BioSpectrum the business of Bio & Health Sciences

From Super Computing to Health Informatics

08 November 2016 | Interviews | By BioSpectrum Bureau

From Super Computing to Health Informatics

The Centre for Development of Advanced Computing, better known as C-DAC has made major forays into Health Informatics and Digital Healthcare with the development of several technologies, software and hardware solutions and products. These include hospital management information systems, drug supply chain management system, telemedicine solutions, mobile healthcare solutions, healthcare standards, decision support systems and EHR/EMR Systems.
This is just one major area of work for C-DAC which is spread across 11 centres in the country and has a total of 2,800 employees. Originally established to carry out research and to develop High Performance Computers, the R&D of C-DAC has expanded to various other areas of ICTE such as grid and cloud computing, multilingual computing, heritage computing, professional electronics including VLSI and embedded systems, cyber security and cyber forensics, health informatics, software technologies and education related to these technologies.
Leading this iconic institution at its helm is Prof. Rajat Moona who arrived at C-DAC in 2011 from IIT Kanpur where he continues to serve as Professor of Computer Science.
A recipient of several awards and recognitions, Prof. Moona has been a Visiting Scientist to MIT and a senior Engineering Manager at Mentor Graphics. Here are some excerpts from his exclusive interview to BioSpectrum:

Q: C-DAC has done considerable amount of work in Health Informatics. When and how did this work begin?

A: Healthis one of the basic needs of human beings. With this view, C-DAC is deeply involved in Health Informatics to provide high class healthcare services and solutions. Our major objective is to support healthcare professionals, providers, industry, governance, and patients by providing world class hardware and software solutions; designed, developed and made in India.
As need and technology evolved, C-DAC provided and continues to provide Health Informatics technology from traditional standalone applications to modern-age mobile and cloud technology enabled applications and medical devices. C-DAC is involved in Health Informatics since 1996 when ASHA software was introduced to operate on medical images including X-RAY, MRI, etc. Around 1998, C-DAC extended Health Informatics support by including Hospital Management Information Systems (HMIS) to manage workflow of hospital processes. C-DAC has implemented the Health Informatics System at Sanjay Gandhi Post-Graduate Institute of Medical Sciences (SGPGI), Lucknow. At that point of time our system proved to be the first of its kind for a super specialty hospital like SGPGI. Telemedicine systems were supported by C-DAC in early 2000s to provide remote diagnosis and treatment to patients by means of telecommunications technology. Now C-DAC is also focusing on international medical standards to enable high quality, extended security, medical record exchange in Health Informatics application and devices. Meanwhile, C-DAC developed Drug Supply Chain Management System, Decision Support Systems and Mobile Healthcare Solutions which have been released for use.

Q: Which are among the most popular softwares developed by C-DAC in this area?
A: Today C-DAC has a range of products and solutions in a variety of domains and environment. Each of them is targeted to differing usage scenarios and is used by the targeted user community. C-DAC has products and solution in:
â€¢ Hospital Management Information Systems (HMIS) - e-Sushrut, Tejhas, OncoHIS
â€¢ Drug Supply Chain Management System - e-Aushadhi
â€¢ Telemedicine Solutions - Mercury, e-Dhanwanthari, Sanjeevani
â€¢ Healthcare Standards - SDK for DICOM, HL7 standards and Toolkit for SNOMED CT
â€¢ Decision Support Systems - Ayusoft, EEG Analyzer, cerviScan, iCare@Home, Signal Processing System for Neurological Disorder Detection
â€¢ Mobile Healthcare Solutions - mSwasthya, MosQuIT, mCare
â€¢ EHR/EMR Systems - EMR System for Oncology, Distributed Healthcare Store, PHRMS
â€¢ Medical Electronics and hardware - Tarang, Fully Automatic Bio-Chemistry Analyzer, Digital Stethoscope, Wireless ECG Sensor
â€¢ Blood bank management system - e- Raktkosh

Q: To what extent has the Health Informatics software helped bring timely medical assistance and intervention to patients?
A: Health informatics software and hardware play a key role to facilitate timely and effective treatment to patients. Treatment may be provided by healthcare providers while patient's hospital stay need not be extended unnecessarily. Clinical departments, like laboratory, radiology, surgery, OPD, IPD or administrative departments and even multiple clinics/hospitals are inter-connected with the help of Health Informatics software resulting in speedy clinical process and improved healthcare. Patient efforts are reduced in such connected clinical environment. This time-saving factor is especially important with the increasingly growing healthcare needs.

