



Welcome to...

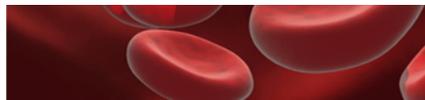


# Key NSF Funding Opportunities for Maker Education/SBIR/STTR Projects R&D

Oct. 2016 Webinar



EHR-CORE • AISL • DRK-12 • ITEST  
STEM+C • Cyberlearning • DCL





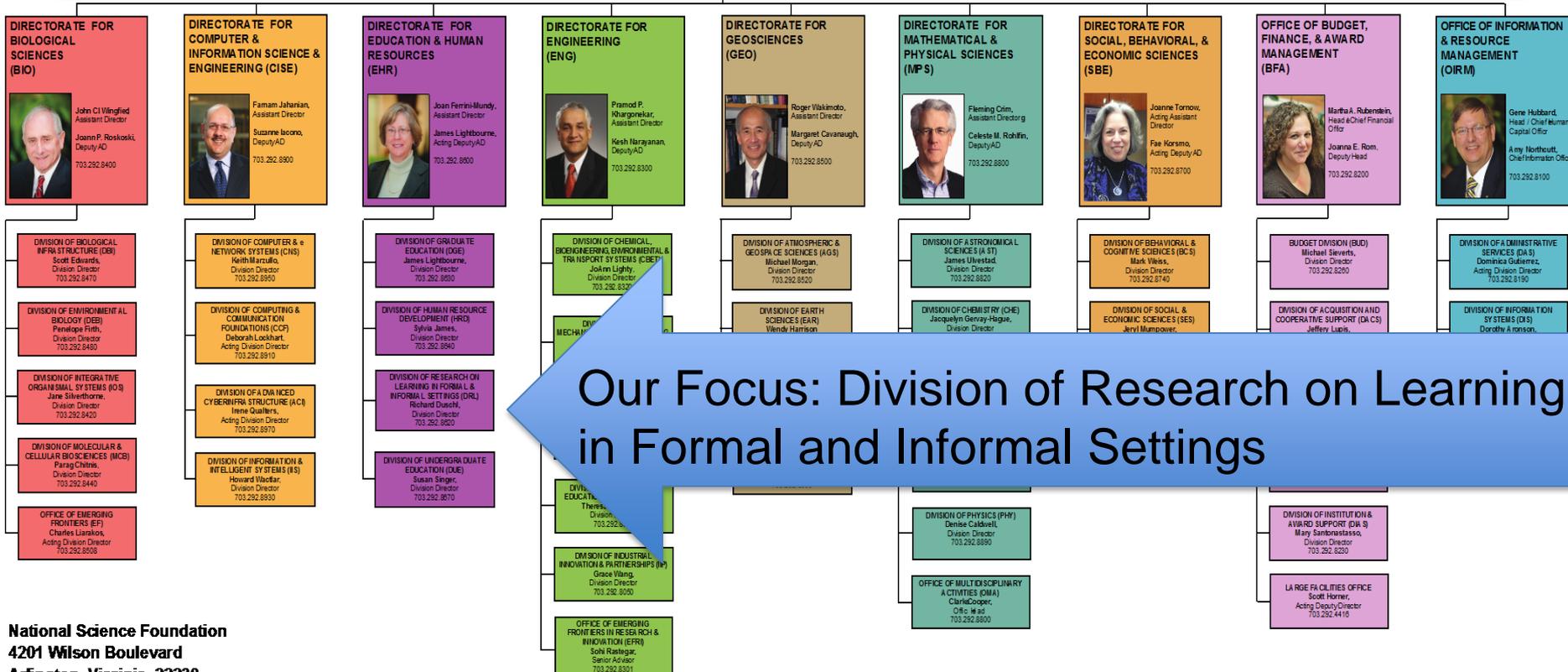
# NATIONAL SCIENCE FOUNDATION

OFFICE OF DIVERSITY & INCLUSION (ODI)

