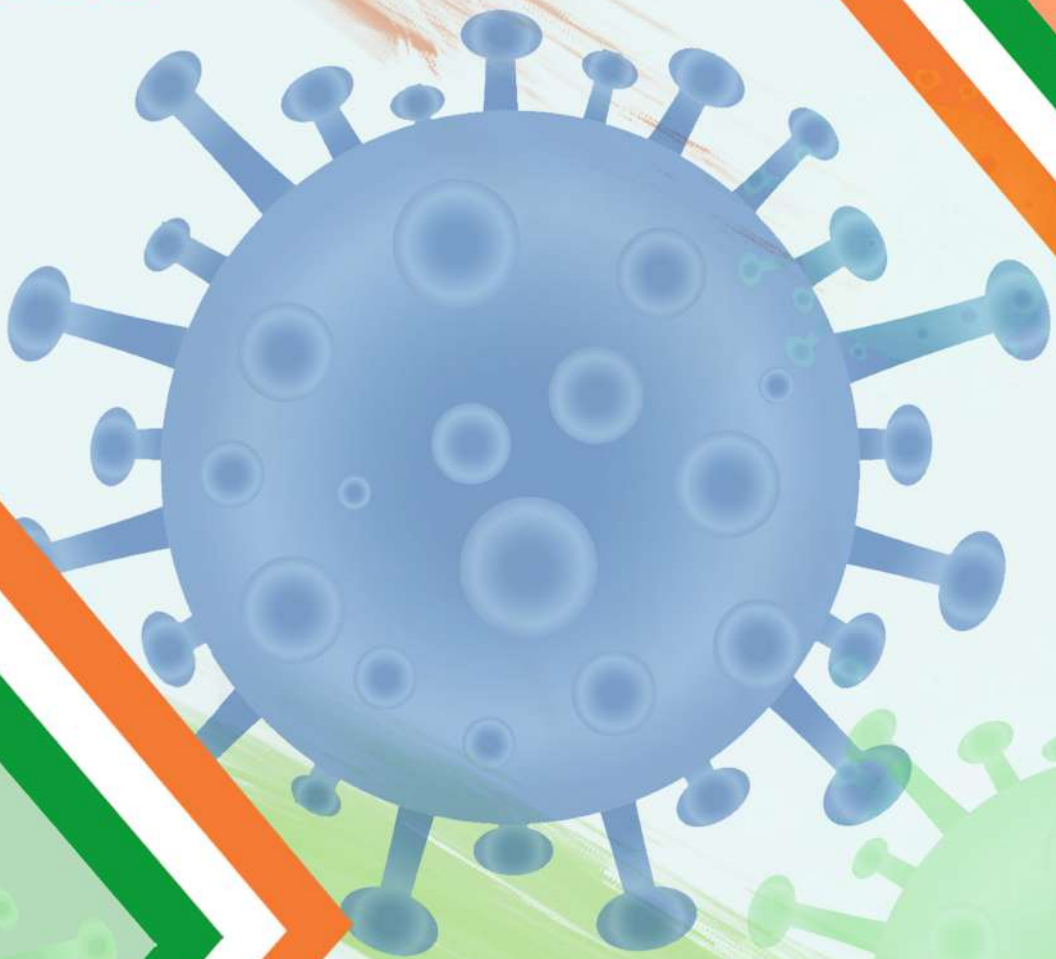
SCIENCE & TECHNOLOGY EFFORTS IN INDIA ON COVID-19

SPECIAL ISSUE
Initiatives from the Office of the PSA

25th October 2020



Compiled by
VIGYAN PRASAR
An Autonomous Organisation of
Department of Science & Technology,
Government of India

सबका साथ, सबका विकास, सबका विश्वास
Sabka Saath, Sabka Vikas, Sabka Vishwas

सत्यमेव जयते

डॉ हर्ष वर्धन
Dr Harsh Vardhan

स्वास्थ्य एवं परिवार कल्याण, विज्ञान और प्रौद्योगिकी व पृथ्वी विज्ञान मंत्री, भारत सरकार
Union Minister for Health & Family Welfare, Science & Technology and Earth Sciences Government of India

FOREWORD

The 2019 Novel Coronavirus (SARS-CoV-2) has spread rapidly throughout the world and has assumed the proportion of a Pandemic. Given the lack of an efficacious vaccine as well as non-availability of suitable chemotherapeutic interventions, mankind is experiencing an unprecedented existential crisis.

2. The Ministry of Science and Technology and the Ministry of Health & Family Welfare, with their various departments, are contributing in various ways towards the national R&D efforts for developing solutions to combat COVID-19. The Department of Science & Technology under the Ministry has launched a nationwide exercise to map and boost development of COVID-19 solutions with R&D, seed capital and scale-up support. All academic and research institutions are being reoriented to focus on the development of diagnostics, vaccines, antivirals, disease models and other R&D to enable a cure for this dreadful disease. Around 15 labs of Council of Scientific & Industrial Research (CSIR), under the Department of Scientific & Industrial Research, across the country are working in close partnership with major private sector Industries, PSUs, MSMEs and other Government departments to develop solutions for COVID-19. The Department of Biotechnology (DBT) under the Ministry has also formed a consortium to support the development of Medical equipment, Diagnostics, Therapeutics, Drugs and Vaccines to meet the Healthcare Challenges. Indian Council of Medical Research (ICMR), under the Ministry of Health & Family Welfare has already isolated the virus strain successfully, which is a first step towards vaccine research. Similarly, various other organizations under Ministry of Human Resource & Development, Ministry of Defence, Ministry of Chemicals & Fertilizers, etc. are also contributing substantively to our R&D efforts. The private sector has also come forward in a big way to supplement these efforts.

3. With a view to spreading awareness about the S&T efforts of the Government of India as well as private sector in finding solutions for COVID-19, Vigyan Prasar - an autonomous institution under Ministry of Science & Technology and engaged in large-scale science communication and popularization activities - has compiled all initiatives being undertaken in this field.

4. This document "Science & Technology Efforts on COVID-19 in India" shall serve as a ready-reckoner for policy makers, scientists, researchers, scholars and other stakeholders who might be interested in understanding and keeping themselves abreast with the latest S&T efforts being made to develop solutions to combat COVID19.

(Dr. Harsh Vardhan)

कार्यालय: 348, ए-स्कंध, निर्माण भवन, नई दिल्ली-110011 • **Office:** 348, A-Wing, Nirman Bhawan, New Delhi - 110011
Tele: (O) : +91-11-23061661, 23063513 • **Telefax:** 23062358 • **E-mail:** hfwminister@gov.in
निवास: 8, तीस जनवरी मार्ग, नई दिल्ली-110011 • **Residence:** 8, Tees January Marg, New Delhi - 110011
Tele: (R) : +91-11-23794649 • **Telefax:** 23794640

के. विजयराघवन
भारत सरकार के प्रमुख वैज्ञानिक सलाहकार
K. VijayRaghavan
Principal Scientific Adviser to the Govt. of India

सत्यमेव जयते

विज्ञान भवन एनेक्सी
मौलाना आजाद मार्ग, नई दिल्ली - 110011
Vigyan Bhawan Annexe
Maulana Azad Road, New Delhi - 110011
Tel. : +91-11-23022112
Fax: +91-11-23022113
E-mail : vijayraghavan@gov.in
office-psa@nic.in
Website : www.psa.gov.in

FOREWORD

Science, Technology and Innovation play a crucial role in advancing humanity and bringing prosperity to society. Developed and developing societies invest in science and nurture the entrepreneurial energies that can harness the fruits of science in the form of innovative products. These products provide solutions to myriad challenges.

Until recently, most people would not have heard of corona viruses. But they, and the diseases they cause in humans and animals, have been recognized for over 50 years. The novel corona virus disease (COVID-19) now affects millions around the world. The capacity of health systems globally were put to a 'stress-test' in responding to the needs of all those requiring immediate care.

Product and technology development usually takes time, involves enormous sums of capital and is riddled with risks. The role of the Government, as a catalyst, to reduce some part of this risk is a policy instrument that has been used across the world. To address the challenge, this office has facilitated the engagement and whole-heartedly participation of industry. As a result, tens of solution-centric products and technological interventions are made available for public use immediately, which include disruptive technologies in the field of diagnostics, prognostics, theranostics, and intensive care and so on. Still, tens of more focussed research are ongoing for vaccine development and targeted drug candidates for therapeutics. Success in the biotech product development endeavour in India highlights the fact that the Indian biotech industry can deliver highly innovative technologies and products that have national as well as global relevance.

Transitioning India into product development and the manufacturing nation has been one of the primary aims of 'Make in India' and 'Startup India' programmes that were launched in 2014 and 2016, respectively. It is indeed good to see innovative products which have been made available quickly during these critical times – all of them are creatinga visible and tangible impact. One defining feature of all the products featured here is that they have successfully interwoven high quality with affordability and have a significant potential to deliver maximum societal impact – the true measure of success of any innovative product, service or process. Further, they indicate a feature of demonstrating that Indian industry has the strength to successfully deliver the goals of 'Make in India' and 'Start-up India'. Each of the product has a passionate team behind it that has risen to the challenge of delivering a best in the class product by India, in India, for India and the world. We congratulate them for their efforts and wish them even more success in the future.

Integrating innovation culture into the national scientific enterprise can indeed bear superlative results-Indian Industries' revolution in triggering this culture is reflected in this compilation. We believe that communication is more critical now than ever. Sharing our knowledge and perspectives on time will be an invaluable weapon to fight together this invisible war. Vigyan Prasar, with its sizeable reach, is doing a commendable job in compiling and publishing the efforts by various agencies towards the mitigation of COVID-19, untiringly since the eruption of the pandemic in India.

It seems clear that we have to live with COVID-19 for a while and, therefore, strict vigilance should be maintained especially during the ongoing long festive season.

K. VijayRaghavan

(Prof. K. VijayRaghavan)

PREFACE

The COVID-19 pandemic is unleashing a human development crisis. On some dimensions of human development, conditions today are equivalent to levels of deprivation. The crisis is hitting hard on all constitutive elements of it: economy, health and education. Most of the current strategies to reduce the risk of SARS-CoV-2 transmission are based on controlling interactions between humans, including case isolation, tracking patient contacts and screening passengers crossing borders. The pandemic has posed one of the biggest challenges to the entire humanity. In the wake of its outbreak, our lives have changed in ways we had never imagined before.

In these critical times, access to authentic information is of paramount importance. Vigyan Prasar (VP) has been covering the pandemic since the early days with the science communication perspective, ensuring that science and safety are the primary focus. For the benefit of the stakeholders and target audience, Vigyan Prasar is preparing and publishing compilation of the most relevant initiatives and efforts taken by the Government of India through its various Science Ministries, Departments, and Funding organizations, in the shape of daily, weekly, and now fortnightly e-Newsletter. These research-driven and technology-based interventions have been initiated on war footing to fight out the outburst of the pandemic.

Taking the journey further, this edition of newsletter extensively covers initiative taken and facilitated by the Office of the Principal Scientific Adviser (PSA) to the Government of India. The initiatives indicate a paradigm shift in S&T governance through the office, as the common beeline was the speedy implementation with transparency.

The pandemic was superimposed on unresolved tensions between people and technology, between people and the planet, between the haves and the have-nots. These tensions were already shaping a new dimension of inequalities pertaining to enhanced capabilities and the new necessities of the 21st century. But the response to the crisis carries the potential to shape strategies on how those tensions can be addressed and how inequalities in human development are reduced. We hope this initiative of Vigyan Prasar shall be a handy guide to scientists, researchers and scholars, especially those who are interested in knowing various aspects of COVID-19 and contributing to the coronavirus warfare and making the nation Aatmanirbhar.

Vigyan Prasar
New Delhi

SCIENCE & TECHNOLOGY EFFORTS TO MITIGATE COVID-19 BY THE

OFFICE OF THE PRINCIPAL SCIENTIFIC ADVISER (PSA)

Guidelines and policy-level decisions taken up after national level COVID-19 Pandemic eruption

Expanding testing facilities in the country

The Empowered Committee on R&D has worked towards enhancing the testing facilities to meet COVID-19-related challenges by leveraging the existing resources (instruments and human resources) in Government of India laboratories. It has enabled ICMR to issue the required notification allowing institutions under DST, DBT, CSIR, DAE, DRDO and Indian Institute of Science (IISc) to self-assess and prepare their BSL labs for research and testing of coronavirus. The O/o PSA has developed a "Handbook for COVID-19 testing in Research Institutions" which allows more such labs to self-assess its preparedness in terms of equipment, staff and expertise required for COVID-19 testing. A detailed checklist has been outlined, which can be used by a research lab to self-assess and indicate their preparedness for declaring the lab as a research and testing facility for COVID-19 after ICMR approval.

