

MSU INVESTMENT PROPOSAL FOR INSTITUTIONAL PRIORITIES

PROPOSAL OVERVIEW

Request Title	MSU Innovation Fund	Request Date	July, 2012
Request Area	Technology Transfer	Email	rmahurin@montana.edu
Requester Name	Rebecca Mahurin, Ph.D.	Phone	994-2752

STRATEGIC ALIGNMENT

Educate Students

- ☐ Our graduates will have achieved mastery in their major disciplines
- ☐ Our graduates will become active citizens and leaders
- ☐ Our graduates will have a multicultural and global perspective
- ☐ Our graduates will understand the ways that knowledge & art are created and applied in a variety of disciplines
- ☒ Our graduates are prepared for careers in their field
- ☒ We will provide increased access to our educational programs
- ☒ Communities and external stake holders benefit from broadly defined education partnerships with MSU

Create Knowledge and Art

- ☒ Students, faculty, and staff will create knowledge and art that is communicated widely

Serve Communities

- ☐ We help meet a fundamental need of the citizens of Montana by providing degree programs for our students
- ☐ We help meet the educational needs of the citizens of Montana by providing a wide range of educational opportunities to a variety of students
- ☒ Our students, faculty, staff, and administrators reach out to engage and serve communities
- ☐ Our students, faculty, staff, and administrator reach in to build the university community

Integrate Learning, Discovery, and Engagement

- ☐ Each graduate will have had experiences that integrate learning, discovery and engagement
- ☒ Outreach activities will educate students and address the needs of the communities we serve
- ☒ Students, faculty, and staff will create knowledge and art that addresses societal needs
- ☒ MSU is a community that will be characterized by synergy within and across disciplines, roles and functions.

Stewardship

- ☒ The public trusts the institution to operate openly and use resources wisely
- ☒ The faculty and staff are well-qualified and supported
- ☐ MSU will support Native American students, programs, and communities
- ☒ MSU will be an inclusive community, supporting and encouraging diversity
- ☒ Our publicly provided resources are used efficiently and effectively
- ☐ Natural resources are used efficiently and sustainably
- ☐ MSU nurtures a culture of resource conservation and ecological literacy among students, faculty and staff
- ☐ Our physical infrastructure (e.g., building, equipment, open spaces) will be well-maintained and useful

INSTITUTIONAL BENEFIT**Campuses**☒ Bozeman ☒ Billings ☒ Havre ☐ Great Falls ☐ FSTS ☒ Extension ☒ MAES**Cross-Dpts**

Please List: College of Engineering, Immunology and Infectious Diseases, Microbiology, Chemistry/Biochemistry, College of Agriculture, College of Technical Sciences (MSU-N), Biological and Physical Sciences (College of A&S, MSU-B)

TIMEFRAME**Proposed Dates**

Start:

End:

COST AND REQUIREMENTS**Funding Type**

One-Time (\$)

Multi-Year (\$)

Base (\$)

FTE

Personnel (w/benefits)**Materials & Supplies****Travel****Contracted Services****Capital****Other Operations****TOTAL**

Personnel costs are absorbed by the VP of Research, Technology Transfer Office. All funds listed above go directly to support translational research which increases the potential for additional external sponsored research awards, start up business opportunities and corporate licenses.

Funding levels allow for at least two funding events in year one, three in year two and four in year three.

We expect to solicit additional funding from the following sources:

1. MSU Foundation
2. Industry Partners
3. Non-MSU Affiliated Foundations
4. Federal Government Programs
5. Reimbursements

Please comment if necessary regarding cost and requirements.