Claudia J. Postell, Head  
703.292.8020

Established as an independent agency under the Executive Branch (NSF Act of 1950):

*"To promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes."*



Our Focus: Division of Research on Learning in Formal and Informal Settings



National Science Foundation  
WHERE DISCOVERIES BEGIN

QUICK LINKS

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FASTLANE



Advancing the Sciences

Funding & Supporting

Inspiring & Educating

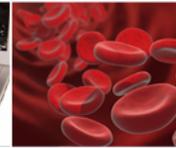
HIDE



New compounds discovered that are hundreds of times more mutagenic  
January 6, 2014

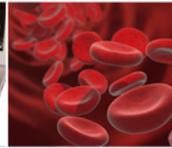


Atlas Mountains in Morocco are buoyed up by superhot rock, study finds  
January 2, 2014



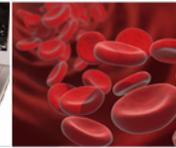
## What is Making?

- Making can be called creating, producing, crafting, shaping, tinkering, composing, and building.
- It covers many areas of interest and many skills, and projects often combine several of each.
- Making sits at the intersection of art and science, and at the crossroads of technology and design .



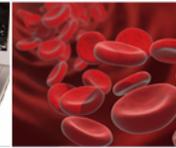
## Overview of Webinar

- What is Making?
- Overview of NSF funding opportunities
- Proposal review process
- Preparing a competitive proposal



# Origins of Maker Movement

- Historic origins in 19<sup>th</sup> century industrial era: libraries, public lectures,
- Newfound accessibility and affordability of technologies such as the Internet, 3D printing, mini-computers & electronics
- Make Magazine “branding,” Maker Faires
- Movement in education towards more action-based learning
- Development of interest-driven, technology-enhanced learning spaces in science & children’s museums, libraries, schools & universities
- Development of entrepreneur-focused community maker spaces
- An increased focus on STEM studies and career readiness for science fields



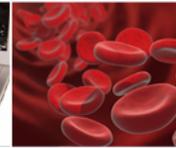
# Key Qualities of Maker the Movement

- Digital transformative tools that are used in Making projects
- Community aspect and emphasis
- The open-minded, action-oriented, creative Maker mindset
- Making, in pedagogical terms, is rooted in constructivism, a learning theory that highlights the notion of learning through constructing, both in terms of tangible and intangible objects and notions

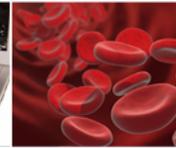
Reference: <https://www.asee.org/documents/papers-and-publications/papers/maker-summit-report.pdf>



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# Selected Funding Opportunities Supporting Making

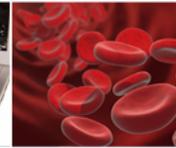


# Choosing the Appropriate Program

- Where is the “intellectual center of gravity” of your project?
  - Foundational learning research (ECR)
  - Resources, Models, & Tools (DRK-PreK12)
  - Informal STEM learning (AISL)
  - Workforce development in STEM for youth & teachers (ITEST)
  - Partnerships with schools and others (STEM+C)
  - Maker Dear Colleague Letter (High Risk/High Gain)
  - SBIR/STTR (small business/start ups/project R&D to develop product)
- Examine the websites of the relevant programs
  - Prepare a 1-2 -page summary of your project
  - Address the merit review criteria
  - Contact one of the listed Program Directors with questions about relevance of your project



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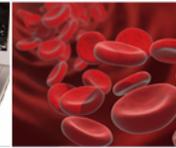


# Advancing Informal STEM Learning (AISL)

- Advances new approaches to and *understanding* of the design and development of STEM learning in informal environments for public and professional audiences.
- Investments should be of interest and utility to public audiences, informal STEM practitioners, and decision-makers.
- Priorities are: knowledge-building, innovation, strategic impact, and collaboration.
- Supports a range of project types (n=7) to serve different functions and varied strategies.
- Deadline date: Nov. 8, 2016
- <https://www.nsf.gov/pubs/2015/nsf15593/nsf15593.htm>



