses *may* constitute publication restrictions; they typically *delay* publication of results. Publication review clauses are frequently employed to assist in protecting intellectual property or to ensure that proprietary information originally

provided by an external party (as opposed to MSU research) is not disseminated without the originator’s consent. See Table 1.

Table 1. Publication/participation restrictions: What does current MSU policy allow?

publication/participation restriction type	research	testing	contract training	instruction or service/outreach
classified	no	no	no	no
national origin, independent of citizenship	no	no	no	no
discretionary publication approval by funder	no, absent exigency ¹	yes	yes, subject to conditions ²	yes, subject to conditions ³
citizenship, whether controlled by contract, ITAR, or EAR	no, absent exigency ¹ or justified ACP ⁴	yes	yes, subject to conditions ²	sometimes, subject to conditions ⁵
brief delay to protect funder—provided info is proprietary/sensitive ⁶	yes	yes	yes	yes
brief delay to permit IP protection	yes	yes	yes	yes

Notes:

¹ Currently, the only approved “exigency” condition at MSU relates to improvised explosive device (IED) defensive measures.

² Students on Contract Training support must be appointed under the labor payroll, not assistantships, following mandatory discussion with Graduate School to ensure no thesis/dissertation complications exist. Participation must be voluntary.

³ Although this category is not research and hence theses/dissertations are not involved, those supported by the award must be advised of constraints on authorship rights and possible copyright royalties due to sponsor approval. Participation must be truly voluntary.

⁴ In some limited cases, ITAR or EAR-based citizenship restrictions can be accepted when they apply to facilities, equipment, or information that support a project without needing open access by foreign participants and without precluding open publication of the general research results obtained. This is challenging to administer and rare, and requires an access control plan (ACP).

⁵ In some cases, instructional or fellowship awards limit participant eligibility for support. These instances are reviewed with the Office of the General Counsel.

⁶ “Sensitive” information refers to unclassified government information, such as “For Official Use Only”, ITAR and EAR-controlled information. The key point in this row is “funder-provided”.

University Research Organization (URO): A generic term used at Michigan State University to refer to a proposed entity designed to conduct applied research and development under a contract, grant, or a cooperative research agreement that contains terms and conditions not consistent with normal academic research policies, such as publication restrictions or citizenship restrictions.

University Affiliated Research Center (UARC): A term describing entities with contractual relationships established between a department of the Federal Government (at present, the Department of Defense and its constituent services, NASA, or the National Security Agency) and a university to facilitate applied research and development. Such contracts have pre-agreed terms and conditions that may include personnel exclusions and publication review or restrictions. The UARC agreement itself does not necessarily have funding attached to it; rather, it can be used to place funding from the sponsoring Federal department to the URO in an efficient manner.

Unclassified but Sensitive (UBS): Research and Development that is not classified but (i) not free and open for dissemination or (ii) can have personal exclusions and publication review/restrictions. Technology and services that fall under export-control regulations (e.g., ITAR and EAR) may be unclassified but sensitive. In company with other major American research universities, MSU conducts research on UBS topics and/or with UBS technologies under the “Fundamental Research Exclusion” afforded to American higher education by the ITAR and EAR export control regimes.

Background

Collection of materials relevant to the charge began immediately with an ANGEL site. The committee began its efforts in person on 19 July 2011 and met weekly thereafter. To date, there have been fifteen meetings of the committee. Members sometimes participated through Web-based communications when they could not attend in person.

The committee developed a list of candidate universities of similar size and mission to Michigan State University that were believed to have UROs. The initial list included two universities, Cornell and UC-Berkeley, that do not have, or no longer have, such an organization, leaving the following (asterisks identify interviews conducted as described below):

1. Georgia Institute of Technology**
2. Iowa State University
3. North Carolina State University*
4. Pennsylvania State University*
5. Purdue University**
6. Texas A&M University
7. University of Hawaii*
8. University of Michigan
9. University of Texas**
10. Utah State University*

The committee then gathered information from each institution (see Appendix I), through a search of publically available information and informal contact with colleagues. The committee then identified individuals in four categories and requested telephone interviews.

1. Responsible administrator (such as vice president for research)
2. Director of the URO
3. Member of the faculty involved in academic governance
4. Member of the faculty involved in URO-based research

Some of those identified declined to be interviewed or did not respond to the interview request. Each phone call of those who agreed to be interviewed involved two or more committee members: one was designated as the lead interviewer and one as the scribe. The committee developed a comprehensive list of questions to be used as guides for the 30-minute interviews. (The questions developed by the committee are presented in Appendix II of this report.) Not all questions were asked for each interviewee; rather, the committee members asked questions relevant to the role of the individual in the institution and based upon the flow of the interview itself.

In compliance with the practical side of its charge to engage the MSU faculty in discussion of the URO concept, the committee plans both a website and meetings. Two members of the committee have been working with the Division of Engineering Computing Services (DECS), to develop a website for password-restricted faculty login. The site is to include all the materials used by the committee with a single exception: the policies, facilities, and operations at other universities whose personnel agreed to be interviewed will appear only in redacted form to disguise the identities of those persons and institutions. The committee hopes to reach the faculty at large through (a) the regular Deans & Directors list, (b) a governance list, and (c) an issue of *Gray's Matters* given over in whole or in part to the issues. The committee agreed it would be best to use all three in rapid succession to make it clear that the impetus to evaluate the desirability of a URO is both faculty- and administration-driven. The committee anticipates that the Steering Committee will assign matters to the University Committee on Faculty Affairs, the University Committee on Faculty Tenure, the University Committee on Graduate Studies, or other standing committees, as the Steering Committee may deem appropriate. To assist in that process,

committee members are willing to meet with the standing committees to clarify and to amplify its findings in confidence. In a number of cases, exact information about other universities’ or UROs’ policies might prove useful as models to be embraced or avoided.

