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## **Timeless Inspirator- Reliving Gandhi**

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### **Inclusive Innovation through Science and Technology Solutions**

*"You may never know what results come from your action, but if you do nothing, there will be no result."* – Mahatma Gandhi

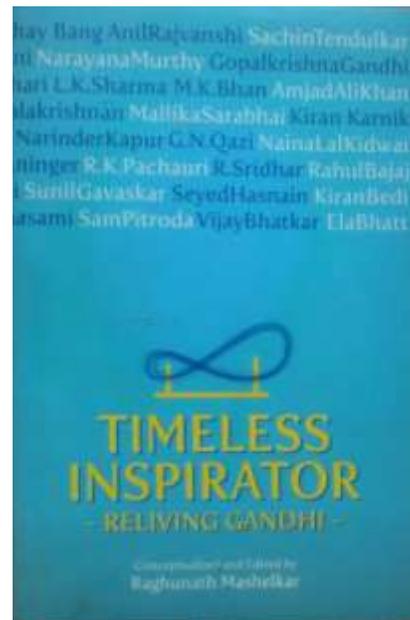
Decades ago, Mahatma Gandhi had urged the nation's scientists to remain ever-alive and responsive to the needs of the under-privileged. His advice to the scientists was "Just as some of the experiments in your laboratories go on for all the twenty-four hours, let the big corner in your heart remain perpetually warm for the benefit of the poor millions."

'Inclusive innovation' is a terminology that is getting firmly etched into national conscience today. 'Inclusive innovation' is nothing but the creation and application of knowledge that is most relevant to the needs of the poor. The truth of the matter is that inclusive innovation is a concept that Gandhiji had pioneered decades ago.

Science and Technology (S&T) are major drivers of a nation's socio-economic development. These drive the progress that mankind makes in eradicating diseases, addressing poverty and catalyzing overall economic growth.

Unfortunately, despite the tremendous progress made by Indian S&T, a large number of people have remained excluded from enjoying the benefits of scientific advancement. One reason for this non-equitable distribution of resources and access to technology is the gap between the laboratory and the people.

In India, the Council of Scientific and Industrial Research (CSIR) has been at the forefront of the movement that has consistently used S & T for the service of the nation. Time and again, CSIR's national laboratories have risen to the occasion to find solutions in the face of technology denials and other challenges faced by the nation. CSIR has had a long history of developing technologies for the masses. Many of these technologies are bringing benefits to the society even today. However, CSIR does not believe in sitting on its laurels. CSIR is a timeless innovator and continuously reinvents itself to meet the ever emerging challenges in a nation with such



vast number of poor people and an equal number of problems. One such creative reinvention by CSIR is the recently launched programme, CSIR 800.

CSIR 800 refers to those of 800 million people, who, according to the Asian Development Bank, live on less than Rs 100 i.e. less than two dollars a day. The reference to the number 800 is intended to serve as a constant reminder to CSIR about its obligation to the people at large and not just to an exclusive section of the society. The programme links CSIR's strategic business model to the economic prosperity of the country. There is a firm resolve that CSIR's innovation strategies have to be built around providing affordable solutions for all the necessities of life. Let us take one key area of healthcare to illustrate the point.

### **Affordable healthcare: A key driver**

Affordable healthcare is a key driver for human well being and, therefore, economic development. The genesis of organized production of pharmaceutical products in India can be traced back, to 800-400 BC when the basic concepts of Ayurveda as a structured system of medicine were laid down. The modern pharmaceutical the Industry in India was started in 1901, with the establishment of Bengal Chemical and Pharmaceutical Works in Calcutta by Acharya P.C Ray. However, medicines largely remained out of reach for many.

The Indian Patents and Designs Act of 1911 was highly in favor of multinational companies. Not unexpectedly, drug prices were one of the highest in the world. In 1970, a bold decision was taken. The patent Act of 1970 replaced the Act of 1911 and allowed only process patents. This was a turning point in nation's history. This is where the foundations of a resurgent Indian drugs and pharmaceutical industry were laid.

Today India has an estimated 24,000 plus drug manufacturers. Together they produce output valued at nearly US \$18 billion (estimated to grow about 12% annually). The Indian pharma Industry is ranked 4th in terms of volume and 13th in terms of value of production. It commands nearly 22% of the global generic market.

Indian pharmaceutical industry has excelled itself in providing affordable healthcare to the people of India. The CSIR Laboratories have been key players in the development of Indian generics in partnership with the Indian drugs and pharma industry. These affordable generics have helped save millions of lives, not only in India but around the world.