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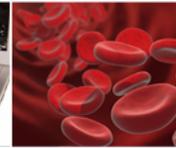


# Discovery Research PK-12

- DRK-12 supports integrated Research and Development of Resources, Models , and Tools in the service of STEM learning and learning environments.
- Goals are: enhanced student achievement in STEM, preparation for the scientific workforce, and improved science literacy.
- Program strands: Learning, Teaching & Assessment
- Focus is on the learning that takes place during the 12-14 years students are enrolled in the formal classroom learning environment.
- Deadline date: Dec. 5, 2016
- <https://www.nsf.gov/pubs/2015/nsf15592/nsf15592.htm>



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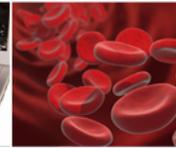


# ITEST: *Innovative Technology Experiences for Students and Teachers*

- Funded through H1-B Work Visa Revenue
- Look out for a new program solicitation
- Two project types: Strategies and SPREAD
- Broadening Participation Emphasis Program
- STEM Workforce Advancement
- Diverse Learning Environments
- Deadline date: TBA (late summer 2017)
- Look for a revised program solicitation (est. spring 2017)



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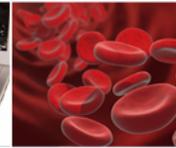


# STEM + Computing (STEM+C)

- EHR-CISE partnership for computing education
- Broaden participation in computing.
- Advance the evidence-based foundation to support the education and professional development of K12 teachers in computing.
- Advance applied research in teaching and learning for the integration of computational thinking in the STEM disciplines for real-world application of computing with those disciplines.
- Deadline date: March 14, 2017
- [https://www.nsf.gov/publications/pub\\_summ.jsp?WT.z\\_pims\\_id=505006&ods\\_key=nsf16527](https://www.nsf.gov/publications/pub_summ.jsp?WT.z_pims_id=505006&ods_key=nsf16527)



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# EHR Core Research (ECR)

Introduced in 2013 to support *fundamental research to generate foundational knowledge* in and across the following focal areas:

- STEM learning and STEM learning environments
- STEM professional workforce development
- Broadening participation in STEM

**ECR projects are:** Theory driven, theory generating, theory testing and predictive.

Funding and management is shared across all 4 divisions in EHR.

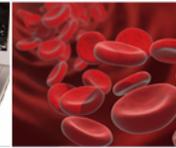
Deadline date: 2<sup>nd</sup> Thursday in September (annually)

<https://www.nsf.gov/pubs/2015/nsf15509/nsf15509.pdf>



## Cyberlearning & Future Learning Technologies

- **Innovation:** inventing and improving next-generation genres (types) of learning technologies
- **Advancing understanding of how people learn in technology-rich learning environments**
- **Promoting broad use and transferability of new genres**
- Program is a collaboration of NSF's Computer & Information Science, Engineering & Education Directorates
- Current solicitation (to be replaced):  
[https://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=504984](https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504984)
- Look out for new solicitation in a few weeks



## Resource Centers

**NSF funds resource centers linked to some programs. The resource websites have project abstracts, research and evaluation reports, and a variety of other useful info for project planning and proposal development.**

- Advancing Informal STEM Learning: <http://www.informalscience.org/>
- Discovery Research PK-12: [www.cadrek12.org](http://www.cadrek12.org)
- Innovative Technology Experiences for Students & Teachers: [www.stelar.edc.org](http://www.stelar.edc.org)
- Cyberlearning: <http://circlcenter.org>
- You can also search for abstracts of funded projects at: [www.nsf.gov](http://www.nsf.gov)



## Dear Colleague Letter: Enabling the Future of Making to Catalyze New Approaches in STEM Learning and Innovation

- Elucidate the processes and potential benefits of learning, e.g. design thinking, in the *Maker* context;
- Leverage *Making* to develop and test its role in improving the effectiveness of formal and informal learning pathways for increasing retention and broadening participation in STEM for students and faculty;
- Explore new ideas and models of formal and informal STEM learning by leveraging existing knowledge in Making;
- Investigate and test effectiveness of new approaches to design and innovation enabled by *Maker* spaces and practices;
- Enable new tools and knowledge for design and prototyping across all disciplines that can significantly increase *Making* capabilities; and
- Further the understanding of innovation processes from prototypes through their transition to products that have greater societal and economic impact through enhanced marketability and large-scale market adoption.



