



NATIONAL SCIENCE FOUNDATION  
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**NSF 19-051**

## **Dear Colleague Letter: Supporting Research at the Intersection of Agricultural Science, Big Data, Informatics, and Smart Communities, a joint effort between the National Science Foundation (NSF) and the U.S. Department of Agriculture's National Institute of Food and Agriculture (USDA/NIFA)**

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March 21, 2019

Dear Colleagues:

Building on NSF's history of investments in data and computational sciences and USDA/NIFA's history of investments in agricultural science, NSF and USDA/NIFA wish to notify the community of our intention to jointly fund convergent research that combines methods in agricultural, biological, and computer and information science and engineering to address pressing challenges and opportunities in digital agriculture. This Dear Colleague Letter (DCL) is aligned with NSF's Harnessing the Data Revolution Big Idea, and aims to build capacity across disciplinary boundaries, in preparation for larger scale investments at the intersection of computational, agricultural, and biological sciences.

Motivated by the increasing volumes of data, faster computation, and algorithmic advances, there is an opportunity to apply transformative, data-driven research methods to the agriculture sector that are responsive to and will yield meaningful insights for farmers, other stakeholders, and society at large. Of interest for this DCL are applications focused on economically important plants, animals, and their environments—in particular food, fuel, feed, and health—and where research outcomes in a particular application area may be transferable to, or informative for, other agricultural application areas. Relevant stakeholders can be integrated into the proposed research activities, including as partners in the project, if appropriate for the project.

Specific topics of interest include, but are not limited to, the following:

- Methods for analyzing existing, large datasets, such as artificial intelligence, machine learning, and computer vision, for example, leveraging environmental, imaging, and

genomic data;

- Models for genetic x environment x management x socioeconomic interactions (G x E x M x S) in order to predict livestock, aquaculture, and plant phenotypic outcomes and sustainability—such as yield, survivability, resistance to environmental stressors, pest resistance, drought resistance, and nutritional value;
- Data storage, management, and integration across a range of data types to enable a systems – level approach, including integration of big data in real-time systems;
- Wired and wireless networking challenges in rural settings, including computation at the edge;
- Security, privacy, and management for access and sharing of farm and community data; and
- Learning science innovations, which may include development of computational skills for biological and agricultural science majors, and communities of agricultural practice for a diverse and innovative future workforce.

Principal Investigators may also consider the design of instructional materials or workforce development pathways, combining computational and agricultural expertise, in the broader impacts of proposals. The intention is to encourage students in biological, agricultural and engineering programs in two- or four-year colleges and universities, across all education levels, to acquire data and/or computational science skills and, vice versa, to expose students in data and/or computational science to agricultural challenges. Additionally, activities could aim to improve retention and capabilities of a region's agricultural workforce.

Proposals pursuant to this DCL may be submitted to one of the three programs listed below:

- [Cyber-Physical Systems \(CPS\)](#) program;
- [Information and Intelligent Systems \(IIS\): Core Programs](#) — Information Integration and Informatics (III) program; and
- [Smart and Connected Communities \(S&CC\)](#) program.

Proposals must follow the guidance contained in NSF's [Proposal and Award Policies and Procedures Guide \(PAPPG\)](#), the corresponding solicitation and that is described here. All proposals pursuant to this DCL must include the prefix "DATAg:" following the title prefixes required in each solicitation, where appropriate.

Additionally, researchers are encouraged to leverage existing agriculture data sets. Data and code resulting from funded work is expected to be adequately characterized, readily accessible and usable, and stored in a safe environment with adequate measures taken for long-term preservation in specific repositories and catalogs, as appropriate, as well as with consideration for protection of confidentiality, personal privacy, and proprietary interests.

For more information, including questions about this DCL, please contact:

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Sincerely,

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