

## BioCOS rides on established R&D protocols

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The affordable and personalized healthcare has been a major concern worldwide. The big pharma and diagnostic companies are now realizing the strong impact of efficient computational methods and simulations in reducing use of biomarkers and drug development cost and time. Such issues are now being addressed with clinical genomics and network medicine concept, which heavily relies on computational algorithms and methods for data analysis.

Bangalore-based BioCOS Life Sciences was formed on Jan 25, 2008, to address this concern of accuracy and reproducibility of the available computational methods. The company was started by Mr Sanjeev Kumar and Dr Shipra Agarwal with some senior scientists from Jawaharlal Nehru Center for Advanced Scientific Research (JNCASR) and Indian Institute of Science (IISc) Bangalore in India as its scientific advisers.

The company's focus is on two main things: disease and technology. At present, it is concentrating on specific diseases that are a serious concern in tropical countries. Mr Sanjeev Kumar, CEO and MD of the company, says, "We have established experimentally proven differentiating results in the area of clinical genomics and we take care of the research problems using next-generation sequencing (NGS) technologies. Our technological focus is based on computational algorithms to analyze the voluminous data to generate critical knowledge-based understanding through our NGS, systems biology and network medicine tools and databases." The company is also focusing on developing tools and databases to elucidate the role of non-coding RNAs in regulating the key molecular and regulatory mechanisms in human and model organisms.

The first challenge, Mr Kumar recalls, was to establish an efficient infrastructure. BioCOS was able to develop good and sophisticated cluster nodes and other necessary infrastructure to solve the data complexity and efficient analysis specially for NGS data. Talking about some of the milestones, Mr Kumar says, "Since we always aimed at achieving the developments of high quality research and product, the concept required government support. We were awarded the Department of Scientific and Industrial Research recognition in 2010 based on the company's accreditation for R&D achievements and capabilities."

In short span of time, BioCOS has developed reliable, reproducible and good research outcomes that helped it to achieve various national and international R&D collaborations. It has gained recognition in R&D from several reputed institutions, such as IISc Bangalore, JNCASR and National Institute of Immunology (NII), New Delhi. The company is also nurturing R&D liasons with renowned scientists from France, Germany, Sweden and the UK to develop landmark capabilities in selected fields. "Our research support and services to the JNCASR and Leon University in Paris, France, have led the discovery of key findings in very important areas of biological research," adds Mr Kumar.

At present, the company generates its revenue from contract research done with the usage of highly customized tools, validation and data annotation approaches. The demonstration of the company's reliable and reproducible algorithmic approaches helped the company to bag some highly challenging contract research projects, which facilitated its operations and establishment of the R&D pipeline flow. Later, the company also received R&D grants that further enhanced its endeavor to develop in-house products.

"We have handled challenging and very successful contract research projects for our customers and scientists," says Mr Kumar. "We have worked from designing the analysis to develop the new methods and annotation systems to deliver the best possible research outcomes to researchers using systems biology, transcriptomics and next generation sequencing data analysis. We believe that the research services delivered through the guidance of experienced computational biologists and through interactive communication makes a big difference in achieving the exceptional computational and related biological results." BioCOS has done some contract research projects for the JNCASR in the area of malaria, for National University of Singapore and for some research labs in Europe in the areas of NGS data analysis.

The company is now planning to launch its products in the market and generate revenue. One of them, an integrated product for which a name has not been finalized yet, can handle, manage and analyze transcriptome data (RNA-SEQ and microarray), genome (DNA-Seq-wgs, exome-seq and SNP arrays) and DNA-protein binding (Chip-Seq and Chip-on Chip). The product has various pin-pointed foci to solve the critical problems of the high throughput data analysis, such as capturing more number of isoforms (discovery of novel protein isoforms in disease conditions), more reliable method to capture altered transcription from RNA-sequencing data, identification of structural variation with higher precision, disease specific association analysis and identification of protein-binding sites on genome (with a unique approach to handle repeats).

"Using the novel capabilities of computational methods in our product, we have been providing discovery-oriented research, support and services to highly specialized research labs in India and abroad and are looking forward for more applied and useful alignment with pharma companies now," says Mr Kumar. In April 2012, a paper was submitted in Nucleic Acid Research by the company's associate Ecole Normale Superieure de Lyon, France. The research completely utilized BioCOS' Chip-Seq algorithm.

The ongoing development of iMNET (another product under development) for systems biology and pathway modeling from molecular data is focused on specific human diseases (primarily on metabolic syndrome, CVD, type 2 diabetes, diabetic complications, malaria and some cancers), primary and secondary pathway interactions and physiological mechanisms of some plants). Another scientific R&D paper with company's scientific associations and collaboration with JNCASR Bangalore is under review in Cancer Science which utilized the methods and algorithms of iMNET.

"The parts of these two product are under IP filing process and we plan to launch them soon after the complete validation and IP filing is completed (commercial versions possibly by the end of next year-end)," says Mr Kumar.

The company is on the way to become a major player in some of the healthcare efforts going on in India for metabolic syndrome (type 2 diabetes, cardiovascular disease, hypertension), malaria and some cancers. The company has developed reliable and competent tools to address these diseases effectively in an affordable manner. BioCOS is also looking at enhancing its efforts, existing technologies and approaches for customized systems biology and next-generation sequencing applications to manage and analyze data in a seamless manner. These have already been well-accepted by the collaborators and now the company is looking at enhancing the tools to penetrate this business.

"We are also working aggressively to have an impressive patent portfolio in the near future. We have in mind to invite venture capitalists to invest sizeable funds in BioBOS and in its promising R&D programs and products to take them to next level in a win-win situation for both," Mr Kumar concludes.