Findings

The committee began its deliberations with an exploration of other universities’ policies, the secondary literature on the tradition of government- and corporate-sponsored research in universities (see Appendix III), and with then-confidential documents provided by the Senior Associate Vice President for Research and Graduate Studies: Frequently Asked Questions (FAQs), MBI URO Scenario, and Leonidas-URO Internal Scenarios.

The committee found that there are two operationally distinct versions of the MSU-internal URO (Leonidas) related to differences in organization and focus:

1. Umbrella organization—simplifies the negotiation process and presents “one face” to government sponsors. Such organizations have the advantage of flexibility in research areas and scope and require less initial funding.
2. Core-competency organization—seeks to become the national resource in a fairly broad technical area with a full-time research staff (fixed-term).

Comparing these two models, the committee finds that *umbrella organizations* tend to have a lower overall volume of research activity because they tend not to have an associated UARC and hence have more tenuous streams of funding. However, they do possess the potential for expanding research and development opportunities across a wide technical front. Hence, they are a good model for initiating a URO when the institution is not certain what technical area will become the core strength for the URO. *Core-competency organizations* operate as units with independent, or at least designated, support staff from the normal administrative support functions. They usually have one or a few main sponsors that support a large fraction of the total sponsored research in the URO. The most successful, in terms of number of personnel and annual research volume, have developed over time (in many cases decades) a few core-competencies. Such diversification of the expertise in the URO is inherently better shielded to reductions in topical area support.

Similarly with a corporately distinct model (MSU-independent), the committee considered three versions with varying implications:

1. MBI as currently constituted;
2. a new division of MBI; or
3. another corporately independent entity (which would then need to qualify as a 501-C3, i.e., not-for-profit, organization).

Some of the distinctions between an MSU-internal and a corporately distinct organization can be summarized in the following table as developed by the committee.

Table 2. Pros and cons for a MSU-internal and a corporately distinct URO across a number of issues.

Item	Internal URO		Corporately Distinct URO	
	PRO	CON	PRO	CON
advance knowledge, expand human understanding	research is funded; basic research is exempt from publication restriction	publication may be restricted or delayed; research must be motivated by academically sound reasons	research is funded	publication may be restricted or delayed, including basic research; funding of research is a business decision

educational goals	real world research and educational experience	may be limited to US citizens or permanent residents	students are hired as employees—real world research and educational experience	may be limited to US citizens or permanent residents
contribution to society	provide solutions to local, national and global problems		provide solutions to local, national and global problems	
location	outreach and economic development for the region and state		outreach and economic development for the region and state	
applied research	lead for future research at MSU	FOIA issues	lead for future research at MSU	FOIA issues?
proprietary research	economic development, outreach	FOIA issues, conflict of interest issues	economic development, outreach	conflict of interest issues
defense related research	flexibility to participate in ITAR programs	isolation from non-domestic participants	flexibility to control access and ITAR programs	
testing and analysis	outreach to government (and industry)		outreach to government and industry, at URO's discretion	
local economic development & technology transfer		essentially the same as the current situation at MSU	strong potential for enhanced economic development activities; MSU as Michigan's academic-industry catalyst	
incubator for start-up companies		URO is in the same position as the other major academic units	independence from academic policy and procedures; closer interaction with industrial sector	
publication restrictions/delays		depends on sponsor	inherent in model	depends on sponsor
personnel and expenditure reporting	relatively easy; joint appointments		primarily fixed-term staff with fractional faculty participation	only a fraction can be captured at MSU through sub-awards to MSU
research metrics	credit for publications and funding per FTE and per major academic unit increases		publications and funding per faculty increases	much less than 100%
faculty buy-outs	some budget relief to academic unit	compensation or partial compensation to units; more students taught by non tenure-system faculty	some budget relief to academic unit	compensation or partial compensation to units; more students taught by non tenure-system faculty
outside work-for-pay: faculty,	consistent with current policy of 1 day/week	None	new outside-work-for-pay opportunity; additional supplemental funding	faculty involvement limited to 1 day/week as per MSU policy
outside work-for-pay: students	work-for-pay similar to TA	needs clear identification of publishable and non-publishable; students may be pressured to participate	part-time non-thesis, non-academic work for pay defined by employee contract	contracts for students not under MSU control; students may be pressured to participate
indirect costs	similar to MSU			2-2.5x higher than MSU
investment	3-5 year start-up, possibly foundation	longer time to "break-even" based on initial	3-5 year start-up, possibly foundation	

	funds	assumptions	funds; shorter time to "break-even" based on assumptions (primarily due to a higher IDC rate).	
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An important difference for a corporately distinct URO that emerged from some of the telephone interviews lies in greater flexibility in employment policies than is possible in a state-supported institution. The particular case noted that increases in salaries of URO employees were not allowed at an institution-internal URO, not because the URO lacked sufficient funding to provide such a pay raise; rather, the state legislature placed a freeze on salaries and by association with the institution, the URO was similarly constrained.

