The PIIR in Data Driven Science is preparing to enter its second year. This announcement contains all the information necessary to participate in this year’s competition. Rules and Guidelines are mostly unchanged from last year, with exception of deadlines as listed in Section 4, and the relationship to the NSF-funded Midwest Big Data Hub (see Section 5).

1. Introduction and Goals

As a land grant institution, Iowa State University’s research mission advances the economy of Iowa and serves its citizens; addresses grand challenges by advancing knowledge, technology, and human potential; and educates students through creative scholarship and new discoveries.

The Presidential Initiative for Interdisciplinary Research (PIIR) was established to support this mission by proactively investing in initiatives that promote a culture of interdisciplinary research, help secure new large-scale research grants and contracts, and build the university’s reputation for innovation. To date, the initiative has significantly enhanced the research enterprise by establishing new large-scale research collaborations across campus and with other universities, federal agencies, and industry partners.

To prepare Iowa State University for becoming a leader in Big Data, the Presidential Initiative for Interdisciplinary Research (PIIR) is being extended to support the advancement of Data Driven Science on campus. Data Driven Science has evolved as a transformative paradigm that encompasses research and decision making approaches for extracting knowledge from large complex data sets, often from a variety of sources. The importance of such approaches for an increasing number of scientific and humanistic endeavors cannot be overstated. Understanding data collection and unveiling structures in large and high-dimensional data sets will become as common in research projects as regression analysis and microscopy are today.

Data Driven Science as an approach to scientific discovery and decision-making includes:

- **application areas (or content domains)** that increasingly include important aspects of basically all sciences and business, as well as many areas of the humanities and design disciplines;

- **data science**, the interdisciplinary field that is emerging as the common core of the different Big Data concepts, which includes topics that relate to the nature of data (understanding its collection and structure), methodologies for processing and analyzing data (computation and databases, modeling and analyses, visualization and information presentation), and understanding the ethical, legal and social impacts of Big Data (privacy and security, policy, ethics); much of these core areas are included the STEM disciplines of statistics, data base and software systems, ISME, mathematics, computer and software engineering, and mobile applications; and the areas of ethics, privacy issues, and policy implications from the humanities and social sciences; and

- **education and outreach** efforts as integrated components.
The PIIR for Data Driven Science (PIIR DDS) recognizes that federal agencies are aggressively funding ground-breaking interdisciplinary research with meaningful integration of application domains and data science, including an explicit focus on ethical, legal and social impacts (ELSI) to society. To incentivize the development of such integrated research collaborations on campus, the VPR office is creating a seed program that funds interdisciplinary research groups over 3 years at $100 – 200K per year per group.

Because research groups in data driven science are just forming at ISU, the funding focus will be on research that sets the stage for the team to credibly apply for grants. Teams will be required to target and apply for moderate to large funding opportunities, with the long-term expectation of growing into mature research groups that will be capable of pursing large-scale inter-institutional funding portfolios. Mentorship and team development programs will be provided to maximize the success of these teams.

2. Expectations

- Each team will have a lead faculty investigator and a core group of four or more faculty and staff members working together in the interdisciplinary area of Data Driven Science (DDS). Proposals from teams of investigators are expected so that different dimensions of DDS can be approached within each project. Specifically, teams are required to have at least one faculty investigator in each of these components: application domain, core data science methodologies, and ELSI, if applicable. The lead investigator should be a full or associate professor at Iowa State, and the team should include participants from multiple academic units on campus.

- Teams are expected to define an integrated interdisciplinary research effort distinguished by intellectual excellence and driven by a clear vision of fundamental advances, new discoveries, or technological developments having state, national, and global economic and societal impact. Further, the area of scholarship should likely be such that more than one agency may support the work.

- Substantial parts of the PIIR DDS funding may be used for research purposes to allow groups to mature in their understanding of Big Data as a scientific paradigm. It is expected that teams will use at least 25% of the funding for identification and development of funding opportunities, and for community building and visibility outside of Iowa State.

- Teams are asked to identify potential sponsors and to submit at least one joint proposal each in their second and third year.

3. Financials

PIIR DDS funding is planned to be allocated at an annual level of $100,000 – 200,000 per team over a 3-year period, with funds to be partially supported by cost sharing with colleges. It is expected that up to three teams will receive funding at this level starting in FY17, subject to the availability of funds. Additional groups of three teams are planned for FY18.

