



Science, Technology and Innovation and the Challenge of Epidemic

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In a recent twitter talk Principal Scientific Advisor (PSA) Professor K. Vijay Raghavan described some of the ideas used to tackle the innovation, including expediting review of proposals on innovative solutions and try to guide the prospective innovators on regulatory issues.¹ He also talked about caution against over-interpretation of findings and need for more evidence for theories and hypotheses proposed on aetiology link between immunity and vaccination and enhancing immunity. In such times, there is a need for caution against quick conclusions and to promote evidence-based policy making. The dilemma here is that evidence-based policy making in such circumstances cannot take too much time to arrive at policies and to implement them. Hence the Government should promote more interdisciplinary research and integrate decision sciences in this and link use of Artificial Intelligence (AI) and machine intelligence. The Tata Consultancy Services (TCS) is using AI to find drugs for Corona.² It will be better to bring together groups working on AI and health. We may need teams of experts from various disciplines to analyse new findings and infer them for policy

making. As the government is promoting open access and collaborative research in this issue, the idea of strategic collaborations among institutions, industry and academic establishments can be thought of.

However, the major challenge now is to find effective solutions quickly and ensure that they are widely adopted. The use of open innovation can help in this and innovation challenges can be organised for specific themes/problems. Another approach would be prize fund to address and solve a particular issue. For example, a prize for a low-cost ventilator suited for Indian conditions can be announced and the innovator can be rewarded with a prize. But given the commercial scope of the innovations, mere prizes won't be attractive unless the prize money is huge and very attractive. Hence prize plus help in commercialising will be a better incentive. Or in addition to the prize, the government can buy the technology and related IP, out right and license them. Or the innovator can be encouraged to license and transfer the technology.

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solved through reverse engineering. Given the phenomenal capacity in reverse engineering for processes in India, it is time to identify problems that can be better solved through reverse engineering. Here too the focus should be on timely solving of problems and rewards for it.

Through ATAL Innovation Mission (AIM) and similar schemes, a culture of innovation is being inculcated by the Government of India. On the other hand, we have thousands of students who have been receiving fellowships from INSPIRE.³ The Government can try to link these and see how best such facilities that are developed under AIM can be used by INSPIRE Fellows and how AIM can also contribute to finding solutions to the epidemic. For example, Maker labs can be used to develop prototypes and substitutes.

3D printing has been used during the crisis to produce spare parts for ventilators at very affordable prices in Italy. Although there are IP issues, using this crisis, opportunities for using 3D Printing to develop substitutes, spares and innovative products should be created. In fact, we would suggest that given the huge need for ventilators and other equipment and other items used, wide spread use of 3D Printing can be promoted. The current ones can also be harnessed for this. Using this opportunity government can develop a plan for harnessing 3D Printing in health sector, particularly in bio-medical engineering.

PSA mentioned about finding solutions to problems like maintaining hygiene in shared facilities and how to maintain social distance when limited space has to be used by many. In addressing such problems, frugal innovation approach can help. The frugal innovations are generally meant for Bottom of the Pyramid population or for areas where facilities available are not adequate for implementing typical and standard solutions. We suggest that such problems can be first identified and listed and then the scope for frugal innovation can be examined. Some of the available ones may be tweaked while working on new ones can be promoted.

In this context, it should be pointed that through the Science For Equity, Empowerment and Development (SEED) division, the Department of Science and Technology (DST) has supported many NGOs and innovations working with women, tribal groups and rural areas. They have a wide range of innovative products and

technologies.⁴ Some of the technologies may be examined for their relevance in addressing this crisis. It is also suggested that their innovative capacity can be harnessed to develop products and technologies.

Open access to information and data has been promoted so that research groups can access, publish and share without constraints. This is a welcome development. But open access to information and data from/in India should be linked with globally available information and data, on one hand, and with open access tools, protocols and libraries (of chemicals, biological materials) and data so that there is synergy. To facilitate this, the Government of India should promote open source projects and groups working in Corona. Such groups and projects can be interdisciplinary and can work together to develop open access tools, processes and products. The Open Plant SynBio Project in Cambridge University is a good example.⁵ It combines Open Source with Do-It-Yourself Biology and encourage open source hardware and instruments. Although the epidemic may be conquered in the short run, in the long run it is desirable to have an Open Source Project on epidemics so that all aspects are addressed and solutions are found.

Finally, it is time to revisit the Open Source Drug Discovery (OSDD) model.⁶ While CSIR launched OSDD project in 2007 to find cures for TB, a similar project can be launched now to meet the challenges of the epidemic. This new project can be a collaborative one involving other developing countries and other stakeholders such as foundations and industry.

Endnotes

- ¹ <https://twitter.com/abhayjere> discussion on 8th April 2020
- ² <https://www.thehindu.com/sci-tech/science/coronavirus-tcs-uses-ai-for-drug-discovery/article31257352.ece?homepage=true>
- ³ <https://online-inspire.gov.in/>
- ⁴ <https://dst.gov.in/seed-home>
- ⁵ <https://www.openplant.org/>
- ⁶ Krishna Ravi Srinivas 2010, 'Open Source Drug Discovery: A Revolutionary Paradigm or A Utopian Model?' In 'Incentives for Global Health: Patent Law and Access to Essential Medicines Series: Connecting International Law with Public Law: Edited by Thomas Pogge, Matthew Rimmer and Kim Rubenstein- Cambridge University Press 2010- Pp 263-283