Another important feature of UROs, which can apply to either the MSU-internal or corporately distinct model, is permissible operation under allowable Government Accounting Principles. The nominal operating procedures utilized at Michigan State University are Office of Planning and Budget (OPB) Circulars A-21 and A-110, requiring time sheets (percent of time committed to an activity). Most, if not all, of the UROs contacted operate under OMB Circular A-122 and Federal Acquisition Regulations (FAR) 31.2, permitting a fee to be charged in addition to the negotiated indirect cost to the contract. UROs using this accounting system can use such funds to seed research through an internal research and development (IRAD) program. One interviewee, a pre-tenure colleague, noted that receiving such funding was the most beneficial aspect of his activities within the university's URO.

In the case of at least one university, the URO and academic units utilized the same contracting organization and, therefore, transactions between the URO and the departments such as faculty appointments, student appointments, etc. were transparent and simple. At MSU, this would be similar to the ease experienced by faculty in academic units who are collaborating with the National Superconducting Cyclotron Laboratory (NSCL).

Student Involvement

A concern expressed by a number of committee members is whether involvement in URO-operated projects will impair students' ability to publish the results of their efforts. Another concern is that students, especially those dependent on a funding source, might feel pressure to participate in a URO project if it were suggested by a faculty supervisor or mentor. Additionally, there is some concern that participation in an export-controlled project creates a moral hazard for students who may inadvertently violate those regulations. One of the committee's guiding principles is the need to protect students to the maximum extent. In interviews with personnel at several of the institutions identified above, the committee found that:

1. At all institutions contacted, both undergraduate and graduate students participate in projects.
2. In only one case did the URO sponsor students for personal security clearances. The one university that did report such action noted that the students found this to be a benefit in future job searches.
3. In most cases, the URO does not employ students on projects with "risky" publication review. To be clear, every effort is made to ensure that students have the ability to publish sufficient results of their work to meet the needs of their degree programs.

In one case, the URO was described as having an "inner boundary" within which classified and other publication-restricted projects are conducted by full-time employees and faculty who are fully aware of the restrictions to publish, and an "outer boundary" within which export-controlled or publication-reviewed research is conducted. Between the two boundaries, students are involved; however, as noted above, every effort is expended to facilitate their publication of results. Outside this framework lies traditional academic research with free-and-open publication rights.

The committee agrees that it is imperative that the integrity of each and every student's degree program be maintained. Since the URO will not be conducting classified research, the risk lies in projects with potential publication restriction or review. It is not always realistic to preclude student involvement in projects that have publication review requirements. It is therefore critical that the student operates in a URO under *informed consent* in which the institution makes appropriate written and verbal presentations so it is clear to the student what, if any, are the limitations or exclusions associated with the URO employment. Protections for students are especially well defined in Stanford University's policy on openness in research (as pointed out in the Senior Associate Vice President for Research and Graduate Studies FAQs document). Another possibility discussed by the committee is to require each student's research major professor to assure the institution that the student's research will yield sufficient results to justify the conferral of the appropriate degree regardless of publication-reviewed aspects of the student's work. It is clear to the committee that this is a matter for governance to consider in detail.

Faculty Involvement

Faculty are involved in URO research at all of the institutions contacted by the committee. Typical benefits to the faculty member are:

1. Engagement in applied research that is close to the near-term needs of the end-user.
2. Summer salary support.
3. Access to equipment (on a fee-basis) not available in the academic units.
4. Seed funding for exploratory research of mutual interest to the URO and the faculty member. Such projects are meant to position the URO/faculty member for additional federal funding.
5. Ability to support students beyond the capabilities of the academic unit.

No faculty members mentioned any coercive methods to force them to participate in projects that have publication restrictions or review. Specifically, the assistant professor interviewed was clear that he did not participate in such projects. However, interviewees did note the cultural differences between the URO staff and operations, on the one hand, and academic faculty, policies, and procedures on the other. For example, since a URO operates as a not-for-profit research organization (e.g. on a business-like basis), the URO employees tend to be more driven to meet deliverables on a short time frame and to pursue directed research rather than investigator-initiated research. These differences can sometimes cause angst among faculty with differing objectives and priorities.

FOIA, MI-FOIA, and Intellectual Property Policies

The committee was not asked to investigate the implications of a URO for corporate-sponsored for-profit ventures. These emerged as a matter of course, and the committee thus shares what it learned.

FOIA and MI-FOIA. A concern of some faculty members, borne out by many years of experience, is that companies are hesitant to enter into research agreements involving use of or creation of company-proprietary IP due to the terms of MI-FOIA. It is clear that an MSU-internal URO is subject to the MI-FOIA provisions as all MSU units are subject to those provisions. FOIA applicability to an external URO is unclear. This is a matter for further analysis and commentary by the Office of the General Counsel.

Intellectual Property. The establishment of a URO under either model suggests that a policy for IP may need to be developed. The current policy is seen by a member of the committee as inhibiting greater corporate research support. In interviews with URO management and participants at other institutions, however, it became clear that the IP policies of the host institution are largely irrelevant to the operation of the URO because 90+% of the support for the URO comes from Federal Government sources. The blanket government-use license associated with technology developed with government support makes seeking IP protection of limited interest to the URO and its employees.