## Dear Colleague Letter: Enabling the Future of Making to Catalyze New Approaches in STEM Learning and Innovation (continued)

- EAGER proposals are exploratory work in its early stages on untested, but potentially transformative, research ideas or approaches.
- **The EAGER proposals must transcend typical approaches supported by NSF core research programs, and be considered “high-risk, high-payoff,” for example, in the sense that it involves radically different approaches, applies new expertise, or engages novel disciplinary or interdisciplinary perspectives.**
- Investigators are strongly encouraged to provide a two-page (or less) statement explaining the core idea of their projects.
- Submissions should begin with “EAGER: MAKER:” in the proposal title.
- Deadline date: December 15, 2016
- <https://www.nsf.gov/pubs/2015/nsf15086/nsf15086.jsp>



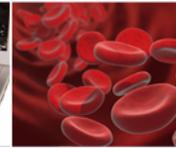
## NSF Small Business Innovation Research (SBIR)/ Small Business Technology Transfer (STTR)

- Innovative proposals that show promise of commercial and societal impact in almost all areas of technology
- Proposals should be driven by market and societal needs and opportunities, and should identify both the end users of the proposed technology and the proposed pathway to commercialization.
- A few examples of technology areas: biomedical, electronics/robotics/wireless, IT, educational, semiconductors/photonics, smart health.
- Info on how: <https://www.nsf.gov/eng/iip/sbir/howtoapply.jsp>
- Typical grantees are small businesses, start-ups
- Contact a program officer! (Ben Schrag is a good contact on maker projects: [bschrag@nsf.gov](mailto:bschrag@nsf.gov))
- Next deadlines: Dec. 6, 2016



## RESEARCH IN THE FORMATION OF ENGINEERS (RFE)

- The NSF Engineering (ENG) Directorate has launched a multi-year initiative, the Professional Formation of Engineers, to create and support an innovative and inclusive engineering profession for the 21st Century. Professional Formation of Engineers (PFE) refers to the formal and informal processes and value systems by which people become engineers. It also includes the ethical responsibility of practicing engineers to sustain and grow the profession in order to improve quality of life for all peoples. The engineering profession must be responsive to national priorities, grand challenges, and dynamic workforce needs; it must be equally open and accessible to all.
- [https://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=503584](https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503584)



## BROADENING PARTICIPATION IN ENGINEERING (BPE)

- The Broadening Participation in Engineering (BPE) Program is a Directorate-wide initiative dedicated to supporting the development of a diverse and well-prepared engineering workforce. Across every educational juncture (e.g., elementary, secondary, and postsecondary levels), efforts to improve engineering interests, preparation, connections, experiences, and opportunities among underrepresented groups is of major importance to BPE.
- [https://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=504870](https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504870)

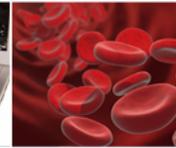


## EHR: Improving Undergraduate STEM Education

- The Improving Undergraduate STEM Education (IUSE: EHR) program invites proposals that address immediate challenges and opportunities that are facing undergraduate STEM education, as well as those that anticipate new structures (e.g. organizational changes, new methods for certification or credentialing, course re-conception, cyberlearning, etc.) and new functions of the undergraduate learning and teaching enterprise. The IUSE: EHR program recognizes and respects the variety of discipline-specific challenges and opportunities facing STEM faculty as they strive to incorporate results from educational research into classroom practice and work with education research colleagues and social science learning scholars to advance our understanding of effective teaching and learning.
- [https://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=505082](https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505082)



