Utah System of Higher Education
New Administrative Unit Proposal
Cover/Signature Page - Abbreviated Template

Institution Submitting Request:	**College of Nursing**
Proposed Effective Date[1]:	**07/01/2019**
Institutional Board of Trustees' Approval Date:	
Proposed Unit Title:	**Center of Excellence for Exposure Health Informatics**
Sponsoring School, College, or Division:	**College of Nursing**
Sponsoring Academic Department(s) or Unit(s):	**College of Nursing**

Proposed Unit Type:

☐	New Administrative Unit
☐	New Center
☐	New Institute
☐	New Bureau
☒	Conditional Three-Year Approval for New Center, Institute, or Bureau

Chief Academic Officer (or Designee) Signature:
I, the Chief Academic Officer or Designee, certify that all required institutional approvals have been obtained prior to submitting this request to the Office of the Commissioner.

Date: May 31, 2019

☐ I understand that checking this box constitutes my legal signature.

[1] "Proposed Effective Date" refers to date after Regent approval when new unit is operational or change to unit is published.

New Unit Description - Abbreviated Template

Section I: The Request

College of Nursing requests approval to establish the Center of Excellence for Exposure Health Informatics effective 07/01/2019. This action was approved by the institutional Board of Trustees on _____

Section II: Program Proposal

Administrative Unit Description/Rationale

Present a brief description of the unit. Describe the institutional procedures used to arrive at the action being proposed. Briefly Indicate why a new administrative unit or change to the unit is justified. Are similar units offered elsewhere in the USHE or the State? State how the institution and the USHE benefit from the proposed unit or unit change.

Description of the unit.

The College of Nursing requests formation of a new Center of Excellence for Exposure Health Informatics (CEEHI). This will be a multi-disciplinary center, co-led by Nursing Informatics and Biomedical Informatics faculty and their collaborators. The CEEHI mission is to foster and facilitate the next generation of exposure health research through use and development of novel informatics methods and solutions.

The proposal is sponsored by the College of Nursing; it was developed in collaboration with the School of Medicine Department of Biomedical Informatics, collaborating faculty, and in consultation with the School of Medicine Research Unit.

Faculty Vote:

The College Council of the College of Nursing met on April 26, 2019 and voted unanimously to approve the proposal.

Justification

There is increasingly persuasive evidence that health and wellness are the result of a complex interactive process between the cumulative effects of multiple environmental exposures (chemical, physical [air, noise, etc.], biological, social, and psychological), lifestyle and behavior, health care, and genetic susceptibility. These factors influence health throughout the life course, in positive (health) or negative (illness) ways. Federal and global initiatives including the Healthy People 2020 agenda define *environment* as a holistic term encompassing all types of exposures. Pharmacologic substances are important health exposures, and the team's expertise includes informatics methods to support information exchange between poison centers and emergency departments. The term Exposure Health recognizes the full scope of environmental exposures and behaviors that may impact health and wellness. Much like the genome represents a person's entire set of genes, the *exposome* represents all the exposures of a person in a lifetime and how those exposures related to health. Informatics methods to understand and use the rich and vast data sets for exposure health research are beginning to emerge, but many are early in development making this a highly innovative area of science.

Exposure Health Informatics (environmental health informatics) is the application of biomedical informatics (BMI) science and methods to provide insight into the complex interaction between environmental exposures and other factors, and their short- and long-term consequences on human health. The University of Utah has a growing body of researchers investigating environmental issues, and cross-department collaborations are increasingly needed to examine how environment and lifestyle influence health outcomes. The CEEHI occupies a unique niche in providing novel informatics methods and solutions to support exposure health research.

Background – PRISMS Informatics

The NIH Pediatric Research using Integrated Sensor Monitoring Systems (PRISMS) program (http://www.nibib.nih.gov/research-funding/prisms) was launched in 2015 to develop sensor-based, integrated health monitoring systems for measuring environmental, physiological, and behavioral factors in epidemiological studies of pediatric asthma and other chronic diseases. The University of Utah was funded by NIH/NIBIB to develop an informatics ecosystem under this initiative (1U54EB021973, $5.5 million). The University of Utah PRISMS informatics ecosystem is a *Federated Integration Platform*; an infrastructure that is helping researchers to bring together diverse data in flexible ways as needed for environmental health studies. This ecosystem facilitates sensor deployment and performance of sensor-based studies, and the integration, processing, visualization, and secure transmission of study data. The goal is to provide an effective, flexible and open access approach to collecting, managing and analyzing high-resolution data from sensors, generating and utilizing clinically relevant exposomes (exposure measurements); and integrating these exposomes with clinical, self-report, behavioral, and other research data. The PRISMS informatics ecosystem provides key infrastructure that can accommodate diverse types of future studies that include exposure monitoring.

