

Preface

Year 2016-17, being the CSIR Platinum Jubilee year, proved to be full of various activities. Two events are worth noting. On 31st August 2016, Parliamentary standing committee for Science & Technology and Environment and Forests headed by Smt Renuka Chowdhury, MP, visited CSIR-4PI as part of their study tour. The committee showed deep appreciation for the work being carried out in the areas of earth system sciences, natural hazard, climate and weather, high performance computing and cyber security which form the core activities of the Institute. The committee was of the opinion that CSIR-4PI is immensely contributing to the betterment of the society. The committee emphasized need for building competence in cyber security and data science. Dr. Harsh Vardhan, Hon'ble Minister for Science & Technology and Earth Sciences visited CSIR-4PI on 5th February 2017. He interacted extensively with young scientists. He said that science has solutions to many problems faced by common man including poverty, health, poor infrastructure, corruption, etc. He felt that the Institute has the potential to make a big impact. He urged for an effective collaboration and changing the work environment where people should brainstorm to attack the problems of the society through their scientific research. He was of the opinion that knowledge sharing can bring about effective solutions which will improve the quality of life of common man. He noted that the institution has huge potential to work for better future of our country.

This year, the 12th Five Year Plan (12th FYP) ended. CSIR-4PI led a program on Advanced Research in Engineering and Earth Sciences (ARiEES). The scope of the programme covered Cyber Security, Cryptography, CSIR-Varsha, Carbon Flux estimates and Natural Hazard (Earthquakes, Landslides and extreme events). The Sectoral Monitoring Committee (SMC) considered the project as one of the best projects among several 12th FYP projects of CSIR and recommended continuation of Seismic Hazard and Carbon Flux research. Carbon flux estimation is particularly important in view of the fact that India has ratified its commitments to COP21. It is imperative that we put mechanisms in place for robustly estimating our sources and sinks of Green House Gases (GHG). This is now possible because of Institute's initiative in setting up of reference GHG station at Hoskote near Bengaluru which enables calibration and traceability to primary NOAA standards. Modeling of oceanic component of carbon cycle supplements the sparse measurements to estimate air-sea Carbon dioxide, Oxygen and Nitrogen fluxes. Detailed studies into oceanic turbulence models to simulate tracer distributions measured at WHOI site in the Arabian Sea have been performed.

In the area of solid earth studies, for the first time, accuracy of SRTM heights in the Indian subcontinent were evaluated using GPS heights of about 200 GPS points. Comprehensive study of crustal models and water vapor for Northeast India using 12 years of GPS observations gave significant insights into the tectonic deformation, spatial and temporal variability of atmospheric water vapor and its relation to the observed rainfall. Two new CGNSS stations were established. Crustal and mantle structure in the Kashmir Himalaya has been reported for the

first time. Site specific microzonation of Srinagar city has been initiated and microtremor data have been acquired and analysed. The Neo-Deterministic seismic hazard map for the entire country has been prepared and published.

Understanding of climate change issues, monsoon phenomena continue to pose challenges. Ultra high-resolution weather and climate model framework is now in place that will enable better simulations. As part of another 12th FYP project, downscaling capability for climate assessment over small islands was demonstrated, though there is a long way to go. CSIR-4PI continues to play an important role in use of weather and climate data for applications to health sector, such as vector-borne disease prediction, renewable energy, and assessment of other potentials. Hobli-level forecasts over Karnataka during monsoon seasons are routinely issued and effort is being made to improve the forecast skill. Karnataka region is of particular interest owing to dense network of rain gauges and automated weather stations.

High Performance Computing and Cyber security research is an important capability at CSIR-4PI. The HPC system was very well utilized often exceeding 90 percent in usage. Another 140 Teraflops is ordered to enhance the capacity. This should ease some pressure. However, there is a need to enhance the capacity further. CSIR-NAL, CSIR-NCL, CSIR-IGIB and CSIR-4PI were among the major users accounting for more than 60 % of the available computing power. At times NAL usage went as high as 54 percent signaling the need for enhancement of computing power. Progress in cyber security triggered extensive discussions with Cyber Emergency Response Team, India (CERT-IN) leading to proposal in collaboration with C-DAC. An MoU was signed with Cognizant Technology Solutions (CTS) who have expressed their interest for long-term partnership in areas of cyber security, artificial intelligence and deep learning. CSIR-4PI is working with CSIR-CEERI developing a mission project on intelligent systems which will open up many areas in the future.

It is also notable that in collaboration with Indian Center for Societal Transformation (Indian CST), Bengaluru and National Productivity Council, New Delhi, CSIR-4PI successfully implemented cloud services and migrated ePashuhaat portal. This activity is expected to assume significance in coming years and possibly lay foundation for data science and analytics as decision support system.

Setting up of computational and data science group still remains unfulfilled. This capability is clearly important not just for CSIR-4PI, but also across CSIR. Major projects will benefit from data driven decision-making. The Institute will continue to pursue this.

Vidyadhar Mudkavi, Head, CSIR-4PI