**Advice from successful NSF centers, relevant to STC pre-proposals**

**Highlights from panel discussions during campus info sessions (2014-2018)**

 *(BRDO; updated March 26, 2019)*

This document provides advice from UC Berkeley faculty who have led or participated in NSF Science and Technology Centers (STC) and Engineering Research Centers (ERC). BRDO has paraphrased information that is particularly relevant for 2019 STC pre-proposals:

**Process**

* The STC competition is a *multi-stage* competition, and your strategy for each stage should be different.
* Preliminary proposals will be reviewed by multidisciplinary panels, and full proposals by ad hoc review followed by panel review. Proposals recommended will be site visited, and full documentation of the site visit results will be reviewed by a summary panel.
* Center proposals are won not on technical details of the individual research projects but on a clear and compelling vision, followed by other factors like broader impacts, management structure, and institutional support. While pre-proposals should address all required elements, *quality of science/vision and team composition are the most important criteria at this stage*.
* The review process for pre-proposals is not as rigorous as for full proposals due to the large number of pre-proposals submitted and the challenges associated with reviewer conflicts of interest for large multi-institutional, multi-investigator projects. This makes it even more important to clearly and compellingly articulate your big vision in the first few pages of the pre-proposal. Balance the amount of technical detail included, and keep in mind that you’ll be writing for a more general audience than usual.
* An ex-NSF program manager explained that, while advocating for your concept with program managers at the full proposal stage is important, it is premature at this early stage of the competition.

**Vision**

* You must have a strong vision from the start. It’s important to distinguish your center, develop its identity, and emphasize what’s special about it.
* Center funding is intended to support work that is more than the sum of its parts and research that could not be accomplished successfully outside the center setting. Avoid the temptation to look at your center as a series of individual research grants. It’s important to convey a sense of “centerness” and cohesion.
* Make sure to describe the compelling vision for your center in the first few pages of the proposal.

**Goals and Impact**

* In proposing a national center, your goals should be broad and ambitious but not so broad that their impact is only incremental and not so ambitious that they seem unrealistic.
* Although your proposal is initially for a 5-year plan, it should have a 10-year vision.
* Your center themes should be unique, new, and distinct from those of existing centers.
* The number of themes that are appropriate for your center depends on your discipline (know your audience). Too many themes for a proposed center can indicate a lack of focus.
* NSF will expect you to deliver on your proposed goal(s).

**Team Composition**

* A key principle for developing a cohesive team is to install investigators early on who are leaders in their fields and are strongly committed to the center's vision.
* Collaborations should be decided on early in the proposal process, with attention to compatibility and the value added by each partner/institution. It can be a mistake to add a partner just because you have an acquaintance in that organization. Select your partners carefully to ensure the right fit so that all parties benefit.
* Investigators at both the lead and partner institutions must be willing to invest time for the duration of the center. Thus, it's important to maintain funding at levels that are significant for the research of each investigator to assure their buy-in. It may take a combination of incentives —including money, postdocs, and students—to support faculty in moving beyond the individual investigator mentality.
* In assigning research thrust leads, consider: (a) selecting representatives from each partner institution, as the more genuinely equal your partner campuses feel, the more fully they will contribute to the project; and (b) incorporating faculty at different career stages and offering faculty development opportunities.
* You may want to explore mechanisms for postdocs to continue their involvement with the center as they move into faculty positions. This supports their ongoing professional success, organically extends your network of collaborating institutions, and ensures a steady flow of fresh energy and ideas, as some faculty investigators will inevitably fatigue out and move on.
* Diversity matters (see education and outreach below).

**Center Management**

* NSF places a high value on good management and believes that achieving anticipated synergies ("the whole being greater than the sum of the parts") is directly determined by center management.
* You need to instill confidence in reviewers that the center's management is astute enough to identify and correct problems early. Flexibility and nimbleness are important. One way to demonstrate these is to build in annual opportunities for course corrections and for analysis and revision of your strategic plan as necessary.
* Carefully consider the external advisory committee’s role, even though you are not permitted to name or contact potential members until the center is funded. Your advisory committee members must be strongly invested in the success of the center and willing to give tough advice. Allocate some slots on the advisory committee to individuals who have experience managing centers and can advise you on center management practices.
* Your center needs a mechanism for shared governance (e.g., an executive committee) that is active and includes multi-institutional participation.
* The qualifications of the lead PI/Center Director should include: sufficient time to invest in managing the center; a national reputation as a leader in his/her discipline; experience leading large-scale multi-disciplinary projects; the ability to rally community and develop consensus.
* It can be highly effective to appoint co-leaders for each research thrust, pairing a more senior investigator as the primary lead with a more junior investigator as the co-lead, so that as things change over time, co-leads have the opportunity to move into lead positions.
* In identifying thrust leaders, keep in mind that senior faculty tend to be over-committed and reluctant to take on more travel, while junior faculty are likely to be motivated by opportunities to build their networks, resources, funding, and collaborations.

**Education and Outreach**

* Education and outreach are *required* *components* of an NSF center. A successful STC proposal must have an integrated education and outreach plan "baked into" the center's structure from the start.
* Increasing diversity in STEM is important to NSF. Having diverse leadership and a diverse team helps show that you’re serious about this and aids in the creation of an inclusive environment.
* The specifics of your education, outreach, and evaluation activities increase greatly in importance to reviewers in the later stages of the competition.
* Your education plan must incorporate activities at all partner institutions, but not all of these need be duplicated or operated in an identical manner at every partner institution.
* Your education plan should be led by a designated PI and fully supported by center leadership. All investigators in the center should be actively involved in some facet of the education plan.
* Concentrate on an aspect of diversity that is particularly relevant to the focus of your center (e.g., addressing gender or racial disparities prevalent in your field). Keep in mind, however, that NSF has indicated in the past that serving just one group is not sufficient; think about all relevant underrepresented categories.