Appendix I: Comparable University Organizations

The Committee identified public universities relatively comparable to MSU and determined by personal contacts and the Web whether they (still) had URO-like operations. Committee members then conducted interviews with informed individuals including, when possible, the counterpart to Paul Hunt in the university's administration, someone internal to the research organization and knowledgeable about its operations, and the head of the faculty senate or other informed outsider on the faculty.

Cornell University

Nothing relevant to report

Georgia Tech Research Institute

University: Georgia Institute of Technology

Website: <http://www.gtri.gatech.edu>

Established: 1934 (as GaTech Engineering Experiment Station)

Approximate Funding: \$205M (2010): It is a UARC per DDR&E in 1995.

Reporting Line: Executive Vice President for Research

Contact Information: Georgia Tech Research Institute 212 Centennial Research Building, 400 W. 10th Street Atlanta, Georgia 30332-0801 phone: 404-407-7400

Description: GTRI is comprised of eight (8) laboratories including:

1. Aerospace, Transportation and Advanced Systems Laboratory (ATAS): ATAS develops advanced technologies and systems, from conceptual development to prototypes, including system simulations and test & evaluation related to threat radars, missiles, aerospace and ground vehicles, unmanned and autonomous systems, transportation, power and energy, and food processing technologies.
2. Applied Systems Laboratory, Huntsville (ASLH): ASLH conducts world-class applied research for several government agencies located at the US Army Redstone Arsenal and Huntsville area.
3. Cyber Technology and Information Security Laboratory (CTISL): The Cyber Technology and Information Security Laboratory (CTISL) conducts applied research focused on secure information systems, network vulnerability, and mission assurance within the cyber domain. CTISL engineers apply the latest technologies in signal and protocol exploitation, web crawling, malware analysis, and reverse engineering of embedded and application binaries. CTISL also develops and designs secure, resilient enterprise networks for command and control, and secure database applications, services and perimeter guards.
4. Electronic Systems Laboratory (ELSYS): ELSYS focuses on systems engineering solutions in the areas of electronic defense and human systems integration. ELSYS researchers are nationally recognized for their contributions to national defense in countermeasures technique development.
5. Electro-Optical Systems Laboratory (EOSL): EOSL conducts research in broad areas in electro-optical systems. The lab also performs applied research in the growth and application of carbon nanotubes, multifunctional materials, RFID and optical tagging, chem-bio sensors.
6. Information and Communications Laboratory (ICL): ICL conducts a broad range of research in areas of computer science, information technology, communications, networking, and technology policy to help customers master information. Research supports national security; emergency response; interoperability of interconnected systems; planning, learning and decision support; and systems engineering. The lab also helps customers develop commercial products from university research and conducts activities in support of technology transfer, including training, exercises and information diffusion.

7. Sensors and Electromagnetic Applications Laboratory (SEAL): SEAL researchers investigate and develop radio frequency sensor systems, with particular emphasis on radar systems engineering, ELINT, COMINT, MASINT, electromagnetic environmental effects, radar system performance modeling and simulation, advanced signal and array processing, sensor fusion, and antenna technology.
8. Signature Technology Laboratory (STL): STL's main focus is the development of technologies for the management and control of multispectral signatures of objects under observation by sophisticated sensor systems.

GTRI also has a large number of research centers within these laboratories. It has approximately 1500 employees.

Iowa State University

University: Iowa State University

Website: <http://www.industry.iastate.edu/technicalassistance.html>

Established: 1963

Approximate Funding: unknown

Reporting Line: Vice President for Research and Economic Development

Center for Industrial Research and Service (CIRAS). Since 1963, CIRAS has been helping the College of Engineering and Iowa State University Extension and Outreach carry out their land-grant university mission to improve the quality of life in Iowa by enhancing the performance of Iowa industry.

CIRAS has a mission to improve the quality of life in Iowa by enhancing the performance of business and industry through research, education, and technical assistance.

CIRAS account managers located throughout the state meet with clients to assess their needs and provide links to resources that companies can use to increase their competitiveness. Solutions are offered through a combination of direct assistance from center staff, university faculty, partner organizations and outside consultants. CIRAS staff members have expertise in numerous areas, including: biorenewables, engineering, government procurement, management practices, productivity and quality systems.

In FY08, businesses from 93 Iowa counties received assistance on projects or attended educational workshops from CIRAS staff or partners. Some 667 companies reported \$62 million in new investments, \$12 million in costs saved or avoided, and \$122 million in sales gained or retained (\$196 million total). Company executives stated that 2,226 jobs were added or retained as a result of the technical assistance and education they received from CIRAS and its partners. In addition to direct project and workshop assistance to companies, CIRAS staff provided educational information to over 10,000 individuals in FY08. The center is supported in part by the DoC/NIST Manufacturing Extension Partnership, the DoD/DLA Procurement Technical Assistance Program, the DoC/EDA University Center Program, and the USDA BioPreferred Program.

Institute for Physical Research and Technology (IPRT). IPRT is a network of scientific research centers conducting cutting-edge, interdisciplinary research in a broad spectrum of areas. Through IPRT Company Assistance, Iowa manufacturers have access to this expertise and facilities through short-term, *no-cost* technical assistance in materials-related areas and contract research and development for product and process development or improvement. State-of-the-art instrumentation is available to faculty and industry alike at the following facilities. Equipment lists and price rates are available at the link above.