Mobilising Scientific Community

The office of the PSA has played a coordinating role for government ministries/departments, scientific institutions, academia and enterprises to accelerate decisions on dealing with research and innovation-based actions to meet the COVID-19 challenges. Support has been provided to enable national, state and local bodies towards evidence-based action and to mobilise the scientific community for providing targeted solutions. To this end, the O/o PSA constituted the Science & Technology Empowered Committee for COVID-19 on 19 March 2020.

The committee was chaired by Prof Vinod Paul, Member, NITI Aayog and Prof K VijayRaghavan, Principal Scientific Adviser. It is responsible for coordination amongst science agencies, scientists, industries and regulatory bodies, and to take speedy decisions on research and development-related issues to tackle the SARS-CoV-2 virus and the COVID-19 disease. The committee has worked towards implementation of scientific solutions to meet COVID-19-related challenges. It has enabled ICMR to issue the required notification allowing institutes under DST, DBT, CSIR, DAE, DRDO and Indian Institute of Science (IISc) to self-assess and prepare their BSL labs for research and testing of coronavirus through the standard and rigorous protocols as stipulated by ICMR.

A mechanism has been evolved between various STI funding ministries/departments/agencies to ensure a rapid and coordinated mechanism to support various research and innovation projects. This includes (i) Constitution of a Task Force on Repurposing of Drugs (TFORD-COVID19) to look into the status of scientific evidence, technology readiness levels, the status of IP, manufacturability in India etc. In depth information on various drug candidates will help

to allow informed decision making. The regulatory/legal processes are also being addressed. (ii) Mathematical models to track the disease spread and models to predict the medical equipment and auxiliary requirements of the COVID-19. (iii) Manufacturing of test kits, ventilators, PPE in India. The Government of India on 29 March 2020 constituted 11 Empowered Groups of Officers, under DM Act 2005, to engineer a well-planned and coordinated emergency response to ensure health and economic security of millions of Indians from COVID-19 outbreak. These Groups are empowered to identify problem effective solutions thereof; delineate policy; formulate plans; and take necessary steps for effective and time-bound implementation for these. PSA is a member of the Group responsible for coordinating with the private sector, NGO, International bodies for response-related activities.

Aarogya Setu - Links contact tracing and testing

The O/o PSA has been instrumental in the launch and outreach of the AarogyaSetu App. The app built through public-private-partnership will help people assess themselves the risk for their catching the Coronavirus infection by tracking infected cases in the vicinity. This is a data protected App using cutting edge Bluetooth technology, algorithms and artificial intelligence tools.

The App will help the administration to take necessary, timely steps for assessing the risk of spread of COVID-19 infection and ensuring isolation where required. The PSA also serves on a committee constituted by the Cabinet Secretariat to evaluate and ensure development and launch of Citizen App technology platform to help citizens and government in combating COVID-19 issues arising out of this pandemic.

Advisory on Homemade Mask Manual

The O/o PSA has issued a detailed manual on homemade masks for curbing the spread of Coronavirus. The guide provides a simple outline of best practices to make, use and reuse masks to enable NGOs and individuals to self-create such masks and accelerate the widespread adoption of masks across India. This has now become a part of the national advisory for citizenry issued by the MoHFW. The manual has been released in several regional languages.

COVID-19 Critical Medical Supplies Digital Platform

COVID-19 critical medical supplies advisory cell is enabled by a digital platform to facilitate States with managing supply and demand of critical medical equipment and enable efficient decision making with regards to procurement of the same. The platform has been developed by Invest India (of DPIIT) in partnership with the O/o PSA and will be provided to the States through the MHA Empowered Committee. The portal will help:

- national demand aggregation of critical medical equipment;
- provide access to supplier information at one place – GeM, Invest India, Industry Association (FICCI, PhD Chamber of Commerce, CII, etc.);
- enable states to estimate numbers of critical medical equipment based on the number of patients and healthcare workers;
- centralized query mechanism and online facilitation for States seeking advice on managing medical equipment demand/supply/usage single source of information for people and infrastructure resources prepared by NSDS geotagging of crises management infrastructure (healthcare centres, isolation centres, etc.) along with the district-wise patient load.

Convergence on the COVID-19 Innovation challenges

The Office of the PSA has converged efforts across various government departments and programme to identify innovations that can tackle COVID-19 challenges. The effort has: (i)

brought together DST, AIM, StartUp India and AGNIi to evolve standard criteria for evaluation and shortlisting of best solutions; (ii) sensitise R&D and academic institutions and City Clusters to submit solutions for COVID-19 challenges; (iii) enable new potential technologies for testing at government labs/academic institutions; (iv) connecting with industry partners through CII for ensuring rapid manufacturing; (v) channelling financial resources and other enabling mechanisms for their implementation; (vi) so far 22 start-ups have been shortlisted for support by AGNIi team from more than 400 applications.

Industry coordination and participation through CSR

The O/o PSA worked with the Ministry of Corporate Affairs for issuing an enabling OM for the use of CSR funds for research and innovation projects for providing solutions to meet the COVID-19 challenges. This has ensured the speedy engagement of industries to support the COVID-19 crisis with resources through available CSR. The O/o PSA is coordinating with R&D labs for accessing these funds as healthcare, and preventive healthcare are covered under Schedule VII of Companies Act as Specified CSR activity.

Foot-Operated Washing Station implemented at IAO

Foot-operated Washing Station, implemented at the Indian Astronomical Observatory (IAO), Hanle, Ladakh, provided as an example for implementation in the 'Guidelines for hygiene and sanitation in densely populated areas, during the COVID-19 pandemic' released by the Office of the PSA. IAO has one of the world's highest located sites for optical, infrared and gamma-ray telescopes. It is operated by the Indian Institute of Astrophysics (IIA), Bengaluru.

Medical Equipment Regulation

The Office of the Principal Scientific Advisor has provided specific support to help understand and formulate regulatory requirements in the Indian context for ventilators and other medical equipment.

Setting up of S&T Core Team

A 'Science & Technology core team' has been set up in the office of the Principal Scientific Advisor to crowdsource ideas and solutions from experts, companies, academia and citizens to tackle the spread of the COVID-19 virus in the country.

Access to healthcare equipment for vulnerable sections

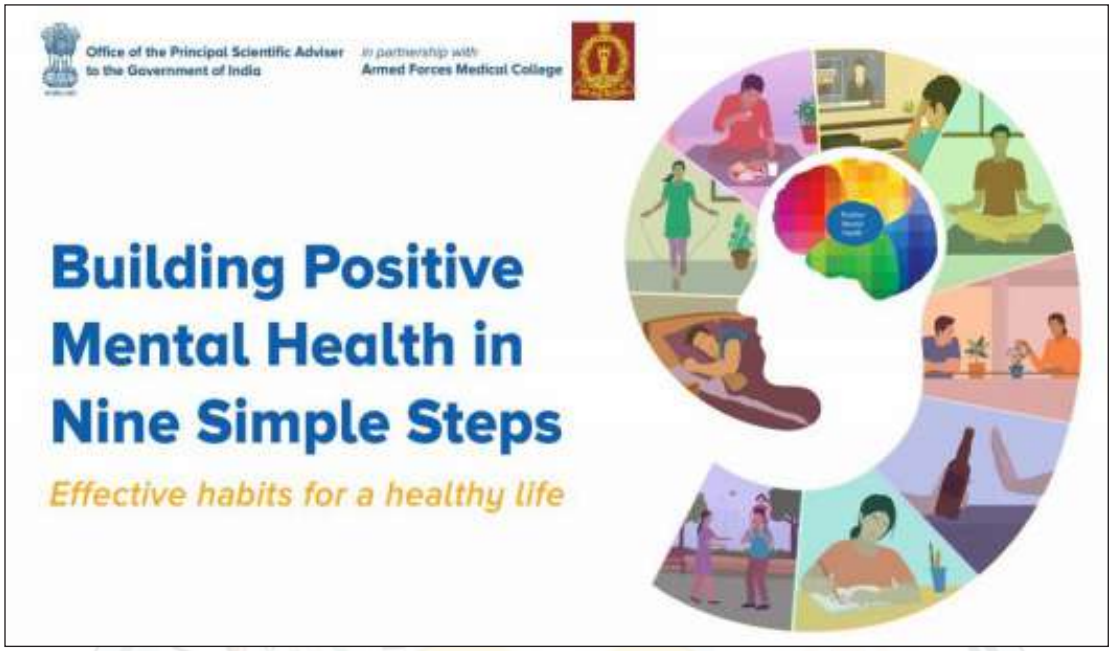
The O/o PSA is working on specific measures for the elderly and the underprivileged and people without phone access.

Facilitating outreach through science communication & popularisation Agencies

The O/o the PSA has been closely working with science communication agencies such as Vigyan Prasar. COVID Gyan (https:// covid-gyan.in), a website dedicated to scientifically accurate COVID-19 content and resources, has been launched as a joint initiative of multiple research institutions.

Simple guide to building positive mental health

As news about SARS-CoV-2 (COVID-19) dominates the headlines and public concern is on the rise, taking care of mental health is as important as looking after the physical health. Good mental health and positive wellbeing can help individuals better cope with the COVID-19



threat and the uncertainty it is creating. Resilience is the process of finding healthy ways to adapt and cope with adversity and distress. Building resilience can be the key to helping the individuals get through the COVID-19 pandemic crisis and its aftermath. It can help protect one from various mental health symptoms, such as depression, anxiety and traumatic stress. It can also help those who already have mental health conditions cope better. Prior tragedies have shown the power of resilience. Knowing this and how to build resilience can be a source of great hope for many people. In fact, people can even experience emotional growth after a tragedy.

In association with Armed Force Medical College (AFMC) Pune, Office of the Principal Scientific Adviser brings forth a guideline book to build positive mental health. This e-book is published in Hindi as well as in English to reach out to the larger audience.

Innovation Challenge on COVID-19 Biomedical Waste Treatment

The Prime Minister's Science, Technology and Innovation Advisory Council (PM-STIAC) through the Office of the PSA to the Government of India has set up the 'Swachh Bharat Unnat Bharat' Waste to Wealth Mission to identify technology solutions for India's waste challenges.

The mission invites technology applications from start-ups, corporates and entrepreneurs from research institutions to address the challenge of safe collection, disposal/treatment of large volumes of waste being generated during the ongoing COVID-19 pandemic which includes the use of masks, gloves, and PPEs by not only frontline workers and airports and railway stations but also by household community individuals such as municipal sanitary workers, barbers, the food business and the general population.

Eligibility Criteria: Indian industry, start-ups, entrepreneurs, and research institutions are eligible to apply for innovations and solutions which can be deployed immediately.

Contact Info: SBUB@investindia.org.in

Novel Coronavirus Disease 2019 (COVID-19): Guidelines on rational use of Personal Protective Equipment

The guideline is for healthcare workers and others working in points of entries (POEs), quarantine centres, hospitals, laboratories and primary healthcare & community settings. The guideline uses the setting approach to guide on the type of personal protective equipment to be used in different settings.

Website link:
http://psa.gov.in/sites/default/files/pdf/GuidelinesonrationaluseofPersonalProtectiveEquipment.pdf.pdf

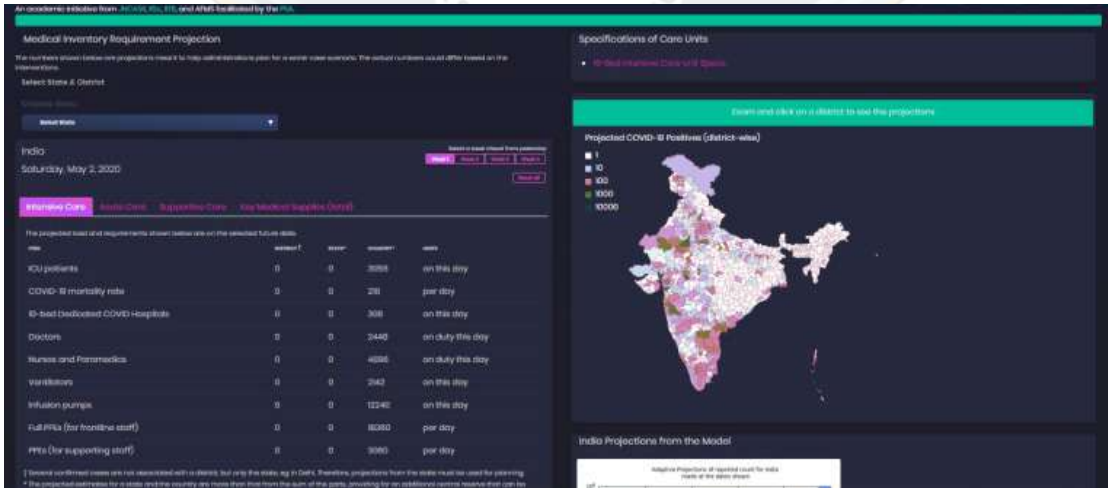
Handbook for COVID-19 testing in Research Institutions

Handbook for COVID-19 testing in Research Institutions has been adapted from World Health Organization (WHO) Interim guidance for laboratory testing and issued by the Office of Principal Scientific Adviser to the Government of India. The purpose of this document is to provide interim guidance to laboratories and stakeholders involved in COVID-19 testing of patient samples. Adoption of these best practices is left for the discretion of the laboratory supervisor.

