2024-2029 KY NSF EPSCoR RII Track-1 Proposal Idea Papers

On behalf of the Statewide EPSCoR Committee, KY NSF EPSCoR is seeking idea papers from the Kentucky research community to include in the next $20 million/ 5-year RII Track-1 proposal, which will be submitted to NSF in the Summer of 2023. If funded, an awarded Track-1 proposal to Kentucky would support Research Infrastructure Improvement (RII) activities from July 2024 – June 2029.

Here's what you need to know:

There can be only one funded RII-Track 1 award per state at a time, so Kentucky is not eligible to submit until the summer of 2023, but we will need a year to identify a proposal topic and develop the proposal, so we are starting now.

The current active solicitation for this program is 22-599 https://www.nsf.gov/pubs/2022/nsf22559/nsf22559.htm, which is not the solicitation Kentucky will be responding to, but it should be referenced to learn more about the program and how it works.

Below is a timeline of activities for developing the proposal.
We are starting the process by asking the academic community to submit Idea Papers by August 1, 2022.

May 2022: Request Idea Papers

Idea Papers include only two sections – (1) a listing of involved institutions and participants (only KY institutions and individuals can participate on a Track-1), and (2) an overview of the proposed topic including a general scope of work.

There is no page limit for section 1. Section 2 should not be more than 5 pages.

Successful idea papers will:

1. Propose participants/activities at both the state's research institutions (UK and UofL), as well as include the state's regional two- and four-year colleges and universities. Inter-institutional, collaborative research that impacts the entire state is a fundamental characteristic of successful Track-1 applications.

2. Focus on areas of importance to the National Science Foundation, the program sponsor; and that are areas of interest and strength for Kentucky.
https://www.nsf.gov/about/budget/fy2022/pdf/01_fy2022.pdf

3.Include new faculty hires to complement existing faculty and expertise. Start-up support for the new faculty hires can be included within the Track-1 budgets.

4.Focus on activities that will make research groups more competitive for large-scale NSF center applications after five years of Track-1 financial support.

5.(For program size/scope context) Kentucky's prior T-1 awards have typically:

a.) Included 1 to 3 major research themes. If > 1 theme is selected, the themes will have connections to each other.
b.) Supported approximately 200 participants per year (across all roles and research themes)
c.)Provided support to enable 5-10 new research faculty hires over the five years of the award

June 2022: Informational Webinar

KY NSF EPSCoR will host an informational webinar about the entire proposal development process and answer questions from the community.

August 1, 2022: Idea Papers are due

Submit Idea Papers to: jeff.mossey@uky.edu

September 1, 2022: Proposal theme(s) selection

The Statewide EPSCoR Committee members will review the Idea Papers and determine the proposal's research theme(s) by September 1, 2022. All groups submitting Idea Papers will be informed of this outcome and groups that proposed activities that relate to the selected theme(s) will be invited to participate in the next phases of proposal development.

The overall objective during the proposal theme selection process is to identify research areas of common and complementary interest that will have an impact on the entire state's research infrastructure, so the greater the number of inter-institutional partnerships within the Idea Papers, the more likely the proposed theme is to be selected.

September 26, 2022: Proposal development workshop and team building event hosted by KY NSF EPSCoR.

October 2022 – June 2023: Proposal Development

July 2023: Proposal Submission to NSF

Personnel: The organization structure of KAMPERS is shown in Figure 2. A total of eight new faculty hires are proposed at four different Kentucky institutions. They are referenced by number throughout the proposal and included in the project map below.

- UofL hire #1 (P5, P6, P7, Yr 1): Expertise in hardware embedded intelligence and learning and optimization related to massively scalable distributed wireless power, communication and sensor data fusion in structural electronic systems and the Internet of Things (IoT), allowing integration into our enhanced robotic structures.
- UofL hire #2 (P7, P10, Yr 2): Specialization in shared human-robot learning and control schemes at the Human-Machine Interface and Soft Robotics with expertise in neuro-adaptive control, deep learning, modeling and control of flexible materials allowing collaborative interfaces between sensor arrays and next generation manufacturing robots.
- EKU hire #3 (P1, P2, Yr 1): A chemist or physicist with expertise in computation.
- UK hire #4 (P10, P3, P5, Yr 1): Expertise in human-robot control systems, including bio-inspired methods such as adaptive control and deep reinforcement; including collaborative work with the Next Generation Systems Group at UofL and robotics and controls faculty at UK.
- UK hire #5 (P2, P4, Yr 1): Expertise in synthetic biology to provide capacity in resin biosynthesis.
- UK hire #6 (P2 and P4, Yr 1): Expertise in the field of printed electronics, likely recruited from the A.C. Arias or V. Subramanian groups at Berkeley. Will provide expertise in fabrication of electronic devices from printable components, and integration into larger device arrays.

