

Agenda and Minutes
Advisory Committee Meeting, Education and Human Resources
Wednesday, 30 November 2016 and Thursday, 1 December 2016
National Science Foundation, 4201 Wilson Boulevard, Arlington, VA
Stafford I, Room 375

Wednesday, 30 November 2016

Advisory Committee members present: Bruce Alberts, Hyman Bass (virtual), Elizabeth Boylan, John T. Bruer, Cathy Casserly, Carlos Castillo-Chavez, Muhammed Chaudhry, Rory A. Cooper, Margaret Honey, Okhee Lee, Mark Lipsey (virtual), David H. Monk, Roy Pea (virtual), Debra Joy Pérez, Francisco C. Rodriguez (chair), James Spillane, Marilyn Strutchens, Candace Thille (virtual), Laurel Vermillion (virtual), Lilian Wu

I. Welcoming Remarks, EHR Updates, and Meeting Overview

Dr. Francisco Rodriguez, *Chancellor, Los Angeles Community College District, and Chair, EHR Advisory Committee*

Dr. Joan Ferrini-Mundy, *Assistant Director, Education and Human Resources*

Dr. Rodriguez called the meeting to order and Dr. Ferrini-Mundy gave EHR personnel and activity updates. Dr. Ferrini-Mundy shared highlights from her presentation at the recent meeting of the National Science Board, in which she framed EHR investments as addressing three goals: (a) Develop the Careers of Scientists and Engineers, (b) Build Knowledge through Research, and (c) Transform Institutions.

II. Overview from NSF Leadership on Two of the NSF Ten Big Ideas: *Work at the Human-Technology Frontier: Shaping the Future and Harnessing Data for 21st Century Science and Engineering*

Dr. Fay Cook, *Assistant Director, Social, Behavioral, and Economic Sciences, lead on Human-Technology Frontier*

Dr. Jim Kurose, *Assistant Director, Computer and Information Science and Engineering, lead on Harnessing Data*

Dr. Cook and Dr. Kurose each introduced Advisory Committee members to one of the NSF Ten Big Ideas. Dr. Cook described three strands of research around the *Work at the Human-Technology Frontier*: (a) Understand the Risk and Benefits of New Technologies, (b) Create Technologies to Enrich Lives in Future Workplaces, and (c) Inform the Education and Lifelong Learning of Tomorrow's Workforce. Dr. Kurose explained that *Harnessing Data for 21st Century Science and Engineering* will involve: (a) advanced cyberinfrastructure ecosystems and (b) innovative educational pathways. Research in both these areas will inform and support theoretical and systems foundations for data-intensive research in all area of science and engineering, and education. Advisory Committee member discussions focused mainly on links

between these Big Ideas and NSF INCLUDES/broadening participation efforts. Advisory Committee members encouraged NSF/EHR to think of how these Big Ideas can enrich education and workforce development for all, while being mindful that the data revolution may not reach everyone equally, and may, unintentionally, create new “digital divides.”

III. An EHR Perspective on Work at the Human-Technology Frontier: Shaping the Future and Harnessing Data for 21st Century Science and Engineering

Dr. Evan Heit, *Division Director, EHR Division of Research on Learning in Formal and Informal Settings*

Dr. Lee Zia, *Acting Division Director, EHR Division of Undergraduate Education*

Dr. Barbara Natalizio (AAAS Policy Fellow, EHR Division of Graduate Education)

Drs. Heit and Zia discussed ways in which EHR is already engaging with the two Big Ideas introduced in the earlier session. Dr. Heit gave examples of current awards from Cyberlearning, EHR Core Research, and ITEST for research and development of learning technologies that support broad participation, promote interest in STEM and STEM education, and prepare students and teachers for future STEM workplaces. Dr. Zia described the power of methods for exploiting large data sets to support personalized learning and optimization of educational materials. Dr. Natalizio then moderated a discussion among Advisory Committee members around the question of how EHR should shape programs and investments to build connections to these Big Ideas. The main theme that arose was communication/collaboration. The Big Ideas suggest cross-disciplinary, collaborative work, which will only be successful if communication happens. How can NSF foster such communication? Proposed ideas included: (a) funding of interdisciplinary research teams, (b) mid-career grants for building collaboration/team skills, and (c) media campaign about the Big Ideas.