Website link:
http://psa.gov.in/sites/default/files/pdf/Handbook_COVID19_Research_Institutions.pdf

COVID-19 Medical Inventory

The COVID-19 Medical Inventory is an academic initiation from Jawaharlal Nehru Centre for Advanced Scientific Research (JNSCAR), Indian Institute of Science (IISc), Indian Institute of Technology Bombay (IITB), Mumbai, and Armed Forces Medical Services (AFMS), facilitated



by the PSA. The inventory is a district-level short-term conjecture of medical inventory for COVID-19. This includes inventory for intensive and acute supportive care requirements. The mathematical model has been tuned with the recent data and the projections have now been revised. The numbers shown below are projections meant to help administrations plan for a worst-case scenario; however, the actual numbers could differ based on the interventions. This web application provides a four-week projected requirement for various medical inventories across districts, states, and the national level. The initiative aims to be helpful in planning for infrastructure, arranging essential human resources and procurement of materials. MSMEs and other industries working in the production and supply chain of these essentials may use these projections to support their local government administration.

Website link:
https://covid19medinventory.in/

Office Memorandum for focused research on Corona vaccines and other S&T issues

A Task Force for focused research on Corona vaccines and other S&T issues (referred to as the Vaccine Task Force, VTF) Co-Chaired by Dr Vinod Paul, Member, NITI Aayog and Prof K VijayRaghavan, Principal Scientific Adviser to the Government of India has been constituted by the PMO. The Empowered Technology Group (ETG) has been approved by the Cabinet and is Chaired by Prof K VijayRaghavan. The Joint Committee of the ETG and PMO constituted Task Force for focused research on Corona vaccine and other S&T met on April 16 and April 20, 2020. The ETG and VTF have approved the 'Guidelines for sharing of biospecimen and data for research related to COVID-19'. These guidelines should be followed and the stipulated timelines for sharing/ providing biospecimens should be adhered to.

Website link:
http://psa.gov.in/sites/default/files/VaccineTaskForce_ETG_Guidelines.pdf

KISANMITR Initiative to meet demand side of agri technologies for farmers through S&T enablers

With the imposition of lockdown, India has faced a unique challenge of migration of a large number of workers from unorganised sectors in urban, peri-urban regions to villages and rural areas. This will require to rapidly engaging the migrants moving to primary agricultural and rural livelihood settings by supporting them with effective employment opportunity locally through technological and innovative solutions to increase their efficiency and yield. This will also require youth migrants who could be supported by making them change agents or trained personnel for the deployment of technical know-how etc. in villages.

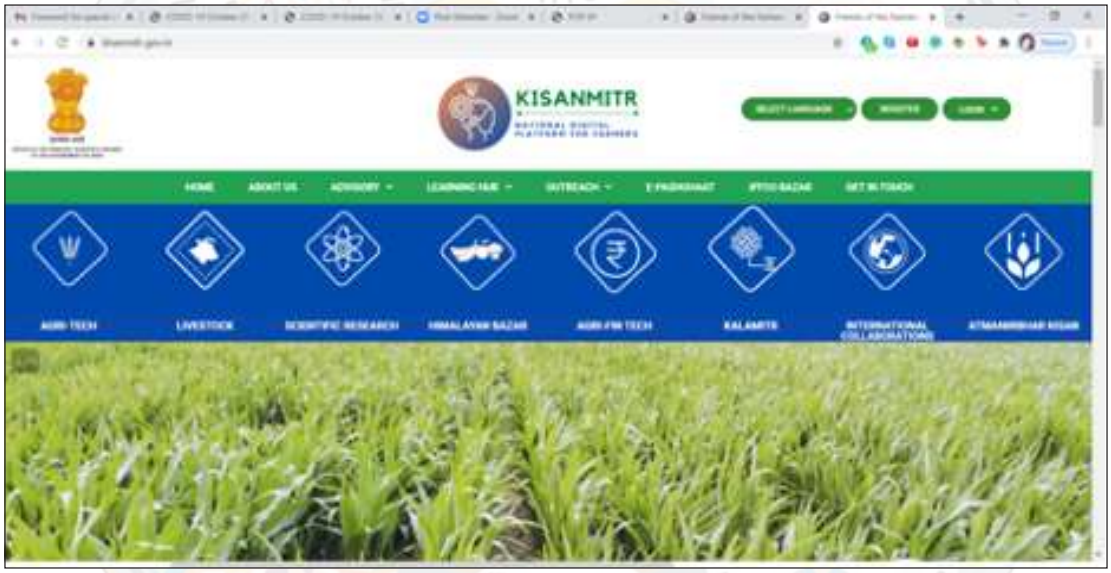
To meet the load on agriculture and to ensure sustainable farm and allied products including best rural practices, both agro-scientific research output and agri-technologies deployment will be essential at this juncture as an effective response through a COVID-19 Agriculture track being launched by the Office of the Principal Scientific Adviser to Government of India.

The objective of the call was to support the migrants and other agriculturists by providing access to scientific knowledge and innovative technologies as well as required capacity building by involving scientists and technologists from national laboratories and academic institutions along with their incubated start-ups from the supply side. Efforts will be made to bridge the

supply side with the demand side by proactively involving enablers like industry, accelerators, foundations and public agencies to support technologies and solutions through evaluation for low cost, high quality, bankable and scalable projects in agriculture and allied areas. The range of scientific and technological products would include, amongst others, light equipment, scientific solutions and heavy-duty technologies.

An Atmanirbhar India can be achieved primarily through self-reliance and self-sustainability in agriculture. Standardization and promotion of indigenous knowledge of agricultural technology, techniques and resource utilization are imperative. However, in India, the findings relevant to farmers are housed in multiple national and international databases. This data could be relevant and helpful to the farmers if found on a single unified platform.

Moving ahead with the call, the Office of the Principal Scientific Adviser (PSA) to the Government of India has launched an initiative called KisanMitr. The initiative aims to transform agricultural extension in rural India using the latest available digital platforms, technologies and research methods. The group of experts and partners shall build, scale, and improve mobile phone-based agricultural extension with the goal of increasing productivity and income of smallholder farmers and their families pan India.



KisanMitr is a seven-phase project aimed at supporting farmers to become Atmanirbhar (self-reliant).

The first three phases focus on creating a repository of agricultural technologies, livestock technologies, and scientific research to catalyze modernization of farming and solve information asymmetry. The engagement stage of the platform independently helps young start-ups to showcase their agricultural technologies and easily engage with market demand. Market demand includes Industry, Incubators and Farmer Producer Organizations (FPOs).

The fourth phase focuses on creating a last-mile network for niche (nutritional, medicinal, aromatic, organic, GI-tagged) agricultural products from the fringes. Autonomous drones are being considered for development through a hub-and-spoke model of unmanned aerial vehicles (UAVs - land & Sky), especially in mountain states where the road networks might not have full coverage. Demand to be generated through charitable trusts for undernourished children as well as retail aggregators in metro cities.

The fifth phase focuses on equipping farmers with actionable agricultural insights and early weather alerts. Data related to soil health, moisture, weather, and ecology is being aggregated and analyzed to generate personalized insights related to crop selection, fertilizers requirements, and water needs for each farmer at farm-holding level. This would be provided by Ministry of Electronics and Information Technology (Meity) UMANG through an Atmanirbhar App. The sixth and seventh phases look at micro-financing needs of the farmers and supplementing their incomes through off-farm products such as handlooms and textiles.

The details of all seven phases have been entailed below:

PHASE I

The first phase focuses on creating a repository of agricultural technologies to catalyze modernization of farming and solve information asymmetry. The engagement stage of the platform independently helps young start-ups to showcase their agricultural technologies and easily engage with market demand.

After the outbreak of COVID-19 pandemic, reverse migration happened across the country, in which labours returned to their native villages. Through the KisanMitr digital platform, migrant youth can not only engage in farming but can also become agriculture-related entrepreneurs, helping their communities with modernization techniques.

The KisanMitr platform receives a catalogue of technologies supplied by institutions such as IIT, IISER, CSIR, ICAR, MSME, start-ups, and reputed Universities specializing in agriculture (Punjab, Tamil Nadu).
The demand is comprised of buyers from accelerators, agri-innovators, agri-incubators, industry, foundations, large FPO communities and Women Self Help Groups (SHG). A few examples are NABARD DDMs, TAFE, ITC, Coromandel, Tata Chemicals, Rallis, Nagarjuna, etc.

Examples of a few technologies on the platform include soil & water conservation technologies, farm ecosystem machinery services, clean energy-related technologies, logistics or supply chain technologies, storage and processing techniques, Mandi dashboards with real-time data, Drones on hire, etc.

The KisanMitr platform facilitates an engaging exchange between the supply and demand sides through chat, video meetings, rating system, and feedback forms. It also bridges the collaboration gap between the research institutes and the industry primarily via competitions in which difficult problems from the industry are posed as a challenge to the scientific community.

To solve the cold-start problem, NASSCOM and NIAM organize weekly webinars and convene both the sides to the platform. DD Kisan is considering televising the agricultural technologies in order to increase visibility and adoption of modern farming techniques and technologies across the country.

PHASE II

The second phase provides a repository of livestock technologies to catalyze modernization of animal husbandry and solve information asymmetry. The platform provides filters to easily find livestock, technology, or research from ePashuHaat as well. The engagement stage of the platform independently helps young start-ups to showcase their livestock technologies and easily engage with market demand.

The KisanMitr platform receives a catalogue of technologies supplied by institutions such as IIT, IISER, CSIR, ICAR, MSME, start-ups, Gates Foundation, etc.

The demand is comprised of buyers from accelerators, incubators, industry, foundations, large FPO communities, and Women Self Help Groups (SHG). A few examples are NABARD DDMs, TAFE, ITC, Coromandel, Tata Chemicals, Rallis, Nagarjuna, etc.

Examples of a few technologies on the platform include DNA tests, Immunization techniques, Disease detection kits, Purification techniques, Pregnancy test kits, Business management apps, Organic medications, etc.

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PHASE III

The third phase provides a repository of agriculture-related scientific research and technologies that might not be ready for mass production yet, but industry leaders and technology enthusiasts get an early opportunity to see what's around the corner and engage in the development process of the final product. The engagement platform helps research teams and young start-ups to showcase their research and easily engage with industry interest.

The KisanMitr platform receives a catalogue of research and technologies supplied by institutions such as IIT, RUTAG, IISER, CSIR, ICAR, MSME, start-ups, Gates Foundation, etc.

Examples of a few research projects on the platform include oil extraction techniques, dehusking techniques, small-scale milling techniques, curing and polishing techniques, storage techniques, production improvement techniques etc.

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PHASE IV

The fourth phase of the project focuses on developing a last-mile supply-chain network for niche (nutritional, medicinal, aromatic, organic, GI tagged) agricultural products cultivated by farmers on the fringes. This phase has been named Himalayan Bazaar considering the geographical distribution of the supply-side farmers.

Thousands of FPOs and Women SHGs located in the mountain states, north-eastern states, and tribal areas will be on-boarded to sell their produce on the platform. Small Farmers'

Agribusiness Consortium (SFAC) data of thousands of FPOs is currently being used by KisanRath app (NIC). The same data is being sought for on-boarding FPOs from mountain states and tribal areas onto the KisanMitr digital platform through API integration.