- UK hire #7: (P1, P4 and P5, Yr 2): Expertise in the field of organic/bio electronics, with focus on flexible device arrays and sensing, likely be recruited from groups such as Z. Bao's at Stanford, will bring expertise in the area of sensing and electronics integration.
- SCC hire #8 (Yr 1): A new faculty hire involved in all aspects of the SCC workforce development activities including teaching courses, post-secondary outreach, business outreach, advanced manufacturing integration projects, and curriculum development.

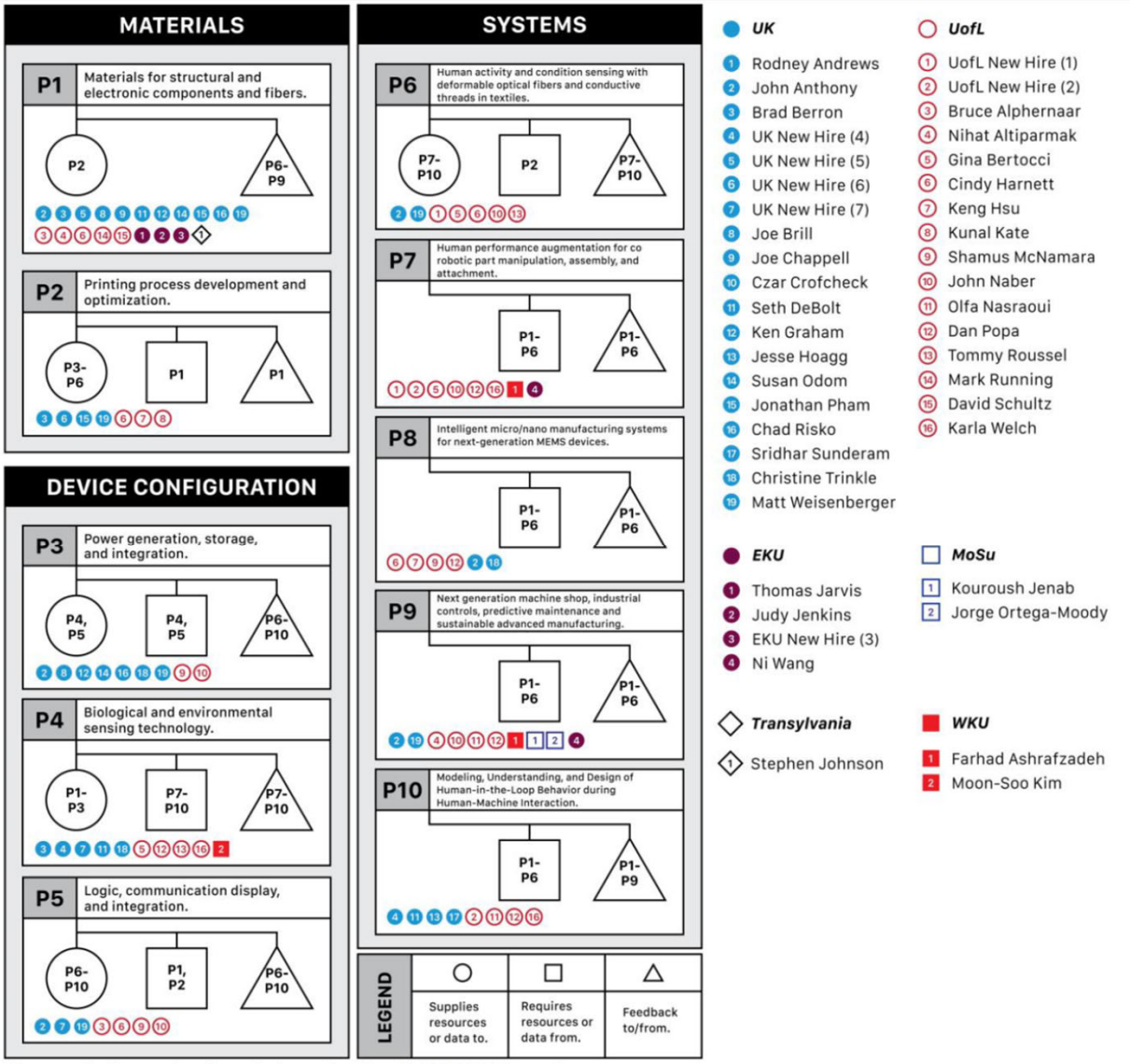
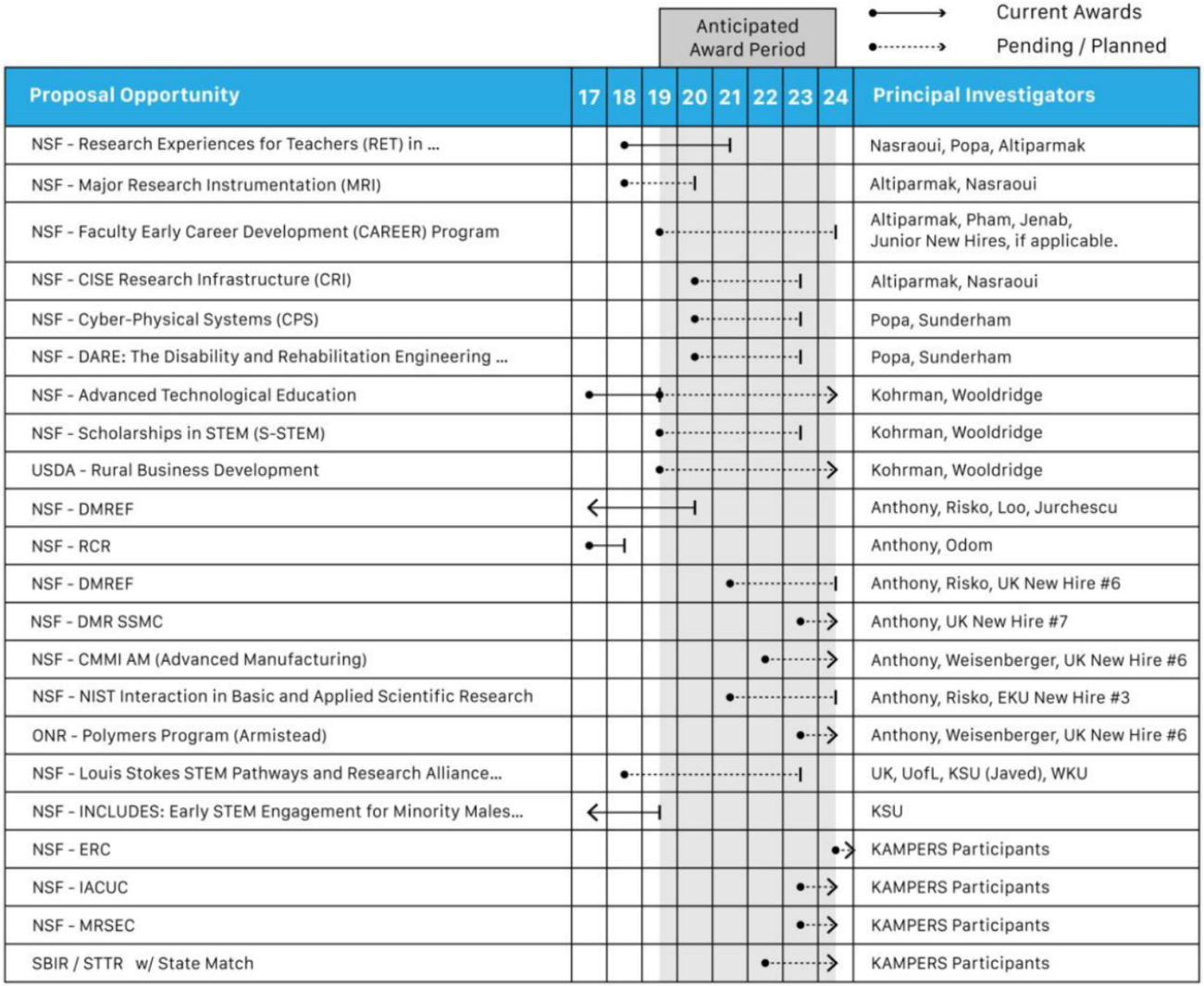


Figure 2: Organizational chart for the KAMPERS project.