PROPOSAL SCOPE

Innovation (n.) – the process of transforming a new idea into tangible impact

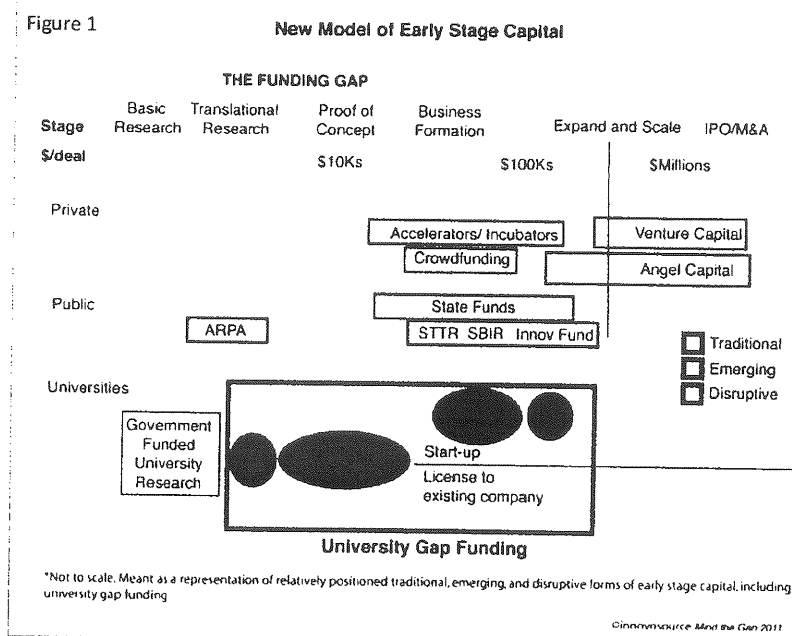
In other words, an idea or invention is not enough. It must be adopted - usually through the introduction of a successful new product or service – before it makes a difference.

What: The MSU Technology Transfer Office (TTO) proposes establishing a fund to further develop inventions that have been disclosed to the TTO. Such programs are commonly referred to as “Gap Funds” and are designed to provide funding to further develop technologies, thus ‘de-risk’ commercialization. Early-stage technologies from universities are difficult to license. Funding opportunities from federal agencies rarely allow for technology development. Therefore, universities are faced with attempting to license at a very early stage. Technologies that are further developed have greater potential for licensing. The gap fund will support projects that the Office of the VP of Research, MSU faculty, outside advisors, and potential licensees determine will improve the commercial potential of the technology. A successful gap fund, that increases commercialization of MSU technologies, will lead to more technology-based companies thus more student employment and internship opportunities, more high-paying jobs for our graduates, more opportunities for our faculty and students to work with companies on commercially viable technologies in their field, and a more robust economy in Montana.

Invention disclosures submitted to the TTO will be evaluated as potential gap fund projects. These projects will generally fall into the categories of:

1. Translational development that addresses early-stage commercialization questions such as: Toxicology testing, genome sequencing, metabolomics and proteomics.
2. Proof of concept or prototype development that demonstrates actual use in a commercially relevant environment such as field testing, scale-up or pilot programs, or integration with off-the-shelf components.

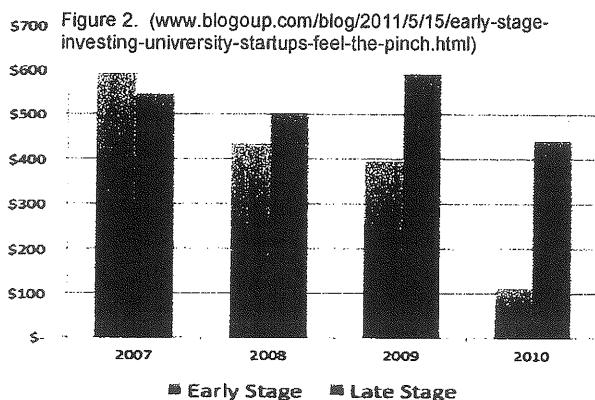
According to Oklahoma St. Univ. research, there are more than 50 gap funds at North American research institutions.



Why: As shown in Figure , the ‘gap’ between university research deliverables and technology that industry is willing to commercialize is wide and unaddressed. Figure 2 illustrates the widening of this gap between university research and possible commercialization. Funding for startup companies is drying up and moving towards later stages of investment. What both of these diagrams mean to universities is that licensing to large companies is getting more difficult and the chances of successfully starting a company around a university technology are decreasing. The goal of gap funding is to ‘de-risk’ university technology by addressing the key questions industry views as barriers to commercializing a particular technology.

