



**NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230**

NSF 15-093

Dear Colleague Letter: Unsolicited Proposals for Quantitative Approaches to Biomedical Big Data (QuBBD)

July 6, 2015

Dear Colleagues:

The explosion in the availability of health- and disease-related data from biological, biomedical, behavioral, social, environmental, and clinical studies is creating new opportunities for collaborative research. Innovative methodology for visualization, modeling, and analysis of biomedical big data is imperative to address the challenges posed by complex data structures such as images, networks, and graphs, missing and sparse data, and complex dependence structures and interaction effects.

One of the critical application areas at the interface of the biomedical and data sciences is precision (or personalized) medicine. The goal of precision medicine is to develop a targeted treatment (or prevention) regimen that takes into account unique characteristics of an individual such as genetic makeup, environmental factors, and lifestyle. Achieving the goal of precision medicine will require combining data across multiple formats and developing novel, sophisticated mathematical, statistical, and computational methods that facilitate high-confidence predictions for individuals.

These challenges will require inter- and cross-disciplinary teams that include mathematicians, statisticians, and biomedical researchers and engineers to develop models, methods, and approaches that can lead to new insights and lay the groundwork for future advances in precision medicine.

Through this Dear Colleague Letter (DCL), NSF's Division of Mathematical Sciences (DMS), Directorate for Mathematical and Physical Sciences, aims to foster inter- and multi-disciplinary, exploratory collaborations by encouraging the submission of unsolicited proposals for small one-year planning grants (typically less than \$100,000 in total costs per grant). We encourage collaborative proposals from new teams of researchers, representing the quantitative / computational sciences and the biomedical sciences, pursuing novel approaches to data challenges in precision medicine. These collaborations, cutting across multiple disciplines, have the potential to lead to new research directions and contribute to the enhancement of the mathematical sciences infrastructure.

Proposals should address how this new collaboration will address a biomedical challenge and describe the use of large-scale publicly available biomedical datasets to illustrate the proposed models and methodology. Data science topics of interest in this context include, but are not limited to, network analysis, causal analysis, and machine learning.

The National Institutes of Health (NIH), through the Big Data to Knowledge (BD2K) Initiative, will be participating in this effort and plans to jointly sponsor these grants to plan *new* collaborations at the intersection of the quantitative/computational and biomedical sciences. The planning grants are intended to stimulate and facilitate collaborations that may lead to the development of full submissions to the

funding agencies. Proposals submitted in response to this DCL will be reviewed by the Division of Mathematical Sciences.

SUBMISSION PROCESS

Unsolicited proposals in response to this Dear Colleague Letter must meet the requirements of NSF's Grant Proposal Guide and should be submitted to the DMS Infrastructure Program by August 6, 2015. For information about the DMS Infrastructure Program, please see https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=12756&org=DMS. The project title should start with the identifier "QuBBD:" and total budget requests for the one-year planning grants should not exceed \$100,000.

For more information or questions, please contact DMS Program Officer Nandini Kannan at nakannan@nsf.gov or (703) 292-8104.

Sincerely,

Michael Vogelius
Division Director
Division of Mathematical Sciences