The demand-side will be comprised of charitable trusts and retail aggregators such as IKEA Foundation, ICICI Foundation, Akshaya Patra, Reliance Fresh, and Rotary.

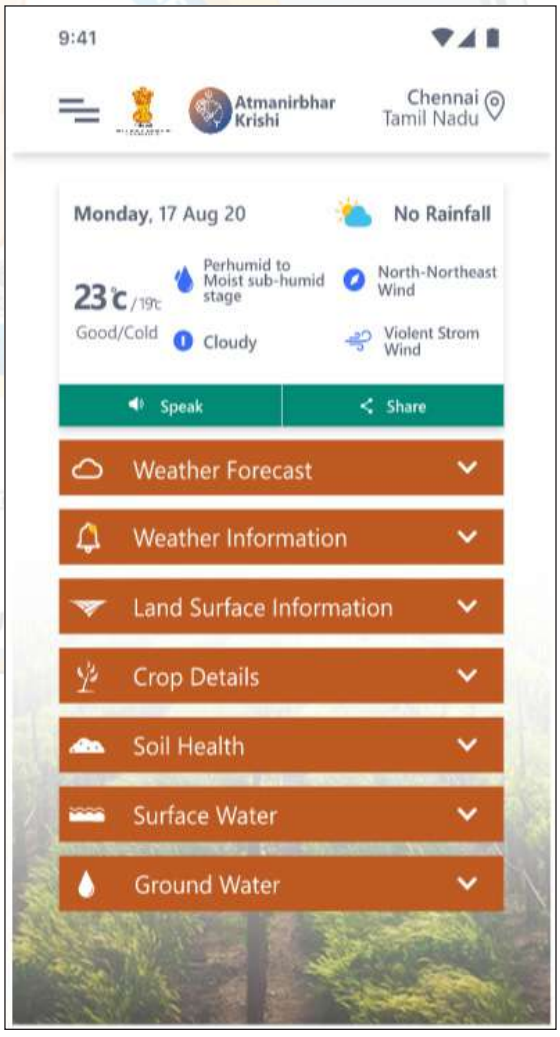
In order to connect the farmers on the fringes with the primary supply-chain network, autonomous unmanned aerial vehicles (UAV) created by ex-ISRO and IISc teams have been proposed as a solution. Using a hub-and-spoke model, these drones can bring smaller quantities of produce from nearby areas to the main hub located near a city. The proposal has been sent to the Ministry of DONER for evaluation.

The KisanMitr platform facilitates an engaging exchange between the supply and demand sides through chat, video meetings, rating system, and feedback forms. The platform also bridges the collaboration gap between the research institutes and the industry primarily via competitions in which difficult problems from the industry are posed as a challenge to the scientific community.

The project has received support from various departments of the government as well as private sector organizations.

PHASE V

There is a wealth of information which can be very relevant to the farmers which is carefully curated by various departments of the government, but it is locked in different platforms and not easily available to a common farmer. The fifth phase of the program focuses on filling this very gap, by combining data from various sources like IMD, ISRO, NWIC, etc. and making it available to the farmers in an easily understandable way.



The office of the PSA started by connecting with all the relevant departments, and under the able guidance of the advisory committee of Dr Kalpana Shastry (Agricultural Expert, PJTSAU) and Mr Nagaraja Prakasam (Angel Investor, Mentor, Fund Advisor, board member for more than 12 Agriculture related industries) converted the idea into a feasible project.

The *Atmanirbhar Krishi* app has been developed by the Tech Mahindra Makers Lab (Research and Development wing of Tech Mahindra Ltd) as a part of their CSR activity, and the collection of data in a common repository has been done by Indian CST. Meark Enterprises provided project management services.

Each and every information has been carefully considered, and has been made easily understandable for the farmers. The app is available in 12 local languages, and is free of cost for any of the farmers, start-ups, KVKs, SHGs or NGOs to use. Considering the connectivity issues in the remote areas of the country, the app needs minimal internet.

Data	Source
Weather & Weather based Information	Indian Meteorological Department (IMD)
Land surface & Crop	Indian Space Research Organisation (ISRO)
Soil Health	Department of Agriculture Cooperation & Farmer Welfare (DACFW)
Surface Water & Ground Water	National Water Informatics Centre (NWIC)

More information about the 'KisanMitr – Atamnirbhar Krishi App By PSA' is available at the link: https://www.youtube.com/watch?v=yF2olTP1M8A

PHASE VI

This phase aims to provide details of agriculture related financial technologies (Agri-Fin tech) that will be useful to farmers managing their own accounting and financial statements, helping them understand in simple terms, their ledger and books of accounts and how to keep the records as well as technologies that will help any network of Non-Banking Finance Corporations (NBFCs) to monitor FPO financial progress. Start ups have several financial technology products that can be showcased here.

PHASE VII

The farmer families' income can be enhanced by the use of allied businesses, which may contain non allied off farm industries like textiles, handlooms, jewelleries etc. apart from allied farm businesses like milk, post harvest enhancements and more.

There are many supplier technologies which are available in the off farm category, which need to be connected with the wider demand. Moreover, there are many startups or even technology research institutions who may be working on new technologies and are in need of funding as well as industry engagement. The demand side would be pleased to get a sneak peek at the upcoming technologies and they can very well connect in advance to understand the technology and promote the same.

The Kalamitr platform has thus been built to connect the technologies available in these domians to the wider demand. It provides the technology categorization into the 6Cs to indicate how the technology may help the user (Construct, Capacity, Create, Channel, Connect, Capital) and thus allows anyone to search and understand more about any given technology in more details.

Tech Mahindra Makers Lab (Research & Development Wing of Tech Mahindra Ltd) has built the Kalamitr platform which connects neatly into the KisanMitr platform. The suppliers can not only upload the information about their technologies onto the platform, but they can also connect and interact with prospective investors and buyers through the horizontal services like audio/video call, chat etc. provided on the platform.

The supplier technologies are being populated with the RUTAG data, whereas Industree Foundation is helping to get the demand side on boarded.

Industry Engagement facilitated by the Office of the Principal Scientific Adviser

With the country facing an unprecedented crisis due to the coronavirus pandemic, the premier technical institutes have completely re-oriented their research ecosystem to develop solutions for the myriad issues that are coming up. This Herculean effort that lacks a parallel in modern history demands not only a significant commitment in terms of manpower and infrastructure but also a sizeable financial outlay. The industry has stepped up to do its part and help the country overcome this crisis by funding and collaborating on research projects with academia.

Major initiatives:

National Reagents Consortium: A Cluster approach for promoting high-quality, affordable and indigenous manufacture of diagnostics and reagents

The COVID-19 pandemic has brought to the forefront an unprecedented challenge of catering to the national need for diagnostic kits in India in a short period of time. It has compelled us to re-evaluate our strengths and resources needed to tackle an issue of this magnitude. For a country like India, with a billion-plus population, rapid and effective testing is an important step in handling the crisis. The enormous challenge of a severe shortage of COVID-19 diagnostic testing kits has hampered the country's plans for large-scale testing of the population. This shortage of kits is primarily caused by lack of supply of high quality reagents that go into the manufacturing of these kits. Several factors are responsible for this supply-chain obstruction - high global demand; price and supply risk of imported products; and quality, capability and capacity issues of the local manufacturers. Indigenous manufacturing of kit reagents and components is an integral link in the value chain of diagnostic manufacturing.

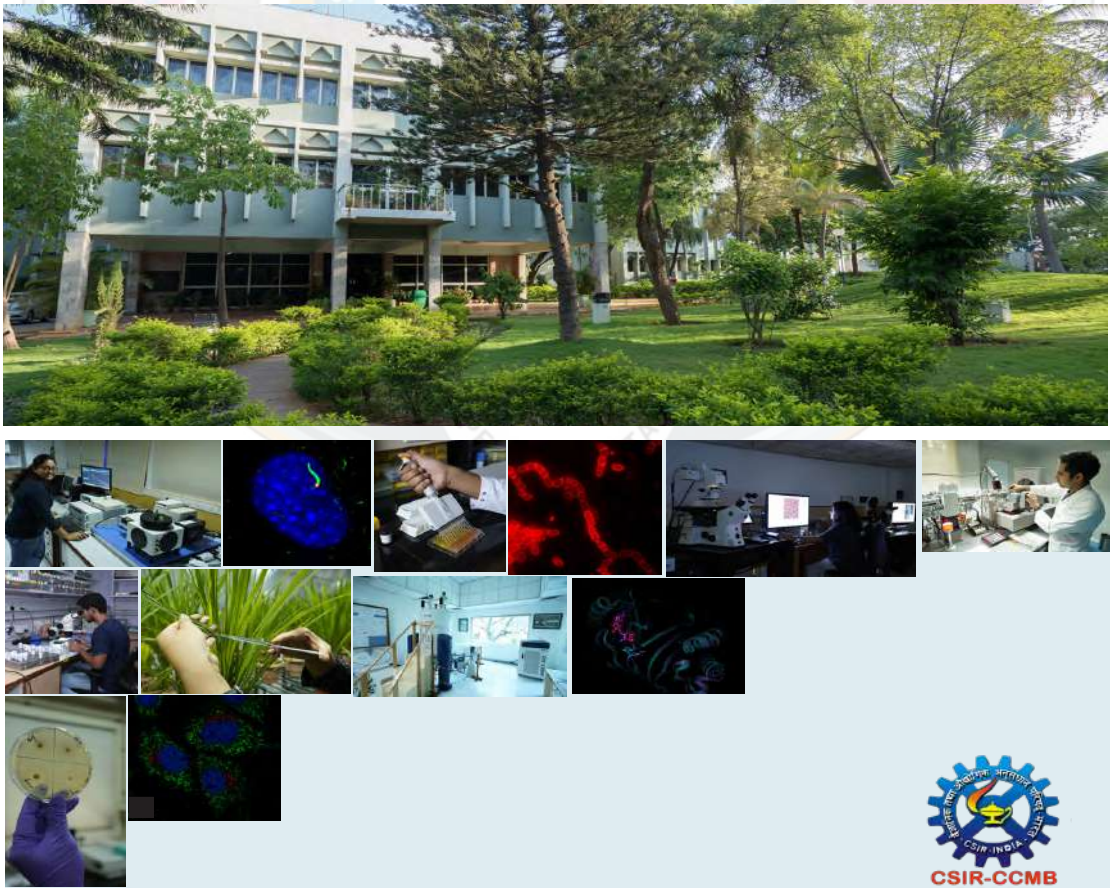
To address the problem at a national level, the office of the Principal Scientific Adviser (PSA) to Government of India (GoI) has led the creation of public-private partnership models for a nation-wide capacity-building programme for diagnostics through city clusters including cities such as Bangalore, Delhi, Hyderabad and Pune. Emphasising the need for such an initiative, Prof. K. VijayRaghavan, PSA to GoI said, "Building capabilities and capacities of indigenous manufacturers of reagents and kits will ensure that we are able to effectively implement the testing strategies for our population. The programme will also go a long way in making India self-sufficient in the area of molecular diagnostics."

The Hyderabad City Cluster (HCC) took up the initiative to form the Reagent Consortium and fill the gaps in the affordable manufacturing of indigenous diagnostics and reagents. Hyderabad is strongly positioned to lead the way by utilising its existing expertise in the life sciences sector. The Reagent Consortium is being led by CSIR-CCMB (Centre for Cellular and Molecular Biology), a premier research institute under the CSIR umbrella, supported by RICH (Research and Innovation Circle of Hyderabad), the nodal entity of the HCC. Other members of the Consortium will be the MSME reagent manufacturers and testing and validation agencies. CCMB has been involved in the national COVID-19 mitigation activities from the very early stage of the pandemic and has been at the forefront of testing, training, kit validation, anti-viral drug screening, vaccine collaborations and development of diagnostic kits. CCMB is also one of the ICMR-approved testing and validation centres and a national repository for COVID-19 patient samples. With its large pool of researchers and its first-hand experience with COVID-19-related projects, CCMB is well equipped to support the national plan of development of diagnostic reagents and kits.

The Consortium has initially focused on the RT-PCR diagnostic platform. It has identified MSME manufacturers of components and reagents. The RT-PCR technique finds wide applications in research, diagnosis and detection of several diseases. A target of 500,000 reactions for COVID-19 testing has been set for the pilot phase of this programme, which will be scaled up to enable production of 10M kits per month within about a year of beginning the programme. The pilot phase of the programme, which will run for 6 months, has been funded by FIND India (Foundation for Innovative New Diagnostics) with support from Bill and Melinda Gates Foundation.