The intention of these internal grants is to identify areas of core competency in DDS at the university and to forge collaborations that develop a first-rate scientific reputation and that can compete in top-level external funding programs.

Appropriate uses of PIIR DDS funding include academic year teaching release, hiring of graduate students and postdocs, travel, hiring of consultants to add value to the team, and development of strong, meaningful
and lasting connections with partner institutions, funding agencies and industry through workshops. Equipment can be funded in exceptional situations. Funds may not be used to support summer salaries.

4. Proposal Process and Timeline

Proposals for PIIR DDS funds will be submitted to the Office of the Vice President for Research (VPR) through a two-step process that involves an initial white paper and a full proposal by invitation only. The timeline for the process is as follows:

- March 21, 2016 White papers due
- April 11, 2016 Invitation for full proposals distributed
- May 22, 2016 Full proposals due
- June 15, 2016 Final decisions announced

The portion of the white paper that describes the proposal is limited to three single-sided pages, with one-inch margins on all sides, and typed in 11-point (or greater) Calibri or Times New Roman font. Each white paper should include the following:

- A title page that lists the proposal title and the senior participating investigators, along with their organizational or departmental affiliation
- A white paper of up to three pages that articulates the proposed vision and activities of the team:
  - Rationale and vision for the proposed research, describing the scale of your effort, and highlighting its innovative and transformational nature
  - A concise description of the long-term research goals, which highlights the need for an interdisciplinary approach involving multiple investigators, and the means for achieving success
  - Meaningful descriptions of how ELSI research is an integrated component of the vision and project (or justification for why ELSI is not an important component of the project)
  - An outline of the planned research
  - Role of each investigator in the research project
  - Plans for intellectual exchange with partner researchers and institutions, industry, national laboratories and other organizations
  - List of funding agencies and programs, companies and others that will be targeted for external funding proposals.
- Additional materials beyond title page and white paper:
  - One-page budget
  - One-page budget justification, including documentation of 10% cost-share by college(s)

The white papers must be electronically submitted as a single PDF attachment to an email sent to Sue Shipitalo at sueship@iastate.edu by 5:00 PM on March 21, 2016.

Questions on the initiative should be directed to Wolfgang Kliemann at kliemann@iastate.edu.
5. Review Criteria and Selection Process

The selection process will be led by a multidisciplinary team assembled by the Office of the Vice President for Research, with representatives from all colleges. Subject matter experts drawn from academia, government laboratories and industry may also review the full proposals and assist the committee in the selection process. The review form criteria are:

VISION AND MOTIVATION. The research rationale and vision articulates an innovative and transformative DDS approach that will lead to fundamental advances, new discoveries, and/or technological developments that could have societal impacts.

ELSI INTEGRATION. The vision and plan effectively integrate research into relevant ethical, legal and societal impacts of the proposed research vision. If a limited ELSI component is expressed, it is well justified.

CONTRIBUTIONS TO DATA DRIVEN SCIENCE. The research vision makes substantive contributions to data science and its applications. The proposed research may fit well with the spoke priorities of the Midwest Big Data Hub\(^1\) (preference).

RESEARCH FUNDING PLAN. The plans for developing a sustained external research funding portfolio are effective and ambitious.

TEAM DEVELOPMENT. The plans for forming a strong and sustained research team represent an effective and realistic approach. The potential synergies of the team and its plans are clear and well articulated. The qualifications and collaborative track record of the investigators will support the vision.

EXTENDING IOWA STATE UNIVERSITY’S RESEARCH IMPACT. The interdisciplinary research effort adds new transformative value to the DDS community at Iowa State University. The research vision anticipates future opportunities for connections with ISU’s education, outreach and engagement mission.

\(^1\) Areas identified as ‘spokes’ by the Midwest Big Data Hub (http://midwestbigdatahub.org) include:
- Food-Water-Energy
- Health Sciences, Life Sciences, Bioinformatics, and Genomics
- Smart Cities and Communities
- Digital Agriculture (precision farming, sustainability, ...)
- Advanced Manufacturing
- Network Science
- Transportation
- Business Analytics
- Tools and Services