Final Annual Report

Tennessee Tech University

President

Research and Economic Development

Research

Research and Economic Development
Department/Unit Contact: Francis Otuonye

Mission/Vision/Goal Statement
Vision: Provide research support for Tennessee Tech University to emerge as a leading university for collaborative-interdisciplinary-innovative-creative-entrepreneur culture driven research and development in solving societal and industry problems of critical importance to workforce and economic development of the Upper Cumberland region and the State of Tennessee.

Mission: Our mission is three-fold.

- Sponsored and scholastic research: support, inspire, incentivize faculty to pursue sponsored and scholastic research and grow sponsored research program.
- Innovation: develop and inspire innovation and entrepreneurial culture on campus involving students and faculty.
- Economic development: play a support role in economic development of the Upper Cumberland region and the state through research developed in the University.

Goal 1

Define Goal
Goal 1: Develop and encourage activities to increase extramural funding.

Intended Outcomes / Objectives
Objective 1.1: Provide initiation grants for individual and interdisciplinary research projects.
Objective 1.2: Provide assistance with proposal preparation.
Objective 1.3: Offer proposal and faculty research development workshops and training.

Goal 2

Define Goal
Goal 2: Develop and encourage activities to enhance innovation.

Intended Outcomes / Objectives
Objective 2.1: Provide initiation grants for innovative ideas that might result in invention disclosures.
Objective 2.2: Provide funding for filing patents and copyrighted materials.
Objective 2.3: Seek opportunities to inform angel investors and venture capitalists of inventions in the University intellectual property portfolio.

Goal 3

Define Goal
Goal 3: Identify activities that could potentially improve the economic environment of the region.

Intended Outcomes / Objectives
Objective 3.1: Provide support to, and collaborate with, public and private sectors in economic development activities.

Goal 1 Assessment Tools

Goal/ Outcome/ Objective: Goal 1
Type of Tool: Tracking Spreadsheet

Rationale
Goal 1: Develop and encourage activities to increase extramural funding. *Objective 1.1:* Provide initiation grants for individual and interdisciplinary research projects. *Method of Assessment:* Amount of initiation grants/support provided for research growth. *Objective 1.2:* Provide assistance with proposal preparation. *Method of Assessment:* Track number of proposals submitted by faculty; administer satisfaction surveys; track value of all proposals submitted; track number of faculty who received proposal preparation assistance. *Objective 1.3:* Offer proposal and faculty research development workshops and training. *Method of Assessment:* Track number of proposal development workshops; administer satisfaction surveys; track number of awards received; total value of awards received.

Goal I, which is to develop and encourage activities to increase extramural funding, is unchanged from the previous year. Progress in meeting the goal was assessed primarily by tracking the amount of initiation awards/support provided for research growth; number of proposals submitted by faculty, administrators, and staff; the value of those proposals; the number of faculty, administrators and staff who received proposal preparation assistance; the number of proposal development workshops and trainings; the number of awards received; and the total value of those awards. Further, a satisfaction survey was administered to evaluate the degree to which the ORED was meeting the objectives of Goal 1. Success in meeting the target goals for the 2015/16 academic year goal provided the impetus for increasing those targets for the 2016/17 academic year.

Frequency of Assessment: Annually

⚙ Goal 2 Assessment Tools

Goal/ Outcome/ Objective: Goal 2
Type of Tool: Tracking Spreadsheet

Rationale
Goal 2: Develop and encourage activities to enhance innovation. ***Objective 2.1:*** Provide initiation grants for innovative research projects that might result in invention disclosures. ***Method of Assessment:*** Track number of inventions disclosed; track number of provisional patents filed. ***Objective 2.2:*** Provide funding for filing patents and copyrighted materials. ***Method of Assessment:*** Track number of patents and copyrighted materials filed. ***Objective 2.3:*** Seek opportunities to inform angel investors of intellectual property in TTU portfolio.***Method of Assessment:*** Track number of inventions licensed and/or commercialized.

Goal 2 is to develop and encourage activities to enhance innovation. Faculty are supported and incentivized to disclose inventions and are provided technical assistance in patenting and licensing inventions. Tracking of intellectual property disclosed and inventions licensed or commercialized is used to measure outcomes.

Frequency of Assessment: Annually

⚙ Goal 3 Assessment Tools

Goal/ Outcome/ Objective: Goals 1, 2 and 3
Type of Tool: Tracking Spreadsheet

Rationale
Goal 3: Identify activities that could potentially improve the economic environment of the region. ***Objective 3.1:*** Provide support to and collaborate with public and private sectors in economic development activities. ***Method of Assessment:*** Track number of economic development activities supported; track number of industry contacts made.