Proposal process: MSU researchers with an invention disclosure accepted by the TTO will have an opportunity to submit a gap funding proposal. The TTO application form will include a project plan, budget, and a task plan to

address key questions or barriers to commercialization. Due diligence will be conducted by TTO staff. In addition to the standard due diligence report, the TTO will:



- Identify potential licensees and determine additional research that needs to be done
- Receive written 'interest' from prospective licensee(s)
- Refine costs/budget with faculty
- Review gap funding research progress and provide guidance on how the research is addressing the task plan

Funding decisions will be influenced by an Advisory Board made up of MSU staff, as well as outside experts. Licensee interest will impact the review process but MSU's TTO staff will make final funding decisions.

Requirements: The following are requirements for gap funding research:

1. The intellectual property and prospective product/technology must either address a need in the marketplace and have a competitive advantage over pre-existing products, or involve a new product or new market development.
2. The proposed work must be completed within six months; with a possible one-time-only six month extension.
3. The proposed work must be directed at product or technology development or testing that will lead to commercialization.
4. An individual may submit one proposal in any 12 month period as a principal investigator or co-investigator.
5. Proposals that are unsuccessful on the first submission can be resubmitted two additional times.

Economics:	Year One	Year Two	Year Three
# of Awards (est.)	2	3	4
Amount of Awards (\$)	\$15,000-25,000	\$15,000-25,000	\$15,000-25,000
Total Awards (\$)	\$30,000-50,000	\$45,000-75,000	\$60,000-100,000

Additional Funding: We consider this proposal to the University Budget Council to be the basis of a three year pilot program. In year two of the program we expect to have preliminary indication of its success (interest from licensees, establishment of the advisory board, prospects of initially funded technologies). If positive, we will approach the following sources for additional support (statistics from University of Minnesota survey):

- Donors – Gifts made either internal or external to the University. Results indicate that donor funds generally make up approximately 10% of gap funds.
- Industry Partners – 12% of gap funding across the nation comes from industry.
- Foundations – Private foundations account for upwards of 15% of all sources of gap funds for universities.
- We will also look to generate funds from licenses on supported technologies. Royalties are the most utilized source of funds at around 46%.

Return on Investment: Return on investment will be in the form of both soft returns and hard dollar returns, although prediction of those returns is naturally difficult (please refer to the Assessment Plan for additional information on returns). Soft returns will be in the form of:

1. Enhanced relevance and visibility of research
2. Enhanced service to the University community
3. Strengthened recruiting of faculty and students
4. Further development of loyal alumni
5. Maximizing societal impact

Hard returns will be in the form of:

1. Increased up-front licensing fees
2. Increased royalties
3. Greater percentage of recouped patent fees

Detailed Comparable Data:

University of British Columbia							
Total number of projects	Total amount awarded	Total disclosures	Total licenses	Investment from private sources	Awards from gov. sources	Royalties received	Total number of startups
138	\$4,710,337	99	57	\$436,000,000	\$24,700,000	\$2,250,000	34
Significantly, UBC reports a 95:1 leveraging, computed on the basis of \$436 million in private equity financing raised from \$4.7 million invested.							

Oklahoma State University							
Total projects awarded	Total amount awarded	Total disclosures	Total patents	Total licenses	Total awards received - result of funding	Total awards pending	Total number of start up companies
19	\$462,292	13	9	3	\$1,502,743	\$1,700,954	10
19 projects have been funded, at an average of \$24,341 per project. Within only two years, OSU has realized a 3:1 leveraging, with a 4:1 being likely within the next 6 months due to additional financing.							

Select Comparables (The TTO has profiled approximately 20 university gap funds):

Institution	Amount of Gap Fund (\$)	Source	Max. Amount/Award (\$)
Idaho/Boise State	\$350,000	State Board of Higher Education	\$70,000
Iowa	\$300,000	University Research Foundation	\$50,000
Mississippi State	Variable	Endowment	\$40,000

As reflected in the information above, there is no standard gap fund. Funds as bridging solutions vary according to university culture, average number of disclosures, university research focus, and funding community. Each university utilizes different tools, support systems, and solutions to accomplish specific goals. Further, any specific technology will travel an individual commercialization route. Because of these issues, there is no single Gap Fund model.