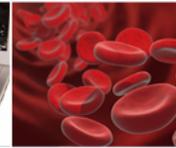
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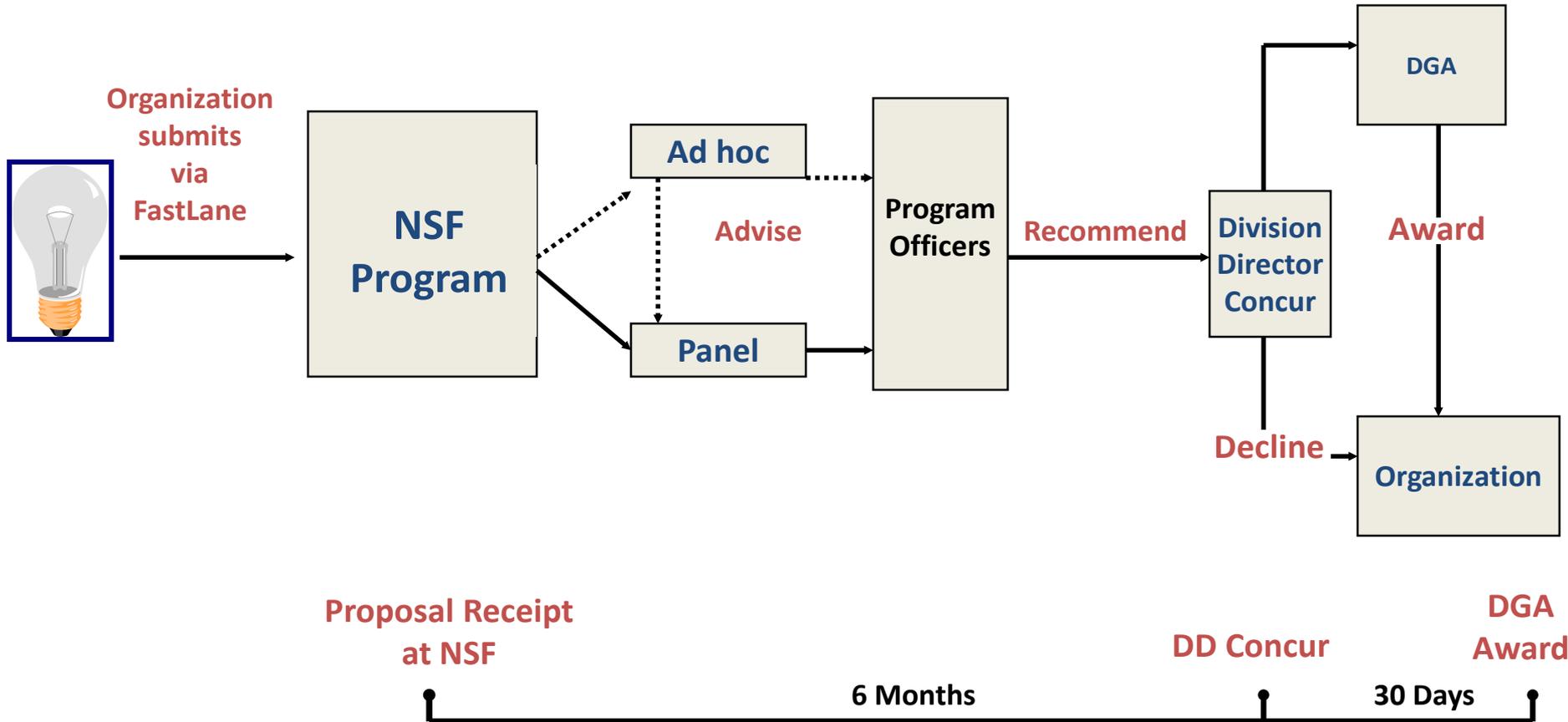
# Proposal Review Process

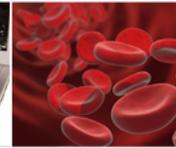


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# Proposal Review Process and Timeline

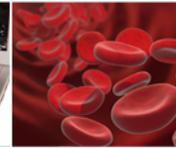




# NSF Review Criteria

All proposals are reviewed under two criteria:  
Intellectual Merit and Broader Impact

1. What is the potential for the proposed activity to:
  - a. advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
  - b. benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or institution to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home institution or through collaborations) to carry out the proposed activities?