- Animal Gene Transfer Facility
- Atomic Force Microscopy
- Bessey Microscopy Facility

- Cell Facility
- Chemical Instrumentation Facility
- Confocal Microscopy Facility
- Crop Products Pilot Plant
- DNA Sequencing and Synthesis Facility
- Environmental Engineering Research Laboratory
- Fermentation Facility
- Gene Chip Facility
- Grain Quality Laboratory
- Human Metabolic Unit
- Hybridoma Facility
- Image Analysis Facility
- Mass Spectrometry Unit
- Materials Analysis and Research Laboratory
- Materials Preparation Center
- W.M. Keck Metabolomics Research Laboratory
- Microarray Facility
- W. M. Keck Laboratory for the Fabrication of Microminiaturized Analytical Instrumentation (Keck Lab) of the Institute for Combinatorial Discovery
- Nuclear Magnetic Resonance Facility
- Plant Transformation Facility
- Protein Facility
- Proteomics Facility
- Sensory Evaluation Unit
- Soybean Molecular Marker Facility

**North Carolina State University
Centennial Campus at North Carolina State**

University: North Carolina State University

Website: <http://centennial.ncsu.edu/centennial-community.php>

Established: 2000

Approximate Funding: unknown

Centennial Campus defines a “partner” as an organization or company that has a stated desire to “engage in appropriate and meaningful ways with the University.” Corporate and government partners that seek robust and mutually beneficial relationships with faculty and/or students, thereby adding value for both the partner and the University. Interactions include, but are not limited to:

- Working with students (including hiring part-time, intern and recent graduates and those involved in senior projects)
- Working with faculty (formally or informally)
- Lab or equipment sharing
- Curriculum input
- Sponsored research
- Co-development of intellectual assets
- Patent licenses

To facilitate partnering, these questions are asked:

- Do your activities align with the academic and/or research activities of NC State University?
- Do you have an existing relationship with NCSU? If not, do you intend to have one and what will that entail?

Centennial Campus at NC State is a community with researchers, students, faculty and partners working together to solve real-world problems. Centennial Campus is also part of the larger Raleigh and Triangle community. Centennial combines lab and office space with college classrooms, living quarters and recreational opportunities.

Amenities and privileges our partners enjoy by being a part of the Centennial Campus community:

- Ongoing research and collaboration opportunities with more than 75 NC State departments,

- centers and institutes located on Centennial Campus
- Ongoing research and collaboration opportunities with every college and department at NC State
- Access to world-class, state-of-the-art laboratories and research equipment, both on Centennial Campus and throughout NC State
- Close proximity to four colleges with a strong physical presence on Centennial Campus -- College of Engineering, College of Textiles, College of Veterinary Medicine and the College of Education.
- Close proximity to the Graduate School, which is located on Centennial Campus
- Ongoing partnership and liaison services with the Centennial Campus Partnership Office

NC State's strategic research initiatives fall into four main areas: Health & Well-Being, Energy & Environment, Educational Innovation, and Safety & Security. While partner companies and organizations on Centennial Campus run the gamut of scientific and technological diversity, several areas of research and development stand out, including: green energy grid technology, biotechnology and biomedical research, nanotechnology and advanced materials, environmental health, smart systems and information technology and innovative education.

Overall Size: 1,334 acres

Buildings on Campus: 32

Partners: 62 corporate, government or non-profit partners

More than 75 NC State research centers, institutes, laboratories and department units

Population: 2,470 employees of corporate and institutional partners

1,350 university faculty, staff and post-docs

3,400 university students, 600 middle school students, 60 housing residents

Infrastructure Investment: 3 million sq. ft. of constructed space

Technology Incubator: The Technology Incubator located on Centennial Campus at NC State is designed with startup and early stage companies in mind. Whether it's tapping into the university's vast human resources of students, researchers or staff or whether it's taking advantage of the business planning and commercialization support we offer – the Technology Incubator is an entrepreneur's dream location.

Centers and Institutes on campus (partial list). Institute for Advanced Analytics, Institute for Next Generation IT Systems (ITng), William & Ida Friday Institute for Educational Innovation, Institute for Emerging Issues, Nonwovens Institute, Center for Comparative Medicine & Translational Research Center for Research on Textile Protection & Comfort, Center for [Chemical Toxicology Research & Pharmacokinetics](#)

[Industrial Extension Service \(IES\)](#) helps businesses increase efficiency, productivity and quality through the use of the latest technologies and best practices in engineering and business management. IES has returned nearly \$540 million in direct annual gain to the state over the past five years.

Pennsylvania State University Applied Research Laboratories

Website: <http://www.arl.psu.edu/>

Established: 1945.

Approximate Funding: \$100M, US Navy UARC

Reporting Line: Senior Vice President for Research and Dean of the Graduate School

Description: PSU/ARL is comprised of seven (7) units including:

1. Advanced Technology Office (AT): The Advanced Technology Office (ATO) provides technological advancements for undersea systems and complementary applications by providing overall ARL capability and leadership.
2. Communications, Information, & Navigation Office (CINO): The Communications, Information and Navigation Office (CINO) at ARL serves as a research center of excellence in communication technologies, information fusion and processing, navigation science, and visualization in response to sponsor needs.
3. Fluids & Structural Mechanics Office (FSMO): The design and analysis of underwater propulsors forms a core area of research and development at ARL Penn State. With its excellent test facilities, ARL Penn State has traditionally focused on experimental fluid dynamics, where fundamental and exploratory research is conducted into the physical phenomena governing boundary layer flows, cavitation, flow control, and the hydrodynamics of marine vehicles. In conjunction with research in experimental fluid dynamics, ARL Penn State works to develop a technology base for the design and analysis of marine vehicles integrated with their control systems and propulsors. This technology is applied in the development and demonstration of advanced concepts, with a focus on propulsor and turbomachinery design. This design work concurrently incorporates technology developed in other research areas at ARL Penn State, namely, flow and structural acoustics, computational mechanics, materials science, and manufacturing science.
4. Materials & Manufacturing Office (MMO): The mission of the Materials & Manufacturing Office (MMO) is to advance the state-of-the art in materials and manufacturing processing technology. To that end, we address issues related to materials design, materials processing, component design, manufacturing systems, repair and sustainment. Our technologies are enabling in that success for us entails design and fabrication of lighter, cheaper structural components for ships, subs, aircraft, or vehicles, more cost effective manufacturing processes for fabrication or repair of components of platforms, or design and integration of sensor systems for health or environmental monitoring of systems. These technologies are relevant to all platforms of interest within the DoD and consequently, we support a wide range of customers within the Navy and the DoD.
5. Research & Academic Programs Office (RAPO): This research area includes a full-spectrum acoustics program that ranges from basic research to practical applications, an innovative research program in distributed and intelligent dynamic systems, and a state-of-the-art exploratory and foundational research program.
6. Undersea Weapons Office (UWO): The Undersea Weapons Office supports the U.S. Navy in its efforts to defend surface ship's and submarines against torpedo attack. Utilizing the rich array of academic and research assets that ARL has available, the office develops capabilities for the detection and defensive engagement of threat torpedoes. Building on the Laboratory's experience in undersea weapons, acoustics, signal processing, modeling and simulation, energy and power systems, systems engineering and hydrodynamics, Torpedo Defense has been an important core competency of ARL for more than a decade.
7. Centers & Institutes: ARL administrated Centers & Institutes are important cross- disciplinary efforts that address research and manufacturing challenges too complex for single-investor programs. These Centers & Institutes provide focal points for the development and transfer of new technologies, processes and equipment in a cooperative environment with industry, academia, and the U. S. military.

PSU/ARL has approximately 900 staff and students. They do maintain personal security clearances for professional staff.

**Purdue University
Institute for Defense Innovation (IDI)**

Website: <http://www.purdue.edu/research/vpr/idi/>

Established: 2007

Approximate Funding: \$20M (cumulative)

Reporting Line: Vice President for Research and Discovery Park

Description: IDI is comprised of five centers of excellence:

1. Center for Electronic Defense Systems, CEDS: CEDS is dedicated to the advancement of the field of radio frequency (RF)/microwave systems for defense applications. CEDS will utilize a comprehensive approach to RF engineering which will span from electromagnetics to circuits to waveform synthesis to digital processing with the goal of developing the next generation of RF/microwave systems.
2. Center for Impact Science and Engineering, CISE: CISE is a comprehensive research and development consortium among a nationwide set of world-class researchers and clinicians. The overarching objective of the Center for Traumatic Brain Injury is to develop new technologies for the prevention, mitigation, treatment and rehabilitation of traumatic brain injury.
3. Purdue Center for Systems Integrity, PCSI: PCSI is providing the capability to design, monitor, and improve the “health” of engineered systems in all stages of the life cycle and at all scales of the system architecture. Our mission is to enable the world’s leading scientists, engineers, and technicians to create revolutionary advances in the system performance and supportability.
4. Center for Predictive Materials Modeling and Simulation, PMMS: PMMS focuses on the potential for prediction of damage (irreversible and cumulative deformation) in polymer composites due to mechanical and environmental loading. These predictions are now feasible by utilizing a hierarchy of advanced modeling techniques including atomistic and molecular simulation, polymer mechanics, mesoscale micromechanical modeling and composite mechanics validated via nanometrology and macroscopic measurements.
5. Center for Thermal Engineering for Military Power Systems, TEMPS: TEMPS’ focus is directed towards the research and development of new solid-state materials, new coolant materials, and enhanced thermal measurement capabilities for application in areas such as thermal energy storage, thermal and solid-fluid interfaces, and high temperature composites. Coupled with development and synthesis of these new nanomaterials is the multi-scale, multi-fidelity modeling and experimental validation of the new materials and their application.

Texas A&M University, Research Division

Website: <http://vpr.tamu.edu/>

Established: Various Years

Approximate Funding: total budgets of centers and institutes is not fully listed but appears to be >\$1B

Reporting Line: Reports to the Texas A&M University President

Description:

Texas A&M has an extensive number of Institutes and Centers – beyond the primary centers listed below, there are 216 Centers and Institutes listed at <http://ci.tamu.edu/>. All of these entities are organizationally placed Under the Vice-President for Research. Hence, this office oversees all traditional research as well as the various Texas A&M incarnations of a URO. By reviewing the Centers and Institutes, there are government-funded, partnerships and private corporate funded entities. In addition, the Centers and

Institutes include traditional research, policy research, “URO-type” research as well as teaching support and a significant number of outreach initiatives. The Centers that were highlighted are:

- [Research Valley Partnership](#)
- [Texas A&M Health Science Center](#)
- [Texas A&M Institute for Genomic Medicine](#)
- [Texas AgriLife Extension Service](#)
- [Texas AgriLife Research](#)
- [Texas Engineering Experiment Station](#)
- [Texas Engineering Extension Service](#)
- [Texas Forest Service](#)
- [Texas Transportation Institute](#)
- [Texas Veterinary Medical Diagnostic Laboratory](#)

It appears that in practice, the Vice President for Research is a Vice President for External Funding because the diverse types of entities included in the division.