Dr Rakesh Mishra, Director of CSIR-CCMB said, "Bringing together suppliers of biotechnology reagents to meet the national emergencies is critical and the cluster is helping in truly aggregating the stakeholders in the diagnostic space." Highlighting the importance of a collaborative network, Ajit Rangnekar, Director-General of RICH said, "The prior creation of clusters helped us to quickly plan and organise our activities around this initiative and put in place the required structures". The programme has received an enthusiastic response from the MSME players. Dr Sudarshan Reddy, Founder and CEO of Oncosimis Biotech, a company incubated at AIC-CCMB said, "India undoubtedly needs more high-quality, affordable testing to safely re-open the economy. I appreciate the efforts of CSIR-CCMB in developing self-sustainable COVID-19 testing solutions by providing the much-needed insights and guidance to bring out better products."

The programme will help expand India's R&D capabilities by making low-cost, high-quality reagents readily available with creation of a streamlined network of the entire value chain. It is a step in the right direction to respond to the *Aatmanirbhar Bharat* (Self-reliant India) call of Hon'ble Prime Minister of India to ensure that the country is well-prepared to handle future crises.



Guarding the Guardians: Helping India's 'Corona Warriors' to take on COVID-19 with Mentored Laboratory Training

Currently leading the global daily numbers for new COVID-19 cases, India is rapidly scaling up its testing network to arrest the pandemic's spread. The number of private and public sector laboratories empanelled by the Indian Council of Medical Research (ICMR) for COVID-19 testing has increased from 19 in early March to 1,774 as of September 20, 2020. Together, these labs are conducting around 1 million tests every day.

However, ICMR looks to further bolster this pan-India testing apparatus. Our Nation faces major challenge: the dearth of professionals with adequate knowledge of molecular biology methods, biosafety requirements, and practical bench skills required to work with highly-infectious diseases.

The need-gap is staggering. To begin with, it leaves the health and personal safety of the first line of India's defence against the novel coronavirus highly vulnerable. Inadvertent mistakes made during sample collection, transportation, testing, and reporting also increase the risk of accelerating the spread of the disease, as well as lower the accuracy of the tests.

This is where the Mentored Laboratory Training for COVID-19 and Infectious Diseases launched by the *Foundation for Innovative New Diagnostics* – along with *Tata Institute of Fundamental Research, PanIIT Alumni Reach for India,* and *National Institute of Immunology* – steps into the picture. The multi-pronged COVID-19 diagnostic training programme aims to empower trainees with the basic knowledge and practical bench skills of molecular biology methods that can be implemented for COVID-19 diagnostics and other infectious diseases.

Live lab setup at PanIIT Centre, Jharkhand to impart hands-on expertise in COVID-19 diagnostics training

RNA Templating and Auto Extraction setup

Speaking on the need for such an intervention, Prof. K.VijayRaghavan, Principal Scientific Adviser to the Government of India added, "With India's 'Corona Warriors' leading the fight against the pandemic, it is our duty to ensure they have the requisite knowledge and skills to execute this task. Hence, we felt the need to tie up a befitting, high quality project and wish successful execution of the same across India with the help of the best in this field."

Enabled by the Office of the Principal Scientific Adviser, Government of India, with support from the Bill & Melinda Gates Foundation, the training will be carried out through a hybridised online/offline module and will comprise five 'Workstreams'. These 'Workstreams' will include online training coursework, weekly mentoring workshops with regional and national experts across multiple associated functions, upskilling sessions at COVID-19 testing sites, pre-service training on basic molecular biology, and online query support from experts for troubleshooting.

This integrated approach will help to create a skilled laboratory workforce that can carry out sustained, high-quality COVID-19 sample processing, testing, and reporting – without compromising the accuracy of the results or the biosafety of India's brave 'Corona Warriors'.

India to double its testing capacity - InDx - a new project facilitated by Office of the PSA

A major project has been launched to indigenously manufacture, in bulk quantities and at much lower costs, all reagents needed for RT-qPCR-based and other molecular methods of diagnostics of COVID-19. The Rockefeller Foundation has provided financial support for the project executed by the Bangalore Life Science Cluster, which would improve access to COVID-19 diagnostics across the country.

The COVID-19 pandemic has been unprecedented and has severely affected countries across the world. India, with its population of more than 1.3 billion, is scaling to test rapidly and widely across its population. Considering the nature of the virus, its mode of transmission and non availability of effective drugs and vaccines, the best way to check the spread of the infection and save lives (and livelihoods) is by testing larger number of individuals and isolating the positive cases. In this context, there is an urgent need to scale up the production of RT-PCR and other molecular diagnostic testing kits in the country.

The newly launched project called Indigenisation of Diagnostics (InDx), anchored at Centre for Cellular and Molecular Platforms (CCAMP), aims to build a robust supply-chain network of Indian MSMEs capable of producing reagents that go into a testing kit as well as manufacture testing kits. The project involves identifying bottlenecks in the supply-chain network, short-falls in quality levels and gaps in the ability of these MSMEs to scale-up. The project would handhold MSMEs in meeting both quality and quantity such that the network would be able to put together a million indigenous kits a day. The project employs a dynamic digital supply-chain platform developed pro-bono by Tata Consultancy Services (TCS). In addition, the project envisages providing support to maintain a sustainable business plan for the consortium with the help of experts in the field.

Prof K VijayRaghavan, the Principal Scientific Advisor to the Govt of India, who is overseeing India's efforts of indigenisation of biomedical products, said "this is a multipurpose project addressing not only the COVID-19 crisis but aimed at helping MSMEs to expand their business opportunities and to improve the overall healthcare system by developing more high quality, but low cost molecular diagnostics. Important collaboration with The Rockefeller Foundation will enable our MSMEs to meet global standards."

"The generous support by The Rockefeller Foundation and enthusiastic response by MSMEs to participate in the proposed supply-chain network has given the confidence that we would be able to meet the target of one million kits per day within the next few months," says Dr Taslimarif Saiyed, CEO of CCAMP, who heads the project at Bangalore Life Science Cluster. Prof. Satyajit Mayor, Director of NCBS, Bangalore, an advisor to the project says, "This initiative may help innovations in our ability to meet global quality and thereby our MSMEs may not only be able to serve the Indian market and be able to export to the other needy countries at very competitive prices. We hope to expand the project to include other new molecular diagnostic methods such as Lateral Flow Assays or LAMP-based assays for COVID-19 testing, newly developed saliva-based sampling tests, which are point-of-care tests and also scalable to test at scale."

"Strengthening India's ability to develop fully indigenous diagnostic kits is expected to improve the entire healthcare system as affordable molecular diagnostics may soon be available for other diseases, particularly cancer and rare tropical diseases," says Prof. LS Shashidhara, Dean (Research) at Ashoka University, who is also an advisor to the project.

Major Outcomes:

During the unprecedented COVID-19 crisis, CII has significantly contributed in building collaborations wherever possible between companies and academic institutions. In partnership with ACMA, SIAM, IMTMA and SIDM, CII formed a network of companies for augmenting the inventory of ventilators through manufacturing by utilising their resources such as plant and machinery and highly skilled manpower to mass-manufacture ventilators or through import. Parallelly, with the support of the PSA's office, a consortium of innovative COVID-19 technologies, offered by industry and start-ups incubated by national research laboratories, government agencies and academic institutions was also formed to make technologies available for industry partnerships.

Development of a Novel Peptide Therapy for COVID-19 at IIT Delhi

This project, being carried out at DBT Centre of Excellence for Biopharmaceutical Technology, IIT Delhi, is utilizing bioinformatics tools to design a novel peptide for blocking coronavirus. They are being supported in their endeavour by Kisankraft Limited. The IIT Delhi-based start-up Growdea Technologies Pvt. Ltd is founded by Dr Avinash Mishra at IIT Delhi.

IIT Kanpur – Nocca develops Invasive Ventilator with IoT-enabled features

Nocca Robotics Pvt. Ltd is engaged in designing and manufacturing robots that clean solar panel in a waterless manner. Using the Team's extensive experience in electromechanical control systems in their regular business, they decided to contribute in nation's fight against COVID-19, by designing a ventilator along with the active involvement and guidance from the incubator of IIT Kanpur. An experienced team of pulmonologists and intensivists from India and overseas has been advising the Team on the design principles of invasive ventilators. The development is aided by an experienced group of Indian business leaders and biomedical engineers.

The ventilator has been designed in a way so that

- It can be manufactured at a large scale at multiple sites.
- It can work with medical airline plus oxygen as well as ambient air plus oxygen, thus providing the versatility to operate under both conditions.
- It meets all the essential specifications laid out by the Government of India.

The designed mechanical ventilator can operate in PC-CMV, PC SIMV, PSV, VC-SIMV, VC CMV, PRVC, ACV, CPAP and BPAP modes. The ventilator is permanently connected to a mobile phone which is used to control the device and display critical information. The IoT-enabled feature creates an efficient Ventilator Management System that allows:

- doctors to control the ventilators remotely and thus ensuring lesser exposure to COVID-19 patients and/or ventilator and
- control of multiple machines with one IoT device thus addressing the problem of limited availability of trained doctors.

Current Status:

- The product is currently at the compliance and pre-clinical testing stage.
- The project has been a brilliant union of the academia, start-up and hospital. This was possible with industry being the major component of all, binding everyone together.

Industries supporting the project:

i) **ACT Grants:**
Description: ACTS Grants is the Action COVID-19 Team equipped with Rs. 100-crore grant created by India's start-up community to give wings to ideas that could combat COVID-19 with immediate impact. They have been seeking capital-efficient, scalable solutions from NGOs and innovative start-ups which need an initial seed grant to fight the spread of the pandemic. Many organisations like MMT, Dell, Infoedge, and members of funds like Accel, Aavishkaar, Sequoia, and Unitus, have donated in personal capacity. For more details, please visit www.actgrants.in
Support: The ACT grant is currently being used for prototype development and preclinical trials of the product.

ii) **Ansys:**
Description: Ansys offers a comprehensive software suite that spans the entire range of physics, providing access to virtually any field of engineering simulation that a design process requires. Organizations around the world trust Ansys to deliver the best value for their engineering simulation software investment. During the COVID-19 pandemic, Ansys is also striving to positively contribute to the battle against coronavirus. Ansys is supporting the ongoing initiatives of its customers and partners.
Support: The fund by Ansys has helped the product's initial research and development.

iii) **Standard Chartered:**
Description: Standard Chartered Bank is India's largest international bank with 100 branches in 43 cities.
Support: These funds were one of the early ones and helped in the project's initial product R&D.

iv) **ICICI Securities:**
Description: ICICI Securities Limited is a Registered Investment Advisor under SEBI Investment Adviser Regulations, 2013 and has been offering advisory services under the brand ICICIdirect Investment Advisory Services.
Support: The funds were used in the project's initial product R&D.

v) **Cummins India:**
Description: Through Cummins Technologies India Pvt. Ltd., Cummins is at the forefront of designing future technologies for turbos, emissions, fuel systems and more.
Support: Cummins is helping the project by supplying one of the most critical components in the ventilator – the flow sensors.

vi) **Naukri.com:**
Description: Naukri.com is a recruitment platform that provides hiring-related services to corporates/ recruiters, placement agencies and to job seekers in India and overseas. *Support:* These funds are currently helping the project with prototyping and compliance testing of the ventilator.

vii) **AdorPowertron:**
Description: AdorPowertron is the world's leading solution provider of high frequency & conventional high voltage rectifier transformer sets that are deployed for clean air applications (including electrostatic precipitators for power stations, cement, pulp & paper and steels plants and roads). They are also India's largest provider of traffic safety & enforcement solutions, including speed enforcement systems & IP and electronic Variable Messaging Signs/Commercial LED Walls.
Support: Conversation is on with Ador for mass manufacturing of the product starting next month.

Cholamandalam provides funding support to IIT Madras Students to scale up production of face shields

The coronavirus spreads primarily between people in close contact, often by small droplets during coughing, sneezing, and talking. Hence, face shields have become critical to protecting healthcare workers in the frontlines and treating patients.

Cholamandalam, the financial services arm of the Murugappa Group, has provided funding to IIT Madras students to scale up the production of face shields.

The students started manufacturing these face shields using 3D printing, with a production rate of around 1,000 pieces per day. As the project gathered momentum and attracted more orders, the team shifted to 'Injection Moulding' technique, which enabled them to quadruple the production rate to around 4,000 pieces per day at a reduced cost with an improved design. The students have already delivered over 45,000 face shields to hospitals and police personnel in Chennai, Puducherry, Avadi and Cuddalore among other places.