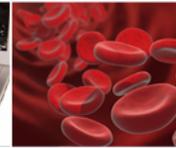


# Preparing a Competitive NSF Proposal

## **IMPORTANT! (see below)**

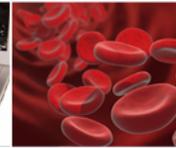
- Refer to specific program solicitation for program requirements
- Refer to Program Award Policy & Procedures Guide for NSF proposal requirements:

<https://www.nsf.gov/pubs/policydocs/pappguide/nsf16001/>



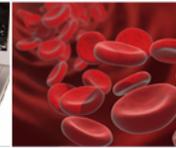
# Help the Reviewers

- Writing to reviewers and program officers
- Make what they are looking for easy to find, using the language of the review criteria and headings to highlight the elements of the project description.
- Don't assume that all reviewers will know the jargon of your discourse community or commonly used acronyms as reviewers may not be in your subspecialty.
- Make sure the most important things receive the most space



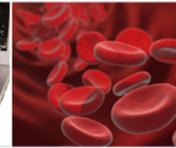
# Before You Begin Writing

- Do your homework
  - Familiarize yourself with the NSF website
  - Print and read the Grant Proposal Guide (GPG)
  - Read the solicitation carefully multiple times
  - Check the NSF Awards Search Page
  - Visit the Website of the resource center or network for the relevant program.
- Talk to NSF Program Officers about your ideas
  - POs may ask you to send a 1-2 page summary in advance.



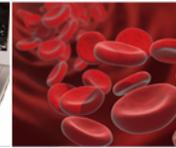
# Project Summary Suggestions

- **One page maximum**
- **First Sentence**
  - Type of Proposal (Most programs have “strands”)
- **Second Sentence**
  - STEM or STEM Cognate areas of emphasis
  - Grade or Age level (s) addressed
- **A general description of the project to be designed, implemented, and evaluated.**
- **Intellectual Merit and Broader Impacts**
  - Must include separate statements on each of these two NSB criteria



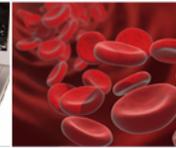
# Project Description Should Include...

- 15 page maximum (exception: EAGER DCL)
- Project overview
- Project goals and objectives
- Summary of effectiveness and impact of prior support
- Explanation of principles that guided the project design, informed by the literature
- Detailed work plan with a timeline
- Qualifications of key personnel who will be coordinating the project
- Anticipated results
- Research plan (if appropriate)
- External review or evaluation process
- Dissemination plan



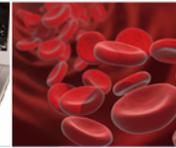
# What Makes This Project Important?

- How is it innovative or potentially transformative?
- How will it advance knowledge and move the field forward?
- What are the anticipated outcomes or products of this project?
- Who will be interested in these outcomes, and how will you target dissemination of findings to them?
- How might these products or findings be useful on a broader scale?



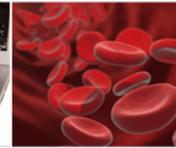
# What Have You And Others Done?

- Describe the theoretical and research basis on which the proposal is based.
- How has the prior research influenced this project?
- Discuss how the proposal is innovative and different from similar projects.
- If you have previously been funded by NSF for similar work, provide evidence about the **effectiveness** and **impact** of that work.



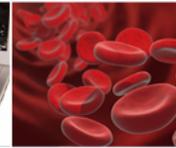
# Who Will Do the Work?

- Briefly describe the expertise of the persons included on the proposal and why they are needed:
  - Education researchers and evaluators
  - Teachers and/or practitioners
  - Community and/or industry
  - STEM-related content experts
- Upload two page bios for all senior personnel
- Don't forget the mentoring plan if Post-Docs are involved.



