REPORT REQUIRED BY SEC. 1008(c), P.L. 110-69: HIGH-RISK, HIGH-REWARD BASIC RESEARCH

This is a report on the National Science Foundation's (NSF's) support of basic research that can be considered high-risk, high reward that: meets fundamental technological or scientific challenges, involves multidisciplinary work, and involves a high degree of novelty.

Given that the Foundation's vision is *"Advancing discovery, innovation and education beyond the frontiers of current knowledge, and empowering future generations in science and engineering"* (NSF FY 2006-2011 Strategic Plan), support for such research is an integral component of NSF's programs. High-risk, high reward research or potentially transformative research (PTR) is central to the vision of the National Science Foundation (NSF). Congress, the National Science Board, and the scientific community all want to ensure NSF's support for PTR remains strong.

The FY 2010 Budget Request includes approximately $92.0 million to leverage activities across the research directorates and offices aimed at increasing support for transformative research. Examples of potential foci for these investments include innovative processes for identifying potentially transformative research, special solicitations and competitions, increased use of specialized funding mechanisms, notably NSF's EAGER (EArly-concept Grants for Exploratory Research), establishing collaboratories, employing sandpits (a process that couples novel/high-risk research project development with real-time peer review), and exploring novel processes for problem solving.

NSF's previous Sec. 1008(c) submission noted that NSF has: modified the intellectual merit review criterion to include potentially transformative concepts; established the NSF-wide Facilitating Transformative and Interdisciplinary Research (FacTIR) working group; and established an operational definition of transformative research. Since then, NSF has implemented an additional funding mechanism, EAGER, to support PTR and is providing training to new program officers on the importance of supporting PTR as part of a balanced awards portfolio. The EAGER mechanism is contained in the January 2009 version of the NSF Grant Proposal Guide (GPG). NSF is monitoring the implementation of this new funding mechanism closely and will make modifications as indicated by use data. Specifically, the GPG states:

> *The EAGER funding mechanism may be used to support exploratory work in its early stages on untested, but potentially transformative, research ideas or approaches. This work may be considered especially "high risk-high payoff" in the sense that it, for example, involves radically different approaches, applies new expertise, or engages novel disciplinary or interdisciplinary perspectives. These exploratory proposals may also be submitted directly to an NSF program, but the EAGER mechanism should not be used for projects that are appropriate for submission as "regular" (i.e., non-EAGER) NSF proposals. PI(s) must contact the NSF program officer(s) whose expertise is most germane to the proposal topic prior to submission of an EAGER proposal. This will aid in determining the appropriateness of the work for consideration under the EAGER mechanism; this suitability must be assessed early in the process.*
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> - *The Project Description is expected to be brief (five to eight pages) and include clear statements as to why this project is appropriate for EAGER funding, including why it does not "fit" into existing programs and why it is a "good fit" for EAGER. Note this proposal preparation instruction deviates from the standard proposal preparation instructions contained in this Guide; EAGER proposals must otherwise be compliant with the GPG.*
> - *The box for "EAGER" must be checked on the Cover Sheet.*

- *Only internal merit review is required for EAGER proposals. Under rare circumstances, program officers may elect to obtain external reviews to inform their decision. If external review is to be obtained, then the PI will be so informed in the interest of maintaining the transparency of the review and recommendation process. The two standard NSB-approved merit review criteria will apply.*
- *Requests may be for up to $300,000 and of up to two years duration. The award size, however, will be consistent with the project scope and of a size comparable to grants in similar areas.*
- *No-cost extensions, and requests for supplemental funding, will be processed in accordance with standard NSF policies and procedures.*
- *Renewed funding of EAGER awards may be requested only through submission of a proposal that will be subject to full external merit review. Such proposals would be designated as "EAGER renewals."*

High risk, high reward proposals that are multi-disciplinary and involve a high degree of novelty are encouraged and supported through core funding programs. These factors are also expressly considered through NSF's intellectual merit component of our merit review criteria. Additionally, the Foundation provides numerous targeted funding opportunities specifically designed to foster innovation and welcomes such proposals (e.g., Cyber-enabled Discovery and Innovation, Solar Energy Initiative, Emerging Frontiers in Research and Innovation, and Science and Technology Centers).

The Foundation is committed to the support of highly innovative research proposals that have the potential to transform the frontiers of science and engineering. Only by supporting such proposals, can we realize the vision articulated in the Foundation's strategic plan.