One recalls with pride what happened more than a decade ago, when the anti-retroviral treatments for HIV-AIDS were costing US \$ 10,000 for a year's treatment. A pharmaceutical company from India offered the treatment for US \$ 300. This set up a big international debate about intellectual property rights and the rights of the poor. It set up a debate on the obligation of the countries in maintaining public health as regards Trade Related Aspects of Intellectual

Property Rights (TRIPS). And then came the Doha Declaration, where this issue of TRIPS Vs public Health was amicably resolved with enabling s of such life-saving yet provisions that made it possible to have access patented drugs for poor nations.

It needs to be recognized that the basic process development work with innovative process chemistry for those anti-retrovirals to that of HIV-AIDS was done at one of the pre-eminent chemical laboratories of CSIR. This is a very powerful example of CSIR working for the public health rights of the poor, not only in India, but around the world.

Drug discovery continues to be an extremely expensive and Chancy proposition. Estimates about the cost of developing a new drug and taking it to market place vary from a low of \$800 million to nearly \$ 1.5 billion per drug. Overall, the discovery and development of a new medicine takes about 12 to 15 years.

It is estimated that only about 30 percent of new medicines actually earn enough revenue during their patented product lifecycle to cover the average upfront cost of development. This poses a great challenge, when it comes to diseases of the poor, such as tuberculosis (TB). For TB, the market size is only about US\$ 300 million. This is not lucrative for profit seeking drug manufacturers. The result is that the research on discovering new molecules for TB is being neglected currently.

While Intellectual Property Rights (IPR) cannot be totally discarded, there has to be a balanced view between health as a right and health as a business. Developing drugs for the poor, such as for TB, requires innovative solutions. Open Innovation is practiced in other fields. Why not in drugs and pharmaceutical industry? Can we draw a leaf out of the software industry? Linux, open source software is a very good example. Linux proved to be transformative. Can we have, similarly, a transformational approach in drug discovery?

### **Open Source Drug Discovery (OSDD): A step towards affordable healthcare**

It was this challenge that gave rise to the idea of Open Source Drug Discovery (OSDD). This is a CSIR-led team India consortium with global partnership, provides a decentralized, global, web-based platform for the best minds to collaborate. It enables them to solve the complex problems associated with drug discovery for infectious diseases. It is a radical departure from a hierarchical model of doing science towards one, where all collaborators are treated as equal.

This approach could effectively transcend geographical barriers yet harness the power of distributed peer-review. It was a perfect mechanism that could potentially fulfill the hope of providing inclusive of healthcare to all and especially to the weaker sections of the society.

OSDD is focused on TB, which has especial relevance for India, which sees about 1.8 million cases per year. There are two TB-related deaths every three minutes in India. Mycobacterium tuberculosis (Mtb) is the pathogen behind Tuberculosis...one of the three "primary diseases of poverty." Although July 2008 marked a decade since the genome of MTb was sequenced and made available to the scientific community, a single drug therapy for Tuberculosis still remained out of reach.

In OSDD, the larger, more complex problem is broken down into simpler and smaller sets with well-defined deliverables called work-sets. These can then be targeted by the registered participants, who form a balanced ecosystem of complementary skills. All research findings are held in a shared database, through a globally accessible portal, which any research institution involved in TB research, can access ([www.osdd.net](http://www.osdd.net)).

As on 21 August 2010, there are 4181 registered members representing 127 countries. While not all the countries of the world have joined as yet, the representatives span the A-Z of the comity of nations: A as in Albania and Z as in Zimbabwe.

This year, in Delhi, the power of the OSDD community was in evidence. Extensively using Web 2.0 collaborative tools, a batch of student volunteers under the supervision of senior scientists, both from India and abroad, worked together. They self-organized themselves into functional entities; each taking a small chunk of the annotation puzzle.

In record time, they came up with a Google map- like visualization of the various pathways of Mtb. This OSDD-TB Metabolome map documented about 3500 proteins, 3000 species and 1400 reactions. It is, without doubt, the most comprehensive map of the pathogen's metabolome till date.

The programme was called Connect to Decode (C2D) and it was the first time that a comprehensive mapping of the Mtb genome was compiled, verified and made publicly available. C2D findings are likely to contain critical data, which, if mined effectively, may unlock precious details about the organism's vulnerability. This will provide targets for newer drug.

The enthusiasm was truly contagious. Others started joining in. Infosys Technologies joined in as a partner for CSIR's OSDD. It announced its support to international collaboration on 11 April 2010. The hope was that this will drive a new paradigm in drug discovery and promote affordable healthcare in the developing world.

It is hoped that these small steps taken will leave giant footprints on the sands of time. Global open source collaboration has a huge potential in achieving the long awaited goal of availability

of affordable healthcare solutions for millions of underprivileged people in the developing world.

One is sure that if we were blessed with Gandhi's presence around today, he would have applauded this approach of creating a global public good through an innovative global partnership through OSDD. He would have certainly applauded this OSDD spirit of 'of the people, by the people, for the people'.

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