University of California—Berkeley
Nothing relevant to report

University of Hawaii
Applied Research Laboratory

Website: <http://www.hawaii.edu/ar/faq.html#arcore>

Established in 2007 by the University of Hawai'i System.

Controversy surrounded its establishment, with the final agreement being that no Classified Research was allowed for 5 years. The Website has not been updated since 2007, and the *Honolulu Advertiser* has had no story on it since a \$1mil Navy grant for detection of roadside bombs. Another news source said they were awarded a \$26.2 mil Navy grant, but that source is not now accessible and nothing was said about this in the *Advertiser*.

University of Michigan
Office of Vice-President for Research

University: University of Michigan

Website: <http://research.umich.edu/>

Established: Various Years

Approximate Funding: The total UM Research external funding from federal agencies is \$751M and private sector \$39M (not separated between the institutes and other sponsored research).

Reporting Line: Reports to the UM President

Description: There are a number of different types of entities at UM which appear to be UROs. Most notably in the Office of Vice President for Research there are two “Incubator Units”. The most unique is the Center for Advancing Research & Solutions for Society -- <http://carss.umich.edu/> -- addressing largely social issues with the intent of developing programs and initiatives with sustained external funding. While there appear to be several initiatives that may qualify as UROs, listed as Research Units – see <http://www.research.umich.edu> – the OVPR notes that “Several large-scale research institutes outside the academic units conduct full-time research, usually focused on long-term interdisciplinary problems: The [Life Sciences Institute](#) and the [Michigan Memorial Phoenix Energy Institute](#).” Other entities that could be URO-type organizations are:

- [Center for Human Growth & Development \(CHGD\)](#)
- [Institute for Research on Women & Gender \(IRWG\)](#)
- [Magnetic Resonance Imaging Facility \(fMRI\)](#)
- [UM Transportation Research Institute \(UMTRI\)](#)

It appears that these various organizational entities have their own chain of command, but are nonetheless organized in the Office of the Vice President for Research. Exceptions appear to be for medical research, such as the [A. Alfred Taubman Medical Research Institute](#) which is part of the UM Health System rather than the OVPR. The Taubman Institute's purpose is "to provide the University of Michigan's finest medical scientists the freedom, resources and collaborative environment they need to push the boundaries of medical discovery, to produce breakthroughs in cures and treatment of disease and ultimately to alleviate human suffering."

University of Texas—Austin Applied Research Laboratories

Website: <http://www.arlut.utexas.edu>

Established: 1946, renamed as ARL in 1968.

Approximate Funding: \$75M, US Navy UARC

Reporting Line: Vice President for Research

Description: UT/ARL is comprised of four (4) laboratories including:

1. [Advanced Technology Laboratory \(ATL\)](#): The Advanced Technology Laboratory (ATL) is involved in the research, development, and application of both acoustic and electromagnetic technologies. Applications of acoustic technology include transduction, environmental acoustics, signal processing, modeling, and prototype systems development for high resolution sonar and high energy low frequency sources. Electromagnetic technology applications include millimeter wave security sensors, data links for security sensors, and underwater optical systems.
2. [Environmental Sciences Laboratory \(ESL\)](#): The Environmental Sciences Laboratory (ESL) conducts research in areas of ocean acoustic propagation and noise processes to advance understanding of the impact of the ocean acoustic environment on the performance of sonar systems. ESL has been an active participant in the development of advanced distributed surveillance systems and sonobuoy systems. To accomplish these goals, the group has developed strong capabilities in the areas of mathematical modeling of acoustic propagation, analysis and interpretation of acoustic data collected in ocean experiments, development and application of sophisticated signal processing algorithms, and development of instrumentation for experimental purposes.
3. [Signal and Information Sciences Laboratory \(SISL\)](#): The Signal and Information Sciences Laboratory (SISL) conducts research in the broad areas of signal physics and information sciences for a variety of DoD sponsors as well as other government agencies and industry. SISL's work in signal physics covers a wide of range of topics in acoustics. This work has historically focused on underwater acoustics, primarily for the U.S. Navy. However, more recently, SISL's sponsor base in underwater acoustics has expanded to include U.S. government law enforcement and intelligence agencies. Current work includes research in the areas of active and passive sonar and submarine vulnerability reduction, as well as research aimed at industrial and medical applications of acoustics. These industry and medical related efforts include the reduction of combustion emissions via acoustical processes, acoustically enhanced combustion, and theoretical and empirical studies of medical ultrasound.
4. [Space and Geophysics Laboratory \(SGL\)](#): It is our goal to become an extension of our customer's program and deal with their most difficult technical problems. And while demonstrating what is possible with existing technology, continue to be open to new technology and innovative acquisition

practices. Through all of this we hope to establish a long term relationship with those whom have chosen to sponsor our research.

UT/ARL has approximately 325 staff and 150 students. They do maintain personal security clearances for professional staff.

Utah State University

Innovation Campus: <http://innovationcampus.usu.edu/>

This entity was founded by the USU Foundation and its original funding was apparently facilitated by nearby Hill Air Force Base, and later DoD and NASA contracts. The campus also has private occupants, many in the sensing technology area, which appears to derive from their expertise developed in association with AF and NASA projects.