In our marketing efforts, we hear the following:

"We think this work is sophisticated and quality, it represents a step forward from the previous generation by using chelates rather than metal alone. Having said that, we think there is some potential risk to be overcome before we would consider pursuing: In more detail, the biggest risks are:

- *Loss of T1-weighted imaging benefit at higher field strengths of clinical interest*

- Unknown fate and long residence time of Gd within the body following tissue uptake and metabolism of the protein cages, and;
- Potential for immunogenicity and hypersensitivity type reactions due to the viral/protein cage constructs

We think further risk reduction is first necessary, particularly in the area of safety. We would be interested in revisiting when the technology has progressed a little more – specifically in learning how the nanoparticle could be used to image atherosclerosis a shorter time after injection (e.g. <4 hours)". - GE HealthCare regarding an MSU Chemistry/Biochemistry Technology

"According to our dynamics guys (Senior Technology Fellow), we've looked at LIDAR before, and the size of the system at the time rendered it unsuitable for flight aircraft. If it has been or could be re-packaged smaller, it would be useful for flight tests. We typically measure oscillatory blade motions directly through the rotating controls (this is expensive and not schedule friendly). It would be beneficial if we could measure them externally, either from the airframe or even independent of the aircraft. We have near term projects that could benefit from the technology if the previous limitations have been addressed or if the current system could be adapted." -Bell Helicopter, a Textron Company

Indicators from MSU Faculty:

"I think this is a good idea. Small funding as described below could support a graduate student to perform additional tests. For example, my group had an MBRCT grant. When I wrote the grant, I focused on testing the compounds that we developed as antibacterial agents. Now that we have a lot of those results in hand, I feel that it would be interesting to test the same compounds as anti-fungal agents. A "gap fund" would be useful for tests like these that would expand the scope and usefulness of new materials." -Mary Cloninger, Ph.D., Department of Chemistry/Biochemistry

"I spoke to Michele (Hardy) this afternoon and we are very interested in this funding opportunity. We would really like to get GRA into some sort of salve and apparently this can be a bit pricey to optimize. Once we had this we would test the compound material in vitro and in animal models. This is a necessary next step for us and bridge funding (while we try to get this funded via NIH) would be fantastic." -Jovanka Voyich-Kane, Ph.D., Department of Immunology and Infectious Diseases

"I think that is a great idea and it would benefit our work tremendously. For a technology that is too immature to go directly to production, it might be unlikely a company would pick up the technology as is. It is more realistic that the PIs would go for a phase 1 STTR/SBIR with a company to mature it further. If we had funding to do one more iteration of the technology (i.e., another cut of the IC, another cut of the board, etc...), then it would be more attractive from an STTR/SBIR perspective OR get closer to being picked up by a company." -Brock LaMeres, Ph.D., Department of Electrical Engineering

"This sounds like a good program. Right now we are trying to develop funding to do additional experiments on microbially enhanced coal bed methane production. The bottom line is that right now we have no free funds to conduct critical experiments needed to get the data we want before proceeding. Gap Funding in any amount would really help us in the near term. We also need this data to prepare research proposals to NSF, the USGS, and Shell.....this would be money well spent if we can get it." -Al Cunningham, Ph.D., MSU Center for Biofilm Engineering

PROPOSAL SCOPE

Broader impacts for students:

This proposal funds additional laboratory work. As such, it creates additional and enhanced (applied) research for students working under supervision of a Principal Investigator. The research to be funded will include input from industry advisors, and thus students will have the opportunity to work in a more 'real world' environment--one driven by outside goals. Because students (graduate and undergraduate) will be involved in projects directly influenced by industry, they will have opportunities to interact with industry, which will open up **internship and career opportunities**.

Broader impacts for faculty:

Faculty, the implementers of research activities driven by these awards, will gain closer connections with industry which will pay off in **increased sponsored research opportunities**, consulting engagements, and advising. The further research will also lead to **more publications**, research presentations, invention disclosures, and patents.

Broader impacts for MSU:

Establishment of a Gap Fund will make MSU more attractive to faculty and graduate students. In this way, establishment of the Fund is seen as a **competitive advantage**, relative to other institutions.

Pushing MSU technologies closer to commercialization, with the input and written support from industry, will **increase the number and value of licenses**. Upfront license fees, patent cost reimbursement, and royalties will increase and provide higher returns to MSU, MSU departments, and MSU faculty.

