**Perspective: Experiences and learnings from my time as an ERC PD at the NSF**

**By Rajinder Khosla**

In October 1996, I came to the National Science Foundation after 30 years of industrial experience at Kodak as leader of the Micro Electronics Technology Division in image sensors, ASICS, and systems development, along with two years of industry/university experience. I was hired as a Program Director in the Electrical, Communications & Cyber Systems (ECCS) Division in the Directorate for Engineering.

Soon after joining, I was approached by John Hurt, a Program Director from the Engineering Education and Centers (EEC) Division, to participate as an Observer for the Site Visit Team planned for the Microelectronics Packaging Research Center at Georgia Institute of Technology, which had been inaugurated in 1994. My industry background and the university experience were very helpful in understanding and appreciating the structure of the ERC. I enjoyed the experience so much that I offered to participate more actively.

During my 15 years at NSF, I attended a number of blue ribbon panels, in which potential ERCs, which had passed through all the review panels’ scrutiny of the submitted proposals, are invited for a final selection. Going through these selection procedures, I learned a lot about leading-edge technologies and their impact. I also was selected to attend some of the ERC inauguration ceremonies. Participation in these exciting events was enlightening and invigorating.

As time passed, I had the opportunity to participate in many ERC Site Visits, such as at the ERC for Power Electronics Systems at Virginia Polytechnic Institute and State University in 1998, the ERC for Subsurface Sensing and Imaging Systems based at Northeastern University in 2000, the ERC for Extreme Ultraviolet Science and Technology (EUV-ERC) at Colorado State University in 2003, the Smart Lighting ERC at the Rensselaer Polytechnic Institute in 2008, and the Center for Integrated Access Networks (CIAN) at the University of Arizona in 2008.

Ultimately, the greatest learning experience for me was when ERC Program Leader Lynn Preston asked me to manage one ERC and a new network she had started: the ERC for Computer-Integrated Surgical Systems and Technology (CISST) based at the John Hopkins University, which was started in 1998, and the Network for Computational Technologies (NCN) at Purdue University, which was started in 2002. Now I was able to work more closely with the respective CISST and NCN teams. Whether directly as a PD or as a site visitor, I always found that the biggest challenge in working with any center was to ensure that the “3-plane diagram,” with its emphasis on systems requirements, drove the enabling technology and research activities of the center.

In working closely with the CISST Center Director and his teams, it was exciting to see how the development of the “da Vinci Robotic Surgical System” made by Intuitive Surgical Inc. was enhanced through a partnership with the ERC and how the system strengthened the research and education efforts of the ERC. NCN’s nanoHUB website is a resource for the entire worldwide nanotechnology discovery and learning community. Both of these efforts have not only made advances in technology but have also made an impact in education and on industry.

Since retiring from NSF in 2011, I have continued to benefit from my learning and experience with Lynn and the ERC Program. Now I am on the outside, working with two ERCs at the North Carolina State University. I am able to fully participate in the inner workings of these ERCs. Without any hesitation, I can state that my experience at NSF working with ERCs has helped me to guide and advise these centers. The ASSIST Nanosystems ERC passed their 6th-year review this year (2018) and the FREEDM Systems Center has completed their 10th year as an ERC and recently had their Graduation celebration.