These face shields have received a lot of appreciation and positive feedback from the users. More importantly, this was seen as a good replacement to the Hazmat Suit Helmets which most users felt were suffocating and did not allow smooth access to stethoscopes as well.

Corona Killer Drone CK100

The Office of the Principal Scientific Adviser (PSA), Government of India and Invest India, India's National Investment Promotion Agency have closely collaborated through the AGNIi Mission and Invest India's Business Immunity Platform (BIP) to facilitate the use of specially designed drones to support COVID-19 disinfection in Varanasi.

The Government's COVID-19 strategies align with global best practice: protecting Indians against COVID-19, by minimising their chances of catching it. To boost the capacity of the local

authority in achieving this, Government is leveraging the power of technology.

Drones offer an effective solution. Using drones, authorities could spray disinfectant over large, crowded, vulnerable urban areas: protecting city-dwellers from COVID-19, while reducing human contact to keep frontline workers safe.

Garuda Aerospace, a Chennai-based drone start-up, responded to Varanasi's disinfection drive. The team worked with Central, State, and Local government authorities to get Garuda's technologies and personnel to Varanasi. The team monitored and supported every step of this exercise by helping the Government and the innovator collaborate to fight COVID-19 together.

Drone operations in Varanasi have just commenced. The team will now extend similar capabilities to more cities across India. This forms part of a broader effort to use innovative technology, via Government-innovator collaboration, to reinforce Indian authorities' fight against COVID-19.

Website link:
https://www.agnii.gov.in/innovation/corona-killer-drone-ck100

Venture Center's initiative on developing simple and low-cost face shields gets support from Cummins India Foundation, Persistent Foundation & Kirloskar Brothers Ltd. Pune

One of the ways in which the human-to-human transmission of the SARS-CoV-2 virus occurs is through respiratory droplets generated when people cough, sneeze, or exhale. Thus, healthcare workers, police personnel, and caregivers of suspected/confirmed COVID-19 patients are mostly at risk of getting infected.

To safeguard the health of these workers, enthusiastic staff and entrepreneurs at Entrepreneurship Development Center (Venture Center), a technology business incubator hosted by CSIR-National Chemical Laboratories in Pune have designed and manufactured a simple and low-cost face shield, which provides a physical barrier between the workers and other people they interact with, significantly minimizing their contact to the infection.

The face shield comprises of a transparent clear polyester sheet that protects the face from any airborne fluid particles. The sheet is kept in place with the help of a headband and an elastic strap. The face shield design uses MDF and can be machined (instead of laser cutting), which makes the process simpler, cheaper and scalable.

The designs are now available freely for download under a Creative Commons Attribution – Non Commercial – ShareAlike 4.0 International Public License.

A glimpse of beneficiaries and various activities on development of Face Shields at Venture Center

Anyone can use the knowhow freely for non-commercial use (means that you will price it reasonably and provide at affordable costs and make it available without unfair discrimination). So far, nearly 1 lakh face shields have been delivered to healthcare workers and police forces across the country.

This initiative has been generously supported by:

- Cummins India Foundation: Founded in 1990 as an independent legal entity, the Cummins India Foundation (CIF) channelizes Cummins' commitment towards Corporate Responsibility.
- Persistent Foundation: It was formed in 2009 to institutionalize Corporate Social Responsibility within Persistent. The Persistent Foundation supported donation of face shields for frontline staff at hospitals in Pune.
- Kirloskar Brothers Ltd. Pune: Established in 1888 and incorporated in 1920, Kirloskar Brothers Limited (KBL) is the flagship company of the $2.1 billion Kirloskar Group.

Website Link:
https://www.venturecenter.co.in/covid19/pune-face-shieldaction-group/

IIT Delhi & NCL Pune developing an ELISA-based assay for COVID-19 testing

Indian Institute of Technology Delhi (IITD) and National Chemical Laboratory (NCL) Pune join hands to create an economical process for manufacturing the antigens used in ELISA and home-based diagnostic kits to offer effective, quick, robust and affordable diagnostic solutions to fight COVID-19 outbreak. The initiative is being funded by Microsoft.

The two institutions are developing ELISA-based assays for qualitative measure of human anti-COVID-19 IgG and IgM antibodies in serum. Risks related to RT-PCR-based methods are minimized by developing IgG and IgM-based ELISA assays and home-based testing kits. ELISA for the detection of COVID-19 is helpful in diagnosis of current burden of COVID-19 patient samples in this ongoing pandemic. The resulting assay is expected to provide robust, quick, reliable and economical solution for mass testing of novel coronavirus. This novel expression system will aid private sector companies to provide home-based detection kits economically. This project is spearheaded by Prof. Anurag S. Rathore, Department of Chemical Engineering, IIT Delhi and Dr Rahul Bhambure, NCL, Pune.

IIT Delhi developing infection-proof fabrics

Indian Institute of Technology Delhi (IITD) is developing infection-proof fabrics to prevent hospital-acquired infections (HAIs) through its start-up Fabiosys Innovations Private Limited. The mission at Fabiosys is to make hospitals safer. The public healthcare facilities in developing countries like India have always been crowded. According to the statistics from Ministry of Health and Family Welfare (MoHFW), for every 100 hospitalised patients in developing countries, 10 patients get HAIs. This initiative is being funded by Huawei Telecommunications (I) Co. Pvt. Ltd.

The Fabiosys team has been working for the past 1.5 years for developing "infection-proof fabrics" to prevent HAIs. The fabric developed by Fabiosys kills around 99.9% of the pathogens in 1-2 hours. The team has developed an affordable novel textile processing technology which converts regular cotton fabrics into infection-proof fabrics. They take rolls of cotton fabrics and treat those with a set of their proprietary developed chemicals under a set of particular reaction conditions using the machinery already commonly available in textile industries. The fabric, after undergoing these processes, gains powerful antimicrobial functionality.

The Fabiosys Team is mentored by Prof. Samrat Mukhopadhyay, Department of Textile and Fiber Engineering, IIT Delhi with an expertise in textile chemical processing and professors from various departments of AIIMS Delhi.

IIT Madras start-ups' efforts to develop 'Portable Hospital Unit' funded by Wells Fargo

With a contagious disease such as COVID-19, it is essential to have smart health infrastructure to screen, contain and treat people. Unlike urban areas, rural areas do not have plenty of existing infrastructure that can be converted to hospitals. There it is difficult to construct buildings from scratch as the requirement is immediate.

Wells Fargo, an American multinational financial services company, is providing funding support to an IIT Madras-incubated start-up called Modulus Housing to tackle this problem. The start-up has developed a portable hospital unit that can be installed anywhere within two hours by four people.

Called 'MediCAB,' it is a decentralised approach to detect, screen, identify, isolate and treat COVID-19 patients in their local communities through these portable microstructures. It is

foldable and is composed of four zones – a doctor's room, an isolation room, a medical room/ ward and a twin-bed ICU, maintained at negative pressure.

The major advantage of decentralised micro infrastructures is that these can be used across the nation. These microstructures can be shifted to rural India. Hence, this can be one-shot two-kill scenarios and can be put to good use even after COVID-19 is eliminated from the country.

Tube Investments of India Limited (Murugappa Group) funds IIT Madras project for development of 'Doffing Units'

It has become paramount to ensure the safety of the frontline healthcare workers treating the COVID-19 patients. A key aspect of this is facilitating the safe removal of their Personal Protective Equipment (PPE).

Towards this, Murugappa Group has provided funding for an IIT Madras project to design and enable rapid construction of a modular 'Doffing Unit' for the safe removal of PPE. This project was undertaken in collaboration with the Chengalpattu Medical College and Hospital (CMCH) in Tamil Nadu where the doffing unit has already been deployed. The entire design, fabrication and deployment of the doffing unit took place remotely during the lockdown period.

'Donning' is the procedure of assembling PPE on the healthcare providers and 'doffing' is the procedure for removal of PPE. Such procedures will have to adhere to certain standard protocols to prevent further spread of infections.

IBPL, Pune supports Venture Center and BMek develop and donate infrared digital thermometers

The non-contact IR thermometer is designed and developed by BMek Tech LLP and Protoshop at Venture Center using readily available modules to provide safe and quick temperature measurement of the forehead for primary screening during current COVID-19 emergency.

A glimpse of activities undertaken for development and distribution of IR thermometer

The design is made available open source wherein the complete knowhow with mass manufacturing ready hardware and software design is available to manufacturers for free. This is an effort to enable a large number of manufacturers to manufacture the thermometers and cater to their local needs. The technical details of this device are available for copying under the Creative Commons–Noncommercial-share Alike License at: http://www.protoshop.in/covid19/

Seven prototype units have been manufactured at Venture Center till date. One unit is being used at NCL Innovation Park gates, one unit at NCL Medical Center and five units were handed over to Pune Police. The design up-gradation is also going on. Now it is getting scaled up in partnership with NCL (National Chemical Laboratory) with BEL (Bharat Electronics Ltd.) Pune.

International Biotech Park Limited (IBPL) has generously supported this initiative. IBPL is the first public-private biotechnology park initiative in Maharashtra which is a joint venture between Maharashtra Industrial Development Corporation (MIDC) and TCG Real Estate, a 81-acre Park dedicated to biotechnology in the field of Life Sciences, Chemical, Pharmaceutical, Biotech products and process.

Infineon Technologies provides funding support to IIT Madras start-up to develop power backup system for ventilators

COVID-19 is an infectious disease caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). While the majority of cases result in mild symptoms, some progress to acute respiratory distress syndrome, requiring mechanical ventilation. For such patients, ventilators have become the difference between life and death.

Reliable power backup for ventilators and Isolation homes in B & C towns, where power availability is not reliable or at the remote locations which are off-grid has become essential. This will save substantially the need for diesel generators for powering such systems in the rural areas. Towards this, Infineon Technologies AG, a German semiconductor manufacturer, is providing support to Cygni Energy, an IIT Madras incubated start-up, to develop a power backup system for the ventilators. The power backup for ventilators will be targeted towards off-grid and weak-grid areas.

Cygni Energy Pvt. Ltd. is an IIT Madras incubated start-up, established about five years ago, working in the domain of efficient DC solar power backup. Cygni has numerous inventions in the area of solar-DC and is a pioneer in this field.

ICMR-approved probe-free RT-PCRs for diagnosis of COVID-19 developed at IIT Delhi

The researchers at Kusuma School of Biological Sciences, IIT Delhi, have developed a probe free technology for COVID-19 detection, and it is one of the firsts to be approved by ICMR. This will be more affordable and easily scalable as compared to the existing methods. Microsoft has offered the support for this project.

The sensitivity of this in-house assay is comparable to that of commercially available kits. This assay can be used both as a qualitative (yes or no) assay without the need for extensive instrumentation and it can also be used for quantitatively to assess virus loads. The team proposes the use of this assay for specific and affordable high throughput screening of COVID-19. Time for assay is less than 2 hours. This is a probe-free assay (i.e., low cost) and is ideal for high-throughput, large-scale screening. This assay can be used as a regular PCR, i.e., it can be used in setting without a real-time PCR machine but with a regular PCR machine and agarose gel electrophoresis system. IIT Delhi KSBS Team working on this project consists of Prof. Vivekanandan Perumal, Dr Akhilesh Mishra, Dr Parul Gupta, Dr Sonam Dhamija, Prof. Manoj B. Menon, Prof. Bishwajit Kundu and Prof. James Gomes.

Persistent Foundation supports TRAC study, a retrospective analysis for COVID-19

The Principal Scientific Adviser to the GoI, Dr K VijayRaghavan, has constituted an S&T Core Group on COVID-19. Under the aegis of this Core Group, a Task Force has been constituted focused on repurposing of drugs for COVID-19. The Nerve Center is located at Entrepreneurship Development Center (Venture Center), Pune. The team has gathered in-depth information on various drug candidates to allow informed decision making.

In order to design better trials and choose potential therapies effectively, there is a need to understand what kind of symptoms patients are presenting with, the kind of therapies being used by doctors for clinical management and their effects. In this context The TFORD has initiated a Retrospective Study in Pune recently to collect clinical management information for COVID-19 patients and to evaluate the efficacy and safety of currently used treatments for hospitalised COVID-19 patients. This study, which aims to collect and curate clinical management information of COVID-19 patients will significantly aid in understanding which therapies could be most beneficial for the Indian population and going further aid in their testing through clinical trials. The study is being funded by Persistent Foundation.