Progress to date in PRISMS included developing a home sensor networking system (simplifying data capture from multiple devices in a participant home), participant data visualization and annotation platforms, research study data management interfaces, computational modeling frameworks, and the core data integration platform. A pilot project in a small number of homes collected a unique longitudinal data set with more than 10 million home air quality sensor readings; that data set is being used to explore and develop novel data analytic methods for environmental research.

Rationale for Creating the Center of Excellence for Exposure Health Informatics:

The Utah PRISMS informatics ecosystem is the result of a unique collaboration and high levels of synergy between interdisciplinary investigators across campus: including health sciences (College of Nursing, Department of Biomedical Informatics, Department of Pediatrics, as well as Pulmonary Medicine and the College of Pharmacy) and main campus (Atmospheric Sciences, Chemical Engineering, Mechanical Engineering, Electrical and Computer Engineering, SCI Institute, Math), as well as a former student who is now collaborating faculty at BYU (Electrical Engineering). The creation of the CEEHI will allow faculty to continue collaborations investigating the effects of the environment on health, and extend collaboration to additional investigators and students, serving as the focal point for an expanding portfolio of research and training activities. Through these collaborative efforts, the center will continue the investigation and development of state-of-the-art informatics methods for exposure/environmental health research.

Biomedical Informatics (BMI) is the overarching field of science for how to use data, information and knowledge to improve human health and healthcare services. Because of that broad scope, informatics practice includes domain or topic specific subsets representing practice foci. The University of Utah is home to the first BMI graduate training program in the world, and to the second oldest nursing informatics graduate program. Now, the University of Utah is poised to become a leader in *exposure health informatics*. The CEEHI will serve as a go-to center for researchers interested in conducting sensor-based, mobile, and virtual studies that include measurements of the environment, physiology, and behavior, by providing expertise, guidance, infrastructure and other resources to the University research community and external groups.

The US Air Force (USAF) Total Exposure Health Program (http://www.totalexposurehealth.com/) has expressed interest in collaboration, including possible funding, to continue the activities of our multidisciplinary group of researchers interested in air quality, noise and other environmental influences on health. Collaboration with the USAF Total Exposure Health Program would require a designated center to coordinate efforts, making the creation of CEEHI a relative high priority for

participating faculty. In addition, the CEEHI will provide a venue to coordinate submission of a broad range extramural proposals, including large (P-type) and R grants, creating a robust infrastructure that will enable and support high resolution (big data) health exposure research at the University of Utah.

Uniqueness of this Center

The proposed Center of Excellence for Exposure Health Informatics (CEEHI) will be a unique offering. Nationally, programs at Columbia University and Harvard have a few similar services, but do not offer the same scope of informatics innovations. Somewhat similar yet also distinctly different endeavors nationally include SmartHome initiatives supported by the University of Missouri, the Mobile Data to Knowledge (MD2K) mobile health platform (behavioral scientists at the U of U collaborated with the MD2K program to evaluate mHealth enabled smoking cessation programs), and the parallel PRISMS informatics platform being developed by UCLA. Within the state, the Utah Department of Environmental Quality (DEQ) focus is mostly on the physical environment (air, water, etc.) and regulatory controls. Domain experts from the division of air quality (DAQ, https://deq.utah.gov/division-air-quality) helped inform the design of the PRISMS informatics ecosystem.