Goal 3 is to identify activities that could potentially improve the economic environment of the region. Goal 3 was assessed by the number of economic development activities, such as proposals, supported and the number of industry contacts made. In 2015/16, no targets were established because this was a new initiative.

Frequency of Assessment: Annually

📏 Results Goal 1

Goal/Objective/Outcome Number: Rationale for Goals and Assessments and Results

Results
Rationale for Goals, Assessments, and the Process of Data Analysis

The goals match TTU's Flight Plan to enhance research, innovation, and contributions to community and economic development of the Upper Cumberland region. The results are being widely disseminated to the President's Cabinet and members of the Academic Deans Council.

Table 1 (attachment Goal 1 Results_Table 1, Appendix A) is summary data of external awards received for each fiscal year within the last six years. Data for each year of funding are presented in the annual reports that are widely distributed to the University Community and posted on the Research website at the link https://www.tntech.edu/research/reports/annual-reports. The increase in externally sponsored activities is attributed to (a) an increase in federal and state funding for research and creative activities, (b) an increase in the number of faculty submitting proposals to funding agencies, and (c) the support and assistance that faculty have received from the ORED in submitting competitive proposals.

Results

Goal 1 and the corresponding objectives and targets were met (Table 2). Approximately 60% (63 faculty) of the 105 faculty who served as principal investigators on proposals in 2015/16 received proposal preparation assistance. There was a remarkable increase in the number of collaborative proposals submitted. Of the 219 proposals submitted, only 53 proposals were with single principal investigators.

Table 2. Goal 1--Develop and Encourage Activities to Increase Extramural Funding.

	Objective	Methods of Assessment	Frequency	2015/16 Targets	2015/16 Results	2016/17 Targets	2016/17 Results
1.1	Provide initiation grants for individual and interdisciplinary research projects	Amount of initiation grants/support provided for research growth	Annually	$150k	$292k	$292K	
1.2	Provide assistance with proposal preparation	Track number of proposals submitted by faculty; administer satisfaction surveys	Annually	131	219	230	
		Track value of all proposals submitted	Annually	$36M	$62.2M	$65.3M	
		Track number of faculty who received proposal preparation assistance	Annually	40	63	66	
1.3	Offer proposal and faculty research development workshops and training	Track number of proposal development workshops; administer satisfaction surveys	Annually	6	5	6	
		Track number of awards received	Annually	130	137	144	
		Total value of awards received	Annually	$13M	$13.1M	$13.8M	

Proposal development trainings, and other services were provided to encourage and motivate tenured and non-tenured faculty to expand their research and scholarly activities. A survey was administered to assess the level of interest and satisfaction of the activities conducted by the ORED, and to measure the impact of the training and other services provided on the number of individual, collaborative, and/or interdisciplinary proposals submitted. Analysis of the qualitative data correlated the level of participation with the level of satisfaction. The responses are very representative of the number of faculty who participated in the events and activities. The responses, comments, and recommendations will be used for modification and improvement of subsequent activities, and replication of the assessed event. The summary results of the survey and recommendations are presented as the attachment titled 2016

Office of Research Annual Survey Key Results (Appendix B).

Overall, faculty have been supported, encouraged, and incentivized to increase the level of externally sponsored activities. Significant progress has been made as demonstrated by the increase in the amount of sponsored activities, the number of faculty who participate in sponsored activities, the number of faculty who attended the trainings and request and receive other services from the ORED. It is anticipated that the impact of these investments will continued to increase and will enhance TTU's research posture regionally and nationally.

Attachments
📄 2016 Office of Research Annual Survey Key Results

📄 Goal 1 Results_Table 1

Results Goal 2
Goal/Objective/Outcome Number: Goal 2

Results
Rationale for Goals, Assessments, and the Process of Data Analysis

The goals match TTU's Flight Plan to enhance research, innovation, and contributions to community and economic development of the Upper Cumberland region. The results are being widely disseminated to the President's Cabinet and members of the Academic Deans Council.

Results

Results of intellectual property activity since 2011/12 are provided in Table 1. During the 2015/16 academic year, the number of disclosures increased from 4 to 15, and the number of provisional applications increased from 2 to 6. There were no patents filed, or inventions commercialized, or licensed. Although, the number of invention disclosures and provisional applications showed a dramatic increase, the disclosures have not yet been converted into patent applications or licenses because the invention disclosures are currently being evaluated to assess their technical and market potentials.

Table 1. Intellectual Property Activity.