Website Link:
https://nclinnovations.org/covid19/trac/

Asian Paints supports MyLab Discovery Solutions to stock emergency supply of COVID-19 testing kit – PathoDetect

There has been a steady increase in testing capacity for COVID-19 over the last few months in India. Currently, over one lakh tests are being performed every day. To help with this increased demand for testing India has been importing testing kits from China, Germany, South Korea and three other countries. However, these imported kits were not enough for a populous country like India. Thus, ICMR has been looking at indigenous testing kits to prepare itself to

conduct mass testing and create an emergency supply bank to meet this requirement in the coming weeks.

MyLab Discovery Solutions, incubated at NCL Venture Center, has developed a COVID-19 testing kit, named PathoDetect, which has received approval from CDSCO in a record 6 weeks' time. PathoDetect offers an in vitro diagnostic real-time PCR assay for qualitative detection of the 2019-novel Coronavirus RNA in respiratory specimens and sera. The kit offers universal detection of SARS-like coronaviruses and specific detection of 2019-nCOV. Each indigenously produced PathoDetect kit can test 100 patients at 1/4th the cost of an existing kit, thus significantly reducing the financial burden on the government. Moreover, Mylab's PathoDetect kit is very simple to use and can significantly expedite the testing process, as it provides results in just 3 hours, compared to the 7+ hours required for existing kits in the market.

Asian Paints Limited has extended financial support to Mylab Discovery Solutions to manufacture and keep available an emergency stock of kits required to help in mass testing. The fund will help MyLab take the necessary inventory risks, plan supplies in advance and meet the growing needs. Currently, MyLab has an existing manufacturing capacity of 25,000 tests per day, which can be enhanced to 40,000 tests per day by further automation.

Portable Fluorescence Reader to enable PCR-based tests for COVID-19 diagnosis, supported by Infineon Technologies

The WHO-approved diagnostic test for COVID-19 is a reverse transcription–polymerase chain reaction (RT-PCR) test that requires high-end equipment, a number of lab accessories and skilled technicians to operate, along with approved testing kits. Only a limited number of labs in the country are equipped with RT-PCR facilities, and the goal of this project is to develop assays and instrumentation that result in cheaper testing kits that do not require these expensive set-ups.

These involve the use of cheaper and widely available PCR thermal cyclers for the RNA amplification process, in combination with intercalating dyes for detection (instead of conventional dyes that use a probe and are very expensive), as well as the development of a reader that measures the resultant fluorescence emissions. These fluorescence readers have been validated in diagnosing other diseases as part of previous research at Indian Institute of Science (IISc) and are currently in the process of being validated for COVID-19 testing. Infineon Technologies has provided a CSR grant for this project.

IIT Madras partners with Infosys for blockchain-based tracker technology for human-to-human transmission of contagious disease and renovation of healthcare infrastructure

The COVID-19 outbreak has revealed starkly the inadequacy of healthcare infrastructure in the U.S., Italy, China, U.K. and other countries to handle such crises. This is an alarm signal for India also to renovate and overhaul its overall healthcare management system so that it is flexible and robust while delivering quality. Towards this a solution is being developed by IIT Madras in collaboration with the IT Firm Infosys - called 'BlockTrack' – which can play a vital

role. This project envisages a solution leveraging Blockchain, Internet of Things (IoT) and AI/ML (Artificial Intelligence/Machine learning) and could be disruptively beneficial. The project seeks to build an infrastructure for single-point records, interoperability and track unwanted or new contagious diseases spreading in the population. The Blockchain-based solution seeks to maintain tamper-proof record of movements of target persons and interoperability among health organizations. These records track pre-identified contagious disease carriers and help health organizations to work in synchronization with each other, across geographies. The following are the key points of 'BlockTrack': i. Unique patient records for identification without duplication of data; ii. Interoperability across platforms and geographies; iii. Supply chain management using tamper-proof Blockchain technologies; and iv. Tracking movement and gathering information around proximity (especially during the outbreak of new diseases).

IIT Jodhpur develops innovative face shield and sterilisation system for N95 masks

In the unprecedented COVID-19 crisis, CII has significantly contributed in building collaborations wherever possible between companies and academic institutions. In partnership with ACMA, SIAM, IMTMA and SIDM, CII formed a network of companies for augmenting the inventory of ventilators through manufacturing by utilising their resources such as plant and machinery and highly skilled manpower to mass-manufacture ventilators or through import. Parallelly, with the support of the PSA's office, a consortium of innovative COVID-19 technologies, offered by industry and start-ups incubated by national research laboratories, government agencies and academic institutions, was also formed to make technologies available for industry partnerships. In its efforts towards developing technologies against COVID-19, IIT Jodhpur has developed an innovative face shield, which is now available in the market as a commercial product of M/s Iscon-Surgicals Ltd, Jodhpur, and a few thousand units have been manufactured and already sold. Besides this, the Institute has also developed an advanced photocatalytic oxidation sterilization system based on UV-light and metal oxide nanoparticles catalyst to treat N95 filtering facemask respirators for reuse. The technology - the knowhow of the sterilisation system - has been transferred to seven firms namely M/s Iscon-Surgicals Pvt Ltd, Jodhpur; M/s Kamtech Associates Pvt Ltd, Jaipur; M/s Chempharm Industries India Pvt Ltd, Sonipat; M/s. Parappadi Technologies (P) LTD, Trivandrum; M/s Johri Digital Healthcare Ltd, Jodhpur; Mai Bharat Society, Jaipur; and M/s Zintex Blue Ocean Pvt Ltd, Jaipur in May 2020. These firms are in the process of the development of these products.

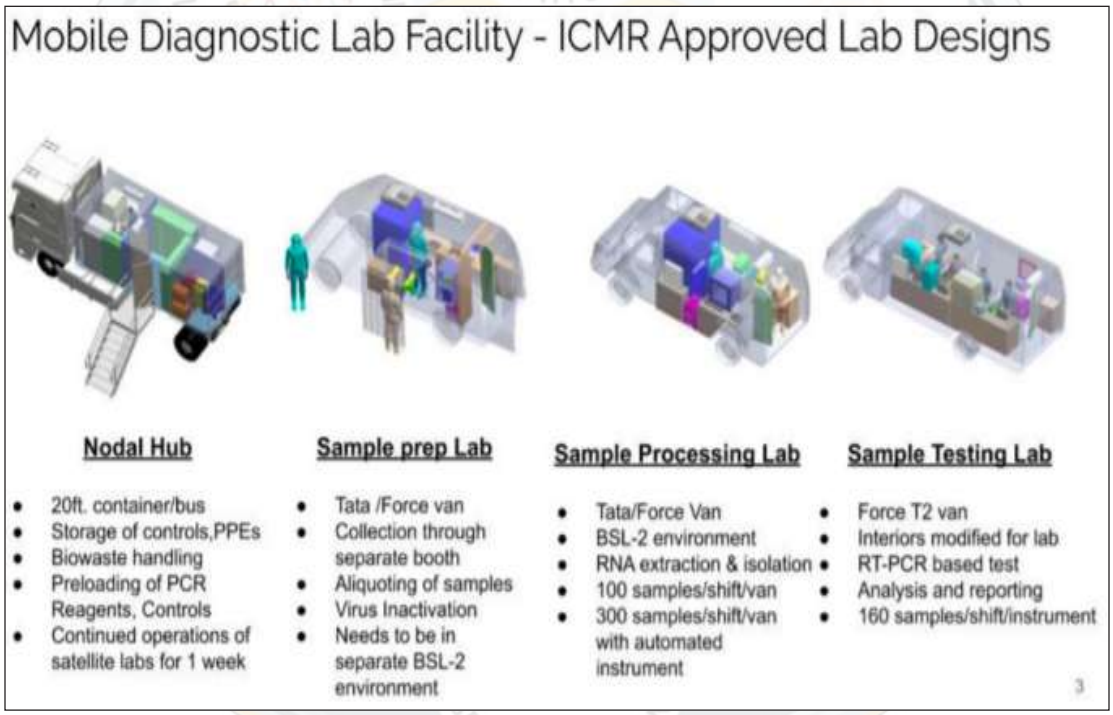
IIT Madras gets support from Fluor India and Capgemini for mass production of COVID-19 testing kits

Fluor Daniel India Private Limited (Fluor India) has been providing comprehensive EPC services since 1995, combining global strength with local expertise. The Fluor Delhi office along with Capgemini, a global leader in consulting, technology services and digital transformation, funded the development and mass production of COVID-19 testing kits through an initiative of the Health Technology Incubator of the Indian Institute of Technology, Madras.

IISc builds Mobile Diagnostic Lab for COVID-19, supported by Toyota Kirloskar Motors, Tata Motors and SBI Foundation

Studies from across the world have highlighted the effectiveness of large-scale testing in managing the spread of new COVID-19 cases as well as reducing mortality, especially with early detection of asymptomatic cases. As the pandemic spreads to the interior parts of the country that do not have access to advanced molecular diagnostic test capabilities, there is an urgent need to build and deploy safe and accurate testing capabilities at various locations.

Towards this goal of scaling up testing capabilities to reach remote areas and reducing turnaround times from sample collection to test results from 1-3 days, this project is working on building a mobile diagnostic laboratory. An ambulance and two vans were donated for this purpose by Toyota Kirloskar Motors and Tata Motors. Through a grant from the SBI Foundation and with the identification of suitable partners for redesign, the interiors of these vehicles are being equipped with instrumentation required to convert them into mobile labs. After multiple iterations of the lab designs, workflows, SOPs and protocol with inputs from several experts within IISc and outside, the final version of the designs and protocol are approved by ICMR.



Soon after the successful deployment of the first unit in Karnataka, the project aims to scale the solution within and beyond the state by engaging with central and state governments, NGOs and other partners.

NCBS & JNCASR working on epidemiological modelling

Mukund Thattai, Sandeep Krishna, and Madan Rao of the National Centre for Biological Sciences-Tata Institute of Fundamental Research (NCBS-TIFR), in collaboration with Srikanth Sastry of Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), are working on mathematical models of the COVID-19 spread, including agent-based models and course gained epidemiological models. These will be matched to national level quantitative data on COVID-19 spread to provide recommendations on outbreak suppressions. In addition, a team led by Upinder Bhalla and Sanjay Sane of NCBS is also working on an olfactory test

for anosmia, which can identify clusters of potential COVID-19 and high-risk individuals. The global pandemic COVID-19 has reached unprecedented international spread and cases are still being reported. Institutes with cutting-edge capabilities like NCBS and inStem will have a significant impact in responding to this crisis. The capacity of these institutes to contribute to the national response has been possible by donors who share their vision and want to work towards a common goal. Partners, such as Punjab National Bank (PNB), the Azim Premji Foundation, Standard Chartered Global Business Service, and the Nuclear Power Corporation of India Limited (NPCIL) are among those whose objectives of success include the well-being and health of the greater populace.

IIT Ropar develops negative pressure room, now developing negative pressure ambulance, isolation rooms & ICUs

IIT Ropar has signed a technology transfer agreement with Espee Industries, Chandigarh for the manufacturing of UV-C Sterilization Unit that can kill microbes. Further, the Institute has also developed a design of a Negative Pressure Room (NPR) to prevent the transmission of COVID-19 through the air at isolation wards and testing labs. This technology will prevent the most vulnerable medical staff from infection. IIT Ropar is installing these low-cost negative pressure cabins in the COVID-19 wards of the medical centres in Rupnagar through the CSR support from Ansys Inc. In addition, it is jointly developing the country's first negative pressure ambulance, isolation room and ICU rooms (fully equipped with medical facilities) with Bafna Healthcare Pvt. Ltd., Faridabad, under an exclusive MoU signed with the company. Researchers at the Institute have also developed anti-microbial coatings for PPE kits and disinfectant spray in tunnels. This technology has received a lot of traction, and active technology transfer negotiations are underway.

Daimler India invites Tech Challenge to support innovative proposals

Daimler India CommercialVehicles (DICV), in collaboration with the Office of Principal Scientific Adviser (PSA) to the Government of India, has announced a Tech Challenge to Universities and Research agencies in India. The collaboration has been initiated, in post-COVID-19 times, to support innovations having potential to be converted into sustainable technologies.
DICV is a wholly owned subsidiary of Daimler AG, Germany, operating under the umbrella of Daimler Trucks Asia. A full-fledged commercial vehicle player in the Indian market, DICV is the only Daimler entity worldwide with a brand dedicated to its home market: BharatBenz. DICV produces and sells in India above 9 to 55 tons trucks as well as BharatBenz buses, Mercedes-Benz coaches and bus chassis. DICV's state-of-the-art manufacturing plant at Oragadam near Chennai spreads over 400 acres (160 hectares) including a highly modern test track and is home to the company's headquarters, R&D and training operations. With one global quality standard, it also produces for Daimler Trucks' brands of FUSO, Mercedes-Benz and Freightliner. Products and parts are exported to more than 50 markets in the Africa, Asia, Latin America and the Middle East. DICV represents an overall investment of more than INR 5,500 crores.