4.9.2 Post RII Track-1 Extramural Funding.

Table 7. Anticipated future funding submissions from KAMPERS participants.



Proposal Opportunity	17	18	19	20	21	22	23	24	Principal Investigators
NSF - Research Experiences for Teachers (RET) in ...									Nasraoui, Popa, Altiparmak
NSF - Major Research Instrumentation (MRI)									Altiparmak, Nasraoui
NSF - Faculty Early Career Development (CAREER) Program									Altiparmak, Pham, Jenab, Junior New Hires, if applicable.
NSF - CISE Research Infrastructure (CRI)									Altiparmak, Nasraoui
NSF - Cyber-Physical Systems (CPS)									Popa, Sunderham
NSF - DARE: The Disability and Rehabilitation Engineering ...									Popa, Sunderham
NSF - Advanced Technological Education									Kohrman, Wooldridge
NSF - Scholarships in STEM (S-STEM)									Kohrman, Wooldridge
USDA - Rural Business Development									Kohrman, Wooldridge
NSF - DMREF									Anthony, Risko, Loo, Jurchescu
NSF - RCR									Anthony, Odom
NSF - DMREF									Anthony, Risko, UK New Hire #6
NSF - DMR SSMC									Anthony, UK New Hire #7
NSF - CMMI AM (Advanced Manufacturing)									Anthony, Weisenberger, UK New Hire #6
NSF - NIST Interaction in Basic and Applied Scientific Research									Anthony, Risko, EKU New Hire #3
ONR - Polymers Program (Armistead)									Anthony, Weisenberger, UK New Hire #6
NSF - Louis Stokes STEM Pathways and Research Alliance...									UK, UofL, KSU (Javed), WKU
NSF - INCLUDES: Early STEM Engagement for Minority Males...									KSU
NSF - ERC									KAMPERS Participants
NSF - IACUC									KAMPERS Participants
NSF - MRSEC									KAMPERS Participants
SBIR / STTR w/ State Match									KAMPERS Participants

Project Implementation: Research Thrusts (RT), Goals, Objectives, Activities and Milestones

RT-1 **Develop new sensing modalities designed to be integrated into structural robotic components, along with the multi-functional materials required to serve as electronic interconnects and insulators. This thrust develops the materials and fabrication processes needed to embed electronic function into structural components, and involves developing new materials, device configurations, and structural forms for demonstration of basic logic, sensing, and data processing arising from co-printed electronic and structural elements, along with on-board power generation and storage. Explore synthetic biology approaches to yield structural materials with programmable lifetimes, to reduce generation of persistent electronic waste.**

Goal 1.1: Develop a compatible suite of printable insulators, conductors, and semiconductors for structurally integrated electronics, along with their full characterization and explore bio-inspired feedstocks for structural components with programmable lifetimes (P1).

►***Objective 1.1.1:*** *Merge knowledge about resins for printing structural components with materials used to fabricate electronic components to co-print them into structural embedded electronics.*

Activity	Y1 Milestone	Y2 Milestone	Y3 Milestone	Y4 Milestone	Y5 Milestone	Responsible Parties
Create printable conductive resins, with full characterization	Demonstrate a conductive fiber > 3000 S/cm	Demonstrate insulated conductive fiber in spooled form	Develop contact strategies, evaluate contact resistance and stability	Demonstrate efficient, low-loss (< 500 ohm per contact) electrical contacts	Utilize conductive fibers to integrate / connect devices within a	Weisenberger, Johnson, Brill, Graham, Naber, Kate

- The first thing a funded Track-1 award is tasked with is to develop a detailed strategic plan for the project.
- The Strategic Plan can be updated annually with NSF's approval.
- 25-30 Research Objectives per year.
- There are also Objectives for other "Project Elements" … Diversity, Education, Outreach, Annual Seed Funding Programs, etc.
- The general organization of the strategic plan is to develop: Goals → Objectives → Activities → Yearly Milestones → List of responsible people (by name) working on every activity.
- Note the inter-institutional nature of the responsible parties (the example to the left has researchers from UK, UofL and Transylvania), which need not be the case for every activity, but collaboration across research groups generally increases significantly as the project progresses and new hires are completed.