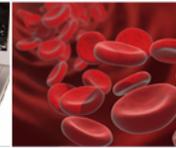
# Research or R&D Topic

- Where is the “intellectual center of gravity” of your project? What do you want to learn by doing this project?
- “Development only” projects are not typically funded (a few exceptions noted)
- Research vs. evaluation as knowledge building



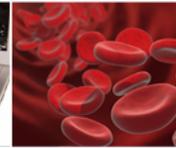
# Budget

- How much will this cost?
- Contact your Sponsored Research Office early and often
- Remember Federally Negotiated Indirect Costs
- Budget and project description should match
  - PI and senior personnel time should reflect the effort on the project
    - Limited to 2 months across ALL NSF awards
    - Justification required for more than 2 months
  - Graduate students and undergraduate students
  - Post docs require a Post-doc mentoring plan
  - Remember to budget for fringe benefits
  - New rules on direct costs for clerical support



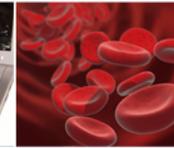
# Budget continued

- Non-personnel Budget costs
  - Equipment is only for equipment that costs more than \$5000
  - Travel must be itemized per trip, can include local costs
  - Participant support – “stipends or subsistence allowances, travel allowances, and registration fees paid to or on behalf of participants or trainees (but not employees) in connection with NSF-sponsored conferences or training projects.”
    - The number of participants to be supported must be entered in the parentheses on the proposal budget.
    - Indirect costs (F&A) are not allowed on participant support costs.
  - Other direct costs
    - Materials and Supplies
    - Publication Costs
    - Consultant Services
    - Subawards



# External Review & Evaluation

- The Merit Review Elements require you to have
  - A mechanism for iterative improvement: Advisory board, external evaluators,
  - A mechanism to assess success: External evaluators, advisory board
- Iterative improvement HELPS your project become better
  - Should focus on how the project is working, why the projects is working that way, and identify places to make it better
  - Should also be responsive to the project's needs
- Assess success
  - Addresses accountability to taxpayer investment



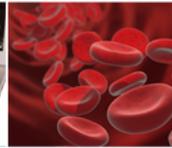
# What Evaluation Is All About

The objectives of the evaluation include:

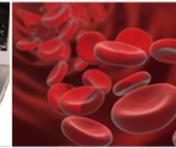
- assessing whether the project is making satisfactory progress toward its goals.
- recommending reasonable, evidenced-based adjustments to project plans.
- determining the effectiveness and impact of the products or processes.
- attesting to the integrity of outcomes reported by the project.



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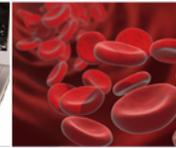


# Proposal Submission



# Proposal Submission

- All proposals are ultimately submitted by your SRO
- If at all possible, use FastLane system (<http://www.fastlane.nsf.gov>)
- DO NOT wait until the last minute (see two bullets above)
- All notifications will be available to you via FastLane



# Where to Submit Proposals

- NSF's FastLane:

<https://www.fastlane.nsf.gov/index.jsp>

- Grants.gov:

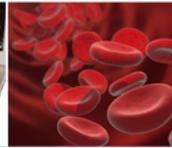
<http://www.grants.gov>

Note:

- Collaborative proposals must be submitted through FastLane.
- Fastlane will check for required sections of proposals.



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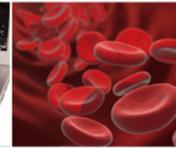
# Questions?

# NSF Needs You!





WHERE DISCOVERIES BEGIN



# Contact Information

## PROGRAM OFFICERS

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David Haury

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## PERSON WHO KNOWS EVERYTHING

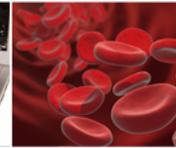
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WHERE DISCOVERIES BEGIN



# Thanks for Participating!

We look forward to receiving your proposals.