With this 'Tech Challenge', DICV has requested for innovative proposals from Universities and Research agencies for an external rotary braking device that can be coupled to the gear train of an internal combustion engine. The rotary braking device shall deliver additional braking torque during motoring of the engine. The objective of this initiative is to nurture institutional know-how to solve real-time industry problems. DICV received proposals from IIT-Madras and IIT-Patna which are being evaluated for their technical suitability. The selected concept will be further developed into a technical proof-of-concept in the next step jointly by DICV and the institute. Also with this collaboration, DICV hopes to benefit with a simple and effective solution for their products sold in India and export markets.

IISc working on novel ventilator design through 'Project Praana,' supported by SBI Foundation and Infineon Technologies

Project Praana has developed a novel design to build an emergency electro-mechanical ventilator for the COVID-19 crisis, using components available in India. The ventilator will have the functionality, look, feel, and safety standards of a commercially available ventilator in the market. The hardware framework is designed to immediately meet the key functionality requirements of an ICU-grade ventilator, while it can also support future add-on features available in advanced commercial ventilators.

The main features of this project are the novel design for robust and safe operation, easy sourcing of components, rapid scaling up in terms of manufacturing and deployment of the product, and simple user interface. Though it is not a stop-gap solution or a 'low cost' ventilator, it is expected to be priced in the range of Rs. 1.5 to 2 lakh per unit, which is substantially lower than currently priced models in the Indian market.

The project has successfully realised a full proof-of-concept for the new design on a bench-top experimental setup. Project Praana is being supported at Indian Institute of Science (IISc), Bengaluru; CSR funds from SBI Foundation; and Infineon Technologies India Pvt Ltd.

Capgemini supports IISc for antibody testing for COVID-19

After infection with SARS-CoV-2, the human body generates virus-specific antibodies that usually prevent another infection. However, it is still unclear how quickly and how often this immunity is generated. COVID-19 antibody-based serological tests are designed to detect these virus-specific antibodies in a blood sample, in contrast to the PCR tests that are used to detect the presence of viral RNA in nasal swabs.

Antibody or serological tests are relatively cheaper, faster and easier and can detect whether a person was infected with the virus in the past (even if they have completely recovered from COVID-19 and have never been tested for the virus). This information is helpful in determining the prevalence of the disease in the community and designing vaccination studies. Since infected individuals are unlikely to get re-infected for at least another 8-9 months, it has been suggested that these tests could also be used as immunity passports for people to resume work. However, these tests can suffer from poor sensitivity and specificity, which can complicate interpretation of the data.

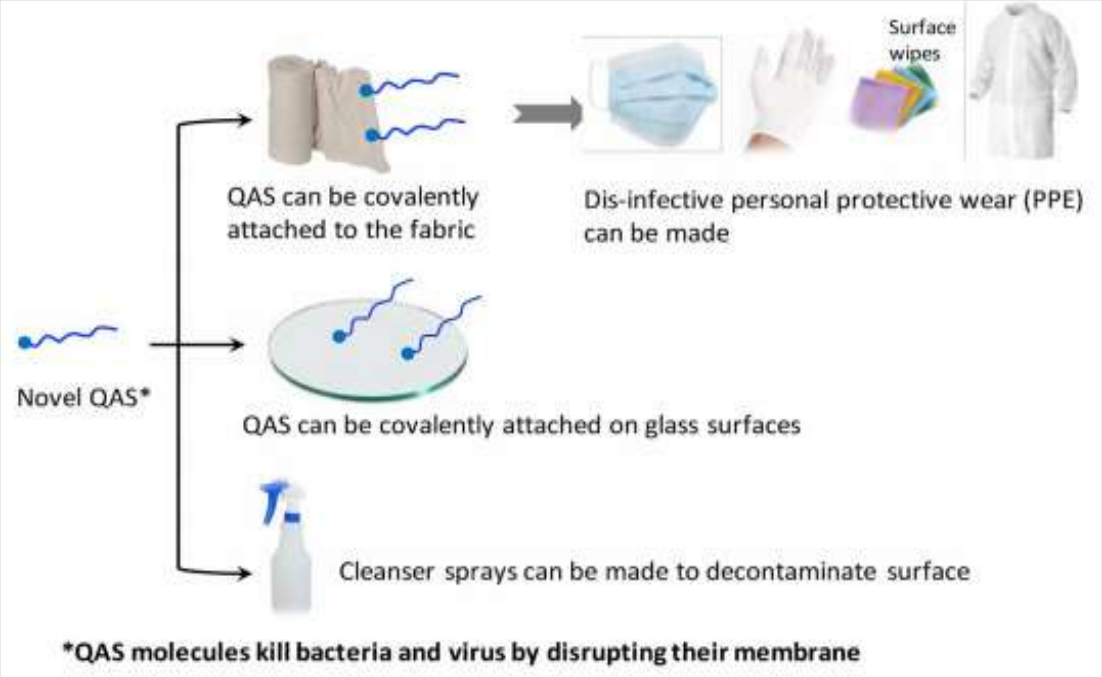
Conventionally, native antigen proteins are used for serological testing, but these have poor performance when produced in large quantities. The team at IISc has proposed an alternative to this by using a combination of several small peptide immunogens (15-30 amino acids long) that are specific to SARS-CoV-2 and can be used to reduce false positives. The team has shortlisted a few peptides that would give higher specificity to these antibody tests as compared to the currently available ones. As these peptides can be chemically synthesised with high quality, the tests are expected to be highly reproducible with longer shelf life. They will be developed in two conventional formats—a high sensitivity 'ELISA' format and a rapid test version. Capgemini Corporation India is supporting this effort with funds for development of the test.

NCBS and inStem are working on disinfection technologies

A team led by Praveen Vemula of Institute for Stem Cell Science & Regenerative Medicine (inStem) and Satyajit Mayor of National Centre for Biological Sciences (NCBS) is leading the effort to develop effective disinfecting technologies.

Given the acute shortage of masks and protective gear envisaged for battling the COVID-19 epidemic, there is need for a rapidly-deployable method for disinfectives capable of neutralising the virus on contact of any surface. The team has developed a low-molecular-weight quarternary ammonium salt (QAS) which can be attached to fabric by heating at 56 degrees Celsius. It is currently also in the process of testing its effectiveness against the coronavirus. This compound can be made at an industrial scale and a Hyderabad-based company is willing to produce high quantities of the compound.

The developed product will provide an immense boost to the longevity of protective equipment in an extremely economical manner, rendering protective equipment more accessible and



reusable.

CSIR-National Aerospace Laboratories (NAL) develops PPEs and Hospital Assistive Devices in partnership with industries to fight COVID-19

CSIR-NAL and MAF Clothing have jointly developed and certified polypropylene-spun laminated multi-layered non-woven fabric-based coverall to ensure safety of doctors, nurses, paramedical staff and healthcare workers. The coverall made with indigenous material have gone through stringent testing at SITRA, Coimbatore and have been certified to ASTM F1670/ F1670M-08(2014) for use. After the technology transfer to MAF Clothing Pvt. Ltd, Bengaluru, they have already manufactured and supplied 65000 PPE coverall to HLL-Thiruvananthapuram and others.

Additionally, CSIR-NAL has also developed BiPAP Non-Invasive ventilator – SwasthVayu – which is a microcontroller-based precise closed-loop adaptive control system with a built-in biocompatible "3D printed manifold & coupler" with HEPA filter (Highly Efficient Particulate Air Filter). These unique features help to alleviate the fear of the virus spread. It has features like Spontaneous, CPAP, timed, AUTO BIPAP modes with provision to connect Oxygen concentrator or Enrichment unit externally. The system has been certified for safety and performance by NABL-accredited agencies. The system has undergone stringent biomedical

tests and beta clinical trials at NAL Health Centre. The system is best suited for treating the mild and moderate COVID-19 patients. The aforesaid technology has been transferred to Apollo Computing Laboratories (P) Ltd, Hyderabad; Kavitul Technologies Pvt. Ltd., Vadodra; Paras Defence & Space Technologies, Navi Mumbai; Datasol (B) Pvt. Ltd., Bengaluru; Nfotec Digital Engineering Pvt Ltd., Bengaluru; and Unimech Aerospace & Manufacturing Pvt. Ltd. Bengaluru. Prototypes are under clinical trials. Industries are ready to take-up manufacturing after clinical trials and orders to be received from hospitals.

NCBS-TIFR and inStem, Bengaluru working on pooled sampling and compressed sensing of COVID-19, supported by Punjab National Bank and Standard Chartered Global Business Service

NCBS and inStem have fully functional BSL-3 level facilities and have been granted permission to start a COVID-19 testing facility. Both are now fully operational and are coordinating with the state health authorities.

Given the acute shortage of reagents for the manufacture and procurement of COVID-19 test kits, a rapid and compressed sensing technology for COVID-19 testing is being developed. As used currently, most of the test results appear negative, which is a waste of resources and effort. The idea is to use smart pooling of samples to dramatically reduce the number of tests. This work is being led by Sandeep Krishna of the Simons Centre at NCBS.
In addition, a rapid, RNA-based point-of-use screening technology is also being developed. This will allow COVID-19 screening to be done at the point of use. The reaction will be completed and results readied within an hour. This work is led by Arati Ramesh of NCBS.

The development of these technologies is a step closer towards enabling low-cost, mass testing that is critical to the reopening of industries and public infrastructure in a post COVID-19 scenario.

NCBS and inStem working on repurposing FDA-approved drugs for COVID-19 treatment, supported by Punjab National Bank

A method to rapidly screen FDA-approved drugs that interfere with key steps of viral entry and processing is being developed by Arjun Guha of inStem, in collaboration with Satyajit Mayor and Vardharajan Sundaramurthy of NCBS-TIFR.

These approaches will yield targets that will be tested in virus uptake in airway epithelial cells – the primary target of tissue of the SARS-CoV-2 virus. In parallel, this pipeline will be useful for drugs that are being simultaneously screened in silico by the well-known Computational Biology group at NCBS.

Since these drugs are already FDA approved, rapid and pilot clinical trials may be carried out by clinicians to test the efficacy of the same, based on these inputs. This project aims to greatly reduce the cost of treatment of COVID-19, helping boost health infrastructure at national and global scale.

IIT Delhi developing PPE kits customised for healthcare professionals

The Indian Institute of Technology Delhi (IITD) joined hands with PNB Housing Finance Limited (PNBHFL) towards its fight against COVID-19 by developing personal protective equipment (PPE) for healthcare professionals.

IIT Delhi and PNBHFL have signed a Memorandum of Understanding under which IIT Delhi start-up ETEX incubated at IITD will be working to develop and deliver smart textile solutions for healthcare. The team has a strong expertise in textile engineering and has technical support from researchers and professionals from interdisciplinary backgrounds including electronics, medical, material and design. The team is committed to innovate advanced technologies related to protection (against pollution and COVID-19), pain, health monitoring and posture. PNBHFL, a leader in the construction finance, will be contributing corporate social responsibility (CSR) funds towards this project.

The COVID-19 pandemic has triggered an unprecedented lockdown in many geographies globally. All public and private stakeholders must contribute wholeheartedly in stopping its spread. As part of its societal responsibilities, PNBHFL has joined hands with IIT Delhi in ensuring the contribution to the nation's effort in flattening the COVID-19 curve. Through this partnership, PNBHFL aims to play a meaningful role in safeguarding the well-being of corona warriors, who are risking their lives by putting service before self, day after day. Prof. Bipin Kumar, Department of Textile Technology is spearheading this project.

For further details on any of the above mentioned initiatives of the Office of PSA, please write to:

secy@psa.gov.in
sapna.poti@gov.in

Vigyan Prasar
A-50, Institutional Area, Sector-62
NOIDA 201 309 (Uttar Pradesh), India
Phones: 0120-240 4430-35
Fax: 91-120-240 4437
E-mail: info@vigyanprasar.gov.in
Website: http://www.vigyanprasar.gov.in