A. SALARY SUPPORT

*Include detail regarding **RII Track-1** support for all faculty and equivalent listed as participants in the RII project during the current reporting period*

Institution	Department	Faculty Name (Last, First)	Faculty and Faculty Equivalent Individual Funded Effort (in months)	Salary Funding for Group Member(s) (in $K)	Comments
			EPSCoR RII **(Track-1 only)**	EPSCoR RII **(Track-1 only)**	
Total for Institution A			**0**	**$0**	
Total for Institution B			**0**	**$0**	
Total for Institution C			**0**	**$0**	
Total for All Institutions			**0**	**$0**	

Notes:

(1) This table should include **all** RII Track-1 salary support spent across the project for the current reporting period.

(2) The total dollar support should include **salary, fringe benefits, and overhead** of a faculty member (or faculty equivalent) and that person's salary support for students and postdocs (and other relevant personnel). Do not include cost of equipment, travel, or supplies.

(3) If a senior personnel does not receive individual funding but members of their group do, include that group's funding in this table.

(4) No one should be listed who has all of the values for effort and funding equal to zero.

(5) Salary support for the full reporting period should be included (actual and projected). Effort (in months) should be not more than 12 months per year per individual.

(6) Include NSF funds only, not cost sharing or cost contributions. Cost sharing and cost contributions should not be included in this table, but reported in Tables G and H.

(7) Indicate total amount for each institution by summing the entries as shown.

(8) Provide information for all faculty-equivalent staff at all institutions in this single table.

(9) If there are reported funded effort-months for an individual, then there must be corresponding funding amounts in dollars on the right hand side.

(10) Anyone listed in Table A must appear in the list of Research.gov participants for this year. However, there may be faculty listed in Research.gov who are not included in this table.

B.PARTICIPANTS

Enter number of participants for the current reporting period

Institution or RII Track-1 Totals	Category	Total individuals in category	Male	Female	Blacks or African Americans	Hispanics	Other Ethnic	Persons with Disabilities	New Investigators*
Institution A	Faculty participants (or equivalent)								
	Technical support staff								[redacted]
	Non-technical support staff								[redacted]
	Post docs								
	Graduate students								[redacted]
	Undergraduate students								[redacted]
	RII Leadership Team								[redacted]
Institution B	Faculty participants (or equivalent)								
	Technical support staff								[redacted]
	Non-technical support staff								[redacted]
	Post docs								
	Graduate students								[redacted]
	Undergraduate students								[redacted]
	RII Leadership Team								[redacted]
Institution C	Faculty participants (or equivalent)								
	Technical support staff								[redacted]
	Non-technical support staff								[redacted]
	Post docs								
	Graduate students								[redacted]
	Undergraduate students								[redacted]
	RII Leadership Team								[redacted]
RII total	Faculty participants (or equivalent)								
	Technical support staff								[redacted]
	Non-technical support staff								[redacted]
	Post docs								
	Graduate students								[redacted]
	Undergraduate students								[redacted]
	RII Leadership Team								[redacted]
	Advisory Board(s)								[redacted]

***New investigators are those at the faculty, junior faculty, and post doc level who are new to the RII Track-1 project during the reporting period.**

Notes:

(1) Include the number of all participants, paid or unpaid, involved in activities funded by the project. Participants are defined as those members of the project who contirbute to the project in an ongoing and regular basis. An example of an unfunded participant could be someone using RII funded equipment but not personally receiving RII Track-1 salary support.

(2) Enter the institution name in the cell to replace the italic label. Add sections as needed for the institutions engaged in the RII Track-1.

(3) An institution can be a university, not-for-profit company, private company, or other entity.

(3) High school students on a paid internship should be described in the narrative but not included in this table.

