IDEA EXCHANGE MEETING
NSF National Research Traineeship (NRT) program

Key Ideas from Program Synopsis (http://www.nsf.gov/pubs/2015/nsf15542/nsf15542.htm)

- NRT Program is designed to encourage the development and implementation of bold, new, potentially transformative, and scalable models for STEM graduate education training.
- The program seeks proposals that ensure that graduate students in research-based master's and doctoral degree programs develop the skills, knowledge, and competencies needed to pursue a range of STEM careers.
- Over time, NSF wants to see development of a literature base to guide graduate education. For now, NSF requires assessment and feedback and is supporting experiments that can contribute to the literature.

Tracks – Traineeship and Innovations in Graduate Education (IGE)
Proposals in 2015/16 are solicited for two tracks:

Traineeship Track: Support for graduate training programs - Up to two proposals per cycle

- focused on effective training of STEM graduate students in high priority interdisciplinary research areas, through the use of a comprehensive, innovative traineeship model that is evidence-based, aligned with changing workforce and research needs, and scalable.
- open to proposals around any interdisciplinary research theme; if submitting two, at least one must address this year's priority theme of Data Enabled Science and Engineering (DESE).

IGE Track: Support for testing of novel approaches - One proposal per cycle

- dedicated solely to piloting, testing, and evaluating novel, innovative, and potentially transformative approaches to graduate education, both disciplinary and interdisciplinary, to generate the knowledge required for their customization, implementation, and broader adoption.

Whereas the Traineeship Track promotes building on the current knowledge base to more effectively train STEM graduate students, the IGE Track supports test-bed projects with high potential to enrich, improve, and extend the knowledge base with attention to transferability and innovation. For both tracks, strategic collaborations with the private sector, non-governmental organizations (NGOs), government agencies, national laboratories, field stations, teaching and learning centers, museums, and academic partners are encouraged.

Award Information

- Ten NRT Traineeship track awards anticipated (5 year duration), up to $3M each.
- Fourteen to twenty NRT IGE track awards anticipated (2-3 year duration) for up to $300,000 each.

Limit on proposals submitted per organization: Up to 3

- Up to two on the Traineeship track: one on any national priority interdisciplinary theme, and one on the DESE research theme.
- One proposal can be submitted for the IGE track.

Due dates and proposal windows: Two submission windows are available in 2015- 2016
- Letters of Intent Due Dates: March 25, 2015 and December 22, 2015
- Full proposal Due Dates: May 6, 2015 and February 22, 2016

More on the two tracks and research themes:
Traineeship Track
    Key Features
1. Development of innovative and potentially transformative approaches to STEM graduate education, informed by evidence.
2. Extension of individual NRT program elements to non-NRT trainees to benefit a larger population of STEM graduate students across an institution.
3. Dissemination of outcomes and gained insights from NRT training approaches.
4. Facilitation and advancement of potentially transformative interdisciplinary research in areas of high priority to the nation.
5. Comprehensive training of STEM graduate students, including the development of technical and professional skills for both research and research-related careers within and outside academia.
6. Evidence-based strategies to broaden participation of students from diverse backgrounds.
7. Robust formative assessment that is central to the traineeship and routinely informs and improves practice.

Research themes for the Traineeship track
For both DESE and non-DESE proposals on the Traineeship track, proposals should describe the integration of training and research elements and the need for bold and innovative approaches to train graduate students in the targeted thematic area.

a) Data-Enabled Science and Engineering (DESE)
Across all areas of science and engineering, challenging computational problems and data of massive scale and complexity are being generated through experimental methods, observational studies, scientific instruments, administrative records, and computational simulations, leading to a growing need for new interdisciplinary advances in mathematical, computational, and statistical algorithms, prediction techniques, and modeling methodologies, as well as new approaches to data collection, data analysis and visualization, data integration and interoperability, and data stewardship. At the same time, computational models, methods, and algorithms, in the form of rich new software and computing systems, are playing a critical role in the solution of complex computational and data-based problems spanning the science and engineering communities. In light of these advances, NSF recognizes the need to address fundamental challenges advancing computational and *data-enabled science and engineering*, including educating and supporting a next generation of researchers in this space.

Of particular interest for this priority theme are focused interdisciplinary efforts that include, but are not limited to, the following:
- Partnerships between computational and mathematical sciences as well as all science and engineering domains supported by NSF, driving forward interdisciplinary research by effectively managing, using, and exploiting heterogeneous data sources and models to

enable advances in these domains through advances in model-based analysis, data storage and management, analytics, and visualization.

- Foundational and applied research on a variety of tools essential for advanced scientific and engineering discovery and technological innovation in collaboration with the domain sciences. Such tools could include computational models and the underlying computer science, mathematical, and statistical theory and methodology; novel algorithmic techniques; and effective utilization and optimization of computing and communications resources.
- Research and development of novel end-to-end science-driven scenarios that integrate and leverage major cyberinfrastructure investments including high-end supercomputers, cloud environments, real-time and remote visualization, provisionable networks, distributed data archives, and software frameworks.
- Integration of educational and training opportunities with major facilities and infrastructure investments in multiple STEM domains, such as:
  - Ongoing NSF Major Multi-User Research Facilities or other large-scale efforts such as the iPlant Collaborative, Engineering Research Centers (and other center-scale efforts), EarthCube, the Network for Computational Nanotechnology, the Panel Study of Income Dynamics (PSID), etc.; and/or
  - Cyberinfrastructure-related facilities that are managed by NSF, by other US federal or state agencies, or by international consortia, including Blue Waters and Stampede, XSEDE, Open Science Grid, the Global Environment for Network Innovations (GENI), NSFCloud, and International Research Network Connection (IRNC) sites.

In keeping with the broader goals of the NRT program, proposals responsive to this priority theme should demonstrate significant impact on new curricula and career-focused training approaches for data-enabled science and engineering.

DESE proposals must clearly articulate an overarching interdisciplinary research theme and how the emphasis on computational and data-enabled science and engineering, including the methods and theories of computational and data science, will foster high-return, interdisciplinary synergies.

b) Other crosscutting, interdisciplinary theme
A theme other than DESE should align with NSF or other national STEM research priority areas and have high potential for development of novel, innovative practices in graduate education. Proposers should describe the importance of the NRT project's thematic focus to the nation and the particular need to train students for a variety of careers in that thematic area, whether within or outside academia.

Innovations in Graduate Education (IGE) Track
Goals of the IGE Track are to
- Catalyze rapid advances in STEM graduate education broadly as well as those responsive to the needs of particular disciplinary and interdisciplinary STEM fields, and

- Generate the knowledge base needed to inform model implementation, adaptability, and scalability.

The IGE Track calls for proposals to

- Design, pilot and test new, innovative and transformative approaches to STEM graduate education,
- Examine the potential to extend a successful approach developed in one discipline or context to other disciplines, or transfer an evidence-based approach to a new context, and
- Develop test-bed projects that are informed by learning science and the body of knowledge about STEM graduate education.

Leadership teams (PI/Co-PIs) comprising professional expertise in the learning sciences and pedagogy, as well as in the principal science domain(s), are strongly encouraged.