There are centers and activities within USHE that are synergetic with, but clearly distinct from, the CEEHI. Included among those are:

- There was recently approved a new Utah Center for Data Science (UCDS). BMI faculty are collaborators on the UCDS. The UCDS focuses on data after it has been acquired and integrated, with attention to computational approaches for analysis ("big data analytics"), NLP, and statistics. The CEEHI core strengths include working with and meeting the needs of researchers and participants, managing the semantic complexities of biomedical research data, and information exchange related to health data. We have expertise in study conduct, data quality evaluation, and data integration. There is obvious potential for synergy between UCDS and CEEHI.
- Center for Extreme Data Management and Visualization http://cedmav.org/ in the school of computing, focused on scalability issues in diverse domains including geospatial information systems and climate modeling
- Global Change and Sustainability Center https://environment.utah.edu/ focus is interdisciplinary research and training on natural and human-built systems, the interactions in those systems, and the role of humans in the environment; but is more focused on basic science initiatives and lacks a strong health or informatics aspect
- Interdisciplinary Exchange for Utah Science (NEXUS) https://nexus.utah.edu/about.php broadly supports interprofessional research across campus to address "grand challenges" including environmental research and sustainability; and provides access to regulated resources such as the Utah Population Database and the All Payer Claims Database. A goal of NEXUS is to facilitate collaboration between centers with related interests. The CEEHI will collaborate with the NEXUS group as appropriate to support studies.

Potential Benefits from the proposed CEEHI

The official center designation will increase visibility of the strengths of Utah's informatics efforts related to environmental health studies within the university and outside of it. We also except this more dedicated and organized focus to lead a continued growth in Exposure Health Informatics with respect to funding, educational output, and community engagement.

In addition to the interest from the US Air Force Total Exposure Health program (described above), we have identified several potentially relevant extramural funding announcements such as a call from NIH/NIEHS: RFA-ES-18-009 (https://grants.nih.gov/grants/guide/rfa-files/rfa-es-18-

009.html) – funding for research infrastructure to improve scientific activities, support maintenance of existing environmental epidemiology cohorts, and facilitate data and resource sharing in environmental health studies ("infrastructure needed to prepare for future [environmental health] research opportunities"). While the founding investigators of CEEHI could individually submit proposals for opportunities like these, the establishment of a formal Center will greatly enhance the funding likelihood by demonstrating institutional commitment to the activity.

In addition, a number of investigators and collaborations have ongoing or pending studies and expressed an urgent need for, and interest in, informatics support for exposure/environmental health research. A few examples follow:

- The Program for Air Quality, Health, and Society http://www.airquality.utah.edu/ housed in the School of Medicine Pulmonary Department, provided the initial seed grant funding that ultimately led to the NIH/NIBIB PRISMS grant. This program continues to recognize the need for informatics and study data management support to facilitate ongoing and emerging clinically relevant studies into the effects of the environment on health.

- PRISMS co-investigators (Dr. Nkoy and Dr. Stone) have an extensive and ongoing program of asthma research and would like to augment their studies with air quality and physiologic sensors. Dr. Reilly in the College of Pharmacy, another collaborator, is investigating gene-environment(-drug) interactions in asthma and has a strong interest in adding home or wearable air quality sensors to enrich his studies.

- Environmental Influences on Child Health Outcomes (ECHO, Stanford PI) is a long term longitudinal study examining multiple environmental factors. Deployments of air quality sensors in the ECHO cohort were important pilot projects in development of the PRISMS Informatics ecosystem, and are have expressed a strong desire for ongoing use and enhancements of the ecosystem.

- The atmospheric science collogues are organizing the 2019 Workshop and proposed NSF/NOAA 2021/2022 field program: AQUARIUS (Air QUAlity Research In the western US) to investigate wintertime PM in mountain basins in the western US.

Consistency with Institutional Mission/Institutional Impact

Explain how the unit is consistent with the institution's Regents-approved mission, roles, and goals. Describe how the existing administrative structures support the proposed unit and identify new organizational structures that may be needed. What changes in faculty and staff will be required?

The Center of Excellence for Exposure Health Informatics will provide important organizational support and credentials to Utah's efforts in research, education, and outreach in the informatics methods necessary to study environmental effects on human health. Members of the Center have established the CEEHI.ccts.utah.edu web domain, and will continue to expand its contents. Most of the activities needed to initiate this center are already taking place under faculty member normal duties, and no additional faculty or staff are required at present.

Educational Relevance

As per University policy the Center will not develop curriculum or offer classes, but faculty members of the Center will work with their respective curriculum committees and collaboratively, to enhance educational offering in Environmental/Exposure Health Informatics. CEEHI faculty may provide expertise or resources (e.g., research practicum experiences) to other educational programs.