C. COLLABORATIONS

Enter number of relationships for the current reporting period

Category	*Within the Jurisdiction but Not Solely Among Participants*		*External to the Jurisdiction- U.S. Domestic*		*External to the Jurisdiction- Foreign*	
	Number of Institutions	*Number of Collaborators*	*Number of Institutions*	*Number of Collaborators*	*Number of Institutions*	*Number of Collaborators*
Academic Research Institutions (without Minority Serving Institution status)						
Primarily Undergraduate Institutions						
Historically Black Colleges and Universities						
Hispanic Serving Institutions						
Tribal Colleges and Universities						
National Laboratories						
Industry						
Other (Specify)						
Total						

Notes:

(1) Values in Table C MUST NOT include any person counted in Table A or Table B. Do not include funded partners.

(2) The number of institutions MUST be less than or equal to the number of collaborators.

D. EXTERNAL ENGAGEMENT

Enter number involved for the current reporting period

	Academic Research Institutions (without Minority Serving Institution status)		Primarily Undergraduate Institutions		Minority Serving Institutions		K-12 Institutions			Other (Specify)	Total
	Faculty	Students	Faculty	Students	Faculty	Students	Teachers	Students Reached Directly	Students Reached via Teacher Training		
Project Total											
Male											
Female											
Underrepresented Minority											

Notes:

(1) Include the number of people (faculty, student, etc.) who have been engaged in outreach activities. Do not include anyone listed in Tables A, B, or C.

(2) Underrepresented minorities include **ONLY** Alaska Natives, Native Americans, Blacks or African American, Hispanics, Native Hawaiians and other Pacific Islanders, and Persons with Disabilities [nsf_frameworkforaction_0808.pdf].

(3) Other participants may include those reached by work with museums or general public - please specify in the table and give details in the narrative.

(4) Each column lists the type of attendee, not the location of the event.

(5) The Project Total enumerates all individuals who participated in the external engagement activities. If participants did not report their gender and/or ethnicity, include them in the Project Total, but do not include them in the Male/Female or Underrepresented Minority rows. Do not add rows to the table.

(6) Sum across each row to compute the "Total" value in Column L.

E. OUTPUTS

Category	Total for Current Reporting Period		Cumulative Total for the Award	
Patents				
Awarded				
Pending				
Licensed				
Proposals / Grants / Contracts	***Number***	***Funds requested***	***Number***	***Funds requested***
Submitted				
Awarded				
Pending				
Published Publications				
Primary RII Track-1 Support				
Partial RII Track-1 Support				
Total New Faculty Hired				
Male				
Female				
Underrepresented minority				
Disabled				
Total Post Docs Involved				
Male				
Female				
Underrepresented minority				
Disabled				
Total Graduate Students Graduated				
Male				
Female				
Underrepresented minority				
Disabled				
Total Undergraduates Graduated				
Male				
Female				
Underrepresented minority				
Disabled				

Notes:

(1) Include only published work in the publication count. Do not include submitted, accepted, pending, etc

F. EXPENDITURES INCLUDING OBLIGATIONS

Summarize overall support levels for each of the major activities of the project

Expenditure Category	**Current Reporting Period**		**Cumulative**	
	$K	***% of annual budget***	***$K***	***% of cumulative budget***
Research Theme 1 (Title)				
Salaries and Fringe Benefits				
Equipment				
Other Research-Related Expenditures (specify)				
Research Theme 2 (Title)				
Salaries and Fringe Benefits				
Equipment				
Other Research-Related Expenditures (specify)				
Research Theme 3 (Title)				
Salaries and Fringe Benefits				
Equipment				
Other Research-Related Expenditures (specify)				
Total Research				
Education and Workforce Development				
Emerging Areas and Seed Funding (for all Research Themes)				
Broadening Participation (including Diversity efforts)				
Partnerships and Collaborations				
Communications and Dissemination (including Outreach and External Engagement efforts)				
Sustainability				
Management (including all administration expenses)				
Evaluation and Assessment				
Indirect Costs				
Other (including Cyberinfrastructure; specify)				
Total				

Notes:

(1) Provide separate entries for each research theme, including salaries and fringe benefits for participants, relevant equipment, and other RESEARCH RELATED expenditures. (Specify what these are.) Add an additional research section if the original proposal contained more than three research theme, or remove extra research areas if your proposal had only one. For all other entries, include the cost of the implementation of project area. Do not add any other additional rows in the non-Research section.