USTAR: <http://ustar.usu.edu/>

This is a state-business funded partnership with the Utah universities that primarily funds professors who are expected to catalyze leadership in target areas..

Utah State University Research Foundation: <http://www.usurf.org/about/mission>

This URO has two relevant subunits independent of the above, the Space Dynamics Laboratory, which has existed for sometime, and Energy Dynamics Laboratory (e.g., batteries), which is newer. They provide security, including “Classified Security”. They have an appointed volunteer Board of Trustees. USU Research Foundation runs as a cost-center, and many grants and contracts including many if not all USTAR grants.

Appendix II: Interview Questions

In the initial contact, the following background information was provided: Michigan State University is considering adopting a university research organization (URO) to serve as a venue for projects of national importance that may not align with normal campus expectations for openness in research participation and publication. Two models are under consideration: an external and corporately distinct entity; or an in-house entity. The faculty committee charged with examining pros and cons of the URO concept developed the following questions to guide its discussions, but not all questions are relevant for any particular individual willing to share experiences and opinions.

History and direction

1. What led to the establishment of your URO?
2. Has your URO evolved? If so, in what directions and why?
3. Do you currently have plans for growth or retraction of your URO?

Organization

4. What type of URO do you have (internal to or external to the university)?
 - a. If the URO is an independent entity, what led to the university's making it independent?
 - b. What is the nature of the formal relationship, e.g., memos of understanding (MOUs)?
5. What type of facility do you have (e.g., owned, rented, close or far from campus)?
6. What type of management or "board" oversight is exercised at your URO?
7. What means do you have to resolve university-URO conflict or uncertainties?
8. Does the university hold any liability for URO activities?
9. How is the URO financed/funded?
 - a. About what fraction of the time does the URO break even financially?
 - b. About how long did it take for the URO to break even?
10. What is the mix between permanent and fixed-term positions in the URO?
11. What rules or restrictions govern the participation of students, post-docs, and untenured faculty in the research of the URO?
12. Are accomplishments by faculty at the URO counted by departments for purposes of reappointment, tenure, pay raises, and promotion?

Operations

13. Do you have criteria for what types of projects can be accepted by the URO and, if so, what are they?
14. What determines whether a grant/contract originates from a unit or the URO?
15. If your URO has engaged in research from which foreign nationals (non green-card holders) were excluded, how were issues of access to premises addressed?
16. Does the university actively seek to relax publication restrictions, if present, for URO projects? Is the existence of the URO an incentive for researchers to bypass negotiating publication rights with funders?
17. Does the existence of the URO affect the likelihood that university researchers will engage in outside-work-for-pay or establish their own companies to carry out their projects? Are there cases where researchers would *prefer* to work through the URO than through their units?
18. What is the university's intellectual property (IP) policy compared to that of your URO?
19. What is the current overhead rate for your URO?
20. Does your URO accept ITAR- and EAR-restricted research?
21. Is your URO exempt from FOIA requests?

Assessment

22. What have been the benefits of your URO (e.g., reputational, financial, et al.):
 - c. —to the university?
 - d. —to the faculty (outside and within the tenure system, including untenured faculty)?
 - e. —to the state?
 - f. —to students/postdocs?
 - g. Have there been off-campus expressions of support for your URO, e.g., from government or industry?
23. What problems has your URO encountered:
 - a. —for the university, departments?
 - b. —for faculty (outside and within the tenure system, including untenured faculty)?
 - c. —for students/postdocs?
 - d. Has there been chronic or acute political criticism of your URO within the university or the state?

Finally, the committee would appreciate your advice in identifying knowledgeable faculty or administrators from your institution whom we might contact to learn about their experiences (positive or negative) with your URO; and one or two members of organizations that have sponsored research at your URO whom we might contact to learn about their experiences (positive or negative) with your URO?

Appendix III: Secondary Literature on Academy-Government Cooperation and the Policies of Other Universities

American Association of University Professors Committee A on Academic Freedom and Tenure, “The Enlargement of the Classified Information System,” *Academe* 69:1 (1983), with an appendix by the National Academy of Sciences Panel on Scientific Communication and National Security, including “Principles for University Research” and “Guidelines for Classified and Gray-Area Research”

National Academy of Sciences Committee on Science, Engineering, and Public Policy, *Scientific Communication and National Security* (National Academies Press, 1982), chapter 2: “Universities And Scientific Communication”

James R. Killian, Jr., “A Brief Analysis of University Research and Development Efforts Relating to National Security, 1940–1980,” in National Academy of Sciences Committee on Science, Engineering, and Public Policy, *Scientific Communication and National Security* (National Academies Press, 1982), Appendix D

“University Research Organization Techniques Pondered at Minnesota,” *Chemical and Engineering News* 27:13 (1949)

National Research Council Committee on a New Government-University Partnership for Science and Security, *Science and Security in a Post 9/11 World: A Report Based on Regional Discussions between the Science and Security Communities* (NRC, 2007)

Judith Reppy, ed., *Secrecy and Knowledge Production* (Cornell University Peace Studies Program Occasional Paper #23, 1999)

Michael Aaron Dennis, ““Our First Line of Defense”: Two University Laboratories in the Postwar American State,” *Isis* 85:3 (1994) 427-455

University Policies:

Johns Hopkins University
Massachusetts Institute of Technology
Michigan State University
Princeton University
Stanford University
University of California, Berkeley
University of Michigan
Washington University