Health Informatics allows patient participation in medical care and patients are empowered to play an active role in their healthcare. This is especially important for people who suffer from chronic illnesses like diabetes, asthma, obesity and cardiac conditions. Patients can monitor their medication usage and engage in dialogue with their doctors for help in making the right healthcare choices. With ability to store, retrieve and share medical records with care providers, the healthcare accuracy and avoidance of error has been increasing.

With these solutions, Healthcare Institutions have created Electronic Health Records which have helped in reducing clinical error and continuing care. With the penetration of Internet and mobile telephony among masses, patients now can see their investigation reports online; they can take online appointment and can even consult specialized consultants at some tertiary care hospital sitting at some faraway places. It has definitely reduced patient wait and provided quality care as well as quality medicines.

Telemedicine solutions have further proved to be helpful in terms of obtaining prescriptions from renowned doctors of prestigious hospitals/medical colleges from far-flung areas thus saving the cost and time in travel.
e-Aushadhi is a web-based supply chain management application that deals with Purchase, Inventory Management & Distribution of various drugs, sutures and surgical items to various Regional/District Drug Warehouses (DWH) of State, District Hospitals (DH), their sub stores like Community Health Centre (CHC) and Primary Health Centre (PHC) and sub-centres to distribute drugs to patients- the final consumer of the supply chain in the state. This portal provides the real time tracking of drugs and vaccine inventory, which, in turn, helps the Ministry of Health and Family Welfare (MoHFW) in better planning, executing and controlling on the stock across the nation.

e-RaktKosh: A centralized Blood Bank Management Information System is a national portal to ensure the real time availability of Blood Components while enforcing the standards to maintain the quality in routine operations of blood banks. Hence minimizes the time in arrangement of blood and ensures the quality of same.

Q: What has been the record in terms of commercial success of this range of software and systems?
A: As C-DAC is a scientific society under the central government, our major focus is on providing high quality and cost effective healthcare products and services to the people of the nation. C-DAC offers a wide range of health informatics products, many of which are used by/deployed in various state and central government hospitals/bodies, private organizations and independent bodies covering a large corpus of population. Few products are targeted towards educational purposes also such as Continuous Medical Education (CME). C-DAC healthcare products enable user organisations to offer services to large populations covering people from most rural and tribal regions, insurgency-affected areas, coastal strip, and far-flung areas. These products are used by single medical provider as well as chains of hospitals.

Some examples include wide scale deployment in Odisha, Tamil Nadu, Punjab, North-East region, Rajasthan, Kerala, AIIMS, SGPGI and many more.
C-DAC's e-Sushrut is presently under implementation in Rajasthan, Telangana, Andhra Pradesh and Maharashtra, along with several tertiary care hospitals in India including the Post-Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Nizam Institute of Medical Sciences, Hyderabad.

e-Aushadhi has been adopted by the MoHFW for Nation Wide Rollout and C-DAC is playing the role of a nodal agency for this nation-wide implementation of e-Aushadhi. As of now, this system has already been implemented in 10 states. It is in the process of implementation in 7 states and 5 states are in the pipeline.

The Blood Bank Management System is yet another niche area wherein C-DAC has completed state-wide automation of blood banks in Rajasthan and has subsequently launched a National Portal for e-RaktKosh inaugurated by the Honourable Minister of Health and Family Welfare, Govt. of India.

Q: There is specific attention being paid by C-DAC to the North-East. How effective has C-DAC's work in the healthcare sector been in this region?
A: The North-East region had remained an untouched area in the field of health informatics for a long time. C-DAC has extended support of healthcare services in this region by deploying several health informatics products. C-DAC has setup a new centre at NIT, Silchar as the north-east is lagging behind in terms of access to e-governance facilities. One of the goals of the new C-DAC facility is to bridge the gap between people of NE region and the healthcare industry.

Telemedicine deployments to connect the North-East with speciality hospitals to provide improved and better healthcare has been an ongoing activity since early 2003. One of C-DAC's projects dealt with the deployment of telemedicine facilities at the Panchayat level in blocks at Arian, Parwada and North Tripura. The remote PHCs/CHCs identified under the project were linked to the respective specialist hospitals. The telemedicine equipment and software developed by C-DAC are deployed under these projects. Healthcare Knowledge System has started in this region to promote public health awareness and IT-enabled health education in all North-East states of India. C-DAC is also working towards early detection of cancer in this region.

C-DAC was the implementing agency for implementation of Advanced Health Management System (AHMS) in Regional Institute of Medical Sciences (RIMS), Imphal. After its successful implementation, hand-holding training was imparted to all the stakeholders of the institute and the system is now fully functional.
e-Aushadhi is being implemented in the states of Manipur and Meghalaya and very soon Assam and Mizoram will also be on board.