	FY 2011/12	FY 2012/13	FY 2013/14	FY 2014/15	FY 2015/16
Invention Disclosures	3	4	2	4	15
Provisional Applications Filed	1	3	2	2	6
Patents Pending Action	2	3	2	2	0
Patents Issued	1	1	1	0	0
Patents Licensed			2	1	0
Copyrighted Materials				0	0

The targets for the objectives in Goal 2 were met (Table 2), except that no inventions were patented or licensed. TTU has, in the past, relied on the TBR to file provisional applications, patent applications, and to commercialize our inventions. With the transition from the Tennessee Board of Regents (TBR)

Externally Funded Projects by Department of Project PI*

PI's College	PI's Department, Center, or Unit	Total Funding					
		FY 2010/11	FY 2011/12	FY 2012/13	FY 2013/14	FY 2014/15	FY 2015/16
Agricultural and Human Sciences	Agriculture	$184,361	$305,169	$187,583	$109,759	$152,150	$194,466
	Human Ecology	$1,021,786	$674,548	$499,700	$464,790	$182,328	$159,467
	Dean's Office	$150,000					$85,000
Arts and Sciences	Biology	$473,641	$434,860	$276,246	$158,720		$248,459
	Chemistry	$70,000	$144,919	$114,200	$90,000	$15,178	$1,114,814
	Cooperative Fisheries Research Unit	$668,950	$588,913	$289,771	$251,252	$30,000	$135,850
	Earth Sciences			$127,350			
	English		$77,516	$47,980	$34,033		$27,500
	Foreign Languages						
	History		$15,000	$15,000			
	Mathematics	$277,847	$157,886	$156,113	$215,458		
	Physics	$97,000	$245,791	$235,794	$454,136	$223,520	$533,356
	Sociology and Political Science						
Business	Business Administration		$24,396				
	Business Media Center	$859,621	$901,501	$1,088,925	$1,238,352	$1,603,933	$1,723,553
	Decision Sciences and Management	$123,300	$123,300	$99,772	$91,772		
	Economics, Finance and Marketing			$5,000		$1,700	$1,000
	Small Business Development Center	$151,251	$60,605	$129,965	$125,997	$136,420	$83,873
Education	Academic Development						
	Art				$9,000		$73,659
	Counseling and Psychology	$506,831	$634,611	$694,697	$663,854	$28,320	$21,941
	Craft Center						$5,660
	Curriculum and Instruction	$1,040,695	$2,012,076	$1,289,564	$918,126	$495,801	$233,993
	Education Administration						$33,264
	Exercise Science, Physical Education, Wellness	$15,000					
	Music						
Engineering	Basic Engineering	$184,910	$47,500				
	Chemical Engineering	$129,404	$105,243		$381,057	$49,100	$329,147
	Civil and Environmental Engineering	$376,166	$466,207	$717,878	$521,323		$504,405
	Computer Science	$383,500	$408,605	$249,332	$699,937		$1,008,129

	Electrical and Computer Engineering	$92,624	$38,781	$100,950	$629,605	$36,000	$434,088
	Manufacturing and Industrial Technology	$90,717	$213,589	$34,500	$60,000		
	Mechanical Engineering	$586,302	$945,365	$524,970	$719,544	$133,973	$1,313,899
	Engineering Administration	$44,444	$41,462	$43,059	$68,709	$68,813	$37,322
Centers of Excellence	Energy Center Appropriation	$896,700	$866,000	$880,700	$919,300		$887,000
	Energy Center Other	$180,464	$16,525	$11,175	$3,850	$1,330,507	$54,275
	Manufacturing Center Appropriation	$1,512,400	$1,460,000	$1,482,900	$1,541,100		$1,476,800
	Manufacturing Center Other	$1,242,412	$523,967	$462,523	$249,831	$3,607,903	$232,255
	Water Center Appropriation	$1,188,000	$1,215,549	$1,161,300	$1,205,600		$1,213,130
	Water Center Other	$326,251	$133,651	$319,482	$108,462		$50,899
Interdisciplinary Studies	Extended Education	$500,000					
Nursing							
Other	Academic Affairs				$140,000		
	Athletics				$500		
	Center for Teaching and Learning Excellence						$62,000
	Counseling Center	$3,619	$2,725	$3,450			$99,998
	Facilities and Business Services			$250,000			
	Nursing						$1,000
	Student Affairs						
	University Police	$6,227					$4,999
Research and Economic Development	Research & Econ. Dev.						$15,000
	STEM Center	$400,000	$198,706	$475,000		$556,853	$688,160
Total	All Units	**$13,784,423**	**$13,084,966**	**$11,974,879**	**$12,074,067**	**$11,020,666**	**$13,088,361**

Appendix B

2016 Office of Research Annual Survey
Key Results

- Of the 115 faculty that responded to the survey, fifty percent of respondents were tenured or on tenure track. The remaining 50% were non-tenure track, administrative, staff, adjunct, or part-time/contract.
- The majority of respondents (68%) have not submitted a proposal during the last year.

Resources offered by the Office of Research
- The majority of respondents reported that they were unaware of the resources offered by the Office of Research.
- Additional feedback included a comment requesting ORED to expend more resources and services to humanities disciplines with regard to externally funded activities.