IV. Committee of Visitor Reports: ECR, TUES/STEP/WIDER/IUSE, HRD¹

Dr. R. Corby Hovis, *Program Director (DUE), COV Coordinator, Education and Human Resources (moderator)*

Dr. Mark Lipsey, *Research Professor, Peabody College of Education and Human Development, Vanderbilt University, and ECR COV Chair*

Dr. Elizabeth Boylan, *Program Director, Alfred P. Sloan Foundation, and TUES/STEP/WIDER/IUSE COV Chair*

Dr. Francisco Rodriguez, *Chancellor, Los Angeles Community College District, and HRD COV Chair*

Formal reports from the ECR and TUES/STEP/WIDER/IUSE COVs were submitted to, and by acclamation received by, the EHR Advisory Committee. A formal HRD COV report will be submitted at a future Advisory Committee meeting.

¹ HRD COV presentation and discussion took place Thursday afternoon.

V. NSF Big Ideas and EHR Pillars: *roundtable discussions*

Two NSF Big Ideas

- *Work at the Human-Technology Frontier: Shaping the Future*
- *Harnessing Data for 21st Century Science and Engineering*

Three EHR “Pillars”²

- *Learning and Learning Environments*
- *Workforce Development*
- *Broadening Participation*

Advisory Committee members each participated in one of six discussions, each focused on one of the two Big Ideas introduced in the morning sessions intersected with one of the three EHR Pillars. Each group discussed the questions below. Subsequently, the groups combined by EHR Pillar to discuss and prepare recommendations to share with the full group.

- *What are relevant areas of research and development that will contribute to better understanding of both the EHR Pillar and the Big Idea?*
- *How might investments around the EHR Pillar make unique contributions to the Big Idea?*
- *How might NSF-wide work on the Big Idea lead us to re-think the types of investments we make around the EHR Pillar?*

Some important themes that arose out of these discussions included:

- While large data sets have the potential to lead to powerful new insights in our understanding of learning, data collection and analysis will require training, collaboration, and careful stewardship, across the education spectrum.
- Data science and new technology will both make possible new strategies for learning, and also require a renewed commitment to lifelong learning.
- NSF/EHR should embrace the opportunities technology offers to promote inclusion, while guarding against unintentionally exacerbating societal divides.

VI. Conversation with NSF Director, Dr. France Córdova and NSF Chief Operating Officer, Dr. Richard Buckius

Dr. Córdova opened the session with some prepared remarks regarding her vision of the NSF Ten Big Ideas and then took questions. Advisory Committee members had suggestions, including a proposal to fund a mid-career faculty or post-doc training program to prepare a generation of leaders to run the large collaborative teams necessary for the NSF Big Ideas. Academic leaders rarely get specialized training in running large interdisciplinary projects. This training could also help in sparking student interest in science through focus on large social issues, and the underscore the important contributions of community college STEM

² As described in the EHR Advisory Committee Strategic Re-envisioning document).

https://www.nsf.gov/ehr/Pubs/AC_ReEnvisioning_Report_Sept_2014.pdf

programs. Another suggestion was to support a cadre of teaching post-docs who would support excellent graduate education.

Thursday, 1 December 2016

Advisory Committee members present: Bruce Alberts, Hyman Bass (virtual), Elizabeth Boylan, John T. Bruer, Cathy Casserly, Carlos Castillo-Chavez, Muhammed Chaudhry, Rory A. Cooper, Margaret Honey, Okhee Lee, David H. Monk, Roy Pea (virtual), Debra Joy Pérez, Francisco C. Rodriguez (chair), Marilyn Strutchens, Candace Thille (virtual), Laurel Vermillion (virtual), Lilian Wu

I. Overview from NSF Leadership on NSF INCLUDES

Dr. Joan Ferrini-Mundy, *Assistant Director, Education and Human Resources, co-lead on NSF INCLUDES*

Dr. Sylvia James, *Division Director, EHR Division of Human Resource Development*

Dr. Denise Barnes, *Section Head for EPSCoR, Office of Integrative Activities*

Dr. Ferrini-Mundy described the NSF INCLUDES program, which encourages use of some variation of a collective impact model “to promote the progress of science and engineering by seeking and developing talent widely, and to diversify the composition of the science and engineering workforce to better reflect the diversity of US society”. NSF INCLUDES is a multi-year initiative. In the first stage, 40 *design and development launch pilot* awards were made in Fall 2016, and a solicitation for additional launch pilot projects was recently released³. *Alliances* and *backbone organization* components will be developed in the coming years. Dr. Sylvia James then gave an overview of the current launch pilot portfolio. Finally, Dr. Joan Ferrini-Mundy and Dr. Denise Barnes discussed the challenges of “on-ramping” current programs in the NSF Broadening Participation portfolio into NSF INCLUDES, *i.e.* how can those programs leverage the NSF INCLUDES investments, and vice versa?