Broader impacts for Montana:

Currently, **half of the licenses executed by MSU are to Montana based companies**, and Montana firms are a preferred licensing target for the TTO. Enhancement of University technology through the establishment of this fund will create more licenses and collaborations with Montana companies. This has the effect of increasing high-paying jobs in cleaner industries, diversifying the economy, and creating tax revenue.

ADDITIONAL INFORMATION

Upon Notice from Budget Council or Appropriate Authority:

Quarter 1	Quarter 2	Quarter 3	Quarter 4
Recruit Advisory Board ¹	Begin Awareness Campaign ²	Advisory Board Meeting	Advisory Board Meeting
Refine Eligibility Requirements	Refine Screening Tools ³	Possible First Funding Event	Possible Second Funding Event
	Begin Screening Of Opportunities (Ongoing)		End of Year Report
	Begin Due Diligence (Ongoing)		

Quarter 5	Quarter 6	Quarter 7	Quarter 8
Advisory Board Meeting	Advisory Board Meeting	Advisory Board Meeting	Advisory Board Meeting
Begin Fundraising ⁴	Possible Third Funding Event	Possible Fourth Funding Event	Possible Fifth Funding Event
Review Six Month Reports	Review Six Month Reports	Review Six Month Reports	End of Year Report
Provide Updates to Prospective Licensees	Provide Updates to Prospective Licensees	Provide Updates to Prospective Licensees	Review Six Month Reports
			Provide Updates to Prospective Licensees

Quarter 9	Quarter 10	Quarter 11	Quarter 12
Advisory Board Meeting	Advisory Board Meeting	Advisory Board Meeting	Advisory Board Meeting
Possible Sixth Funding Event	Possible Seventh Funding Event	Possible Eighth Funding Event	Possible Ninth Funding Event
Review Six Month Reports	Review Six Month Reports	Review Six Month Reports	End of Year Report
Provide Updates to Prospective Licensees	Provide Updates to Prospective Licensees	Provide Updates to Prospective Licensees	Review Six Month Reports
			Provide Updates to Prospective Licensees

¹ Recruit Advisory Board

- Internal
- External (Use Alumni database or State-Ments mailing)

² Awareness Campaign

1. Develop web page and host on TTO site
2. MSU Today announcement (quarterly)
3. Email push to Department Heads (bi-annual)
4. Press Release (at start of awareness campaign and upon any funding event)
5. Contact faculty who have a current disclosure submitted to the TTO (at start of awareness campaign)
6. Develop content for and conduct informative seminar (with webinar capability for other campuses)

Assign Above Tasks Within TTO

³ Develop Screening/Assessment Tools (utilize VC due diligence methodology, borrow from other university Gap Funding programs)

⁴ Fundraising Efforts

Federal and private grant identification, grant writing.

Donor identification, letter writing. Will work with MSU Foundation to ensure that we do not conflict with their efforts. There may be an opportunity to work with MSU-F.

Discussion of reallocation of royalties (not PI royalties) to subsidize the Fund.

Core Theme One: Educate Students

Objective: Our graduates are prepared for careers in their fields.

- Number of graduates employed in a field related to their degree: This proposal increases the number of companies in a technical field. Students from MSU will have increased chances of working for those companies – especially those students participating in the research.
- Number of external advisory boards consulting with MSU Colleges: This proposal adds one advisory board in consultation with MSU.

Objective: We will provide increased access to our educational programs

- Number of non-resident graduate students: The establishment of the MSU Innovation Fund will be component of attracting graduate students to MSU. It furthers MSU's competitiveness relative to other research institutions.

Objective: Communities and external stakeholders benefit from broadly defined educational partnerships with MSU.

- Number of publications and workshops: The funding of additional translational research will directly increase the number and quality of submitted publications.
- Number of students, faculty, and staff participating in identified programs focused on providing educational opportunities and of meeting societal needs: Almost by definition, projects selected for funding will need to meet societal needs. Those could be cures for diseases, solutions to industrial problems, or products with market demand.
- Proportion of students participating in internship and co-operative educational opportunities: Increased opportunities for licensing technology or forming new ventures around technologies naturally create increased opportunities for students – especially those students who participated in the development of the foundational technology.