Administrative Structures

The CEEHI is sponsored by the College of Nursing, but the goal is to continue and increase the multidisciplinary focus initiated with the current PRISMS Informatics grant. The CEEHI is the result of a joint effort between the College of Nursing and the Department of Biomedical Informatics; and the College of Nursing will work in close coordination with the BMI faculty for center leadership. Our goal is to ensure that the CEEHI infrastructure could be made available to Utah clinical and translational researchers who incorporate environmental factors in health-related research.

The center will have a Director and Co-Direcor who head the center. There will also be Associate Directors for Research (in charge of coordinating seminars and forming subgroups to support development of new proposals), Outreach (coordinating joint efforts to outreach to additional members of the research community that can benefit from the know-how and infrastructure available) and Student Involvement. Each director and associate director will be elected by the center faculty and appointed to one-year terms. They can be reappointed an indefinite number of times.

Initial founding members for the center include:

Assistant Professor Scott Collingwood (Pediatrics)
Professor Mollie Cummins, (College of Nursing)
Professor Julio C. Facelli (Biomedical Informatics)
Assistant Professor Ram Gouripeddi (Biomedical Informatics)
Professor John Horel (Atmospheric Sciences)
Professor Sneha Kasera (Computer Science)
Assistant Professor Kerry Kelly (Chemical Engineering)
Associate Professor Hanseup Kim (Elect & Computer Engineering)
Professor Flory Nkoy (Pediatrics)
Assistant Professor Cheryl Pirozzi (Internal Medicine)
Professor Christopher Reilly (College of Pharmacy)
Professor Catherine Staes (College of Nursing)
Associate Professor Katherine Sward (College of Nursing)
Assistant Professor Phil Lundrigan (Electrical Engineering, BYU)

Finances

What costs or savings are anticipated with the actions proposed? What new facilities or modifications to existing facilities or equipment are needed? Describe any budgetary impact on other programs or units within the institution. If new funds are required, describe expected sources of funds.

The CEECHI will receive initial support from the Department of Biomedical Informatics, College of Nursing, and School of Medicine. Each have promised seed funding of $2,000, for a total of $6,000; and the College of Nursing will provide a part time Research Assistant for center start up. The administrative staff at the College of Nursing will provide support associated with budgets, pre- and post-award support for grant submissions, and other administrative needs. The BMI department will provide technical services including support for the center website. Offices for center principals are located in DBMI; the CEEHI is a virtual center that does not

need a physical presence, as are many of the modern informatics enterprises. There is no need, at least initially, for additional faculty or staff. The intent of the seed funding is to provide initial support for operational costs and other organizational events like invited speakers, public lectures, etc.

The Utah CEEHI will solicit activity-specific support from local industry and other civil organizations interested in environmental health research. Of note is that all center members have a substantial and sustained record of extramural funding. Members will be assisted to include support within external funding proposals that explicitly contributes to the center's budget. Members will also be guided to include funds for pre and post award services provided by the College of Nursing (or other department submitting the funding proposal). These funds will contribute to technical and administrative staff and services to further help amplify the center's impact. Multi-department awards will be apportioned to participating units according to their level of participation as per University agreements (e.g. through companion accounts).

Letters of Support

Letters of Support, including those pledging the specific above financial and space support, are attached from:

Michael Good, SVP Health Sciences
Barbara Wilson, Dean College of Nursing
Will Dere, Associate VP for Research HSC
Richard Brown, Dean College of Engineering
Randall Peterson, Dean College of Pharmacy
Darryl Butt, Dean College of Mines and Earth Sciences
David Bjorkman, Chair Department of Internal Medicine
Angelo Giardino, Chair Department of Pediatrics
Wendy Chapman, Chair Department of Biomedical Informatics
Karen Wilcox, Chair Department of Pharmacology and Toxicology
Milind Deo, Chair, Department of Chemical Engineering
Florian Solzbacher, Chair Department of Electrical and Computer Engineering
Ross Whitaker, Director School of Computing
Robert Paine, Chief Division of Respiratory, Critical Care and Occupational Pulmonary Medicine
Aaron Hawkins, Chair Department of Electrical and Computer Engineering, BYU