II. NSF INCLUDES: roundtable discussions

Advisory Committee members each participated in one of four discussions, roughly organized by EHR Division. Each discussion group focused on a small set of EHR programs. Each group discussed the questions below, and then reported-out to the full group.

- *What are the potential connections between EHR programs and NSF INCLUDES?*
- *What are creative approaches to making a robust NSF INCLUDES national network?*

³ https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505289

- *What opportunities do NSF INCLUDES and other NSF programs present for developing STEM talent inclusively, and what specific suggestions do you have for capitalizing on that opportunity?*

The Advisory Committee members stressed that the communication and collaboration necessary for NSF INCLUDES to succeed will not “just happen”, but will need to be carefully, and intentionally, facilitated. In particular, challenges, hurdles, and failures along the path need to be communicated among the various NSF INCLUDES networks. In addition, the Advisory Committee members affirmed that the goals of NSF INCLUDES should be shared across all NSF solicitations and awards.

III. New Business

A. Liaison Report: Dr. Margaret Honey shared highlights from a recent meeting of the Environmental Research and Education Advisory Committee (ERE AC). ERE Advisory Committee members discussed three of the NSF Ten Big Ideas: (a) *Harnessing Data for 21st Century Science and Engineering*, (b) *Navigating the New Arctic*, and (c) *Growing Convergent Research at NSF*. The ERE Advisory Committee continues work on a series of white papers following their September 2015 report: “America’s Future: Environmental Research and Education for a Thriving Century”.

B. Discussion of Open Educational Resources: Dr. Lee Zia and Dr. Cathy Casserly proposed the formation of a subcommittee, “to consider opportunities and challenges for NSF and EHR regarding both the creation and use of open learning resources, and to provide guidance about formulating a research and development agenda for EHR to investigate such opportunities and challenges”. They highlighted areas of discussion from a June 2016 convening of representatives from NSF, Department of Education, and Institute of Museum and Library Services: In addition to the (a) the importance of professional learning, the convening stressed the impact on: (b) teaching, (c) learning, (c) policy, (d) procurement, (e) curation and quality, and (f) accessibility. Establishment of this subcommittee was approved by the AC.

C. NSF Strategic Planning Process: On behalf of the Office of Integrative Affairs, Dr. Jim Lewis solicited feedback from EHR Advisory Committee members on the NSF Strategic Planning Process.

IV. Meeting Reflection and Adjournment

Dr. Ferrini-Mundy opened this session by sharing five preliminary themes she heard throughout this meeting:

- Recognize the bi-directional relationship of the human-technology frontier and education; work at the human-technology frontier has the potential to augment learning, and research on learning will be essential for optimizing human-technology interactions.

- Equally, bear in mind how data science can inform strategies for lifelong learning, and also how research on learning can contribute to advances in data science algorithms and applications.
- EHR should pro-actively collect and synthesize what we know about the Big Ideas (portfolio analysis), communicate our discoveries widely, and
- We must always stress the importance of inclusion, equity, and broadening participation.
- The success of the Big Ideas will depend upon our ability to incentivize and facilitate active, productive, and creative new research and practice communities.

Dr. Ferrini-Mundy opened the floor for comments and questions. Advisory Committee members offered a few suggestions:

- think about the distinction between education and learning in all NSF communications
- continue to be thoughtful about Advisory Committee membership diversity
- consider ways to engage Advisory Committee with each other and with NSF staff between meetings

The Advisory Committee members shared their enthusiasm for the interactive format of this meeting.

Note: After the meeting adjourned, advisory board member, Dr. John Bruer, presented a talk entitled, "Educational Neuroscience: A View from the Bridge", as part of the EHR Distinguished Lecture Series.