Core Theme Two: Create Knowledge and Art

Objective: Students, faculty, and staff will create knowledge and art that is communicated widely.

- Number of student research and or creative experiences (number of paid undergraduate laboratory workers): Increased funding for translational development will open up opportunities for student work in labs.
- Number of undergraduate and graduate student publications and presentations: Additional lab work will create manuscript submittals for publishing.
- Number of graduate theses and dissertations produced: Additional lab work may identify dissertation topics.
- Self reported participation in research as reported in NSSE: Additional funding for translational development will be seen in increased reporting of participation in NSSE.
- Number of peer reviewed publications and conference presentations: Additional manuscripts submitted for publication based on discoveries resulting from additional experiments will increase publications and presentations.
- Magnitude of externally funded research expenditures: Increased translational research funding will stimulate new areas of research for which grants can be applied. It will also stimulate corporate sponsored research.
- Number of patents awarded to faculty and staff members: Funding of translational development will positively impact the quality and quantity of patents.
- Number of technologies successfully transferred to the government or private sector: The primary goal of Gap Funding is to increase the number of technologies transferred to the private sector and some cases, the government sector.

Core Theme Four: Integrate Learning, Discovery, and Engagement

Objective: Students, faculty, and staff will create knowledge and art that addresses societal needs.

- Number of community partnerships: Creating partnerships with communities (businesses, non-university research laboratories, and government research agencies) will be a direct outcome of the funding of additional translational work.

Objective: MSU is a community that will be characterized by synergy with and across disciplines, roles, and function.

- Number of opportunities for faculty/student interaction and engagement: Translational funding will

involve faculty and students. MSU faculty has a high propensity to include students in research for the learning aspects of the students, the cost savings, and the need for skilled labor.

- Number of multi-department grant proposals: Translational research will often require the inclusion of faculty from other departments. This collaboration will open up new opportunities to pursue cross-discipline grants.
- Number of grant proposals including budgeted funds for undergraduate researchers: Results from translational work will open up new research areas and grant proposals. Grant proposals regularly include undergraduate researchers.

Core Theme Five: Stewardship

Objective: The public trusts the institution to operate openly and use resources wisely.

- Number of University committee and councils with one or more members from the community: A component of the Innovation Fund is an advisory committee partially comprised of members from outside of the University. These are individuals who have expertise in defined fields of research commercialization.

Objective: Faculty and staff are well-qualified and supported.

- Number of external awards reported in Faculty Activity: A primary goal of the Innovation Fund is to drive licenses. An intermediate step on the road to licensing is sponsored research. Translational funds will open up new interest from corporations based on the results of translational work.

Objective: MSU will be an inclusive community, supporting and encouraging diversity.

- Number of international research and creative projects collaborations: Additional funding, whether basic, applied, or translational research, directly increases the opportunities for collaboration. As research moves closer to commercialization, there is an increasing need for additional skill sets – often those are found internationally.

Objective: Our publicly provided resources are used efficiently and effectively.

- Economic impact indicators (jobs, income, tax revenue): Approximately ½ of all MSU licenses are to Montana companies. Increased translational work moving technology closer to licensing will directly increase employment, household income, and tax revenue. It will further aid in diversifying the Montana economy.

Assessed objectives are not met in the narrative outlined, what is the plan to amend the proposal?

The proposal is meant to be a proof of concept project and if proved positive, ongoing funding will be sought from non-university resources and internally generated fees. As such, sun-setting of the proposal will be restricted to the management of funds allocated to projects. That will be handled by the TTO with no additional staff or other resources.

SIGNATURES					
Supervisor/Head of Department	Signature				
Dept Head Priority (please circle one):	Very High	High	Medium	Low	Very Low
Dean/Director	Signature				
Rebecca Mahurin, Ph.D.	Rebecca Mahurin				
Dean/Director Priority (please circle one):	Very High	High	Medium	Low	Very Low
Executive/VP	Signature				
Thomas McCoy, Ph.D.	[Signature]				
Executive/VP Priority (please circle one):	Very High	High	Medium	Low	Very Low