Services provided by the Office of Research
- The services that respondents reported being aware of and using the most were (a) Submission of proposal, (b) Proposal preparation assistance, and (c) Review of proposals before submission.
- Most respondents (60%+) were unsure about issues related to subawards and intellectual property.
- More than 70% of respondents reported being somewhat or very satisfied with the following pre-award services: Proposal preparation assistance, Budget development assistance, Proofreading/editing, Completing of compliance forms, Verification that cost share meets requirements, Confirmation that proposal meets sponsor requirements, Review of proposal before submission, Preparation of proposal package, and Submission of proposal.
- More respondents reported being aware of the two services Review award budget and Accept award terms and conditions and execute award on behalf of TTU than any other Post-award services.
- Additional feedback included a request for a "weekly email summarizing all the new major funding opportunities that became available."

Guidance/Training offered by the Office of Research
- The highest percentage of respondents were aware that guidance/training was offered on the topics of Grant writing, Proposal development and Human subjects.
- The highest percentage of respondents indicated they had utilized guidance on the topics of Responsible conduct of research and Human subjects.
- The highest percentage of respondents indicated being somewhat or very satisfied with the guidance/training offered on the topics of Grant writing, Proposal development, Responsible Conduct of Research and Human Subjects.
- More than 60% of respondents who utilized the guidance offered on the following topics were somewhat or very satisfied: Grant writing, Proposal development, Changes to policies and regulations, and Intellectual property.

Recommendations
- Offer workshops/trainings for Humanities faculty.
- Encourage more faculty to submit proposals.

- Encourage more faculty to sign up for e-mail alerts of funding opportunities in their areas of expertise.
- Assist Humanities faculty in identifying funding opportunities and with the development of proposals.
- Continue to publicize the services that ORED provides in pre- and post-award administration.

Governing Board to a TTU Governing Board, we plan to be more aggressive and agile in pursuing intellectual property protections and technology commercialization through third-party contract arrangements.

Table 2. Goal 2 -- Develop and Encourage Activities to Enhance Innovation.

	Objective	Methods of Assessment	Frequency	Targets	Results	2015/16 Results	2016/17 Targets	2016/17 Results
2.1	Provide initiation grants for innovative research projects that might result in invention disclosures	Track number of inventions disclosed	Annually	2	4	15	10	
		Track number of provisional patents filed	Annually	2	2	6	6	
2.2	Provide funding for filing patents and copyrighted materials	Track number of patents and copyrighted materials filed	Annually	2	2	0	2	
2.3	Seek opportunities to inform angel investors of intellectual property in TTU portfolio	Track number of inventions licensed and/or commercialized	Annually	2	1	0	2	

Attachments
No items to display.

Results Goal 3
Goal/Objective/Outcome Number: Goal 3

Results
Rationale for Goals, Assessments, and the Process of Data Analysis

The goals match TTU's Flight Plan to enhance research, innovation, and contributions to community and economic development of the Upper Cumberland region. The results are being widely disseminated to the President's Cabinet and members of the Academic Deans Council.

Results

Although no targets were established in 2015/16 because this goal was a new initiative, the ORED provided support for two economic development proposals, one of which, the Tennessee Reconnect Program, was funded, and the number of industry contacts was 46. Results of Goal 3 and corresponding objectives are presented in Table 1. The results provided a guide for establishing the targets for 2016/17.

Table 1. Goal 3 -- Identify Activities that Could Potentially Improve the
Economic Environment
of the Region.

	Objective	Methods of Assessment	Frequency	Targets	2015/16 Results	2016/17 Targets	2016/17 Results
3.1	Provide support to, and collaborate with public and private sectors in economic development activities	Track number of economic development activities supported	Annually	2	2	2	
		Track number of industry contacts made	Annually	22	46	10	

Attachments
No items to display.

💡 **Modifications and Continuous Improvement -- Program Changes Due to Assessment**
   Goal/Objective/Outcome Number:

   Program Changes and Actions due to Results
   There will be no modifications to the goals and objectives in 2016/17. The ORED will continue to enhance the following initiatives undertaken in 2015/2016: (a) develop and strengthen strategic alliances and relationships with federal and state agencies, industry, and private sector companies to further increase the acquisition of grants and contracts, (b) strengthen existing and develop new research areas and multidisciplinary teams in response to emerging national research priorities, and (c) provide pre-and post-award sponsored program logistics as well as compliance support.

   Link to Assessment

   Link to Flight Plan:

✏️ **Improvements to Assessment Plan**

   Improvements to Assessment Plan
   The ORED conducted a survey to assess the level of interest and satisfaction in the activities and events that were conducted. The summary results of the survey and recommendations are presented in the results for Goal 1 section.