Q: How satisfied are you with the hardware healthcare products developed by C-DAC. For example, what has been the market response to Tarang digital programmable hearing aid?

A: C-DAC is actively involved in the development of cost effective and affordable healthcare devices such as hearing aid, digital stethoscope and digital ECG, etc. These medical devices are cost effective, indigenously developed products which are being used by many healthcare communities. Home devices for patient have been developed by C-DAC to capture vital signs and self-monitoring. These devices are cost effective, non-invasive units suitable for use in rural, primary care and community based clinical settings. Small hardware units have also been developed by C-DAC to link up with a digital microscope and a computer unit. A biochemistry analyser medical laboratory has been developed by C-DAC, designed to measure different chemicals and other characteristics in a number of blood samples quickly, with minimal human assistance. Apart from these we have built van-based mobile units to provide healthcare in rural areas. Vans for telemedicine, veterinary care, Eye and Maternity care have been designed, developed and handed over to NGOs and other agencies. The purpose of the fully automated bio-chemistry analyser is intended for the labs where a heavy load of blood samples is estimated. The efficacy of these products cannot be measured in terms of commercial success alone as mostly that was never the primary target to begin with.

The Tarang Digital programmable hearing aid device is designed to cater to the market for body worn and behind-the-ear type hearing aids. People are using hearing aid devices in large quantities. This is for the first time that hearing aids devised and made in India are being distributed. Tarang was launched online on the C-DAC website and can be purchased from there.

Q: One does not find C-DAC products competing with mainstream products in the market. Are there limitations in terms of sales and marketing because you are a government organisation?
A: As mentioned earlier, C-DAC is a society under the central government. Its major objective is to deliver high quality and cost-effective solutions to the people of India. Large numbers of health communities are using C-DAC health products and in some cases more widely than other products. In many states in India, all state government hospitals are using C-DAC health informatics products with the largest population coverage as compared to products made by others and that is how C-DAC products are in the mainstream. So it's not about sales and marketing, it is about benefiting the people. Having said that, we are always open to transfer technology and know-how for commercial considerations.
As such, we do not have any limitations. Being a government organisation has rather benefitted the organisation in terms of taking up the projects at the national and international levels. We are receiving projects and assignments from various third world countries for implementation of our solutions. Our delegations have already visited a few of them.

Q: Digital Healthcare is seen as the future for the healthcare sector. People are using wearable health monitoring devices and an entire world of possibilities has opened up due to modern technology. Keeping this in mind, does C-DAC have a larger vision for itself given the nation's crying need for better healthcare?
A: C-DAC products are always getting updated with the latest technology and tools. Being a research and development organization C-DAC provides new and future-ready technologies to the community. These new technologies and tools affect our products at first instance along with other modern technologies such as mobile, wearable, cloud-based, and IOT technologies.

C-DAC's vision in health informatics is to provide fully scalable and accessible digital health systems and healthcare environment using cutting edge technology. With this advent of advanced technologies, C-DAC is leaving no stone unturned to keep pace with the digital healthcare.

Q:Is C-DAC planning to release any Apps for the healthcare sector?
A: We are not releasing any apps for now. That is not the plan right now but we can think of it.We have had Apps for developers, for doctors; not for the general public. We have created many tool kits, biological analytics systems through software that we have released to a variety of people.

Q: Any suggestions for policy makers that will help bring about a digital revolution in the country?
A:As we live in a changing environment where rapid development and investment in healthcare informatics is necessary, policy makers must appreciate that the use of technology and creation of conducive environment for R&D is required today for better healthcare services tomorrow.

Q: Any new healthcare products and software on the anvil at C-DAC?
A:C-DAC frequently releases and launches new health informatics products and we make these announcements on our website www.cdac.in. Our recent offerings include e-Raktkosh, a comprehensive blood bank management system, national portal for Family Planning Programme and TB Programme of MoHFW; MoSQuIT- Mobile based Surveillance Quest using Information Technology which helps keep a watch over the status of malaria in a group or a community and comprehensive telemedicine solutions for making healthcare accessible and affordable to bridge the digital divide between rural and urban healthcare setups. We also have the Mobile Tele-Oncology unit for early detection of cancer among rural population, treatment for early stage cervical cancer at the patient location and follow-up consultation for treated cancer cases. The

Mobile Tele-Ophthalmology Unit helps in the early detection of Diabetic retinopathy, glaucoma and other eye diseases.

Abhay Vaidya